STATE BOARD OF TECHNICAL EDUCATION AND TRAINING

Andhra Pradesh :: AMARAVATI

Globally Competitive

CURRICULUM (C-23)

For Polytechnic Diploma Courses

in Andhra Pradesh

3 YEAR (REGULAR)

DIPLOMA IN

CIVIL ENGINEERING

CURRICULUM -2023

(C-23)

3 YEAR (REGULAR)

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1. PREAMBLE

The world is constantly evolving, and so must our approach to education. Our curriculum has been designed with this in mind, with a focus on practical skills, critical thinking, and problem-solving. We believe that these skills are essential for success in both academic and professional spheres.

At the heart of our curriculum is the belief that education should be student-cantered, empowering learners to take ownership of their learning and pursue their passions. We aim to create a learning environment that is safe, supportive, and nurturing, where every student has the opportunity to reach his/her full potential. We acknowledge that learning is a lifelong journey, and our curriculum is designed to provide a solid foundation for continued growth and development. We hope that our students will not only leave with a diploma but with employability and passion for learning

The State Board of Technical Education and Training, (SBTET) AP, has been offering Diploma programmes to meet the above said aspirations of the stake holders: students, parents, industries, academia, and the society at large. As such, it has been the practice of SBTET, A.P., to keep the curriculum abreast with the advances in technology through systematic and scientific analysis of current curriculum and bring out an updated revised version at regular intervals. Accordingly the SBTET, AP under the aegis of the Department of Technical Education, Andhra Pradesh in its 57th Board Meeting held on 05-02-2019 (vide item no: 18) resolved to update the Polytechnic Curriculum C-20, to be implemented with effect from the academic year 2023-24.

Analysis of Curriculum C-20 was started in the month of January-2023. Feedback was collected from all stakeholders: Students, Lecturers, Senior Lecturers, Heads of Sections and Principals for all programmes for this purpose.

A Meeting was convened on 15th February 2023, from 10:00 A.M. onwards, by Smt. C. Naga Rani, I.A.S, Director of Technical Education & Chairperson, SBTET to discuss on revamping of C-20 curriculum to meet the needs of industries and for improvement of placements.
The meeting was attended by Sri Saurab Gaur, I.A.S, Principal Secretary, Skill Development & Training, Smt. Lavanya Veni, I.A.S, Director, Employment & Training. Thirteen Representatives from Industries and 14 Academicians from Higher level institutions and

Officials of ITI, Skill Development, CTE and BTET attended the workshop.

Smt. C Naga Rani, I.A.S., Commissioner of Technical Education while addressing in the workshop, the necessity of industrial training and on hand experience, emphasised that the students need to undergo to support the industries. The gaps in the Curriculum need to be fixed to make the students passionate to work in the industry in order to support economy of the country.

The committees of each branch constituted with experts from industry, higher level Institutions and faculty of Polytechnics are informed to study the possibility of incorporating the following while preparing the curriculum so as to improve employability.

- IOT for all branches
- Theoretical & Practical subjects 50 : 50 Ratio
- Industry 4.0 concepts
- 5G Technology
- Critical Thinking (Quantitative Aptitude, Data Interpretation, Quantitative reasoning etc) to face the written tests conducted by the industries during placements.
- Internships after 1st Year, 3rd Sem (2 to 3 weeks)

A series of workshops with subject experts followed in the subsequent weeks for thorough perusal and critique of draft curricula; and the suggestions thus received from Industrialists and academia have been recorded, validated by another set of experienced subject teachers from the Department of Technical education for incorporation into the Curriculum C-23.

Finally, the draft curriculum was sent to academicians of higher-level institutions, industrial experts and NITTTR (ECV) for wetting.

The design of new Curricula for the different diploma programmes has thus been finalised with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, and duly reviewed by Expert Committee constituted of academicians and representatives from industries. Thus, the primary objective of the curriculum change is to produce employable diploma holders in the country by correlating the growing needs of the industries with relevant academic input.

The outcome-based approach as given by NBA guidelines has been followed throughout the designing of this curriculum to meet the requirements of NBA Accreditation, too.

The revised New Curriculum i.e., Curriculum–2023 (C-23) is approved by Board of Governors of SBTET for its implementation with effect from the academic year 2023-24.

2.   HIGHLIGHTS OF CURRICULUM C-23

All the courses in earlier curriculam are reviewed and the following specific changes arediscussed and incorporated.

i)   To bring the balance between theory and practicals, Construction practice is moved to IV semester and CAD Practice-I is placed in III Semester, so that 5 theory and 5 Lab Courses (50:50) are maintained in III Semester.

ii)   New theory course named "Construction Technology and Valuation" (C-401) is incorporated in IV Semester & CAD Practice-II (C-410) is moved to IV Semester, so that 5 theory and 5 Lab Courses (50:50) are maintained in IV Semester.

iii)   Quantity surveying-I & II are merged as single subject "Quantity Surveying" (C-503) and placed in V semester by deleting repetitive / inappropriate / topics coved in proposed new subject

iv)   New theory course named "Advanced Civil Engineering Technologies" (C-504) is introduced in V semester which covers IOT application in CIVIL Engineering, Prestressed concrete, Prefabricated structures, Advanced Retaining walls, Green Building Technology, Solar energy utilization in buildings.

v)   New Lab Course named "Computer Applications in Civil Engineering" (C-509) is introduced in V Semester which covers MS Excel applications in building estimation, RCC detailing using AUTOCAD, RCC Structural analysis using STAADPRO, ETABS etc, Construction project management using GANTT / MS Project.

vi)   Project work (C-510) is introduced in V Semester so that the students will get an opportunity to do their work with live projects.

vii)   Students Centric Learning activities like Sports / Games / Library / Learning activities related to placements (3 periods duration in each semester including I Year)

viii)   The Proposed C23 Curriculum covers the following aspects

•   Latest advancement in Civil Engineering

•   Industry requirement

•   Alternate materials and technology

•   Soft skill up gradation for better showcasing of abilities

•   Employability

3. ACKNOWLEDGEMENTS

4. RULES AND REGULATIONS OF C-23 CURRICULUM

4.1 Duration and pattern of the courses

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of academic instruction. All the Diploma courses are run on year wise pattern in the first year, and the remaining two or two & half years are run in the semester pattern. In respect of few courses like Diploma in Bio-Medical course, the training will be in the seventh semester. Run-through system is adopted for all the Diploma Courses, subject to eligibility conditions.

4.2 Procedure for Admission into the Diploma Courses:

Selection of candidates is governed by the Rules and Regulations laid down in this regard from time to time.

a. Candidates who wish to seek admission in any of the Diploma courses will have to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Andhra Pradesh,

Mangalagiri. Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).

b.　　The candidates seeking admission should have appeared for S.S.C examination, conducted by the Board of Secondary Education, Andhra Pradesh or equivalent examination thereto, at the time of applying for the Common Entrance Test for admissions into Polytechnics (POLYCET). In case of candidates whose results of their Qualifying Examinations is pending, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of admission.

c.　　Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Andhra Pradesh from time to time.

d.　　For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.

i)　　D.HMCT　　ii) D. Pharmacy

4.3　　Medium of Instruction

The medium of instruction and examination shall be in English.

4.4　　Permanent Identification Number (PIN)

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year for determining the eligibility for promotion etc., A Permanent Identification Number (PIN) will be allotted to each admitted candidate to maintain academic records.

4.5　　Number of Working Days per Semester / Year:

a)　　The Academic year for all the Courses shall be in accordance with the Academic Calendar.

b)　　The Working days in a week shall be from Monday to Saturday

c)　　There shall be 7 periods of 50 minutes duration each on all working days.

d)　　The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to complete the syllabus.

6　　Eligibility (Attendance to Appear for the End Examination)

a)　　A candidate shall be permitted to appear for the end examination in all subjects, if

he or she has attended a minimum of 75% of working days during the year/Semester.

b)   Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.

c)   A stipulated fee shall be payable towards condonation for shortage of attendance.

d)   Candidates having less than 65% attendance shall be detained.

e)   Students whose shortage of attendance is not condoned in any semester / year and not paid the condonation fee in time are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / year when offered in the next subsequent academic semester/year.

f)   For INDUSTRIAL TRAINING:

i) During Industrial Training the candidate shall put in a minimum of 90% attendance.

ii) If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training at his own expenses.

4.7   Readmission

Readmission shall be granted to eligible candidates by the respective Principal/ Regional Joint Director.

   a)   (i) Within 15 days after commencement of class work in any semester (Except Industrial Training).

       (ii) For Industrial Training: before commencement of the Industrial training.

b)   Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non-Engineering Diploma streams). Otherwise, such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.

c) The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not from the day on which he/she has actually reported to the class work.

4.8   Scheme of Evaluation

   a) First Year

Theory Courses: Each Course carries Maximum marks of 80 with examination of 3 hours duration, along with internal assessment for Maximum of 20 marks. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

Laboratory Courses: There shall be 40 Marks for internal assessment i.e. sessional marks for each practical Course with an end examination of 3 hours duration carrying 60 marks.

However, there are no minimum marks prescribed for sessionals.

b)   III, IV, V, VI and VII Semesters:

Theory Courses: End semester evaluation shall be of 3 hours duration and for a maximum of 80 marks.

Laboratory Courses: Each Course carry 60/30 marks of 3 hours duration 40/20 sessional marks.

4.9   Internal Assessment Scheme

a)   Theory Courses: Internal assessment shall be conducted for awarding Sessional marks on the dates specified. **Three-unit tests shall be conducted for I year students and two Unit Tests for semesters.**

Internal Assessment shall be of 90 minutes duration and for a maximum of 40 marks for each test.

S. No.	Type of Assessment	Weightage Assigned
(i)	Testing of knowledge through mid-examination for year/sem as (Mid-1+Mid-2+Mid3) or (Mid-1 + Mid-2)	40
(ii)	Assignments	05
(iii)	Dynamic Learning activities : Project Work/ Seminar/Tech-fest/Group Discussion, Quizzes etc./Extra-curricular activities/NSS/NCC/ IPSGM/Cleaning & Greening of Campus etc.	05
	T O T A L	50

At least one assignment should be completed for each unit which carries 10 marks. The total assignment marks should be reduced to 5.

At least one dynamic learning activity is to be conducted which carries 10 marks. The total marks should be reduced to 5.

The total 50 marks assigned to internal assignment is to be scaled down to 20 marks.

b)   Practical Courses:

(i) Drawing Courses:

The award of Sessional marks for internal Assessment shall be as given in the following table:

Distribution of Marks for the Internal Assessment Marks			
First Year (Total:40 Marks)		**Semesters (Total:40 Marks)**	
Max:20 Marks	Max:20 Marks	Max:20 Marks	Max:20 Marks
From the Average of THREE Unit Tests.	From the Average of Assessment of Regular Class work Exercises.	From the Average of TWO Unit Tests.	From the Average of Assessment of Regular Class work Exercises.

➤ For first year engineering drawing each unit test will be conducted for a duration of 2 hours with maximum marks of 40.

➤ (Part - A : 4 questions x 5 marks = 20 Marks ; Part –B: 2 questions x 10 marks = 20 marks).

➤ For the semester drawing examinations, Two Unit tests shall be conducted as per the Board End Examination Question Paper Pattern.

➤ All Drawing exercises are to be filed in serial order and secured for further scrutiny by a competent authority

(ii) Laboratory Courses:
(a) Student's performance in Laboratories / Workshop shall be assessed during the year/ semester of study for 40 marks in each practical Course.

(b) Evaluation for Laboratory Courses, other than Drawing courses:

i. Instruction (teaching) in laboratory courses (except for the course on Drawing) here after shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP & NITTTR- ECV and posted in SBTET website.

ii. Internal assessment for Laboratory shall be done on the basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP & NITTTR-ECV and posted in AP, SBTET website.

iii. Question paper for End semester Evaluation shall also be task/s based and shall be prepared and distributed by SBTET as done in case of theory courses be prepared as per SBTET rules in vogue.

c) Internal assessment in Labs / workshops / Survey field work etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Teacher.

d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective Head of Section, preferably choosing a qualified person from in the order of preference.

     i) Nearby Industry

     ii) Govt / Semi Govt organization like R & B, PWD, PR, Railways, BSNL, APSRTC,

APSEB etc.

    iii) Govt / University Engg College.

    iv) HoDs from Govt. Polytechnic

       Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.

e)   Question Paper for Practicals: Question paper should cover (the experiments / exercise prescribed to test various) skills like handling, manipulating, testing, trouble shooting, repair, assembling and dismantling etc., from more than one experiment / exercise

f)   Records pertaining to internal assessment marks of both theory and practical Courses are to be maintained for official inspection.

g)   In case of Diploma programs having Industrial Training, Internal Assessment and Summative Evaluation, shall be done as illustrated in the following table:

Assessment no	Upon completion of	By	Based on	Max Marks
1	12 weeks	1.The faculty concerned (Guide) and 2. Training in charge (Mentor) of the industry	Learning outcomes as given in the scheme of assessment ,for Industrial Training	120
2	22 weeks			120
3.Final summative Evaluation	24 week	1.The faculty member concerned, 2.HoD concerned and 3.An external examiner	1.Demonstration of any one of the skills listed in learning outcomes	30
			2.Training Report	20
			3.Viva Voce	10
			TOTAL	**300**

h)   Each staff member including Head of Section shall be assigned a batch of students 10 to 15   for making assessment during industrial training.

Industrial Training Policy Guidelines

1. Duration of the training: 6 months (24 Weeks).
2. Eligibility: As per SBTET norms
3. Training Area: Students may be trained in planning, Designing, Estimating, Drafting,Scheduling and

executing of Civil Engineering works.

4. The candidate shall put a minimum of 90% attendance during Industrial training.

5. If the student fails to secure 90% attendance during industrial training, the studentshall reappear for 6 months industrial training.

6. Formative assessment at industry shall be carried out by the Mentor from the industry, where the student is undergoing training and the in faculty in-charge(Guide) from the concerned section in the institution.

7. The Industrial training shall carry a Weightage of 300 marks and pass mark is 50% inassessments at industry (first and second assessment) and final summative assessment at institution put together i.e. 150 marks out of 300 marks.

8. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.

9. Final summative assessment at institution level is done by a committee including1. Head of the section (of concerned discipline ONLY), 2.External examiner from an industry and 3. Faculty member who assessed the student during Industrial Training as members

4.10   Minimum Pass Marks

a) Theory Examination:

For passing a theory Course, a candidate has to secure a minimum of 35% in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

b) Practical Examination:

For passing a practical Course, a candidate has to secure a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical end examination marks put together. In case of D.C.C.P., the pass mark for Typewriting and Shorthand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand Courses of D.C.C.P course.

C) Industrial Training:

I. Monitoring: Similar to project work each teacher may be assigned a batch of 10-15 students irrespective of the placement of the students to facilitate effective monitoring of students learning during industrial training.

II. Assessment: The Industrial training shall carry 300 marks and pass marks is 50% in assessments at   industry (first and second assessment) and final summative assessment at institution level put together i.e. 150 marks out of 300 marks. And also student has to secure 50% marks in final summative assessment at institution level.

4.11.   Provision for Improvement

Improvement is allowed only after he / she has completed all the courses from First Year to Final semester of the Diploma.

a) Improvement is allowed in any 4 (Four) Courses of the Diploma.

b) The student can avail of this improvement chance **ONLY ONCE**, that too within the succeeding two examinations after the completion of Diploma. However, the duration including Improvement examination shall not exceed **FIVE** years from the year of first admission.

c) No improvement is allowed in Practical / Lab Courses or Project work or Industrial Training assessment. However, improvement in drawing Course(s) is allowed.

d) If improvement is not achieved, the marks obtained in the previous Examinations hold good.

e) Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.

f) Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.

g) All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued, else the submitted originals will be returned.

4.12. Rules of Promotion From 1ST YEAR TO 3rd, 4th, 5th, 6th and 7th Semesters:

A) For Diploma Courses of 3 Years duration

i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds up to 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training, AP from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training AP from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she

a) Puts the required percentage of attendance in the 4th semester

b) Should not have failed in more than four Courses in 1st year

For IVC & ITI Lateral Entry Students:

a) A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester

b) A candidate is eligible to appear for the 4th semester examination if he/she clears at least two subjects in third semester.

iv)   A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester examination if he/she

a)   Puts the required percentage of attendance in the 5th semester

b)   Should get eligibility to appear for 4th Semester examination.

The first backlog exam in 5th semester will be conducted only in instant/supplementary diploma examination.

For IVC& ITI Lateral Entry students:

a)   Puts the required percentage of attendance in the 5th semester

v)   A candidate shall be sent to Industrial training provided he/she puts in the required percentage of attendance in the 4th semester and pay the examination fee/ promotion fee as prescribed by SBTET.

A candidate is eligible to appear for Industrial Training assessment (Seminar/Viva-voce)

a)   Puts the required percentage of attendance, i.e., 90% in 6th semester Industrial Training

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance, ie., 90% in 6th semester Industrial Training.

b) should get eligibility to appear for 5th Semester Examination.

B) For Diploma Courses of 3 ½ Years duration (MET/ CH/ CHPP/ CHPC/ CHOT/ TT):

i. A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester exam if he/she

a).   Puts the required percentage of attendance in the 4th semester

b).   Should not have failed in more than <u>Four backlog Courses of 1st year.</u>

For IVC & ITI Lateral Entry students:

a) Puts the required percentage of attendance in the 4th semester

iv. A candidate shall be promoted to 5th semester industrial training provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

v. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this case ie.,90 % of attendance and attends for the VIVA-VOCE examination at the end of training.

vi. A candidate shall be promoted to 7th semester provided he / she puts the required percentage of attendance in the 6th semester and pays the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 7th semester.

vii. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training.

A candidate is eligible to appear for 7th semester examination if he/she

a) Puts in the required percentage of attendance in the 7th semester

b) Should get eligibility to appear for 4th semester Examination.

For IVC & ITI Lateral Entry students:

a) Puts in the required percentage of attendance in the 7th semester

b) Should not have failed more than four backlog Courses of 3rd Semester

C) For Diploma Courses of 3 ½ Years duration (BM):

The same rules which are applicable for conventional courses also apply for this course. The industrial training in respect of this course is restricted to one semester (6 months) after the 6th semester (3 years) of the course.

i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

ii. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.

iii. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate who could not pay the 3rd semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester examination if he/she

a)   Puts in the required percentage of attendance in the 4th semester

b)   Should not have failed in more than Four backlog Courses of 1st year

For IVC & ITI Lateral Entry Students:

A candidate is eligible to appear for the 4th semester examination if he/she puts the required percentage of attendance in the 4th semester

iv. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as

prescribed by State Board of Technical Education and Training from time to time before commencement of   5th semester.

A candidate is eligible to appear for the 5th semester exam if he/she

a)   Puts in the required percentage of attendance in the 5 th semester.

b)   Should get eligibility to appear for 4th Semester examination.

For IVC & ITI Lateral Entry students:

a)   Puts in the required percentage of attendance in the 5th semester.

b)   Should not have failed in more than Four backlog Courses of 3rd Semester.

v.A candidate shall be promoted to 6th semester provided he/she puts in the required percentage of attendance in the 5th semester and pays the examination fee.

A candidate who could not pay the 5th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6th semester.

     A candidate is eligible to appear for 6th semester examination

a)   Puts in the required percentage of attendance in 6th semester and

b)   should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

a)   Puts in the required percentage of attendance in 6th semester.

b)   Should get eligibility to appear for 5th Semester Examination.

vi.A candidate shall be promoted to 7th semester provided he/she puts in the required percentage of attendance in 6th semester and pay the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of the 7th semester (Industrial Training). A candidate is eligible to appear for 7th semester Industrial Training assessment (Seminar/Viva-voce) if he/she --

a)   Puts in the required percentage of attendance, ie., 90% in 7th semester Industrial Training

b)   Should get eligibility to appear for 4th Semester Examination.

For IVC & ITI Lateral Entry students:

a)   Puts in the required percentage of attendance, ie., 90% in 7th semester Industrial Training.

b)   Should get eligibility to appear for 5th Semester Examination.

Important Note:

Seminar/Viva-voce should not be conducted for Not-Eligible Candidates, till the candidate

gets eligibility. However, the record of internal Assessment for Industrial Training for 260 marks shall be maintained at Institution Level for all candidates and the data is to be uploaded only for eligible candidates. For not eligible candidates the data is to be uploaded as and when the candidate gets eligibility.

Other Details

a)   In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.

b)   The First spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.

c)   The Second spell of Industrial training shall commence within 10 days after the completion of first spell of Industrial training.

4.13.   Students Performance Evaluation

Successful candidates shall be awarded the Diploma under the following divisions of pass.

a)   First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.

b)   First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.

c)   Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60% and above 50% of marks.

i. The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.

ii. In respect IVC & ITI Lateral Entry candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall be taken into consideration for determining the overall percentage of marks secured by the candidates for award of class/division.

d)   Second Class shall be awarded to all students, who fail to complete the Diploma in the regular 3 years/ 3 ½ years and four subsequent examinations, from the year of first admission.

14.   EXAMINATION FEE SCHEDULE:

The examination fee should be as per the notification issued by State Board of Technical Education and Training, AP from time to time.

I. Formative assessment (Internal examination)

a) For theory Courses:

Three unit tests for first year and two unit tests for semesters shall be conducted with a duration of 90 minutes for each test for maximum marks of 40. It consists of part A and Part B.

Part A contains five questions and carries 16 marks. Among these five questions first question consists of four objective items like one word or phrase answer/filling-in the blanks/true or false etc with one mark for each question. The other four questions are short answer questions and carry three marks each.

Part B carries 24 marks and consists of three questions with internal choice i.e., Either/Or type, and each question carries   8 marks.

The sum of marks of 3 tests for I year and 2 tests for semesters shall be reduced to 20 marks in each Course for arriving at final sessional marks.

b) For drawing Courses:

For I year:

Three-unit tests with duration of 90 minutes and for maximum marks of 40 marks shall be conducted for first year. It consists of part A and Part B.

Part A consists four questions for maximum marks of 16 and each question carries four marks (4×4 marks=16 marks).

Part B carries maximum marks of 24 and consists of five questions while the student shall answer any three questions out of these five questions. Each question in this part carries a maximum mark of 8, (3×8 marks=24 marks).

The sum of marks obtained in 3-unit test marks shall be reduced to 20 marks for arriving at final sessional marks. Remaining 20 marks are awarded by the Course teacher based on the student's performance during regular class exercise.

For semester: Two-unit tests with duration of 90 minutes and for maximum marks of 40 marks shall be conducted. The sum of marks obtained in 2-unit test marks shall be reduced to 20 marks for arriving at final sessional marks. Remaining 20 marks are awarded by the Course teacher based on the student's performance during regular class exercise.

c) For Laboratory /workshop: 50% of total marks for the Course shall be awarded based on continuous assessment of the student in laboratory/workshop classes and the remaining 50% shall be based on the sum of the marks obtained by the students in two

tests.

II. Summative assessment (End examination)

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular Course be considered. End Examination paper is of 3 hours duration.

a) **Each theory paper consists of Section 'A' and 'B'** .

Section 'A' with Max marks of 30, contains 10 short answer questions. All questions are to be answered and each carries 3 marks, i.e., 10 x 3 = 30.

Section 'B' with Max marks of 50 contains 8 essay type questions. Only 5 questions are to be answered and each carries 10 marks. Max. Marks: 5 x 10 = 50.

Thus the total marks for theory examination shall be: 80.

b) **For Engineering Drawing Course (107) consist of section 'A' and section 'B'**.

Section 'A' with max marks of 20, contains four (4) questions. All questions in section 'A' are to be answered to the scale and each carries 5 marks, ie. 4 x 5=20.

Section 'B' with max marks of 40, contains six (6) questions. The student shall answer any four (4) questions out of the above six questions and each question carries 10 Marks, i.e., 4 x 10 = 40.

c) **Practical Examinations**

For Workshop practice and Laboratory Examinations, Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise	:	50
Max. Marks for VIVA-VOCE	:	10
Total Max. Marks	:	60

In case of practical examinations with 50 marks, the marks shall be distributed as

Max. Marks for an experiment / exercise	:	25
Max. Marks for VIVA-VOCE	:	05
Total Max. Marks	:	30

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

d)   **Note: Evaluation for Laboratory Courses, other than Drawing courses**:

I. Instruction (teaching) in laboratory courses (except for the course on Drawing) hereafter shall be task/competency based as delineated in the Laboratory sheets, prepared by SBTET, AP and posted in its website.

II. Internal assessment for Laboratory shall be done on basis of task/s performed by the student as delineated in the laboratory sheets, prepared by SBTET, AP and posted in its website.

III. Question paper for End semester Evaluation shall be prepared as per SBTET rules in vogue.

16.   ISSUE OF MEMORONDUM OF MARKS

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, A.P. for each duplicate memo from time to time.

17.   MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA Programmes:

Maximum period for completion of the diploma courses is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date). This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

18.   ELIGIBILITY FOR AWARD OF DIPLOMA

A candidate is eligible for award of Diploma Certificate if he / she fulfil the following academic regulations.

i.   He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.

ii.   He / she has completed all the Courses.

Students who fail to fulfil all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

For IVC & ITI Lateral Entry students:

i.   He / She pursued a course of study for not less than 2 / 2 ½ academic years & not more than 4 / 5 academic years.

ii.   He / she has completed all the Courses.

Students who fail to fulfil all the academic requirements for the award of the Diploma within 4 / 5 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

19.   ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT, RECOUNTING& REVERIFICATION:

A) FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

I. A candidate desirous of applying for Photo copy of valued answer script/s should apply within prescribed date from the date of the declaration of the result.

II. Photo copies of valued answer scripts will be issued to all theory Courses and Drawing Course(s).

III. The Photo copy of valued answer script will be dispatched to the concerned candidate's address as mentioned in the application form by post.

IV. No application can be entertained from third parties.

B) FOR RE-COUNTING(RC) and RE-VERIFICATION(RV) OF THE VALUED ANSWER SCRIPT

i. A candidate desirous of applying for Re-verification of valued answer script should apply within prescribed date from the date of the declaration of the result.

ii. Re-verification of valued answer script shall be done for all theory Courses and Drawing Course(s).

iii. The Re-verification committee constituted by the Secretary, SBTETAP with Course experts shall re-verify the answer scripts.

I. **RE-COUNTING**

The Officer of SBTET will verify the marks posted and recount them in the already valued answer script. The variations if any will be recorded separately, without making any changes on the already valued answer script. The marks awarded in the original answer script are maintained (hidden).

II. **RE-VERIFICATION**

(i)   The Committee has to verify the intactness and genuineness of the answer script(s) placed for Re-verification.

(ii)   Initially single member shall carry out the re-verification.

(iii) On re-verification by single member, if the variation is less than 12% of maximum marks, and if there is no change in the STATUS in the result of the candidate, such cases will not be referred to the next level ie., for 2-Tier evaluation.

(iv) On re-verification by a single member, if the variation is more than 12% of maximum marks, it will be referred to 2-Tier evaluation.

(v)   If the 2-Tier evaluation confirms variation in marks as more than 12% of maximum marks, the variation is considered as follows:

a) If the candidate has already passed and obtains more than 12% of the maximum marks on Re-verification, then the variation is considered.

b) If the candidate is failed and obtains more than 12% of the maximum marks on Re-verification and secured pass marks on re-verification, then the status of the candidate changes to PASS.

c) If a candidate is failed and obtains more than 12% of the maximum marks on Re-verification and if the marks secured on re-verification are still less than the minimum pass marks, the status of the candidate remain FAIL only.

(vii)   After Re-verification of valued answer script the same or change if any therein on Re-verification, will be communicated to the candidate.

(viii)   On Re-verification of Valued Answer Script if the candidate's marks are revised, the fee paid by the candidate will be refunded or else the candidate has to forfeit the fee amount.

Note: No request for Photo copies/ Recounting /Re-verification of valued answer script would be entertained from a candidate who is reported to have resorted to Malpractice in that examination.

4.20.   Mal Practice Cases:

If any candidate resorts to Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per SBTETAP rules and regulations in vogue.

4.21.   Discrepancies/ Pleas:
Any Discrepancy /Plea regarding results etc., shall be represented to the SBTETAP within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

4.22.   Issue of Duplicate Diploma

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, A.P., on payment of prescribed fee and on production of an affidavit signed   before a First Class Magistrate (Judicial) and non-traceable certificate from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical

Education and Training, A.P.

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET AP from time to time.

4.23.   Issue of Migration Certificate and Transcripts:

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

4.25. General

i.   The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.

ii.   All legal matters pertaining to the State Board of Technical Education and Training, AP are within the jurisdiction of Mangalagiri.

iii.   In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET, A.P., Mangalagiri is final.

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C-23 Curriculum for DCE
With Industrial training(In-house) in Semester VI

VISION
Develop Civil Engineering professionals competent to face the global challenges in a progressive environment conducive to learn technical knowledge, skills blended with ethics and values, to serve the society and to better it for a happy and comfortable living.

MISSION

M1	To provide a competitive learning environment, through a need based curriculum designed in collaboration with industry, conducive for high quality education emphasising on transfer of knowledge and skill development essential for the profession and the society as well.
M2	To nurture higher order leadership qualities and ethics and values in students to enable them to be leaders in their chosen professions while maintaining the highestlevel of ethics.
M3	To encourage the spirit of inquisition to promote innovation and entrepreneurship strengthened with life skills to sustain the stress.
M4	To foster effective interactions and networking with all the stake holders so as to work towards the growth and sustainability of the society and environment.

PROGRAMME OUTCOMES(POs)

1. **Basic and discipline specific knowledge**: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve theengineering problems.
2. **Problem analysis**: Identify and analyse well-defined engineering problems usingcodified standard methods.
3. **Design/Development of solutions**: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meetspecified needs .
4. **Engineering tools, Experimentation and Testing**: Apply modern engineering toolsand appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment**: Apply appropriate technology in context of society, sustainability, environment andethical practices.
6. **Project Management**: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate aboutwell defined engineering activities.
7. **Life-long learning**: Ability to analyse individual needs and engaging updating inthe context of technological changes.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. An ability to apply disciplines - specific knowledge to solve core and/or applied Civil Engineering problems.

2. An ability to plan and perform experiments and practices and to use the results tosolve Civil Engineering problems.

3. Apply appropriate technologies and tools with an understanding of the limitations.

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2023
FIRST YEAR

Sub Code	Name of the Subject	Instruction Periods/Week Theory	Practical	Total Periods Per Year	Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
C-101	English	3		90	3	20	80	100
C-102	Engineering Mathematics – I	5		150	3	20	80	100
C-103	Engineering Physics	3		90	3	20	80	100
C-104	Engineering Chemistry and Environmental studies	3		90	3	20	80	100
C-105	Engineering Mechanics	5		150	3	20	80	100
C-106	Surveying-I	4		120	3	20	80	100
PRACTICAL								
C-107	Engineering Drawing	-	6	180	3	40	60	100
C-108	Surveying - I Practice & Plotting	-	4	120	3	40	60	100
C-109	Physics Laboratory	-	3	45	1½	20	30	50
C-110	Chemistry Laboratory	-		45	1½	20	30	50
C-111	Computer Fundamentals Practice	-	3	90	3	40	60	100
	Student Centric Learning Activities		3	90				
	Total	**23**	**19**	**1260**		**280**	**720**	**1000**

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2023

THIRD SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examination			
		Theory	Practical		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
C-301	Engineering Mathematics –II	4		60	3	20	80	100
C-302	Mechanics of Solids & Theory of Structures	5		75	3	20	80	100
C-303	Hydraulics	5		75	3	20	80	100
C-304	Surveying-II	4		60	3	20	80	100
C-305	Construction Materials	3		45	3	20	80	100
PRACTICAL								
C-306	Civil Engineering Drawing-I	-	4	60	3	40	60	100
C-307	CAD Practice-I		4	60	3	40	60	100
C-308	Surveying - II Practice & Plotting	-	4	60	3	40	60	100
C-309	Material Testing Practice	-	3	45	3	40	60	100
C-310	Hydraulics Practice	-	3	45	3	40	60	100
	Student Centric Learning Activities	-	3	45				
	Total	**21**	**21**	**630**		**280**	**720**	**1000**

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2023

FOURTH SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examination			
		Theory	Practical		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
C-401	Construction Technology & Valuation	4		60	3	20	80	100
C-402	Design and Detailing of R.C.Structures	5		75	3	20	80	100
C-403	Construction Practice	4		60	3	20	80	100
C-404	Transportation Engineering	4		60	3	20	80	100
C-405	Irrigation Engineering	4		60	3	20	80	100
PRACTICAL								
C-406	Civil Engineering Drawing-II		6	90	3	40	60	100
C-407	Concrete & Soil Testing Practice		3	45	3	40	60	100
C-408	Communication Skills		3	45	3	40	60	100
C-409	Surveying-III Practice		3	45	3	40	60	100
C-410	CAD Practice-II		3	45	3	40	60	100
	Student Centric Learning Activities		3	45				
	Total	**21**	**21**	**630**		**300**	**700**	**1000**

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2023

FIFTH SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examination			
		Theory	Practical		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
C-501	Steel Structures	4		60	3	20	80	100
C-502	Environmental Engineering	5		75	3	20	80	100
C-503	Quantity Surveying	5		75	3	20	80	100
C-504	Advanced Civil Engineering Technologies	4		60	3	20	80	100
C-505	Construction Management & Entrepreneurship	3		45	3	20	80	100
PRACTICAL								
C-506	Structural Engineering Drawing		4	60	3	40	60	100
C-507	Field Practices		4	60	3	40	60	100
C-508	Life Skills		3	45	3	40	60	100
C-509	Computer Applications in Civil Engineering		4	60				
C-510	Project work		3	45	3	40	60	100
	Student centric learning		3	45				
	Total	**21**	**21**	**630**		**280**	**720**	**1000**

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2023

SIXTH SEMESTER

SI. No.	Subject	Duration	Scheme of evaluation		Max. Marks
			Item	**Nature**	
1	Industrial Training	6 months	1.First Assessment at Industry (After 12 Weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	**120**
			2.Second Assessment at the Industry (After 22 weeks)	Assessment of Learning outcomes by both the faculty and training Mentor of the industry	**120**
			Final Summative assessment at institution l (After 24 weeks)	Training Report	**20**
				Demonstration of any one of the skills listed in learning outcomes	**30**
				Viva Voce	**10**
TOTAL MARKS					**300**

- The Industrial Training shall carry 300 marks and pass mark is 50% in assessment at industry (first and second assessment put together) and in final summative assessment at institution put together
- If the student fails to secure 50% marks in final summative assessment at institution level, the student shall reappear for final summative assessment, in the subsequent board examination.
- During Industrial Training the candidate shall put in a minimum of 90% attendance. If thestudent fails to secure 90% attendance during industrial training, the student should reappearfor 6 months industrial training.

FIRST YEAR

English

Course Code	Course Title	No. of Periods/Week	Total No. of Periods	Marks for FA	Marks for SA
C-101	English	3	90	20	80

S. No.	Unit Title	No of Periods	COs Mapped
1	English for Employability	8	CO1, CO2, CO3, CO4,CO5
2	Living in Harmony	8	CO1, CO2, CO3, CO4,CO5
3	Connect with Care	8	CO1, CO2, CO3, CO4, CO5
4	Humour for Happiness	8	CO1, CO2, CO3, CO4, CO5
5	Never Ever Give Up!	8	CO1, CO2, CO3, CO4, CO5
6	Preserve or Perish	9	CO1, CO2, CO3, CO4, CO5
7	The Rainbow of Diversity	8	CO1, CO2, CO3, CO4, CO5
8	New Challenges- Newer Ideas	8	CO1, CO2, CO3, CO4, CO5
9	The End Point First!	8	CO1, CO2, CO3, CO4, CO5
10	The Equal Halves	8	CO1, CO2, CO3, CO4, CO5
11	Dealing with Disaster	9	CO1, CO2, CO3, CO4, CO5
Total Periods		**90**	

Course Objectives	- To improve grammatical knowledge and enrich vocabulary.
	- To develop effective reading, writing and speaking skills.
	- To comprehend themes related to Personality, Society, Environment to exhibit Universal Human Values.

CO No.	Course Outcomes
CO1	Apply and use various grammatical rules and concepts to communicate in academic, professional and everyday situations
CO2	Use appropriate vocabulary in various contexts.
CO3	Read and comprehend different forms of academic, professional and everyday texts.
CO4	Communicate effectively in speaking and writing in academic, professional and everyday situations.
CO5	Display human values by applying the knowledge of themes related to Self, Society, Science and Environment for holistic and harmonious living through communication.

CO-PO Matrix

Course Code C-101	Course Title: English Number of Course Outcomes: 4				No. of Periods: 90
POs	Mapped with CO No.	CO Periods Addressing PO in Column 1		Level of Mapping (1,2,3)	Remarks
		Number	Percentage		
PO1		Not directly Applicable for English course, however activities that use content from science and technology relevant to the Programme taken up by the student shall be exploited for communication in the Course.			
PO2					
PO3					
PO4					
PO5	CO5	16	18%		>50%: Level 3
PO6	CO1, CO2, CO3, CO4,	52	58%		21-50%: Level 2
PO7	CO1, CO2, CO3, CO4,CO5	22	24%		Up to 20%: Level 1

Level 3 – Strongly Mapped,   Level 2- Moderately Mapped;   Level 1- Slightly Mapped

Learning Outcomes

1. English for Employability

1.1. Perceive the need for improving communication in English for employability

1.2. Use adjectives and articles effectively while speaking and in writing

1.3. Write simple sentences

2. Living in Harmony

2.1. Develop positive self-esteem for harmonious relationships

2.2. Use affixation to form new words

2.3. Use prepositions and use a few phrasal verbs contextually

3. Connect with Care

3.1. Use social media with discretion

3.2. Speak about abilities and possibilities

3.3. Make requests and express obligations

3.4. Use modal verbs and main verbs in appropriate form

3.5. Write short dialogues for everyday situations

4. Humour for Happiness

4.1. Realize the importance of humour for a healthy living

4.2. Improve vocabulary related to the theme

4.3. Acquire reading and speaking skills

4.4. Frame sentences with proper Subject – Verb agreement

4.5. Understand the features of a good paragraph and learn how to gather ideas as a preliminary step for writing a good paragraph.

5. Never Ever Give Up!

5.1. Learn to deal with failures in life

5.2. Use the present tense form for various every day communicative functions such as speaking and writing about routines, professions, scientific descriptions and sports commentary

5.3.   Write paragraphs with coherence and other necessary skills

6. Preserve or Perish

6.1. Understand the ecological challenges that we face today and act to save the environment.

6.2. Narrate / Report past events

6.3. Develop vocabulary related to environment

6.4. Write e-mails

7. The Rainbow of Diversity

7.1. Appraise and value other cultures for a happy living in multi-cultural workspace

7.2. Understand the usage of different types of sentences

7.3. Ask for or give directions, information, instructions

7.4. Use language to express emotions in various situations

7.5. Write letters in various real life situations

8. New Challenges – Newer Ideas

8.1. Understand the functional difference between Active Voice and Passive Voice

8.2. Use Passive Voice to speak and write in various contexts

8.3. Understand the major parts and salient features of an essay

8.4. Learn about latest innovations and get motivated

9. The End Point First!

9.1. Understand the importance of setting a goal in life

9.2. Report about what others have said both in speaking and writing

9.3. Write an essay following the structure in a cohesive and comprehensive manner

9.4. Apply the words related to Goal Setting in conversations and in life

10. The Equal Halves

10.1. Value the other genders and develop a gender-balanced view towards life

10.2. Identify the use of different conjunctions in synthesising sentences

10.3. Write various types of sentences to compare and contrast the ideas

10.4. Apply the knowledge of sentence synthesis in revising and rewriting short essays

10.5. Develop discourses in speech and writing

11. Dealing with Disasters

11.1. Speak and write about different kinds of disasters and the concept of disaster management

11.2. Generate vocabulary relevant to disaster management and use it in sentences

11.3. Analyze an error in a sentence and correct it

11.4. Learn and write different kinds of reports

Textbook: **'INTERACT'** (A Text book of English for I Year Engineering Diploma Courses) - by SBTET, AP

Reference Books:

Martin Hewings   : *Advanced Grammar in Use,* Cambridge University Press

Murphy, Raymond   : *English Grammar in Use,* Cambridge University Press

Sidney Greenbaum   : *Oxford English Grammar*, Oxford University Press

Wren and Martin (Revised by N.D.V. Prasad Rao) : *English Grammar and Composition*, Blackie ELT Books, S. Chand and Co.

Sarah Freeman   : *Strengthen Your Writing*, Macmillan

 End Exam = 80 Marks

  PART-A: 10 Questions 3 marks each =30 Marks

              PART-B: 5 out of 8 are to be answered : 10 marks each =50 Marks

  Unit Tests 1,2,3 @ 40 Marks each

Part A: 16 marks: One question for 4 marks + 4 questions for 3 marks each (4+12 Marks=16 Marks)

Part B: 24 marks: 3 questions for 8 marks each with internal choice. (3X8 Marks= 24 Marks)

Weightage Table : C23-C-101: English									
S. No.	Name of the Unit	Periods Allocated (Total 90 periods)	Weightage of Marks Allocated (Short + Long Answer question)	Weightage (Long answer questions) @10 Marks	Marks Wise Distribution of Weightage (Short answer questions) @3 Marks				CO's Mapped
					R	U	Ap	An	
1	English for Employability	8	20+9	2	3+3	3			CO1,CO2, CO3, CO4, CO5
2	Living in Harmony	8							CO1, CO2, CO3, CO4, CO5
3	Connect with Care	8				3			CO1, CO2, CO3, CO4, CO5
4	Humour for Happiness	8	20+9	2					CO1, CO2, CO3, CO4, CO5
5	Never Ever Give Up!	8					3		CO1, CO2, CO3, CO4, CO5
6	Preserve or Perish	9							CO1, CO2, CO3, CO4, CO5
7	The Rainbow of Diversity	8				3			CO1, CO2, CO3, CO4, CO5
8	New Challenges - Newer Ideas	8	10+3	1		3			CO1, CO2, CO3, CO4, CO5
9	The End Point First!	8	10+3	1		3			CO1, CO2, CO3, CO4, CO5
10	The Equal Halves	8	10+3	1		3			CO1, CO2, CO3, CO4, CO5
11	Dealing with Disasters	9	10+3	1				3	CO1, CO2, CO3, CO4, CO5
	Short Answer Questions		**30**		**6**	**6**	**15**	**3**	
	Long Answer Questions		**80**	**8** (Integration of the cognitive skills of Understanding , Applying & Analysing)					
	Total		**110**						

S.No. of the Question	Weightage of Marks	Language Skill / grammatical Concept of the question	Sub aspects & Description
C23- COMMON-101: ENGLISH: END EXAM (80 Marks)   **Question Paper Pattern (Division of Topics: Question wise)**
PART-A ; 10 questions X3 marks = 30 Marks
1	**3** (6 Questions x ½ Mark)	Articles & Prepositions	a) Definite, indefinite articles b) prepositions of place, time, directions
2	**3** (6 Questions x ½ Mark)	Vocabulary	Synonyms, Antonyms, affixes, words& phrases, Phrasal Verbs, words matching with meanings, one word substitutions,
3	**3** (6 Questions x ½ Mark)	Helping Verbs	a) Primary helping verbs (be/do/have) b) Modal verbs
4	**3** (3 questions 1 mark each)	Tenses	Using appropriate Verb forms
5	**3** (3 questions 1 mark each)	Voice	Conversion : Active & Passive voice
6	**3** (3 questions 1 mark each)	Adjectives	Using appropriate adjective form/ conversion : Degrees of comparison
7	**3** (3 questions 1 mark each)	Types of sentences & positive, negative sentences	Conversion from one type of sentence to the other , making negative sentence
8	**3** (3 questions 1 mark each)	Syntheses of Sentences / Conjunctions / linkers	Transformation of sentences : Simple, complex & compound sentences / use of linkers/ conjunctions
9	**3** (3 nquestions 1 mark each)	Direct& Indirect Speech	Conversion from Direct to Indirect & Vice versa
10	**3** (3 questions 1 mark each)	Correction of Sentences	Remaining grammar aspects (concord & usage based…etc)
PART –B ; 5 QX10 M = 50 Marks
11	**10 Marks**	Paragraph Writing	From Units 1,2,3 (theme based- focus on importance English learning and using)
12	**10**	Giving instructions or directions	From Units 4,5,6,7 Theme based / Situation based /role play/ general topic
13	**10**	Dialogue writing	
14	**10**	Essay writing	From Units 8,9,10,11 (theme based)
15	**10**	Letter writing	Formal / informal letters

16	10	Report Writing	Report on Mini projects/ industrial visits / camps/ events / celebrations
17	**10** (2 questions X 5 Marks)	a) E-Mail writing b) Framing questions	a) E mail etiquette b) Wh & Yes-No questions
18	**10** (Ten questions 1 mark each)	Reading Comprehension	An unseen piece of prose with 10 questions for reading comprehension check

Model Question Paper: End Exam   **C23- C- 101**

SBTET – I Year End Examinations

C23-C-101: ENGLISH

<u>**Time: 3 Hrs.**</u>   <u>**Max.Marks: 80**</u>

PART-A   **10 x 3 = 30 Marks**

Instructions: Answer all the questions and each question carries 3 marks. Marks will be awarded only for the desired and accurate language / grammatical expressions.

1. A) Fill in the blanks with appropriate articles:

   My father sent me _____ envelope through _____ messenger and _____ cover contained a bank cheque in my favour.

   B) Fill in the blanks with suitable prepositions:

   My mother arranged a beautiful flower vase _____ my study table, just beside my computer,

   _____ which she keeps fresh flowers every day. The vase is made _____ ceramic.

2. A) Give synonyms for the words: i)   depressed   ii) caricature

   B) Give antonyms for the words: i)   natural   ii) visible

   C) Add affixes to the words: i)   prefer   ii) proper

3. A) Fill in the blanks with suitable Primary Helping Verbs (Be/ do/ have forms):

   i) All the books _____ already been sold out.

   ii) She paid condonation fees as she_____ not attend the classes regularly last semester.

   iii) Why _____ you not giving me reply?

 B) Fill in the blanks with suitable Modal verbs based on the clue given in brackets.

   i) Pratap is an ambidextrous; he _____ write with his two hands. (ability)

   ii) Jyothsna _____ pay the tuition fees by tomorrow. (obligation)

   iii) My grandfather _____ to ride a horse in his youth. (Past habit)

4. Fill in the blanks with suitable verb form using the base form given in the brackets.

   i) Suma_____ (bring) a pup to the class yesterday.

   ii) Johnny _____(play) the piano in a music band every weekend.

iii) Girija _____ (watch) a movie on TV when I visited her last Sunday.

5. Change the voice of the following:

 i) My elder brother paid my exam fees yesterday.

 ii) These two chapters will be taught in next month.

 iii) They are constructing a new house.

6. i) Pacific is _____(big) ocean of all. (Fill in with appropriate degree of the adjective given in the bracket)

 ii) No other food item is as nutritious as honey.   (Change into Comparative degree)

 iii) Bangalore is one of the beautiful cities of India.   (Change into Positive degree)

7. i) You need two thousand rupees to buy a new pair of shoes. Write a polite expression asking your father for money.

 ii) Radhika has been invited for the wedding.   (Convert into a negative sentence)

 iii)   Our pet pigeons flew away last night.   (Convert into a negative sentence)

8. i) Ramesh can't reach on time _____ he travels by a superfast train. (Fill in with suitable conjunction)

  ii) Though the long bell was given, the children stayed in the classroom. (Change into a simple sentence)

 iii) Get a ticket on a sleeper coach, and then you can sleep during journey. (Change into a complex sentence)

9. i) Tarun said, " Prathima, I shall return your notes tomorrow". (change into a reported speech)

 ii) Arjun requested his sister Priya not to disturb him while he was studying.   (change into a direct speech)

 iii)   Teacher said, "Students, why are you talking in the class?" (change into a reported speech)

10. Correct the following sentences:

 i) These flowers are smelling sweet.

 ii) Either the father or his children has arrived home early.

 iii) Every bike rider should abide to the traffic rules.

PART-B   **10 x 5 = 50 Marks**

Instructions: a) Answer any FIVE questions and each question carries TEN marks.

b) The criterion for the award of marks is the appropriate content, quality and clarity of expression but not the length of your answer.

11. Write a paragraph in 120 words about the problems you are experiencing in speaking English and your own solutions to overcome them.

12. Write a set of instructions to create a word file and insert a Table using MS office on a computer.

13. Write a dialogue in at least eight turns between a sales person at a readymade garment showroom and you as you want to buy a readymade dress.

14. Write an essay in about 175 words on valuing opposite gender and show mutual respect.

15. Write a letter to the Municipal Commissioner about the menace of street dogs in your area.

16. Imagine that your class had visited an industry / organisation relevant to your branch of Engineering; write a report about the visit to submit to your HOD.

17. a) Write an E-mail to your cousin requesting him/her to send you the diploma study material by a courier or post.

   b) Frame THREE 'wh' questions & TWO 'Yes-No' questions from the following passage.

Dolphins are intelligent animals. A dolphin's nose is on top of its head. So, it can easily breathe on the surface of the water. The skin of a dolphin has no scales. It is soft and smooth. They swim in 'pods'; a very large pod is called a 'herd'. They are very social and help each other fight off predators. Dolphins brain has two sides. One side sleeps while the other side stays awake.

18. Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence.

The Indian Army is the land-based branch and the largest component of the Indian Armed Forces. The President of India is the Supreme Commander of the Indian Army, and it is commanded by the Chief of Army Staff (COAS), who is a four-star general. The primary mission of the Indian Army is to ensure national security and national unity, defending the nation from external aggression and internal threats, and maintaining peace and security within its borders. It conducts humanitarian rescue operations during natural calamities and other disturbances, like Operation Surya Hope, and can also be requisitioned by the government to cope with internal threats. It is a major component of national power alongside the Indian Navy and the Indian Air Force. The army has been involved in four wars with neighbouring Pakistan and one with China. Other major operations undertaken by the army include: Operation Vijay, Operation Meghdoot and Operation Cactus.

a) What is the largest component of Indian Armed Forces?

b) Who is the four-star general?

c) "Maintaining internal peace and security is not one of the responsibilities of Indian

   Army". Is the statement True or False ?

d) What is the primary mission of the Indian Army?

e) Name the operation held by the Indian Army during natural disaster.

f) What are the other two forces mentioned in the passage?

g) If you were to join Armed forces, which wing do you prefer? State your reason in a

sentence.

h) Pick the word from the passage that would mean: 'forcefulness or violent behavior'

i) Give the antonym for the word: 'internal'

j) Suggest a suitable title for the passage in a word or phrase.

_____

C23-C-101 :English : Bifurcation of Syllabus for UNIT TESTS 1,2,3			
Unit Test	Lessons / Chapters	Grammar / Language aspects (Topics or Short Answer questions)	Writing Skills (Topics for Long answer/ Essay Questions)
U.T 1	Chapters 1,2,3	a) articles & prepositions, b)Vocabulary: Affixes, synonyms, Antonyms, matching meanings, words & phrases, one word substitutes) c)Adjectives (degrees of comparison) d) Main& Auxiliary Verbs e) phrasal verbs/ word order	a) Theme based Paragraph (focus on LSRW skills, importance of English, Self-esteem, SWOC analysis, Social media) b) Dialogue on themes of lessons 2&3 / Dialogue on General topic / a situation c) Reading comprehension
U.T 2	Chapters 4,5,6,7	a) concord b) Tenses c) Types of sentences d) Framing questions e) words &phrases, linkers	a) Theme based paragraph (Humour for happy living, learning from failures, Environmental protection, multi- culture /global culture) b) Letter writing (formal& informal), c) instructions/ directions, E-mail writing
U.T 3	Chapters 8,9,10,11	a) Voice (active &passive) b) Speech(direct& indirect) c) Synthesis of sentences (simple, complex, compound sentences) d) Error analysis e) words &phrases, linkers	a) Theme based paragraph/ Essay writing (Technical innovations, Goal setting, gender sensitivity, dealing with disaster) b) Essay writing, Report writing c) Reading Comprehension
Unit Test Question Paper pattern (40 Marks)	Total 40 Marks (Part A=16 Part B =24)	Short Answer questions (Part-A) Q. 1 = 4 marks Q. 2 to 5 = 3 Marks each Total=16 Marks	Long Answer Questions: (Part-B) Q. 6,7,8 @ 8 marks each ; Each question with Internal choice Total: 8X3 = 24 Marks

		C23- C-101: ENGLISH: UNIT TEST Exams 1,2,3 (40 Marks each)		
		Question Paper Pattern (Division of Topics: Question wise)		
S.No. of the Question	**Weightage of Marks**	**Language Skill / grammatical Concept of the question**	**Sub aspects & Description**	
		UNIT TEST-1 Marks : 40 ; Time 90 Mnts. (Lessons 1,2,3) :		
		PART-A : 16 Marks		
S.No.	**Marks allotted**	**Grammatical concept/ aspect/ skill**	**Sub topics / concepts**	
1	**4 Marks** (8 Questions X ½ Mark)	Vocabulary	a) Affixes, b) Synonyms c) antonyms d) one word substitutes	
2	**3** (6 Questions X ½ Mark)	Articles & Prepositions	a) Definite, indefinite articles b) Prepositions of place, time direction	
3	**3** (3 questions 1 mark each)	Adjectives	a) Using appropriate forms of adjectives b) Conversion of Degrees of comparison	
4	**3** (6 questions ½ mark each)	Helping Verbs	a) Primary helping verbs (be/do/have) b)Modal verbs	
5	**3 Marks** (3 questions 1 mark each)	Phrasal verbs	Using phrasal verbs in sentences of one's own	
		Part – B : 8X3 = 24 Marks		
6	**8** Marks	Paragraph question A or B (internal choice)	Theme based questions : Lesson 1 : Focus on LSRW skills, problems and solutions in using English, Importance of English, English for employability, SWOC analysis	
7	**8**	Dialogue making A or B (internal choice)	Conversation / Role play between two people : a) Dialogue on themes of lessons 2&3 b) Dialogue on General topic / a situation	
8	**8**	Reading Comprehension A or B (internal choice)	Unseen prose passages with 8 different questions (F I V E model questions+ Others)	
		Unit Test -2: Marks : 40 ; Time 90 Mnts. (Lessons 4,5,6,7)		
		Part – A: 16 Marks		
1	**4Marks**	Tenses	Present, Past, Future tenses : Filling in with proper verb forms using the given base form	
2	**3**	Concord	Concord: agreement between subject and verb	
3	**3**	Framing questions	Framing Wh & Yes-No questions	

4	3	Types of sentences	Conversion of sentences (except questions) , Using of proper linkers / discourse markers	
5	3 Marks	Words& Phrases , linkers	Using words& phrases, linkers in sentences of one's own	

Part – B : 8X3 = 24 Marks				
6	8 Marks	Paragraph writing A or B (internal choice)	a) Themes on lessons 4/5 b) Themes based on lessons 6/7	
7	8	Letter Writing (internal choice : A or B)	a) Letter writing : formal b) Letter writing: Informal	
8	8	a) Paragraph: Tenses Reinforcement b) Email & Instructions/ directions	a) Paragraph on Routines/ past narration / Future plans b) i) E- Mail writing (formal or informal) ii) Giving instructions/ directions	
Unit Test -3: Marks : 40 ; Time 90 Mnts. (Lessons 8,9,10,11)				
Part – A ; 16 Marks				
1	4 Marks	Error Analysis	Find errors and make corrections	
2	3	Voice	Conversion: Active & Passive voice	
3	3	Synthesis of sentence	Conversion: Simple, complex & compound sentences	
4	3	Reported speech	Conversion: Direct & Indirect speech	
5	3	Words & phrases, linkers	Matching words with their meanings/ Using words& phrases, linkers in sentences of one's own	
Part- B : 8X3 = 24 Marks				
6	8 Marks	Essay writing A or B (internal choice)	a) Theme based (lessons 8 / 9) b) Theme based (Lessons 10/11)	
7	8	Report writing A or B (internal choice)	a) Report on Mini projects/ industrial visits / camps/ events /exhibitions / celebrations b) themes from lessons 8 to 11 …like disaster management / technical inventions / gender equality/ goal setting	
8	8	Reading Comprehension A or B (internal choice)	Reading passages with 8 different questions (FIVE model+ others)	

Model Question Papers : Unit Tests

Unit Test-1: C23- C-101: English

Time: 90 Mnts.   **Max. Marks: 40**

Part-A   16 Marks

Instructions: Answer all the questions and the first question carries 3 marks. Question numbers from 2 to 5 carries three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. A) Give synonyms for the words: i) abruptly   ii) advantage

  B) Give antonyms for the words: i) pure   ii) dry

  C) Add affixes for the   words: i) connect   ii) worth

  D) Give one word substitute for the following:
    i) The interactive web page that can be updated frequently by an individual or group.
    ii) An ability that can be acquired by anyone through practice.

2. A) Fill in the blanks with proper Articles:
    i) My cousin joined M.Tech in _____ University in Tamil Nadu.
    ii) Mrs. Rekha Chatterjee is _____ MLA from the West Bengal.
    iii) My father came to _____ college yesterday to pay my exam fees.

  B) Fill in with appropriate prepositions:

    i) What can I do _____ you , Sarat?

    ii) Mr. Agarwal distributed his property _____ his two daughters.

    iii) The coach was pleased _____the performance of the players.

3. a) Fill in with proper form of the adjective given in the brackets :

    Burj Khalifa is one of _____(tall) buildings in the world.

  b) The tiger is more ferocious than the leopard.   (Change into Positive degree)

  c) Very few cities in India are as populous as Mumbai. (Change into comparative degree)

4. A) Fill in with proper Primary Helping Verbs (be/do/have forms)

  i) Prasad _____ (be) at the canteen when I saw him a few minutes ago.

  ii) He _____ (do) this work always.

  iii) The teacher _____just left the classroom.

 B) Fill in with appropriate Modal verbs based on the clue given in the brackets:

    i) We all _____ respect our elders. (moral obligation)

    ii) Sir, _____ I come in please? (seeking permission)

    iii) Tarun _____ easily win the match. (ability)

5. Use the following phrasal verbs in sentences of your own.

  i)   bring up   ii) give away   iii) put off

Part-B   **8X3=24 Marks**

Instructions: Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A) Write a paragraph in around 120 words about the significance of learning and using English in your present and future life.

<div align="center">OR</div>

  B) Write a paragraph in around 120 words about challenges you are facing in speaking and writing English and the solutions to overcome them.

7. A) Write a dialogue between two friends in at least six turns discussing the advantages and disadvantages of social media.

<div align="center">OR</div>

 B) Write a dialogue between two friends, who have joined different courses in different colleges after their tenth class and now exchanging information about their newly joined courses and colleges.

8. A) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence:

     Treating life as an adventure is the best quality of successful people. A person's security lies not in his comfort zone, but in his initiative, creativity and courage. Effective people do not label others from their past success or failure, but rediscover each time they meet them. These people are not overawed by top celebrities, cine personalities and sadhus. Winning people are excellent team players to take part in the process of creative problem solving. They are skillful at balancing their strengths and weaknesses with others. The final character of victorious people is exercising the four dimensions of life i.e., physical, mental, emotional, and enthusiastic.

Questions:

 a) What is the best quality of successful people?

 b) List out the three qualities which make a person secure?

 c) Why are the effective people not wondered at the lives of celebrities?

 d) What do the team players do?

 e) What is the special skill of the winning people?

 f) What is the final character of victorious people?

 g) What qualities of effective or winning people do you want to inculcate?

 h) Pick the word from the passage that would mean: "the feeling of respect, wonder and fear all together at something or someone"

<div align="center">OR</div>

  B) Read the following passage and answer the questions that follow. Your answer should be

accurate, precise and limited to a word or phrase or a simple sentence:

Benjamin Franklin was born in 1706 in Boston, Massachusetts. He came from a big family. He had 16 brothers and sisters. When Benjamin was 15, his brother started the first Boston newspaper. It was called 'The New England Courant'. He worked for the newspaper for a short time, but he was not happy. So, he went to Philadelphia and worked as a printer. In 1729, he bought a newspaper business. The newspaper was the 'Pennsylvania Gazette'. He was very busy. In 1733, he started publishing 'Poor Richard's Almanac'. His pen name (the name he used as an author) was Richard Saunders. This book came out every year. Almanacs have information about weather and crops. They also have wise sayings. The wise saying "A penny saved is a penny earned" comes from Poor Richard's Almanac. Benjamin Franklin was also an inventor. In 1743 he invented a very good stove called the Franklin stove. He invented swim fins. He invented bifocal glasses. He also invented the first odometer. He retired from his newspaper business in 1749. He stopped working on it. Then he became busy with science. Benjamin Franklin was also very interested in American politics. He helped Thomas Jefferson write the Declaration of Independence. In 1776, he and other people signed the Declaration of Independence. Franklin died on April 17, 1790. He was 84 years old.

Questions:

a) How many siblings did Benjamin Franklin have?

b) What was the newspaper started by his brother?

c) What did he buy after working as a printer?

 d) What information was available in his Almanacs?

 e) Mention any two inventions made by Benjamin Franklin?

 f) Rewrite the meaning of the saying in your own words: "A penny saved is a penny earned"

 g) Which American president was Benjamin Franklin associated with?

 h) Pick the word from the passage that would mean: "external limbs of fish that help them swim and steer".

<u>**Time: 90 Mnts.**</u>   <u>**Max. Marks: 40**</u>

Part-A   **16 Marks**

Instructions: Answer all the questions and the first question carries 4 marks. Question numbers from 2 to 5 carry Three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. Fill in with proper verb form using the base form given in the brackets.

 a) The match _____ (start) already before we entered the stadium.

 b) Rani _____ (clean) dishes when the phone rang.

 c) They _____(hold) the thief tightly until the police arrived.

 d) Mr. Rajesh and his team _____(work) on this project since last month.

2. Fill in with the appropriate word from the pair given in the brackets.

  a) Bread and butter _____ a wholesome breakfast. (is / are)

 b) The minister accompanied by his staff _____already arrived. (have/ has)

 c) Not only the film director but also all the actors _____facilitated by the committee. (was/ were)

3. Frame two different 'Wh' questions and one 'Yes-No' question from the following:

   India is the second most populous country just behind China. It is expected that in a few months, India stands top on the list due to our unprecedented birth rate. On the contrary, Japan is losing its population. The rate of death in Japan is double when compared to its birth rate of the country.

4. Convert the following sentences as directed.

 a) I want your bike for one hour. (convert into an imperative sentence)

 b) It is a very beautiful garden. (convert into an exclamatory sentence)

 c) Alas! what a great tragedy. (convert into a declarative sentence)

5. Use the following words/ phrases/ linkers in sentences of your own:

        a) struggle   ii) ground breaking   iii) however

Part-B   **8X3=24 Marks**

Instructions: Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A) Write a paragraph in around 120 words about dealing with obstacles and failures in one's life.

                                OR

   B) Write a paragraph in around 120 words about protecting our environment.

7. A) Write a letter to your Principal requesting him / her to issue your Original Tenth marks list as you

need to update your ADHAR card with date of birth and other details and return the certificate after the updating work.

<div align="center">OR</div>

B) Write a letter to your father requesting him to send you two thousand rupees as you have to pay your hostel fees.

8. A) Write a paragraph in around 120 words about your future plans after Diploma.

<div align="center">OR</div>

B) i) Draft an E-mail to your friend inviting him/her to your village to spend the weekend with you.

ii) Write a set of instructions at least in five sentences about drawing money from an ATM.

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Unit Test-3: C23- Common-101: English

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Time: 90 Mnts.   **Max. Marks: 40**

<div align="center">**Part-A**   **16 Marks**</div>

Instructions: Answer all the questions and the first question carries 4 marks. Question numbers 2 to 5 carry Three marks each. The marks will be awarded only for the desired and accurate language / grammatical expressions.

1. Correct the following sentences:

a) All the books have been sold out last week.

b) I, Ramesh and you will together book a cab.

c) I am feeling terribly cold.

d) The police has arrested the gang of robbers.

2. Change the voice of the following:

a) A cat is chasing two rats.

b) The news has been published recently.

c) They will certainly win the match.

3. Rewrite the sentences as directed:

a) Though Rakesh studied well, he could not get the first class.   (Convert into a simple sentence)

b) It was raining heavily, and so the match was cancelled.   (Convert into a complex sentence)

c) The horse was too old to gallop. (Convert into a compound sentence)

4. Change the speech of the following as directed:

a) Satwik said to his mother, "I forgot my water bottle in my classroom."

b) The teacher ordered the students not to make noise.

c) Swapna said, "Rajesh, what are you searching for?"

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5. Use the following words /phrases/ linkers in sentences of your own:

   i) apologize to   ii) occasionally   iii) for a while

Part-B   **8X3=24 Marks Instructions:**

Answer all the questions. Each question carries 8 marks. The marks will be awarded for the appropriate content, quality and clarity of expressions, but not the length of your answer.

6. A) Write an essay in around 180 words on how the technical inventions changed our lives.

OR

 B) Write an essay in around 180 words about the significance of the gender equality.

7 A) Write a report about any disaster that you have read in newspaper or witnessed including your suggestions for better preventive measures to mitigate the loss.

OR

  B) Write a report about the Inter Polytechnics Sports and Games Meet (IPSGM) held in your District headquarters.

8 A) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence.

    Animals living in modern zoos enjoy several advantages over animals in the wild; however, they must also suffer some disadvantages. One advantage of living in the zoo is that the animals are separated from their natural predators; they are protected and can, therefore, live without risk of being attacked. Another advantage is that they are regularly fed a special, well-balanced diet; thus, they do not have to hunt for food or suffer times when food is hard to find. On the other hand, zoo animals face several disadvantages. The most important disadvantage is that since they do not have to hunt for food or face their enemies, some animals became bored, discontented or even nervous. Another disadvantage is that zoo visitors can endanger their lives. Some animals can pick up airborne diseases from humans.

Questions:

a) What are the two animal habitations mentioned in the passage?

b) Give the main advantage of animals living in zoo.

c) What kind of food is the zoo animals fed with?

d) What is the most disadvantage aspect faced by the zoo animals?

e) How do you think that the visitors can harm the zoo animals?

f) Do you support keeping the animals in a zoo for our entertainment? Justify your answer in a

sentence.

g) Pick the word from the passage that would mean: A violent or bigger animal that kills and eats the other tiny animal.

h) Suggest a suitable title for the passage.

<div align="center">OR</div>

B) Read the following passage and answer the questions that follow. Your answer should be accurate, precise and limited to a word or phrase or a simple sentence.

"I say to you today, my friends, even though we face the difficulties' of today and tomorrow, I still have a dream. I have a dream that one day this nation will rise up, live out the true meaning of its creed. I have a dream that one day on the red hills of Georgia sons of former slaves and sons of former slave-owners will be able to sit down together at the table of brotherhood. I have a dream that my four little children will one day live in a nation where they will not be judged by the colour of their skin but by the content of their character. I have a dream.... I have a dream that one day in Alabama, with its vicious racists, with its governor having his lips dripping with the words of interposition and nullification, one day right there in Alabama little black boys and black girls will be able to join hands with little white boys and white girls as sisters and brothers:" On 28th August in 1963, Dr. Martin Luther King, Jr. spoke these immortal words to a crowd of over 200000 people who had gathered for the now historic march in Washington to demand an end to racial segregation in the USA, and for equality in jobs and civil rights.

Questions:

a) Who is the speaker of the above speech and what is his nationality?

b) What is the occasion of the above speech: (   )

    i) a birthday party   ii) an election campaign

    iii) a movement for a right cause   iv) a government function

c)   What sort of discrimination did the speaker fight against?

d)   What good does he expect regarding the children of slaves and masters?

e) What is the contextual meaning of the frequently used word "dream" ?

f) How should a nation be judged?

g) What are the two places mentioned by the speaker in his speech?

h) Pick the word from the passage that would mean: "that lives for ever without death"

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Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
C-102	Engineering Mathematics-I	5	150	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Algebra	31	CO1
2	Trigonometry	44	CO2
3	Co-ordinate Geometry	23	CO3
4	Differential Calculus	34	CO4
5	Applications of Derivatives	18	CO5
	Total Periods	**150**	

Course Objectives	(i)　　To apply the principles of Algebra, Trigonometry and Co-Ordinate Geometry to real-time problems in engineering. (ii)　　To comprehend and apply the concept of Differential Calculus in engineering applications.

Course Outcomes	CO1	Identify functions as special relations, resolve partial fractions and solve problems on matrices and determinants.
	CO2	Solve problems using the concept of trigonometric functions, their inverses and complex numbers.
	CO3	Find the equations and properties of straight lines, circles and conic sections in coordinate system.
	CO4	Evaluate the limits and derivatives of various functions
	CO5	Find solutions for engineering problems using differentiation.

C-23 - ENGINEERING MATHEMATICS – I
(COMMON TO ALL BRANCHES)
Learning Outcomes
UNIT - I

C.O. 1 Identify functions, resolve partial fractions and solve problems on matrices and determinants.

L.O.　1.1　　Define Set, ordered pair and Cartesian product of two sets - examples.

　　　　1.2　　Explain Relations and functions – examples

　　　　1.3　　Find Domain & Range of functions in finite sets – simple examples.

　　　　1.4　　Define rational, proper and improper fractions of polynomials.

　　　　1.5　　Explain the procedure of resolving proper fractions of the types mentioned

below into partial fractions

$$i) \quad \frac{f(x)}{(ax+b)(cx+d)} \quad ii) \quad \frac{f(x)}{(ax+b)^2(cx+d)}$$

    1.6   Define a matrix and order of a matrix.

    1.7   State various types of matrices with examples (emphasis on 3rd order square matrices).

1.8   Compute sum, difference, scalar multiplication and product of matrices. Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.

    1.9   Define the transpose of a matrix and state its properties – examples.

1.10   Define symmetric and skew-symmetric matrices with examples. Resolve a square matrix into a sum of symmetric and skew-symmetric matrices and provide examples.

    1.11 Define determinant of a square matrix; minor, co-factor of an element of a 3x3 square matrix with examples. Expand the determinant of a 3 x 3 matrix using Laplace expansion formula. State and apply the properties of determinants to solve problems.

1.12   Distinguish singular and non-singular matrices. Define multiplicative inverse of a matrix and list properties of adjoint and inverse. Compute adjoint and multiplicative inverse of a square matrix.

1.13   Solve system of 3 linear equations in 3 unknowns using Cramer's rule and matrix inversion method.

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UNIT - II

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C.O. 2 Solve problems using the concept of trigonometric functions, their inverses and complex numbers.

L.O. 2.1   Define trigonometric ratios of any angle - List the values of trigonometric ratios at specified values.

2.2   Draw graphs of trigonometric functions - Explain periodicity of trigonometric functions.

    2.3   Define compound angles and state the formulae of sin(A±B), cos(A±B), tan(A±B) and cot(A±B).

    2.4   Give simple examples on compound angles to derive the values of sin15^0, cos15^0 , sin75^0 , cos75^0 , tan 15^0 , tan75^0 etc.

    2.5   Derive identities like sin(A+B) sin(A-B) = sin ^{2} A –sin^2 B etc.

    2.6   Solve simple problems on compound angles.

    2.7   Derive the formulae of multiple angles 2A, 3A etc and sub multiple angles A/2 in terms of angle A of trigonometric functions.

    2.8   Derive useful allied formulae like sin^{2}A= (1- cos2A)/2 etc.

    2.9   Solve simple problems using the above formulae

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Syllabus for Unit test-I completed

</div>

    2.10 Derive the formulae on transforming sum or difference of two trigonometric   ratiosinto a product and vice versa, examples on these formulae.

    2.11 Solve problems by applying these formulae to sum or difference or product of two terms.

    2.12 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.

    2.13 Define inverses of six trigonometric functions along with their domains and ranges.

    2.14 Derive relations between inverse trigonometric functions so that the given inverse trigonometric function can be expressed in terms of other inverse trigonometric functions with

examples.

2.15   State various properties of inverse trigonometric functions and identities like

$\sin^{-1}x + \cos^{-1}x = \dfrac{\pi}{2}$, etc.

2.16   Apply   formulae   like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\dfrac{x+y}{1-xy}\right),\ where\ x \geq 0, y \geq 0, xy < 1$ etc.,

to solve Simple problems.

2.17   Explain what is meant by solution of trigonometric equations and find the general solutions of sin x=k, cos x =k and tan x=k with appropriate examples.

2.18   Solve models of the type a $\sin^2$ x + b sin x +c=0 and a cos x + b sin x=c.

2.19   State sine rule, cosine rule, tangent rule and projection rule and solve a triangle using these formulae.

2.20   List various formulae for the area of a triangle with examples.

2.21   Define complex number, its modulus, conjugate, amplitude and list their properties.

2.22   Define the operations on complex numbers with examples.

2.23   Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form with examples.

UNIT - III

Coordinate Geometry

C.O. 3   Find the equations and properties of straight lines, circles and conic sections in coordinate system.

L.O.3.1 Write the different forms of a straight line – general form, point-slope form, slope-intercept form, two-point form, intercept form and normal form (or perpendicular form).

3.2   Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

3.3 Define locus of a point and circle.

3.4 Write the general equation of a circle and find the centre and radius.

3.5 Find the equation of a circle given (i) centre and radius, (ii)two ends of the diameter(iii) three non collinear points of type (0,0) (a,0), (0,b).

3.6 Define a conic section - Explain the terms focus, directrix, eccentricity, axes and latus-rectum of a conic withillustrations.

3.7 Find the equation of a conic when focus, directrix and eccentricity are given.

3.8 Describe the properties of Parabola, Ellipse and Hyperbola in standard forms whose axes are along the co-ordinate axes and solve simple examples on these conics.

Syllabus for Unit test-II completed

C.O.4 Evaluate the limits and derivatives of various functions.

L.O. 4.1 Explain the concept of limit and meaning of $\lim_{x \to a} f(x) = l$ and state the properties of limits.

4.2 Evaluate the limits of the type $\lim_{x \to l} \dfrac{f(x)}{g(x)}$ and $\lim_{x \to \infty} \dfrac{f(x)}{g(x)}$

4.3 State the Standard limits $\lim_{x \to a} \dfrac{x^n - a^n}{x - a}$, $\lim_{x \to 0} \dfrac{\sin x}{x}$, $\lim_{x \to 0} \dfrac{\tan x}{x}$, $\lim_{x \to 0} \dfrac{a^x - 1}{x}$,

$\lim_{x \to 0} \dfrac{e^x - 1}{x}$, $\lim_{x \to 0} (1+x)^{\frac{1}{x}}$, $\lim_{x \to \infty} \left(1 + \dfrac{1}{x}\right)^x$ (without proof) and solve simple problems using these standard limits.

4.4 Explain the concept of continuity of a function at a point and on an interval

4.5 State the concept of derivative of a function y = f(x) – definition, first principle as $\lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$ and also provide standard notations to denote the derivative of a function.

4.6 Explain the significance of derivative in scientific and engineering applications.

4.7 Find the derivative of the elementary functions x^n, a^x, e^x, log x, sin x, cos x using the first principle.

4.8 Find the derivatives of standard algebraic, logarithmic and exponential functions.

4.9 Find the derivatives of trigonometric, inverse trigonometric and hyperbolic functions.

4.10 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with simple illustrative examples.

4.11 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples.

4.12 Explain the method of differentiation of parametric functions with examples.

4.13 Explain the procedure for finding the derivatives of implicit functions with examples.

4.14 Explain the need of taking logarithms for differentiating some functions of $[f(x)]^{g(x)}$ type – examples on logarithmic differentiation.

4.15 Explain the concept of finding the second order derivatives with examples.

4.16 Explain the concept of functions of several variables, finding partial derivatives and difference between the ordinary and partial derivatives with simple examples.

4.17 Explain the concept of finding second order partial derivatives with simple problems.

C.O. 5 Evaluate solutions for engineering problems using differentiation

L.O. 5.1 State the geometrical meaning of the derivative - Explain the concept of derivative to find the slopes of tangent and normal to the curve y=f(x) at any point on it.

5.2 Find the equations of tangent and normal to the curve y=f(x) at any point on it – examples.

5.3 Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.

5.4 Explain the derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples.

5.5 Define the concept of increasing and decreasing functions - Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.

5.6 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable- simple problemsfor quadratic and cubic polynomials.

5.7 Apply the concept of derivatives to find the errors and approximations in simple problems.

Syllabus for Unit test-III completed

C-23 - ENGINEERING MATHEMATICS – I

CO/PO – Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2				3	2	3
CO2	3	3	3	2				3	3	1
CO3	3	2	2	1				3	2	2
CO4	3	3	2	2				3	2	1
CO5	3	3	3	3				3	3	3
Avg.	3	2.6	2.2	2				3	2.4	2

3 = Strongly mapped (High), **2 =**moderately mapped (Medium), **1 =**slightly mapped (Low)

Note:
PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.
PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and conducted.
PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and latest updates in reputed national and international journals, attending seminars, learning mathematical software tools.
PSO1: An ability to understand the concepts of basic mathematical concepts and to apply themin various areas like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all concerned engineering disciplines.
PSO2: An ability to solve the Engineering problems using latest software tool, along with analytical skills to arrive at faster and appropriate solutions.
PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career as an engineer and to sustain passion and zeal for real world technological applications.

C-23 - ENGINEERING MATHEMATICS – I

PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		No	%		
1	CO1, CO2, CO3,CO4,CO5	150	100%	3	>40% Level 3 Highly addressed
2	CO1, CO2, CO3,CO4,CO5	138	92%	3	
3	CO1, CO2, CO3,CO4,CO5	133	88.6%	3	
4	CO1, CO2, CO3,CO4,CO5	120	80%	3	25% to 40% Level 2 Moderately addressed
PSO 1	CO1, CO2, CO3,CO4,CO5	150	100%	3	
PSO 2	CO1, CO2, CO3,CO4,CO5	135	90%	3	5% to 25% Level 1 Low addressed
PSO 3	CO1, CO2, CO3,CO4,CO5	125	83.3%	3	<5% Not addressed

C-23 - ENGINEERING MATHEMATICS – I
(COMMON TO ALL BRANCHES)
COURSE CONTENT
Unit-I
Algebra

1. **Functions**:
Definitions of Set, Ordered pair, Cartesian product of two sets, Relations, functions, domain & range of functions in finite sets.

2. **Partial Fractions:**
Definitions of rational, proper and improper fractions of polynomials. Resolve rational fractions (proper fractions) in to their partial fractions covering the types mentioned below.

$$i) \quad \frac{f(x)}{(ax+b)(cx+d)} \qquad ii) \quad \frac{f(x)}{(ax+b)^2(cx+d)}$$

3. **Matrices:**
Definition of a matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, difference, scalar multiplication and product of matrices. Transpose of a matrix-Symmetric, skew symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Laplace's expansion, properties of determinants. Singular and non-singular matrices-Adjoint and multiplicative inverse of a square matrix- examples-System of linear equations in 3 variables-Solutions by Cramer's rule and Matrix inversion method-examples.

Unit-II
Trigonometry

4. **Trigonometric ratios:**
Definition of trigonometric ratios of any angle, values of trigonometric ratios at specified values, draw graphs of trigonometric functions, periodicity of trigonometric functions.

5. **Compound angles:**
Formulas of sin(A±B), cos(A±B), tan(A±B),cot(A±B),and related identities with problems.

6. **Multiple and sub multiple angles:**
Formulae for trigonometric ratios of multiple angles 2A, 3A and sub multipleangles A/2 with problems.

7. **Transformations:** Transformationsof products into sums or differences and vice versa - simple problems.

8. **Inverse trigonometric functions:**
Definition, domains and ranges-basic properties- problems.

9. **Trigonometric equations:**
Concept of a solution, principal value and general solution of trigonometric equations:
Sinx =k ,cosx= k, tanx =k, where k is a constant. Solutions of simple quadratic equations and equations of type acosx+bsinx=c.

10. **Properties of triangles:**
Relation between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule-area of a triangle- problems.

11. **Complex Numbers:**
Definition of a complex number, Modulus, conjugate and amplitude of a complex number, Arithmetic operations on complex numbers, Modulus- Amplitude (polar) form ,

Exponential form (Euler form) of a complex number- Problems.

UNIT-III
Coordinate geometry

12 Straight lines: various forms of straight lines, angle between lines, perpendicular distance from a point, intersection of non-parallel lines and distance between parallel lines-examples.

13. Circle: locus of a point, Circle, definition-Circle equation given (i) centre and radius, (ii) two ends of a diameter (iii) three non collinear points of type (0,0), (a,0), (0,b) - general equation of a circle – finding centre, radius.

14. Definition of a conic section, equation of a conic when focus directrix and eccentricity are given. Properties of parabola, ellipse and hyperbola in standard forms.

UNIT-IV
Differential Calculus

15. Concept of Limit- Definition and Properties of Limits and Standard Limits -Simple Problems-Continuity of a function at a point- Simple Examples only.

16. Concept of derivative- Definition (first principle)- different notations-derivatives of elementary functions. Derivatives of algebraic, logarithmic, trigonometric, inverse trigonometric and hyperbolic functions. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Chain rule, derivatives of parametric functions, derivatives of implicit functions, logarithmic differentiation – problems in each case. Second order derivatives – examples. Functions of several variables –First and second order partial differentiation-simple problems.

UNIT-V
Applications of Derivatives

17. Geometrical meaning of the derivative, equations of tangent and normal to a curve atany point - problems.

18. Physical applications of derivatives – velocity, acceleration, derivative as a rate measure –Problems.

19. Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima for quadratic and cubic polynomials.

20. Using the concept of derivative of a function of single variable, find the absolute error,relative and percentage errors and approximate values due to errors in measuring.

Textbook:
    Engineering Mathematics-I, a textbook for first year diploma courses, prepared & prescribed by SBTET, AP.

Reference Books:
1.   Shanti Narayan, A Textbook of matrices, S.Chand&Co.
2.   Robert E. Moyer & Frank Ayers Jr., Schaum's Outline of Trigonometry, 4th Edition, Schaum's Series.
3.   M.Vygodsky, Mathematical Handbook, Mir Publishers, Moscow.
4.   Frank Ayers & Elliott Mendelson, Schaum's Outline of Calculus, Schaum's Series.

C-23 - Engineering Mathematics – I
Blue print

S.No.	Chapter/Unit title	No. of Periods	Weightage Allotted	Short type			Essay type			COs mapped
				R	U	Ap	R	U	Ap	
			Unit - I : Algebra							
1	Functions	5	3	1	0	0	0	0	0	CO1
2	Partial Fractions	6	3	1	0	0	0	0	0	CO1
3	Matrices and Determinants	20	16	2	0	0	0	0	1	CO1
			Unit - II : Trigonometry							
4	Trigonometric Ratios	2	0	0	0	0	0	0	0	CO2
5	Compound Angles	5	3	1	0	0	0	0	0	CO2
6	Multiple and Submultiple angles	8	3	1	0	0	0	0	0	CO2
7	Transformations	6	5	0	0	0	0	1/2	0	CO2
8	Inverse Trigonometric Functions	6	5	0	0	0	0	1/2	0	CO2
9	Trigonometric Equations	6	5	0	0	0	0	1/2	0	CO2
10	Properties of triangles	5	5	0	0	0	0	0	1/2	CO2
11	Complex Numbers	6	3	1	0	0	0	0	0	CO2
			Unit III : Co-ordinate Geometry							
12	Straight Lines	6	5	0	0	0	0	1/2	0	CO3
13	Circles	5	3	1	0	0	0	0	0	CO3
14	Conic Sections	12	5	0	0	0	0	1/2	0	CO3
			Unit – IV : Differential Calculus							
15	Limits and Continuity	6	6	1	1	0	0	0	0	CO4
16	Differentiation	28	20	0	0	0	1	1	0	CO4
			Unit – V : Applications of Derivatives							
17	Geometrical Applications	4	5	0	0	0	0	0	1/2	CO5
18	Physical Applications	6	5	0	0	0	0	0	1/2	CO5

19	Maxima and Minima	4	5	0	0	0	0	0	1/2	CO5
20	Errors and Approximations	4	5	0	0	0	0	0	1/2	CO5
Total		150	110	9	1	0	1	3 1/2	3 1/2	
Marks				27	3	0	10	35	35	

R: Remembering Type   **: 37 Marks**
U: understanding Type   **: 38 Marks**
Ap: Application Type   **: 35 Marks**

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C-23 Engineering Mathematics – I

Unit Test Syllabus

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Unit Test	Syllabus
Unit Test-I	From L.O. 1.1 to L.O. 2.9
Unit Test-II	From L.O. 2.10 to L.O. 3.8
Unit Test-III	From L.O.4.1 to L.O. 5.7

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Unit Test I   **C –23, C-102**
State Board of Technical Education and Training, A. P.

</div>

First Year

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Subject name: Engineering Mathematics-I
Sub Code: C-102

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Time : 90 minutes   **Max.marks:40**

Part-A   **16Marks**

Instructions: **(1) Answer all questions.**
           (2) First question carries four marks and the remaining questions carry
Three marks each.

1.Answer the following:

   a.   If $X = \{1,2,3,4\}$ and $Y = \{1,4,9,16,25\}$, then $f : X \rightarrow Y$ defined by

$f = \{(1,1),(2,4),(3,9),(4,16)\}$ is a function: State TRUE/FALSE.   (CO1)

   b.   If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then 3A =_____.   (CO1)

   c.   The value of $\sin 45° + \cos 45^o$ is _____.   (CO2)

   d.   The formula for $\tan 2A$ in terms of $\tan A$ is _____.   (CO2)

2.If $A = \begin{bmatrix} 1 & 3 \\ 4 & -9 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 4 \\ -3 & 1 \end{bmatrix}$ then find $A + B$.   (CO1)

3.Find the determinant of $\begin{bmatrix} 2 & -1 & 4 \\ 0 & -2 & 5 \\ -3 & 1 & 3 \end{bmatrix}$.   (CO1)

4.Find the value of $\sin 75^0$.   (CO2)

5.Prove that $\dfrac{\sin 2A}{1-\cos 2A} = \cot A$ (CO2)

Part-B **3×8=24**

Instructions: **(1) Answer all questions.**
(2) Each question carries eight marks
(3) Answer should be comprehensive and the criterion for valuation
is the content but not the length of the answer.

6.A)   Resolve $\dfrac{2x}{(x-1)(x-3)}$ into partial fractions. (CO1)

or

B)   Resolve $\dfrac{x-4}{(x-2)(x-3)}$ into partial fractions. (CO1)

7.A)   If $A = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ -2 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 & -5 \\ 2 & 1 & 4 \\ 0 & 3 & 1 \end{bmatrix}$, then find AB (CO1)

Or

B)   If $P = \begin{bmatrix} 3 & 1 & 4 \\ 1 & -2 & 0 \\ 3 & 1 & 6 \end{bmatrix}$ and $Q = \begin{bmatrix} 1 & 5 & -3 \\ 0 & 6 & 9 \\ -2 & 7 & 8 \end{bmatrix}$, show that $(P+Q)^T = P^T + Q^T$.

(CO1)

8.A)   Find the adjoint of the matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 5 \\ 2 & 7 & -4 \end{bmatrix}$ (CO1)

or

B)   Solve the following system of linear equations by Cramer's rule:
$x - y + z = 2, 2x + 3y - 4z = -4, 3x + y + z = 8$ (CO1)

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State Board of Technical Education and Training, A. P.

First Year

Subject name: Engineering Mathematics-I
Sub Code: C- 102

<u>**Time : 90 minutes**</u>   **Max.marks:40**

Part-A   **16Marks**

Instructions: **(1) Answer all questions.**
                      (2) First question carries four marks and the remaining questions carry threemarks
     each

1.Answer the following.

    a. $\sin C + \sin D = 2\cos\left(\dfrac{C+D}{2}\right)\sin\left(\dfrac{C-D}{2}\right)$: State TRUE/FALSE   (CO2)

    b.   If $\sin^{-1}\left(\frac{3}{5}\right) = \tan^{-1}(x)$, then $x = $ _____.   (CO2)

    c.   If $z = 2+3i$, then $|z| = $_____.   (CO2)

    d.   The eccentricity of the rectangular hyperbola is _____.   (CO3)

2.Express $(3-4i)(7+2i)$ in terms of $a+ib$ (CO2)

3.Find the intercepts made by the straight line $x + 5y - 10 = 0$.   (CO3)

4.Find the centre and radius of the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ (CO3)

5.Find the vertex and focus of the parabola $y^2 = 8x$.   (CO3)

Part-B   **3×8=24**

Instructions: **(1) Answer all questions.**
                      (2) Each question carries eight marks
                      (3) Answer should be comprehensive and the criterion for valuation
     is the content but not the length of the answer.

6.A)   Prove that $\dfrac{sin5\theta+sin\theta}{cos5\theta+cos\theta} = tan3\theta$.   (CO2)

                         or

  B)   Prove that $tan^{-1}\left(\frac{1}{4}\right) + tan^{-1}\left(\frac{3}{5}\right) = \frac{\pi}{4}$ (CO2)

7.A)   Solve $2\sin^2\theta - \sin\theta - 1 = 0$ (CO2)

                         or

  B)   If a =3, b=4, c=5, find the area of the ΔABC.   (CO2)

8.A)   Find the equation of the line passing through $(1,1)$ and perpendicular to the

line $2x + 3y - 1 = 0$. Also find the perpendicular distance from the given point to the given line. (CO3)

or

B) Find the equation of the ellipse whose focus is (2, 0), directrix is x+y-1= 0 and eccentricity is ½. (CO3)

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State Board of Technical Education and Training, A. P
First Year
Subject name: Engineering Mathematics-I
Sub Code: C-102

<u>**Time : 90 minutes**</u>   **Max.Marks:40**

Part-A   **16 Marks**

Instructions: **(1) Answer all questions.**
(2) First question carries four marks and the remaining questions carry threemarks each.

1.Answer the following:

a. $\lim\limits_{x\to 1}\dfrac{x^2+1}{x+5}=\dfrac{1}{3}$: State TRUE/FALSE.   (CO4)

b. $\dfrac{d}{dx}(x^n)=$_____   (CO4)

c. $\dfrac{d}{dx}\left(3\tan^{-1}x\right)=?$ (CO4)

d.   Write the formula for finding the percentage error in x.   (CO5)

2.Evaluate $\lim\limits_{\theta\to 0}\dfrac{sin2\theta}{\theta}$ (CO4)

3.Find the derivative of $3\tan x+4\log x$ w.r.t. x.   (CO4)

4.Differentiate $x^2\sin x$ w.r.t. x.   (CO4)

5.Find the slope of the tangent to the curve $y=x^3-3x+2$ at the point $(1,7)$.   (CO5)

Part-B   **3×8=24**

Instructions: **(1) Answer all questions.**
(2) Each question carries eight marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6.A)   if $x=at^2$ and $y=2at$ then find $\dfrac{dy}{dx}$ (CO4)

or

B)   Find $\dfrac{dy}{dx}$, if $y=x^x$ (CO4)

7.A)   If $y=ae^x+be^{-x}$, then prove that $\dfrac{d^2y}{dx^2}-y=0.$ (CO4)

or

B)   If $u(x, y) = \log(x + y)$, then find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$ (CO4)

8.   A)   The radius of a sphere is decreasing at a rate of 0.2 cm/sec. How fast is its
            surface area decreasing when the radius is 10 cm.   (CO5)

or

B)   Find the maximum and minimum values of the function $f(x) = x^3 - 3x$.
                                                                              (CO5)

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STATE BOARD OF TECHNICAL EDUCATION, A.P
C-23 ENGINEERING MATHEMATICS-I,C- 102

TIME : 3 HOURS   **MODEL PAPER- I**   **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks.   **10x3=30M**

1. If $A = \left\{0, \dfrac{\pi}{4}, \dfrac{\pi}{2}\right\}$ and $f : A \to B$ is a function defined by $f(x) = \cos x,$ then find the range of

f.   (CO1)

2. Resolve the function $\dfrac{x}{(x-1)(x-2)}$ into partial fractions.   (CO1)

3. If $A = \begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \end{bmatrix}$, find A+B   (CO1)

4. Find the determinant of the matrix $\begin{bmatrix} 2 & -1 & 4 \\ 0 & -2 & 5 \\ -3 & 1 & 3 \end{bmatrix}$ by Laplace's expansion.   (CO1)

5. Show that $\dfrac{\cos 16^0 + \sin 16^0}{\cos 16^0 - \sin 16^0} = \tan 61^0.$ (CO2)

6. Prove that $\dfrac{\sin 2\theta}{1 - \cos 2\theta} = \cot\theta.$ (CO2)

7. Find the modulus of the complex number $3 + 4i$.   (CO2)

8. Find the equation of the circle with centre (0, 0) and radius 5.   (CO3)

9. Evaluate $\lim\limits_{x\to 0} \dfrac{2x^2 - 3x + 1}{x^2 - 2x + 4}.$ (CO4)

10. Find $\lim\limits_{x\to 0} \dfrac{\sin 77x}{\sin 11x}.$ (CO4)

PART-B

Answer any FIVE questions. Each question carries TEN marks.   **5x10=50M**

11. Solve the system of linear equations $x + y + z = 6,\ x - y + z = 2$ and $2x + y - z = 1$ using matrix

inversion method.   (CO1)

12. A) Show that $\dfrac{sin7\theta + sin5\theta}{cos7\theta + cos5\theta} = tan6\theta.$ (CO2)

B) Prove that $tan^{-1}\left(\dfrac{1}{7}\right) + tan^{-1}\left(\dfrac{1}{13}\right) = tan^{-1}\left(\dfrac{2}{9}\right)$ (CO2)

13.   A) Solve $(2\sin x - 1)(\tan x - \sqrt{3}) = 0.$ (CO2)

B) If a =10, b=12, c =5, then find the area of the ∆ABC. (CO2)

14.   A) Findthe distance between the parallel lines $4x - 3y + 9 = 0$ and $4x - 3y + 5 = 0$. Also find their slopes. (CO3)

B) Find the equation of the conic whose focus is (1,0), directrix is 3x+4y+1=0 and eccentricity is 2. (C03)

15.   A) Find the derivative of $3tanx - 4logx - 7x^2 + \sqrt{x}$ w.r.t x. (CO4)

B) Find the derivative of $x^2 e^{3x}$ w.r.t x. (CO4)

16.   A) If $x = a(1 - \cos\theta), y = a(\theta + \sin\theta)$, then find $\dfrac{dy}{dx}$. (CO4)

B) If $u(x, y) = x^2 y + y^2 x$, then find $\dfrac{\partial u}{\partial x}$ and $\dfrac{\partial u}{\partial y}$ (CO4)

17.   A) Find the equation of tangent to the curve $y = x^2 + 1$ at (2,1) . (CO5)

B) The radius of a circular plate is increasing at 0.7 cm/sec. What isthe rate of increase in its area when radius is 10 cm? (CO5)

18.   A) Find maximum or minimum value of $f(x) = x^2 - 4x + 3$. (CO5)

B) If an error of 0.02 cm is made in the side of a square, what is the approximate error   in the area and perimeter of the square? (CO5)

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TIME : 3 HOURS　　　　　　　　　　**MODEL PAPER- II**　　　　**MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks.　　　　　**10x3=30M**

1. If A={-1, 0, 1} and $f : A \rightarrow B$ is defined by $f(x) = x^2 - x + 1$, then find the range of f.
(CO1)

2. Resolve the function $\dfrac{1}{(x+1)(x-2)}$ into partial fractions.
(CO1)

3. If A = $\begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \end{bmatrix}$ and B= $\begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \end{bmatrix}$, then find (A+B)^T.
(CO1)

4. If A= $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, then find A^2.
(CO1)

5. Find the value of $\dfrac{cos36^0 + sin36^0}{cos36^0 - sin36^0} = tan\,81^0$.
(CO2)

6. Prove that $\dfrac{1+cos2\theta}{sin2\theta} = cot\theta$.
(CO2)

7. Find the modulus of the complex number 3+2i.
(CO2)

8. Find the equation of the circle with centre (1,2) and radius 4.
(CO3)

9. Find $\lim\limits_{x \to 0} \dfrac{2x^2 - 3x + 1}{x^2 - 2x + 4}$.
(CO4)

10. Find $\lim\limits_{x \to 0} \dfrac{\sin 5x}{\tan 3x}$.
(CO4)

PART-B

Answer any FIVE questions. Each question carries TEN marks.　　　**5x10=50M**

11. Solve the system of linear equations $x - y + 3z = 5$, $4x + 2y - z = 0$ and $-x + 3y + z = 5$

using Cramer's rule.
(CO1)

12 A) Show that $cos40^0 + cos80^0 + cos160^0 = 0$.
(CO2)

B) Prove that $tan^{-1}\left(\dfrac{1}{4}\right) + tan^{-1}\left(\dfrac{3}{5}\right) = \dfrac{\pi}{4}$
(CO2)

13. A) Solve $2\cos^2\theta - 3\cos\theta + 1 = 0$.
(CO2)

B) If a =5, b=7, C =30º, then find the area of the ΔABC.
(CO2)

14. A) Find the line passing through the point (2,3) and perpendicular to the line

$x - 7y + 15 = 0$. Also find the distance from the given point to the given line. (CO3)

B) Find the vertex, focus, directrix and latus rectum of the parabola $y^2 = 16x$. (CO3)

15. A) Find the derivative of $3\cos x + \log x + 21x + 8e^{-x}$ w.r.t.x. (CO4)

B) Find the derivative of $\frac{1-x^2}{1+x^2}$ w.r.t. x. (CO4)

16. A) If $y = x^{\sin x}$, then find $\frac{dy}{dx}$. (CO4)

B) If $y = \tan^{-1} x,$ then prove that $\left(1+x^2\right)\dfrac{d^2y}{dx^2} + 2x\dfrac{dy}{dx} = 0.$ (CO4)

17. A) Find the equation of tangent to the curve $y = x^3 - 2x^2 + 4$ at (2,4). (CO5)

B) If $s(t) = t^2 + 2t + 3$ is the displacement of a particle, find its velocity and acceleration at the time t=3 sec. (CO5)

18. A) Find maximum or minimum value of $f(x) = 3 + 10x - 5x^2$. (CO5)

B) If an error of 0.02 cm is made in the side of a square, then what is the percentage error in the calculated value of its area? (CO5)

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73

ENGINEERING PHYSICS

SUBJECT	SUBJECT CODE	TOTAL PERIODS	NUMBER PERIODS PER WEEK
ENGINEERING PHYICS	C-103	90	03

S.No	Major Topics	No. of Periods	COs
1.	Units and measurements	09	
2.	Statics	11	CO1
3.	Gravitation	12	
4.	Concepts of energy	10	CO2
5.	Thermal physics	10	
6.	Sound	12	CO3
7.	Electricity & magnetism	13	
8.	Modern physics	13	CO4
	Total:	**90**	

Course objectives	(1) To understand the basic concepts of physics for various Engineering applications as required for industries. (2) To equip the students with the scientific advances in technology and make the student suitable for any industrial organization.

COURSE OUTCOMES	CO1	Familiarize with various physical quantities, their SI units and errors in measurements; understand the concepts of vectors and various forces in statics.
	CO2	Understand the concepts of gravitation with reference to applications in satellites, provides the knowledge of various forms of energy and their working principles.
	CO3	Familiarize with the knowledge of conduction of heat and gas laws; provides the knowledge on musical sound and noise as pollution and also the concepts of echo and reverberation.
	CO4	Provide basic knowledge of electricity and concepts of magnetism and magnetic materials; familiarize with the advances in Physics such as photoelectric ell, optical fibers, semiconductors, superconductors and nanotechnology.

MATRIX SHOWING MAPPING OF COURSE OUT COMES WITH PROGRAMME OUTCOMES
C-23   C-103 ENGINEERING PHYSICS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	1			2
CO2	3		2	2	1		2
CO3	2				1		
CO4	2	2	2	2	2		3

3 = strongly mapped   2 = moderately mapped   1 = slightly mapped

OBJECTIVES
Upon completion of the course the student shall be able to

1.0   Understand the concept of units and measurements
    1.1   Explain the concept of Units
    1.2   Define the terms
        a) Physical quantity, b) Fundamental physical quantities and
        c) Derived physical quantities
1.3   Define unit
1.4   Define fundamental units and derived units
1.5   State SI units with symbols
1.6   State Multiples and Submultiples in SI system
1.7   State rules of writing S.I. units
1.8   State advantages of SI units
1.9   What are direct and indirect measurements.
1.10   Define accuracy and least count
1.11   Define error in measurement
1.12   Define absolute, relative and percentage errors with their formulae
1.13   Solve simple problems on absolute, relative and percentage errors

2.0   Understand the concepts of statics
    2.1   Explain the concept of Vectors
    2.2   Define scalar and vector quantities with examples
    2.3   Represent vectors geometrically
    2.4   Define the types of vectors (equal, negative, unit, co-initial, co-planar vectors,
        Position vector)
    2.6   Resolve the vector into rectangular components
    2.7   State and explain triangle law of addition of vectors
    2.8   Define concurrent and co-planar forces
    2.9   State and explain Lami's theorem
    2.10   State parallelogram law of addition of forces with diagram
    2.11   Write the expressions for magnitude and direction of resultant (no derivation)
    2.12   Illustrate parallelogram law with examples (i) flying of bird and (ii) working of sling.
    2.13   Define moment of force and couple.
    2.14   Write the formulae and S.I units of moment of force and couple.
    2.15   Solve simple problems on (i) Resolution of force and
        (ii) Parallelogram law of forces (finding R,α and θ).

3.0   Understand the concepts of Gravitation
      3.1   State and explain Newton's universal law of gravitation.
      3.2   Define G and mention its value.
      3.3   Explain the acceleration due to gravity (g)
3.4   Explain the factors affecting the value of g
3.5   Derive the relationship between g and G.
      3.6.   State and explain the Kepler's law of planetary motion
      3.7   Define a satellite.
      3.8   What are natural and artificial satellites? Give examples.
      3.9   Define orbital velocity and write its formula.
      3.10   Define escape velocity and write its formula.
      3.11   Write a brief note on PSLV
      3.12   Write a brief note on GSLV
      3.13   Mention the applications of artificial satellites
        3.14   Solve simple problems on (i) Newton's law of gravitation and (ii) calculation of orbital and escape velocities.

4.0   Understand the concepts of Energy.
      4.1   Define work done and energy. Mention their SI units.
      4.2   List various types of energy.
      4.3   Define P.E with examples. Write its equation.
      4.4   Define K.E with examples. Write its equation.
      4.5   Derive relationship between K.E and momentum.
      4.6   State the law of conservation of energy. Give various examples.
      4.7   Write a brief note on solar energy.
      4.8   Explain the principle of solar thermal conversion.
      4.9   Explain the principle of photo voltaic effect
      4.10   Solve simple problems on (i) work done (ii) P.E & K.E and (iii) Relation between K.E & momentum.

5.0   Understand the concepts of thermal physics
      5.1   Define the concepts of heat and temperature
      5.2   State the modes of transmission of heat
      5.3   Define conduction, convection and radiation with two examples each.
      5.4   State and explain Boyle's law
      5.5   Define absolute zero temperature
      5.6   Explain absolute scale of temperature
      5.7   State the relationship between Degree Celcius, Kelvin and Fahrenheit temperatures
      5.8   State Charles laws and write its equation
      5.9   State Gay-Lussac's law and write its equation
      5.10   Define ideal gas
      5.11   Derive ideal gas equation
      5.12   Explain why universal gas constant (R) is same for all gases
      5.13   Calculate the value of R for 1 gram mole of gas.
      5.14   Solve simple problems on (i) Interconversion of temperatures between °C, K and F (ii) Gas laws and (iii) Ideal gas equation.

6.0   Understand the concepts of Sound
      6.1   Define the term sound
      6.2   Define longitudinal and transverse waves with one example each
      6.3   Explain the factors which affect the velocity of sound in air
      6.4   Distinguish between musical sound and noise

6.5   Explain noise pollution and state SI unit for intensity of sound
6.6   Explain sources of noise pollution
6.7   Explain effects of noise pollution
6.8   Explain methods of minimizing noise pollution
6.9   Define Doppler effect
6.10 List the Applications of Doppler effect
6.11 Define reverberation and reverberation time
6.12 Write Sabine's formula and name the parameters contained
6.13 Define echoes and explain the condition to hear an echo.
6.14 Mention the methods of reducing an echo
6.15 Mention the applications of an echo
6.16 What are ultrasonics
6.17 Mention the applications of ultrasonics, SONAR,
6.18 Solve simple problems on echo

7.0   Understand the concepts of Electricity and Magnetism
7.1   Explain the concept of P.D and EMF
7.2   State Ohm's law and write the formula
7.3   Explain Ohm's law
7.4   Define resistance and specific resistance. Write their S.I units.
7.5   State and explain Kichoff's first law.
7.6   State and explain Kirchoff's second law.
7.7   Describe Wheatstone's bridge with legible sketch.
7.8   Derive an expression for balancing condition of Wheatstone's bridge
7.9   Describe Meter Bridge experiment with necessary circuit diagram.
7.10 Write the formulae to find resistance and specific resistance in meter bridge
7.11 Explain the concept of magnetism
7.12 What are natural and artificial magnets (mention some types)
7.13 Define magnetic field and magnetic lines of force and write the properties of
      Magnetic lines of force
7.14 State and explain the Coulomb's inverse square law of magnetism
7.15 Define magnetic permeability
7.16 Define para, dia, ferro magnetic materials with examples
7.17 Solve simple problems on (i) Ohm's law (ii) Kirchoff's first law (iii) Wheatstone bridge (iv) meter
bridge and (v) Coulomb's inverse square law

8.0   Understand the concepts of Modern physics
8.1   State and Explain Photo-electric effect
8.2   State laws of photoelectric effect
8.3   Explain the Working of photoelectric cell
8.4   List the Applications of photoelectric effect
8.5   Recapitulate refraction of light and its laws
8.6   Define critical angle
8.7   Explain the Total Internal Reflection
8.8   Explain the principle and working of Optical Fiber
8.9   List the applications of Optical Fiber
8.10 Explain the energy gap based on band structure
8.11 Distinguish between conductors, semiconductors and insulators base on energy gap
8.12 Define doping
8.13 Explain the concept of hole
8.14 Explain the types of semiconductors : Intrinsic and extrinsic
8.15 What are n-type and P-type semiconductors

8.16   Mention the applications of semiconductors
8.17   Define super conductor and superconductivity
8.18   List the applications of superconductors
8.19   Nanotechnology definition, nonmaterials and applications

COURSE CONTENT

1. Units and measurements
Introduction – Physical quantity – Fundamental and Derived quantities – Fundamental and derived units - SI units –Multiples and Sub multiples – Rules for writing S.I. units-Advantages of SI units – Direct and indirect measurements – Accuracy and least count – Errors : Absolute, relative and percentage errors – Problems.

2. Statics
Scalars and Vectors – Representation of a vector - Types of vectors - Resolution of vector into rectangular components – Triangle law of vectors – Concurrent forces - Lami's theorem - Parallelogram law of forces : Statement, equations for magnitude and direction of resultant, examples – Moment of force and couple – Problems.

3.   Gravitation
Newton's law of gravitation and G – Concept of acceleration due to gravity (g) – Factors affecting the value of g – Relation between g and G- Kepler's laws – Satellites : Natural and artificial – Orbital velocity and escape velocity – Polar and geostationary satellites – Applications of artificial satellites – Problems.

4. Concepts of energy
Workdone & Energy-Definition and types of energy - potential energy - kinetic energy-- K.E and Momentum relation – Law of Conservation of energy, examples - Solar energy, principle of thermal and photo conversion – Problems.

5. Thermal physics
Modes of transmission of heat - Expansion of Gases - Boyle's law - Absolute scale of temperature - Thermometric scales and their inter conversion - Charle's law - Gay-Lussac's law - Ideal gas equation - Universal gas constant (R) - Problems.

6. Sound
Sound - Nature of sound - Types of wave motion, Longitudinal and transverse – Factors affecting the velocity of sound in air - musical sound and noise - Noise pollution – Causes & effects- Methods of reducing noise pollution- Doppler effect- Echo- Reverberation-Reverberation time-Sabine 's formula - Ultrasonics & applications – SONAR - Problems.

7. Electricity & Magnetism
Concept of P.D and EMF - Ohm's law and explanation- Specific resistance- Kirchoff's laws - Wheatstone's bridge - Meter bridge.
Natural and artificial magnets – magnetic field and magnetic lines of force - Coulomb's inverse square law – Permeability – Magnetic materials – Para, dia, ferro – Examples – Problems.

8. Modern Physics
Photoelectric effect – laws of photoelectric effect – photoelectric cell - Applications of photo electric cell - Total internal reflection- Fiber optics - Principle and working of an optical fiber- Applications of optical fibers – Semiconductors : Based on Energy gap – Doping – Hole - Intrinsic and extrinsic semiconductors (n-type & p-type) – Applications of semiconductors - Superconductivity – applications – Nanotechnology definition, nano materials, applications.

REFERENCES

1. Intermediate physics - Volume - I & 2   Telugu Academy (English version)
2. Unified physics Volume 1, 2, 3 and 4   Dr. S.L Guptha and Sanjeev Guptha
3. Concepts of Physics, Vol 1 & 2   H.C. Verma
4. Text book of physics Volume I   Resnick & Holiday
5. Fundamentals of physics   Brijlal & Subramanyam
6. Text book of applied physics   Dhanpath Roy
7. NCERT Text Books of physics   Class XI & XII Standard
8. e-books/e-tools/websites/Learning Physics software

Blue Print for setting question paper at different levels

S.No	Major Topics	Weightage of Marks	Short Answer Type(Marks)			Essay Type(Marks)		
			R	U	A	R	U	A
1	Units and measurements	03	0	0	3	0	0	0
2	Statics	13	0		3	0	10	0
3	Gravitation	20	0	0	0	10	10	0
4	Concepts of energy	13	0	0	3	0	10	0
5	Thermal physics	13	0	3	0	0	0	10
6	Sound	16	0	3	3	0	10	0
7	Electricity & magnetism	16	0	3	3	0	10	0
8	Modern Physics	16	3	0	3	0	0	10
	Total:	110	3	9	18	10	50	20
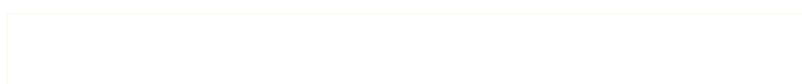
(C–23)   COMMON   C-103

UNIT TEST - I, FIRST YEAR

ENGINEERING PHYSICS

Time : 90 Minutes   *Total Marks* : 40

PART—A   16 Marks

Instructions : (i)   Answer all questions.

(ii) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1.   (i) Which among the following is a fundamental quantity.

   (a) Force (b) Momentum (c) Time (d) Density   (CO1)

(ii) Pascal is the S.I unit of pressure. (True/ False)   (CO1)

(iii) Displacement is vector quantity   (Yes/No)   (CO1)

(iv) The formula for orbital velocity is _____ (Fill in the blank) (CO2)

2.   Define absolute, relative errors and percentage errors.   (CO1)

3.   Define equal vectors, unit vector and co-initial vectors.   (CO1)
4.   A force of 100 N acts at a point at an angle of 60° to the horizontal. Find
the horizontal and vertical components of force.   (CO1)
   5.   Define natural and artificial satellites. Give one example each.   (CO2)

PART—B   24 Marks

Instructions : (i) Answer *all* questions.
            (ii) Each question carries 8 marks with interal
                  choice.

6. (a) Define concurrent and co-planar forces. Explain Lami's theorem.
                                          (CO1)
               OR
   (b)Two forces 20 N and 30N acts at a point an angle of 60°between them.
       Find the magnitude and direction of the resultant.   (CO1)

7. (a) State and explain Kepler's law of planetary motion.   (CO2)
                  OR
   (b) Define acceleration due to gravity (g). Write any three factors affecting
       Thevalueof g.   (CO2)

8. (a) Write a brief note on PSLV and GSLV.   (CO2)
                  (OR)
   (b) State Newton's universal law of gravitation and derive the relationship between g
       and G.   (CO2)

(C–23)   COMMON C-103

UNIT TEST -II, FIRST YEAR
ENGINEERING PHYSICS

Time : 90 Minutes   *Total Marks* : 40

PART—A   16 Marks

Instructions : (i)   Answer all questions.

(iii) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1   (i) Which among the following is unit of Work.

(a)   newton (b) pascal (c) joule (d) watt   (CO2)

(ii) According to Boyle's law, at constant temperature, the pressure of a gas is directly
     proportional to its volume (True/ False)   (CO3)

(iii) Velocity of sound in a medium varies with temperature   (Yes/No)   (CO3)

(iv) The S.I unit of intensity of sound _____ (Fill in the blank) (CO3)

2   Define potential energy, give one example.   (CO2)

3   Briefly write about absolute scale of temperature.   (CO3)
4   An ideal gas of given mass at temperature 100 °C occupies a volume of 240 CC at constant
pressure. Find its volume at 150 °C.   (CO3)
    5.   Write any three differences between musical sound and noise.   (CO3)

PART—B   24 Marks

Instructions : (i) Answer *all* questions.
                         (ii) Each question carries 8 marks with interal
                             choice.

6. (a) Write about solar energy and solar thermal conversion.   (CO2)
                             OR
    (b). Define kinetic energy and derive the relationship between KE and
         momentum.   (CO2)

7. (a) Write ideal gas equation and calculate the value of R for 1 gram mole
        of a gas.   (CO3)
                             OR
    (b) Define conduction, convection and radiation with one example each.
                                         (CO3)
8. (a) Write four methods of reducing an echo and four applications of
        echo.   (CO3)
                         (OR)
    (b) What are ultrasonics. Mention six applications of it.   (CO3)

(C–23)   COMMON C-103

UNIT TEST - III, FIRST YEAR

ENGINEERING PHYSICS

Time : 90 Minutes   *Total Marks* : 40

PART—A   16 Marks

Instructions : (i)   Answer all questions.

(iv) Question 1 carries 4 marks. Question numbers from (2) to (5) carries 3 marks each.

1.   (i) The unit of specific resistance is

   (a) Ω (b) Ω /m   (c) Ω -m   (d) pascal   (CO4)

(ii) Magnetic field lines are open curves. (True/False)   (CO4)

(iii) At the critical angle, the angle of refraction is equal to 90°. (Yes/No)   (CO4)

(iv) Photoeletric cell converts ____ energy into electric energy (Fill in the blank)
                     (CO4)

2.   Find the current passing through a conductor of resistance 2 Ω when P.D of 50 V is applied across it.   (CO4)

3.   State the Coulomb's inverse square law of magnetism and write the equation for it.
.   (CO4)
4.   State three laws of photo electric effect.   (CO4)
5.   Write any three applications of superconductors.   (CO4)

PART—B   24 Marks

Instructions : (i) Answer *all* questions.
                  (ii) Each question carries 8 marks with interal
                       choice.

6. (a) State and explain Kirchoff's laws.   (CO4)
              OR
   (b) Draw circuit diagram of Meter bridge. Two resistors of 10 Ω and
       30 Ω are connected in the left and right gaps of a meter bridge. Find the
       balancing length.   (CO4)

7. (a) Define para, ferro and dia magnetic materials with two examples each.
                                                        (CO4)
              OR
   (b) Explain the principle and working of an optical fiber.   (CO4)

8. (a) Explain intrinsic and extrinsic semiconductors.   (CO4)
              (OR)
   (b) Explain conductors, semiconductors and insulators based on energy gap. (CO4)

BOARD DIPLOMA EXAMINATION, (C–23)
FIRST YEAR EXAMINATION

ENGINEERING PHYSICS (C-103)

Time : 3 hours   *Total Marks* : 80

PART—A   3×10=30

Instructions : (1) Answer all questions.

(2)   Each question carries three marks.

(3)   Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Write any three advantages of S.I units. (CO1)

2. Define moment of force. Write its SI unit. (CO1)

3. Find the work done in lifting a body of mass 10 kg through a height of 20 m against gravity. (CO2)

4. Define absolute zero temperature. Convert -10 °C into Kelvin temperature. (CO3)

5. Define Doppler effect. Mention one application. (CO3)

6. Write the Sabine's formula for reverberation time and name the parameters in it.   (CO3)

7. Define specific resistance. Write its S.I unit. (CO4)

8. Write any three characteristics of magnetic lines of force. (CO4)

9. Draw a neat diagram of photoelectric cell and name the parts. (CO4)

10. Write any three applications of optical fibers. (CO4)

PART—B   10×5=50

Instructions : (1) Answer *any* five questions.

(2) Each question carries ten marks.

11. (a) State and explain triangle law of vectors. 6
    (b) A force of 100 N acts on a particle at an angle of 30° to the horizontal. Find the horizontal and vertical components of force. 4 (CO1)

12. State and explain Kepler's law of planetary motion. 10 (CO2)

13. (a) Derive the relationship between g and G.

    (b) Calculate the orbital velocity of a satellite so that it revolves around the earth if the Radius of earth = 6.5×10^6 m, mass of earth = 6×10^{24} kg and Gravitational constant G = 6.67×10^{-11} Nm^2/kg^2. 5+5 (CO2)

14. Explain the principle of solar thermal conversion and photo voltaic effect. 5+5 (CO2)

15. (a) Derive the ideal gas equation.
    (b) Volume of a gas at 27 °C is 100 CC. Keeping the pressure constant, find its volume at a temperature of 50 °C. 7+3 (CO3)

16. (a) Write any five methods of reducing noise pollution.
    (b) Define echo. Write three applications of it. 5+2+3 (CO3)

17. (a) Derive an expression for balancing condition of Wheatstone's bridge with neat circuit diagram.
    (b) The values of resistance of P, Q, R are 50 Ω, 10 Ω and 15 Ω respectively in the balanced condition of the bridge. Find the unknown resistance S. 7+3 (CO4)

18. Explain n-type and P-type semiconductors. 5+5 (CO4)

Engineering Chemistry and Environmental Studies

Course code	Course Title	No. of Periods per week	Total No. of Periods	Marks for FA	Marks for SA
104	Engineering Chemistry and Environmental Studies	3	90	20	80

S.No	Unit Title/Chapter	No of Periods	COs Mapped
1	Fundamentals of Chemistry	14	CO1
2	Solutions, Acids and Bases	16	CO1
3	Electrochemistry	12	CO2
4	Corrosion	8	CO2
5	Water Treatment	8	CO3
6	Polymers & Engineering materials	12	CO4
7	Fuels	6	CO4
8	Environmental Studies	14	CO5
	Total	90	

Course Objectives

	Course Title: Engineering Chemistry & Environmental Studies
Course Objectives	1. To familiarize with the concepts of chemistry involved in the process of various Engineering Industrial Applications. 2. To know the various natural and man-made environmental issues and concerns with an interdisciplinary approach that include physical, chemical, biological and socio cultural aspects of environment. 3. to reinforce theoretical concepts by conducting relevant experiments/exercises

Course outcomes

Course Outcomes	CO1	Explain Bohr`s atomic model, chemical bonding, mole concept, acids and bases, P^H and Buffer solutions

CO2	Explain electrolysis, Galvanic cell, batteries and corrosion	
CO3	Explain the chemistry involved in the treatment of hardness in water	
CO4	Explain the methods of preparation of polymers and chemical composition and applications of alloys, composite materials, liquid crystals and Nano materials	
CO5	Explain Global impacts due to air pollution, causes , effects and control methods of water pollution and Understand the environment, forest resources, E-Pollution and Green Chemistry Principles.	

Course code C-104	Engineering. Chemistry and Environmental studies No of Course Objectives:5			No Of periods 90	
POs	Mapped with CO No	CO periods addressing PO in Col 1 NO	%	Level 1,2,3	remarks
PO1	CO1,CO2,CO3, CO4,CO5	42	46.7 %	3	>40% level 3 (highly addressed) 25% to 40% level2(moderately addressed 5% to 25% level1 (Low addressed < 5%(not addressed)
PO2	CO1,CO2	9	10.0%	1	
PO3	CO2,CO3	8	8.9%	1	
PO4	CO1	10	11.1%	1	
PO5	CO4,CO5	13	14.4%	1	
PO6					
PO7	CO4	8	8.9%	1	

COs-POs mapping strength (as per given table)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	1			1	1	
CO2	3	2	2					1	1	
CO3	3		2	3						
CO4	3			2			2			
CO5	3				3			1		

3=strongly mapped   2= moderately mapped   1= slightly mapped   Note: The gaps in CO and PO mapping will be achieved by one or more appropriate   activities from the following:

i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes xi) Library visit for e-books

Model Blue Print with Weightage for Blooms category and questions for each chapter and COs mapped

S.No	Unit Title/Chapter	No of Periods	Weight age of marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				Mapped with CO
				R	U	Ap	An	R	U	Ap	An	
1	Fundamentals of Chemistry	14	21	15*	3	3		1½*	1	1		CO1
2	Solutions, Acids and Bases	16	21	8*	10	0	3	1½*	1		1	CO1
3	Electrochemistry	12	13	0	10	3			1	1		CO2
4	Corrosion	8	13	3	10	0		1	1			CO2
5	Water Treatment	8	13	10	0	0	3	1			1	CO3
6	Polymers & Engineering materials.	12	13	0	10	3		0	1	1		CO4
7	Fuels	6	3	0	0	3		0		1		CO4
8	Environmental Studies	14	13	0	13	0			2			CO5
	Total	90	110	36	56	12	6	5	7	4	2	

*One question of 10 marks be given with 50% weightage from unit title 1and 2

Upon completion of the course the student shall be able to learn out

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

1.0 Atomic structure

1.1 Explain the charge, mass of fundamental particles of an atom (electron, proton and neutron) and the concept of atomic number and mass number.

1.2 State the Postulates of Bohr's atomic theory and its limitations.

1.3 Explain the significance of four Quantum numbers and draw the atomic structures of Silicon and Germanium.

1.4 Explain 1. Aufbau principle, 2 Pauli's exclusion principle 3 Hund's principle.

1.5 Define Orbital of an atom and draw the shapes of s, p and d- Orbitals.

1.6 Write the electronic configuration of elements up to atomic number 30

1.7 Explain the significance of chemical bonding

1.8 Explain the Postulates of Electronic theory of valency

1.9 Define and explain Ionic and Covalent bonds with examples of NaCl , $*H_2, *O_2$ and $*N_2$. (* Lewis dot method)

1.10 List out the Properties of Ionic compounds and covalent compounds and distinguish between their properties.

2.0 Solutions, Acids and Bases

2.1 Define the terms 1. Solution, 2. Solute and 3. Solvent

2.2 Classify solutions based on solubility.

2.3 Define mole and problems on mole concept.

2.4 Define the terms 1. Atomic weight, 2. Molecular weight and 3. Equivalent weight and

calculate Molecular weight and Equivalent weight of the given acids.(HCl, H_2SO_4, H_3PO_4) Bases (NaOH, $Ca(OH)_2$, $Al(OH)_3$) and Salts (NaCl, Na_2CO_3, $CaCO_3$)

2.5 Define molarity and normality and numerical problems on molarity and normality

a) Calculate the Molarity or Normality if weight of solute and volume of solution are

given

b) Calculate the weight of solute if Molarity or normality with volume of solution are given

c) Problems on dilution to convert high concentrated solutions to low concentrated

Solutions

2.6 Explain Arrhenius theory of Acids and Bases and give the limitations of Arrhenius theory of Acids and Bases.

2.7 Define ionic product of water and pH and numerical problems on pH (Strong Acids and Bases).

2.8 Define buffer solution and classify buffer solutions with examples. Give its applications.

3.0   Electrochemistry

3.1   Define the terms 1. Conductor 2. Semiconductor 3. Insulator, 4. Electrolyte 5. Non–electrolyte. Give two examples each.

3.2   Distinguish between metallic conduction and Electrolytic conduction

3.3   Explain electrolysis by taking example fused NaCl and list out the applications of electrolysis.

3.4   Define Galvanic cell and explain the construction and working of Galvanic cell.

3.5 Distinguish between electrolytic cell and galvanic cell.

3.6 Define battery and list the types of batteries with examples.

3.5   Explain the construction, working and applications of i) Dry cell (Leclanche cell, ii) Lead storage battery iii) Lithium-Ion battery   iii) Hydrogen-Oxygen fuel cell.

4.0   Corrosion

4.1   Define the term corrosion.

4.2   state the Factors influencing the rate of corrosion

4.3   Describe the formation of a) composition cell b) stress cell c) concentration cell during corrosion.

4.4   Define rusting of iron and explain the mechanism of rusting of iron.

4.5   Explain the methods of prevention of corrosion

a) Protective coatings (anodic and cathodic coatings)

b) Cathodic protection (Sacrificial anode process and Impressed–voltage process)

5. 0   Water Treatment

5.1   Define soft water and hard water with respect to soap action.

5.2   Define and classify the hardness of water.

5.3   List out the salts that causing hardness of water(with Formulae)

5.4   State the disadvantages of using hard water in industries.

5.5   Define Degree of hardness and units of hardness(mg/L) or(ppm).

5.6   Numerical problems on hardness.

5.7   Explain the methods of softening of hard water by :a) Ion-exchange process, b) Reverse Osmosis.

6.0   Polymers & Engineering materials.

A) Polymers

6.1   Explain the concept of polymerisation

6.2   Describe the methods of polymerization a)addition polymerization of ethylene b)condensation polymerization of Bakalite (Only flow chart)

6.3   Explain the methods of preparation and uses of the following plastics:

1. PVC   2.Teflon   3. Polystyrene   4. Nylon 6,6

B) Engineering materials

6.4   Define an alloy. Write the composition and applications of the following.

1.Nichrome 2. Duraluminium 3. Stainless Steel.

6.5.   Define elastomers: Write the compostion and applications of the following

    1. Buna- S   2. Neoprene

6.6   Define Composite materials: Write the composition and applications of the following:

    1.Glass Fibre Reinforcement composites(GFR) 2. Carbon Fibre Reinforcement Composites(CFR)

6.7   Define Liquid Crystals. Classify and give applications of the following:

    1. Nematic   2. Smectic crystals

6.7   Define Nono materials. Write the composition and applications of the following:

    1. nanotubes   2. Nano crystals.

7.0   Fuels

7.1   Define the term fuel

7.2   Classify the fuels based on occurrence.

7.3   Write the composition and uses of the following:

    1. LPG   2. CNG   3. Biogas   4. Power alcohol

7.4   Write the commercial production of Hydrogen as future fuel. Give its advantages and disadvantages.

8.0   ENVIRONMENTALSTUDIES

8.1   Define the term environment and explain the scope and importance of environmental studies.

 8.2   Define   the   segments   of   environment   1).Lithosphere   2).Hydrosphere   3).Atmosphere   4).Biosphere

8.3   Define the following terms:

   1)Pollutant 2).Pollution 3).Contaminant 4)receptor 5)sink 6) particulates 7)dissolved oxygen (DO) 8)Threshold limit value (TLV) 9).BOD 10) COD   11) eco system 1 2) Producers 1 3) C onsumers

   14) Decomposers with examples.

8.4   State the renewable and non- renewable energy sources with examples.

8.5   State the uses of forest resources.

8.6   Explain the causes and effects of deforestation

8.7   Define air pollution and give its Global impacts(1) Greenhouse effect, 2) Ozone layer depletion and 3) Acid rain)

8.8   Define Water pollution. Explain the causes, effects and control methods of Water pollution.

 8.9   Define E-Pollution, State the sources of e-waste Explain its health effects and control methods.

 8.10 Define green chemistry. Write the Principles and benefits of green chemistry.

COURSE CONTENT

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES

1.   Fundamentals of Chemistry

Atomic Structure: Introduction - Fundamental particles – Bohr's theory – Quantum numbers –Aufbau principle - Hund's rule - Pauli's exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configurations of elements

Chemical Bonding: significance–Electronic theory of valency- types of chemical bonds – Ionic and covalent bond with examples–Properties of Ionic and Covalent compounds.

2.   Solutions, Acids and Bases

Solutions: Terms and Types of solutions- mole concept –numerical problems on mole concept -Methods of expressing concentration of a solution –molarity and normality – Numerical problems on molarity and normality.
Acids and Bases: Arrhenius theory of acids and bases – Ionic product of water- pH – numerical problems on pH–Buffer solutions- Classification- applications.

3.   Electrochemistry

Conductors, semiconductors, insulators, electrolytes and non-electrolytes – electrolysis of fused NaCl–-applications of electrolysis - Galvanic cell – Battery-Types- Dry Cell(Leclanche Cell),Lead Storage battery- Hydrogen –Oxygen fuel cell.

4.   Corrosion

Introduction - factors influencing corrosion - composition, stress and concentration cells–rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodic protection methods.

5.   Water technology

Introduction–soft and hard water–causes of hardness–types of hardness–disadvantages of hard water – degree of hardness (ppm and mg/lit) – Numerical problems on hardness - softening methods –   Ion- Exchange process– Reverse Osmosis.

6.   Polymers & Engineering materials

Polymers**:** concept of polymerization – types of polymerization – addition, condensation with examples –
Preparation and uses of the following plastics i).PVC ii) Teflon iii) Polystyrene iv) Nylon 6,6

Elastomers: Preparation and application of the following elastomers i)Buna-s ii) Neoprene

Engineering materials:

Alloys-composition and applications of i) Nichrome, ii)Duralluminium iii) Stainless Steel.

Composite materials- Composition and applications of i) GFR ii) CFR

Liquid Crystals-types- applications of i) Nematic Crystals ii) Smectic cyrstals

Nano meterials- Composition and applications of i) Nanotubes   ii) Nano crystals..

7. Fuels

Definition and classification of fuels–-composition and uses of i) LPG ii) CNG iii) Biogas

 iv) Power alchol

8. ENVIRONMENTALSTUDIES

Environment –scope and importance of environmental studies – important terms related to environment–renewable and non-renewable energy sources–Forest resources – Deforestation -Air pollution–Global impacts on environment –Water pollution – causes – effects – control measures-
E-Pollution- Sources-health effects-control methods. Green Chemistry- Principles-Benefits

Table specifying the scope of syllabus to be covered for Unit Test- 1, Unit Test- 2 and Unit Test -3

Unit Test	Learning outcomes to be covered
Unit Test - 1	**From 1.1 to 2.8**
Unit Test - 2	**From 3.1 to 5.7**
Unit Test - 3	**From 6.1 to 8.10**

REFERENCE BOOKS
1.   Telugu Academy   Intermediate chemistry Vol. 1&2
2.   Jain & Jain   Engineering Chemistry
3.   O.P. Agarwal,   Hi- Tech. Engineering Chemistry
4.   Sharma   Engineering Chemistry
5.   A.K. De   Engineering Chemistry

Model question paper for Unit Test with Cos mapped
UNIT TEST –I
Model Question Paper (C-23)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes   Total Marks: 40
PART-A   16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q.No. 2 to 5 should be brief and straight to the point and shall not
exceed five simple sentences.

1. a. Number electrons present in Na^+ ion is ----------   (CO1)
   b. The molarity and normality of NaOH is the same   (True or False)   (CO1)
   c. Acid with pH 6 is stronger than Acid pH 4   (True or False)   (CO1)
   d. 2s is spherical shaped orbital but 3p is ------------   (CO1)
2. Distinguish between orbit and orbital.   (CO1)
3. Define buffer solution. Give two examples.   (CO1)
4. Calculate the number of moles present 10.6 gm. of Na_2CO_3.   (CO1)
5. Draw the atomic structures of Si and Ge.   (CO1)

PART – B   3x8M = 24M
Answer either (A) or (B) from each questions from Part-B.
Each question carries 8 marks.
   6. a) Explain Postulations of Bhor's atomic theory. Give its limitations.   (CO1)
                                    (OR)
   b) Explain the significance of Quantum numbers.   (CO1)
7.   a) Define molarity normality. Calculate the molarity and normality of 10.6 gm of Na_2CO_3 present
      in 500 ml solution.   (CO1)
                                    (OR)
   b) Explain Arrhenius theory of acids and bases. Give its limitations   (CO1)
8.   a) Define ionic bond. Explain the formation of ionic bond in NaCl.   (CO1)
                                    (OR)
   b) Define solution. Explain the types of solutions based on its solubility.   (CO1)

UNIT TEST –II

Model Question Paper (C-23)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)
TIME: 90 minuts   Total Marks:40
PART-A

                                                       16 Marks

Instructions: (1) Answer all questions.
(2) First question carries 4 marks and each of rest carries 3 marks.
(3) Answers for Q. No. 2 to 5 should be brief and straight to the point and shall not

exceed five simple sentences.

1. a) Graphite is an insulator.   (True of False)   (CO2)
b) ------------ is an electrolyte in Hydrogen-Oxygen fuel cell   (CO2)
c) Zinc is more active than Iron. (True or False)   (CO2)
d) Write the Chemical formula of rust.   (CO2)
2. Write any three differences between metallic conduction and electrolytic conduction.   (CO2)
3. Write a short note on stress cell.   (CO2)
4. Define hard water. Mention any two salts that cause hardness   (CO3)
5. What is the role of salt bridge?   (CO2)

PART – B   3x8M = 24M
Answer either (A) or (B) from each questions from Part-B.
Each question carries 8 marks.

6. a) Explain construction and working of galvanic cell with neat diagram .   (CO2)
(OR)
b) Explain construction and working of Lead storage battery.   (CO2)

7. a) Calculate the temporary, permanent and total hardness of water containing the following salts:
$CaSO_4$ =13.6 mg/lit, $Mg(HCO_3)_2$ = 7.3 mg/lit , $Ca(HCO_3)_2$ = 16.2 mg/lit, $MgCl_2$ = 9.5 mg/lit   (CO3)
(OR)
b) Explain Ion-Exchange process of softening of hard water.   (CO3)

8. a) What is rusting of iron? Explain Mechanism of rusting of iron.   (CO2)
(OR)
 b) Explain cathodic protection methods.   (CO2)

UNIT TEST –III

Model Question Paper (C-20)

ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

TIME: 90 minutes   Total Marks:40
PART-A

16 Marks

Instructions: (1) Answer all questions.
            (2) First question carries 4 marks and each of rest carries 3 marks.
            (3) Answers for Q. No. 2 to 5 should be brief and straight to the point and shall not
                exceed five simple sentences.

1. a) Semiconductor Nano Crystals are called .... (CO4)
   b) Chloroprene is the monomer of Neoprene.   (True/False)   (CO4)
   c) Give any two examples for green house gases.   (CO5)
   d) Presence of ozone in stratosphere is a pollutant.   (Yes/No)   (CO5)
2. Define liquid crystals. State the types.   (CO4)
3. Write the commercial production of Hydrogen by electrolysis of water.   (CO4)
4. Define Green Chemistry. List any two benefits.   (CO5)
5. Define TLV. Give one example.   (CO5)

<div align="center">

PART – B   **3x8M = 24M**

</div>

Answer either (A) or (B) from each questions from Part-B.
Each question carries 8 marks.

6. a) Define polymerisation. Explain condensation polymerisation by taking nylon 6,6
   as an example.   .   (CO4)
                                        (OR)
   b) Define elastomers. Give a method of preparation and applications of Buna-S.   (CO4)

7. a) What is air pollution? Discuss any one of Global impacts of air pollution.   (CO5)
                                        (OR)
   b) Write the composition and uses of the following:
         i) LPG   ii) CNG   iii) Biogas   iv) Power Alcohol   (CO4)
8. a) Define e-waste. State the sources and explain e-waste management.   (CO5)
                                        (OR)
   b) Define water pollution. Write the causes of water pollution.   (CO5)

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Model Question Paper (C-23)
ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES (104)

</div>

TIME: 3hrs   Total Marks:80
<div align="center">PART-A</div>
Instructions: (1) Answer all questions. (2) Each question carries Three marks.   **3x10=30M**

1.   Draw the atomic structures of Si and Ge.   (CO1)
2.   Write the anomalous electronic configuration of Chromium and Copper.   (CO1)
3.   State the limitations of Arrhenius theory of acids and bases.   (CO1)
4.   Define solution. Classify solutions based on solubility.   (CO1)
5.   State the applications of Li-ion batteries.   (CO2)
6.   List the factors that influence the rate of corrosion of metals.   (CO2)
7.   Mention disadvantages of hard water used in industries.   (CO3)
8.   State any three applications of nanotubes.   (CO4)

9.   Write the composition and uses of LPG.   (CO4)
10.   What is e-waste? State the sources of e-waste.   (CO5)

PART – B
Instructions: (1) Answer any five questions. (2) Each question carries Ten marks.   10x5=50M

11.   Explain the significance of quantum numbers.   (CO1)

12.   Define molarity and normality. Calculate the molarity and normality
 of 250 ml of solution that contains 5.3 gm of sodium carbonate.   (CO1)

13.   a) Define ionic bond. Explain the formation of ionic bond in NaCl.   (CO1)
b) Define Buffer solution. Give any two examples and applications.   (CO1)
          14. a) Explain the construction and working of Fuel cells.   (CO2)
b) State any four differences between electrolytic cells and Galvanicl cells. (CO2)
15.   a) Explain mechanism of rusting of iron.   (CO2)
b) Write a short note on Sacrificial anodic method of prevention of corrosion. (CO2)

16.   Define hard water. Explain ion-exchange of softening of hard water
 with a neat diagram .   (CO3)

17.   a) Define elastomer. Write a method of preparation and any two
   applications of Buna-s .   (CO4)
 b) What are Liquid Crystals? Give any two examples and applications.   (CO4)

18.   a) Define deforestation. State the impacts of deforestation.   (CO5)
     b) Write a short note on Ozone layer depletion.   (CO5)

ENGINEERING MECHANICS

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-105	ENGINEERING MECHANICS	05	150	20	80

S.No.	Chapter/Unit Title	No. of Periods	COs Mapped
1	Introduction	4	CO1
2	Forces & Moments	25	CO1
3	Centroid	18	CO2
4	Moment of Inertia	23	CO2
5	Simple Stresses and Strains	40	CO3
6	Shear force and Bending Moment	40	CO4
	Total	150	

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Familiarize with the concepts of forces and their types, applications of forces and moments, calculate the geometric properties like Centroid and moment of inertia... etc., for various sections
	(ii)	Acquire the concepts of simple stresses and strains and their applications, and their relevance to mechanical properties of metals
	(iii)	Understand the effect of loading on beams, analyses Shear Force and Bending Moment of simple beams

Course Outcomes:

Course Outcomes	CO 1	C 105.1	Explain the basic concepts of Engineering Mechanics and concept of different forces & moments and applying these principles for Civil Engineering problems.
	CO 2	C 105.2	Compute the Centroid, Centre of gravity, Moment of Inertia and Radius of gyration for various sections
	CO 3	C 105.3	Calculate the simple Stresses and Strains in structural materials
	CO4	C 105.4	Explain concepts of shear force and bending moments, Compute the SF, BM values and Draws the SFD and BMD for beams.

LEARNING OUTCOMES:

Learning Outcomes	**1.0 Introduction**
	
	1.1 Define Mechanics and Engineering Mechanics
	1.2 State the applications of Engineering Mechanics
	1.3 State the branches of Engineering Mechanics
	1.3 Define the terms 1.Statics, 2.Dynamics, 3.Kinetics and 4.Kinematics
	1.4 List the systems of measurements and Units
	1.5 List S.I and M.K.S units of physical quantities used in Civil Engineering
	2.0 Forces and Moments
	2.1 Define the following terms:
	    1. Force
	    2. Moment
	    3. Resultant
	    4. Equilibrium of forces
	    5. Equilibrant
	    6. Moment of a couple
	2.2 Distinguish between
	    2.2.1 Scalar and Vector quantities
	    2.2.2 Co-planar and non-co-planar forces
	    2.2.3 Parallel and non-parallel forces
	    2.2.4 Like and unlike parallel forces
	2.3 Compute the resultant of two co-planar forces acting at a point by
	    2.3.1 Law of parallelogram of forces and
	    2.3.2 Triangle law of forces
	2.4 Explain 'Lami's Theorem' and 'Polygon Law of forces'
	    2.41 Solve simple problems using Lami's Theorem
	2.5 Explain 'Polygon Law of forces'
	    2.5.1 Compute the resultant of a system of coplanar concurrent forces by Polygon Law of forces
	    2.5.2 Define 'Resolution of forces'
	2.6. Solve problems on computation of the resultant of a system of coplanar parallel forces.
	2.7. Explain the properties of a couple.

2.8. List the conditions of equilibrium of rigid body subjected to a number of co- planar forces.

    2.8.1. Calculate resultant of co-planar concurrent forces by analytical methods.

    2.9   List various types of loads like point load, uniformly distributed load, uniformly varying load, Calculate the support reactions for simply supported beams with point loads and uniformly distributed loading

3.0   Centroid

    3.1   Define Centroid and Centre of gravity

    3.2   Distinguish between Centroid and Centre of gravity

    3.3   State the need for finding the Centroid and Centre of gravity for various engineering applications.

    3.4   Calculate the positions of Centroid for simple plane figures from first principles

    3.5   Explain the method of determining the Centroid by 'Method of moments'.

    3.6   Calculate the position of Centroid of standard Sections-T, L, I, Channel section, Z section, unsymmetrical I section

    3.7   Calculate the position of Centroid of built up sections consisting of RSJ's and flange plates and Plane figures having hollow portions

4.0. Moment of Inertia

    4.1   Define Moment of Inertia, Polar Moment of Inertia and Radius of gyration

    4.2   State the necessity of finding Moment of Inertia for various engineering applications

    4.3   Compute Moment of Inertia and Radius of gyration for regular geometrical sections like T, L, I, Channel section, Z section and unsymmetrical I section

    4.4   State 1. Parallel axes theorem and 2. Perpendicular axes theorem to determine Moment of Inertia

    4.5   Compute MI of standard sections by applying parallel axis theorem.

    4.6   Compute MI of built-up sections by applying parallel axis theorem.

    4.7   Calculate radius of gyration of standard sections.

    4.8   Compute Polar Moment of Inertia for solid and hollow circular Section by applying perpendicular axes theorem.

5.0. Simple Stresses and Strains

    5.1   Define the following terms:

        1.   Stress

	2. Strain
	3. Modulus of Elasticity
	4. Longitudinal Strain
	5. Lateral Strain
	6. Poisson's ratio
	7. Modulus of rigidity
	8. Bulk Modulus
	9. working stress,
	10. Factor of safety
	11. Resilience
	12. Strain Energy
	13. Proof resilience
	14. Modulus of Resilience
	5.2 Distinguish between different kinds of stresses and strains
	5.3 Draw the stress-strain curve for ductile materials (Mild steel) and Hence explain the salient points on the curve.
	5.4 State Hooke's law and limits of proportionality, State the factors affecting factor of safety
	5.5 Solve problems on relationship between simple stress and simple strain under axial loading on uniform bars and stepped bars.
	5.6 State the relationship among the elastic constants, Solve problems on relationship between elastic constants.
	5.7 Calculate stresses in simple and composite members under axial loading
	5.8 Define temperature stress, strain, hoops stress,
	5.9 List and explain mechanical properties of materials
	6.0 Shear force and Bending moment
	6.1 Define
	    a) Cantilever beam
	    b) Simply supported beam
	    c) Fixed beam
	    d) Continuous beam
	    e) Overhanging beam
	Define
	    a) Point Load
	    b) Uniformly Distributed Load
	Describe
	    a) Roller support
	    b) Hinged support
	    c) Fixed support

	6.2 Calculate reactions at rollers/hinged and fixed supportsfor
	1. Simply Supported beams,
	2. Cantilever beams and
	3. Overhanging beams.
	6.3 Explain a)Shear Force and b) Bending Moment
	6.4 Explain sign conventions used for drawing 1. Shear Force and2. Bending Moment
	6.5 Deduce the relationship among the rate of loading, shear force and bending moment
	6.6 Determine Shear Force and Bending Moments on Cantilever and Simply Supported beams for simple cases of loading (Point Load, Uniformly Distributed Load) analytically
	6.7 Describe the procedures for sketching the Shear Force Diagrams (SFD) and Bending Moment Diagrams (BMD)
	6.8 Sketch Shear Force Diagrams (SFD) and Bending Moment Diagrams (BMD) for Cantilever and Simply Supported Beams
	6.9 Define point of contra flexure
	6.10 Determine the Shear Force, Bending Moment and point of contra-flexure for overhanging beams and sketch Shear Force Diagrams (SFD) and Bending Moment Diagrams(BMD) for overhanging beams

PO-CO MAPPING:

C-105	ENGINEERING MECHANICS No. of COs: 04				No. of Periods: 150
POs	**Mapped with CO Nos.**	**CO periods addressing PO in Col.1**		**Level (1,2,3)**	**Remarks**
		No.	**%**		
1	CO1, CO2, CO3, CO4	55	37	2	>40% Level.3
2	CO1, CO2, CO3, CO4	65	43	3	(Highly
3	CO1, CO2, CO3, CO4	20	13	1	addressed)
4	CO2	10	07	1	25% - 40% Level.2
5					(Moderately
6					addressed
7					5% - 25% Level.1
					(Low
					addressed)
					<5% Not addressed

CO-PO MAPPING:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2					2	3	1
CO2	2	2	2	1				2	3	1
CO3	3	3	3					2	3	1
CO4	3	3	2					2	3	1
Average	2.5	2.5	2.25	1				2	3	1

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT:

1. Introduction

Mechanics-Engineering Mechanics-Applications and branches of Engineering Mechanics - Statics, Dynamics, Kinetics and Kinematics - Systems of measurements and Units - S.I and M.K.S units of physical quantities used in Civil Engineering

2. Forces & Moments

Definition of force - Vectors and Scalars - Vector representation of a force - systems of forces - Co-planar forces - Resultant of forces at a point – Parallelogram Law and Triangle Law of forces – Lami's theorem – Polygon law of forces – Resolution of forces- Parallel forces – like and unlike forces – moment of a force - units and sense-couple-moment of a couple – properties of a couple - Conditions of equilibrium of a rigid body subjected to a number of co-planar forces

3. Centroid

Definitions – Centroid - Centre of gravity - Position of Centroid of standard figures like rectangle, triangle, parallelogram circle, semi-circle and trapezium - Determination of location of Centroid of standard sections - T, L, I, Channel section, Z section and built up sections consisting of RSJs and flange plates and plane figures having hollow portion.

4. Moment of Inertia

Definition of Moment of Inertia - Perpendicular and parallel axes theorems –
Moment of Inertia of standard sections like rectangle, triangle, circle and hallow
circular sections - Moment of Inertia of built up sections- T, L, I, Channel section and Z sections using parallel axis theorem - Moment of Inertia and radius of gyration of built-up sections consisting of the combinations of RSJ's flange plates, channels & flange plates etc - Polar Moment of Inertia of solid and hallow circular sections using Perpendicular axis theorem

5. **Simple Stresses and Strains**

    Stress and strain – type of stresses and strains - Stress strain curves for ductile materials- mild steel, elastic limit, limit of proportionality, yield point, ultimate stress; breaking stress; working stress, factor of safety – Factors affecting factor of safety - Hooke's law – Young's modulus – deformation under axial load - Shear stress and Shear Strain – Modulus of rigidity -Longitudinal and lateral strain - Poisson's ratio - Bulk Modulus – relationship between elastic constants (Proof not required, only problems) - Composite sections – Effect of axial loads - Temperature stresses – strains (No problems) – Hoop stress - Resilience – strain energy-proof resilience and modulus of resilience – Mechanical properties of materials-elasticity, plasticity, ductility, brittleness, malleability, stiffness, hardness, toughness, creep, fatigue, examples of materials which exhibit the above properties.

6.0 **Shear force and bending Moment**

    Beams – Types of beams – Cantilevers – Simply supported – Overhanging – Fixed and continuous -Types of supports – Roller – Hinged – Fixed - explanation of S.F and B.M. at a section- Relation between rate of loading SF and BM - Calculation of S.F. and B.M values at different sections for cantilevers Simply supported beams - overhanging beams under point loads and uniformly distributed loads, position and significance of points of contra flexure - Drawing S.F. and B.M diagrams by analytical methods – location of points of contra flexure.

REFERENCE BOOKS:

1. Engineering Mechanics,N. H. Dubey, Tata McGraw Hill
2. Engineering Mechanics,R.S. Kurmi,S.Chand and Company Limited
3. Engineering Mechanics,R.K.Singal,M.Singal, R.SingalI.K.International
4. Engineering Mechanics-Statics,P.Dayaratnam, Tata McGraw Hill

MODEL BLUEPRINT

S.no	Chapter Title	No. of periods	Weigh-tage Allocated	Marks wise Distribution of Weightage			Question wise Distribution of Weightage			Linked with CO
				R	U	Ap	R	U	Ap	
1	Introduction	4	3	3	--	--	1	-	-	CO1
2	Forces & Moments	25	26	3	3	20	1	1	2	CO1
3	Centroid	18	13	3	--	10	1	--	1	CO2
4	Moment of Inertia	23	16	3	3	10	1	1	1	CO2
5	Simple Stresses and Strains	40	26	3	3	20	1	1	2	CO3
6	Shear force and Bending moment	40	26	3	3	20	1	1	2	CO4
	Total	**150**	**110**	**18**	**12**	**80**	**6**	**4**	**8**	

Table specifying the scope of syllabus to be covered for Unit Test-I,Unit Test-II & Unit Test -III

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 3.7
Unit Test – II	From 4.1 to 5.5
Unit Test – III	From 5.6 to 6.10

Time: 90 Minutes   **Unit Test –I**   **Maximum Marks: 40**

<div align="center">

PART- A   **16 Marks**

</div>

Instructions:

    (i) Answer all questions

    (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a)   _____& Dynamics are the branches of Engineering Mechanics   (CO1)

    (b)   The forces, which are lying in the same plane, are called as_____forces
                                                                    (CO1)

    (c)   The centroid of a semi-circle with radius 'r' lies at a distance of_____from the base (CO2)

    (d)   The cycle pedal is the example for a Collinear force (True/False)   (CO1)

2.   State the (i) Parallelogram law of forces (ii) Lami's Theorem

3.   Two forces act at an angle of 120°. The bigger force is 60 kN and the resultant is perpendicular to

    the smaller one. Find the smaller force.   (CO1)

4.   State the need for finding the centroid and centre of gravity for various engineering

    Applications   (CO2).

5.   Determine the centre of gravity of the remaining portion of a circular sheet metal of radius
50 mm, when a hole of 25 mm radius of circle is cut from the right side horizontal axis of the
50 mm radius circle   (CO2)

<div align="center">

PART- B   **3 x 8 = 24 Marks**

</div>

Instructions: **(i) Answer all questions**
                           (ii) Each question carries EIGHT marks
                           (iii) Answer should be comprehensive and the criterion for valuation is the content
                           but not the length of the answer.

6.   (A) Find the magnitude and direction of resultant force for following forces acting at a point
        (a) 30 KN due S
        (b) 25 KN due N-E
        (c) 62 KN due W
        (d) 80 KN at 60^0 E of S and
        (e) 70 KN at 40^0 S of W   (CO1)

<div align="center">

(OR)

</div>

(B) Four forces acting at a point are in equilibrium. Three of them are: 200N due S, 400N due N-E, and 500N at 30^0 east of south. Find analytically the magnitude and direction of the Fourth force. (CO1)

7.   (A) A body of weight 1000 N is suspended by two strings of 4 meters and 3 meters lengths

attached at the same horizontal level 5 meters apart. Calculate the forces in the strings. (CO1)

(OR)

(B) Five forces 20N, 30N, 40N, 50N and 60N are acting on one of the angular points of a regular hexagon towards the other five angular point taken in order. Find the magnitude and direction of the resultant force. (CO1)

8.   (A) A masonry dam is trapezoidal in section with one face vertical. The top width is a m, bottomwidth is b m and the height is h m. Find the position of centroid from the vertical face of the dam. (CO2)

(OR)

(B) Find the C.G. of an I-section with top flange 100mmX20mm, web 30mmX200 mm and

bottom flange 300mmX40mm (CO2)
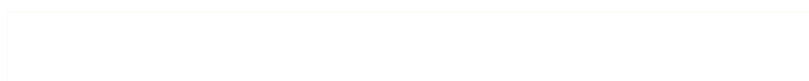
***

Time: 90 Minutes   **Unit Test –II**   **Maximum Marks: 40**

PART- A   **16 Marks**

Instructions: (i) Answer all questions

       (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) The second moment of an area is called_____   (CO2)

   (b) The formula for moment of inertia of a triangle about its base is_____   (CO2)

   (c) The stress is directly proportional to the strain within_____limit   (CO3)

   (d) The ratio between linear strain and lateral strain is called_____   (CO3)

2. The moment of inertia of a square about its base is 900 mm^4. Find the values of Ixx, Iyy and Izz for the square.   (CO2)
3. Define the terms Young's Modulus and Shear modulus   (CO3)
4. Draw Stress-Strain Curve for Mild Steel specimen and indicate salient points   (CO3)
5. Write any three relationships among elastic constants.   (CO3)

PART- B   **3 x 8 = 24 Marks**

Instructions: **(i) Answer all questions**

       (ii) Each question carries EIGHT marks

       (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6.(A) Find the Moment of Inertia of an angular section 350 x 250 x 16 mm with its long leg vertical.   (CO2)

(OR)

   (B) Determine the moment of inertia about the centroidal axes for a built - up section having four equal angle sections forming a box of size 180 mm. The single angle section is 90 mm × 90mm × 10mm. The properties of angle section A= 1047 mm^2; I$_{xx}$ = I$_{yy}$ = 8.1 × 105 mm^4, C$_{xx}$ = C$_{yy}$= 24.2 mm   (CO2)

7.(A) A steel flat of 400mm length, 80mm width and 15mm thickness is subjected to an axial compression of 150 KN. The young's modulus of steel is 2 x 105 N/mm^2 and Poisson's ratio is 0.3. Determine change in length, width and volume of flat.   (CO3)

(OR)

(B) A round bar400 mm^2 in cross sectional area and 100 mm in length is subjected to an axial thrust of 80 kN.If the length of the bar is decreased by 0.17 mm and its diameter increases by 0.01 mm. Determine the Poisson's ratio and three elastic moduli for the material of the bar.

       (CO3)

8. (A) Two channels ISLC 400 are to be placed back to back so that I_{XX} and I_{YY} of sections are equal. Determine the clear distance between back of the channels. For each channels I_{XX} =1.4 x10^8 mm^4 , I_{YY} = 4.6 x 10^6 mm^4 , A = 5800 mm^2 , C_{YY} = 30 mm.　　　　　　　　　　　(CO3)

(OR)

(B) A bar of 25 mm diameter and 600 mm long is subjected to a pull of 50 kN. The change in diameter and length was observed to be 0.03 mm and 0·30 mm. Calculate (a) Young's modulus, (b) Poission's ratio, (c) Modulus of rigidity and (d) Factor of safety if ultimate stress = 204 N/mm^2 .　　　　　　　　　(CO3)

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State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
First Year : C-105 ENGINEERING MECHANICS

Time: 90 Minutes   **Unit Test –III**   **Maximum Marks: 40**

PART- A   **16 Marks**

Instructions: (i) Answer all questions

        (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (i) The bending moment at the point of contra flexure is _____   (CO4)

    (ii) What is the bending moment at end supports of a simply supported beam?

       a) Maximum

       b) Minimum

       c) Zero

       d) Uniform   (CO4)

    (iii) How do point loads and udl be represented in SFD?

a) Simple lines and curved lines

b) Curved lines and inclined lines

c) Simple lines and inclined lines

d) Cant represent any more   (CO4)

 (iv) The parallel axis theorem gives the moment of inertia_____to the surface

      of consideration.

      a) Linear

      b) Non-Linear

      c) Perpendicular

      d) Parallel   (CO3)

2.   A wooden wheel of 2000 mm diameter is to be fitted with a steel ring of 1990 mm internal diameter. Determine (a) Stress developed in steel and (b) Minimum temperature required to fit the steel ring over wooden wheel. Take Young's modulus of steel as 2×10^5 N/ mm^2 and Co-efficient of thermal expansion as $12 \times 10^{-6}/^0$C   (CO3)

3.   Write the relationship between rate of loading, shear force and bending moment.   (CO4)

4.   A simple supported beam of span 6 m carries a uniformly distributed load of 10 kN/m over the left-hand half of the span and a concentrated load of 20 kN at a distance of 1 m from the right-hand support. Find the reaction at the supports.   (CO4)

5.   A cantilever 4 meters long carries a uniformly distributed load of 8 kN/m over a length of 2·5 m from free end. Draw the shear force and bending moment diagrams for the above loading system.   (CO4)

Instructions:

(i) Answer all questions

(ii) Each question carries EIGHT marks

(iii)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) A load of 80 kN is suddenly applied on a bar 4 m long and 1000 mm^2 in cross-section. Calculate the maximum instantaneous stress produced and strain energy stored in the bar if E = 200 GPa.   (CO3)

(OR)

   (B) An RCC column 500 mm × 450 mm in section is provided with 6 nos. of 40 mm diameter bars. The column carries an axial load of 600 kN. Find the stresses in concrete and steel and also calculate the loads shared by concrete and steel if m = 15.   (CO3)

7.(A) A cantilever of length 4 m carries a point load of 5 kN at its free end and a u.d.l. of 2 kN/m over a length of 2 m from the fixed end. Draw the SF and BM diagrams indicating their maximum values.   (CO4)

(OR)

   (B) A uniform beam of 8 m length is supported at its left hand end and at 2 m from its right hand end. Three point loads of 180 kN, 50 kN and 30 kN are carried by the beam at 2 m, 4 m and 8 m from its left support respectively. Draw SF and BM diagrams and show the values at salient points.   (CO4)

8. (A) A simply supported beam of span 8 meters carries a uniformly distributed load of 20 kN/min the right half of the beam and a concentrated load of 40 kN at a distance of 2 m from left support. Draw the shear force and bending moment diagram. Also show the maximum bending moment   .   (CO4)

(OR)

   (B) A beam of length 12 m is supported by two supports at 2 m from left end and another at 2m from right end. It carries a uniformly distributed load of 10 kN/m over its 12 m length. It is also loaded with a point load of 20 kN placed at 5 meters from left support and another point load of 4 kN placed at right face end. Draw the shear force diagram and bending moment diagram. Also determine the position and magnitudes of maximum hogging and sagging moments   (CO4)

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MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C–23)
DCE—FIRST YEAR EXAMINATION
ENGINEERING MECHANICS (C-105)

Time: 3 hours]   [Total Marks: 80

PART—A   10×3 =30 Marks

Instructions: **(1) Answer all questions.**

(2) Each question carries three marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentence

1)   Define the terms 1.Statics 2.Dynamics.   (CO1)
2)   State Parallelogram and triangle law of forces   (CO1)
3)   State the characteristics of couple.   (CO1)
4)   Distinguish between centriod and centre of gravity   (CO2)
5)   State and explain Parallel axis theorem   (CO2)
6)   Find the M.O.I of rectangle of width 200 mm and depth 400 mm about it's base   (CO2)
7)   Draw Stress-Strain Curve for Mild Steel specimen and indicate salient points   (CO3)
8)   State elastic constants and write their relationship.   (CO3)
9)   Define the terms Shear Force and Bending Moment   (CO4)
10) Obtain the expressions for maximum SF and BM for SS beam carrying UDL through its length.
                                                                                                                            (CO4)

PART – B   5 x 10 = 50 marks

Instructions:

i)   Answer any FIVE questions

ii)   Each question carries TEN marks.

iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11)   (A) Find the magnitude and direction of resultant force for following forces acting at a point
           (a) 80 KN due N
           (b) 20 KN due N-E
           (c) 40 KN due E
           (d) 60 KN at 600 E of S and
           (e) 70 KN at 600 S of W   (CO1)

12)   Find the magnitude and direction of the resultant of the two forces 80kN and 120 kN acting at a point with an included angle 60° between them. The force 120kN being horizontal
                                                                                                                            (C01)

13)   Locate the centre of gravity of given Z – section with reference to the axes OX and OY.(CO2)
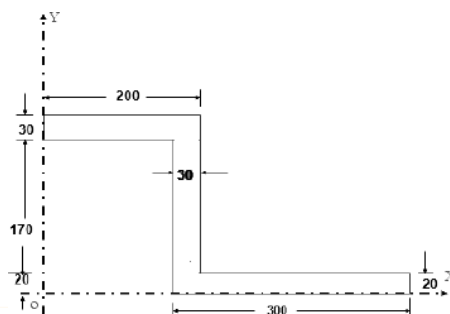
14)   Find the Moment of Inertia of an angular section 350 x 250 x 16 mm with its long leg vertical.

15) A metal bar of 3 m long and 30 mm x 80 mm in cross section is stretched by 1.5 mm under an axial pull of 60 kN. Calculate the Tensile Stress, Longitudinal strain produced and Young's modulus of the material of the bar. (CO3)

16) A steel bar 30 mm diameter is acted upon by forces as shown in the fig. Find the total elongation in the bar taking $E=2.1x10^5 \, N/mm^2$
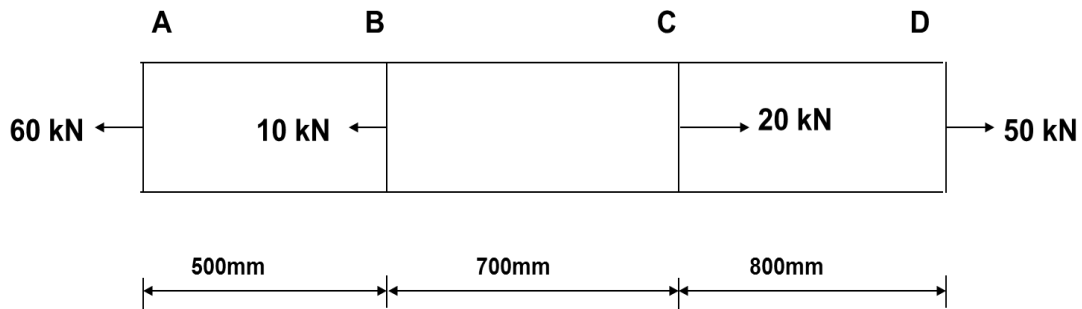
17) A cantilever 5m long carries three point loads of 20 kN, 30 kN at 1m, 2.5m and 4m respectivelyfrom free end . Draw S.F and B.M diagrams. Calculate S.F and B.M at 4.5 m from free end.   (CO4)

18) A beam of span 8m freely supported at its ends carries a UDL of 10kN/m over a length of3m from the left hand support. It also carries another UDL of 15kN/m over a length of 2m from the right hand support in addition to a point load of 30kN at its mid span. Calculate the Maximum SF and BM and draw SFD and BMD.   (CO4)

Surveying-I

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-106	SURVEYING-I	04	120	20	80

S. No.	Major Topics	No. of Periods	COs Mapped
1.	Introduction to Surveying	7	**CO1**
2.	Chain Surveying	27	**CO2**
3.	Compass Surveying	35	**CO3**
4.	Levelling	48	**CO4**
5.	Minor Instruments	03	**CO5**
	Total	**120**	

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Acquire basic knowledge about principles of surveying for location, design and construction of engineering projects.
	(ii)	Develop skills in using basic surveying instruments like measuring chains, tapes, compass, levels & minor instruments

COURSE OUTCOMES:

	CO1	C-106.1	State the fundamental principles of Surveying.
Course Outcomes	CO2	C-106.2	Explain the principle of chain surveying and Perform the operations involved in chaining on flat and sloping grounds and when high ground intervenes, Practice chain triangulation/traversing for location survey.
	CO3	C-106.3	Describe the operations involved in field compass surveying like taking bearings and calculation of included angles & traversing.
	CO4	C-106.4	Explain the fundamental principles of levelling, tabulate the levelling field data, explain computation of reduced levels, different types of

			levelling, errors involved in levelling and contours.
	CO5	C-106.5	List the various minor instruments used in surveying and their uses.

LEARNING OUTCOMES:

Learning Outcomes	**1. 0 Introduction to surveying** 1.1 State the concept of surveying. 1.2 State the purpose of surveying. 1.3 Distinguish between 1. Plane and 2. Geodetic surveying. 1.4 State the units of linear and angular measurements in Surveying and conversions. 1.5 List the instruments used for taking linear and angular measurements. 1.6 Classify different types of surveys. 1.7 State the fundamental principles of surveying. **2.0 Chain Surveying** **2.1** State the purpose and principle of Chain surveying and explain the principles used in Chain triangulation. **2.2** List different instruments used in Chain Surveying and explain their functions. **2.3** List the six points to be followed while selecting the survey stations **2.4** Define ranging and explain methods of ranging a line. **2.5** List the all operations involved in chaining on 1. Flat ground 2. Sloping ground and 3. When high ground intervenes. **2.6** Describe in detail the method of setting out right angles, explain Field work procedure in Chain survey and Method of recording field observations **2.7** List the errors and mistakes in Chain surveying and apply the corrections for measurement due to incorrect length of chain **2.8** Explain the methods of overcoming different obstacles in chain surveying. **2.9** Explain the methods of preparing site plans by Chain Surveying. **2.10** Calculate the areas of irregular boundaries using Average Ordinate rule, Trapezoidal rule and Simpson's rule. **3.0 Compass Surveying** **3.1** State the purpose and principles of Compass surveying. **3.2** Identify the parts of Prismatic Compass and state their functions **3.3** Define -Whole Circle Bearing, Quadrantal Bearing, True meridian, Magnetic meridian, True bearing, Magnetic bearing, Dip, Declination and Local attraction. **3.4** Convert Whole Circle Bearing in to Quadrantal Bearing and vice versa.

3.5 Explain local attraction and its effects.

3.6 Compute the included angles of lines in a Compass traverse and the true bearings of lines in a Compass traverse.

3.7 Explain the operations involved in field in compass Surveying.

3.8 Explain methods of recording field notes and plotting Compass Surveying.

3.9 Explain the method of plotting closed traverse adjusting closing error by Bowditch rule.

3.10 Explain errors in Compass surveying.

4.0 Levelling

4.1 Define levelling and List the types of levelling instruments, Define the terms -Datum or Datum plane, Reduced level, Level surface, Horizontal surface, Vertical Line and Station, Mean sea level ,Bench Mark

4.2 List the component parts of a dumpy level and their functions, explain the steps involved in temporary adjustments of a dumpy level, Define Back sight, Fore sight, Intermediate sight, Change Point.

4.3 List different types of levelling staves, tabulate the levelling field data, state methods of reducing levels, Compare height of instrument and Rise and fall methods, Compute reduced levels by height of instrument and Rise and fall methods, and apply check.

4.4 List the different types of Levelling, Describe in detail Profile levelling and Reciprocal levelling

4.5 State the Errors in levelling and the Precautions to be taken to prevent errors in levelling, Explain the effect of Errors due to Curvature and Refraction, Compute the error due to Curvature, Refraction and Combined error and apply correction to be applied for the above errors

4.6 List the errors eliminated in reciprocal levelling, Derive the formula for true difference in elevation and true error between two points, Calculate true difference in elevation and collimation error in reciprocal levelling

4.7 List the fundamental lines of dumpy level and state the relationship among fundamental lines of dumpy level

4.8 Explain permanent adjustments of a dumpy level (Two peg method without problems)

4.9 Define Contour, Contour interval and Horizontal equivalent, List the Characteristics and uses of contours, explain different methods of contouring and interpolation of contours

4.10 Explain the method of tracing contour gradient / alignment of hill road

5.0 Minor Instruments

5.1 Explain the need for using Minor instruments

	5.2 List various minor instruments used in surveying
	5.3 Explain the uses of the following minor instruments:
	1. Abney Level, 2. Pentagraph and 3. Electronic Planimeter

PO-CO Mapping:

Course Code : C-106	Course Title: Surveying – I Number of COs: 05				No. of Periods: 120
POs	Mapped with CO Nos	CO Periods addressing PO in Col. 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1, CO2, CO3, CO4, CO5	55	47	3	> 40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed
PO2	CO2,C03,CO4	42	34	2	
PO3					
PO4	CO2, CO4	16	13	1	
PO5	CO2	7	6	1	
PO6					
PO7					

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2							2	3	2
CO2	2	2		2	2			2	3	2
CO3	3	3						2	3	2
CO4	3	3		2				2	3	2
CO5	3							2	3	2
Average	2.6	2.67		2	2			2	3	2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT:

1.0   Classification and Principles of Surveying

Definition-Concept of Surveying-purpose of Surveying-Divisions of surveying- Classification of Surveying based on different criteria– Fundamental principles in Surveying - Measurements- Units and conversions-Instruments used for taking linear and angular measurements

2.0   Chain Surveying

Purpose and Principle of Chain Surveying -Suitability of Chain Surveying-Survey stations and their selection-Survey lines and offsets – Instruments used in Chain survey and their function - Ranging a survey line- direct ranging and Indirect ranging –Chaining a line –Duties of leader and follower- Setting out right angles with cross staff and Optical square- Cross staff survey Fieldwork procedure- Recording field notes – field book -Conventional signs - Obstacles in chain survey -methods to overcome obstacles (No problems) -Calculations of area – different methods – Problems by using Average ordinate, Trapezoidal and Simpson's rules.

3.0   Compass Surveying

Introduction, Purpose, principle and uses of compass Survey-Traverse-Open and Closed Traverse –Theory of magnetism-Description working and use of Prismatic compass- Operations in using Compass before taking readings - Concept of Meridian-Types of meridians-Bearing and angle- Designation of bearings- Whole Circle Bearing. Quadrantal Bearing Conversions-Field work in Compass Survey –field notes-traverse using prismatic compass -Local attraction-detection and correction, Dip and Magnetic declination- Variation of Magnetic declination - calculation of true bearings-Determination of included angles from the given bearings and vice versa in compass traverse- Precautions in using a Compass-Errorsin Compass Surveying.

4.0   Levelling

Levelling – Types of levelling instruments – component parts of a dumpy level and their functions – Definitions of important terms used in Levelling – level surface, level line, plumb line, horizontal line, axis of telescope, line of collimation, back sight, fore sight, intermediate sight, station and change point – Temporary adjustments of a dumpy level – types of Levelling Staves - Bench marks – different types of bench marks - Booking of readings in field book – Determination of Reduced levels by height of instrument and Rise and Fall methods – Comparison of methods – Problems-Missing Entry - Calculations-Problems - Classification of Levelling – detailed description of profile levelling - Errors due to curvature and refraction and combined correction (Noproblems) - Contouring – contour, contour interval and horizontal levelling equivalent – Characteristicsof contours – methods of contouring – Block contouring – Radial contouring – interpolationof contours – uses of Contour maps –Marking alignment of roads, railways and canals - Fundamental lines of dumpy level and theirrelations

5.0   Minor instruments

Purpose of Minor instruments- Various minor instruments- Uses of Abney Level, Pentagraph and Electronic Planimeter .

REFERENCE BOOKS :
1)   Surveying - I &II,Dr.B.C. Punmia,Lakshmi Publications Pvt Ltd
2)   Surveying-I &II,Dr.K.R.Arora,Standard Book House
3)   Surveying and levelling - I & II,T.P Kanetkar&S.V.Kulakarni,Pune VidhyardhiGrihaPrakasan`
4)   Text book of surveying, Dr.C.Venktramaiah,Universities Press
5)   Surveying& Levelling,N.N.Basak,TMH

MODEL BLUE PRINT

S.No.	Chapter name	Periods allocated	Weightage of Marks allotted	Marks wise distribution of weightage			Periods wise distribution of weightage			CO'S MAPPED
				R	U	Ap	R	U	Ap	
1	Introduction to surveying	7	13	3	0	10	1	0	1	CO1
2	Chain Surveying	27	26	3	3	20	1	1	2	C02
3	Compass Surveying	35	26	3	3	20	1	1	2	CO3
4	Levelling	48	42	6	6	30	2	2	3	CO4
5	Minor Instrument s	3	3	3	0	0	1	0	0	CO5
	TOTAL	120	110	18	12	80	6	4	8	

R-remember   U-Understanding   Ap-Application

Table specifying the scope of syllabus to be covered for Unit Test-I,Unit Test-II & Unit Test -III

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 2.10
Unit Test – II	From 3.1 to 4.3
Unit Test – III	From 4.4 to 5.3

Model Paper for Unit Test-I :
State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
First Year :C-106 SURVEYING-I

Time: 90 Minutes   **Unit Test –I**   **Maximum Marks : 40**

PART- A   **16 Marks**

Instructions :

    (i) Answer all questions

    (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(a) Marine survey deals with water bodies for the purpose of navigation, water supply, harbour
    works etc. (TRUE/FALSE)   (CO1)

  (b) Number of links in 30 m metric chain is_____   (CO2)

  (c) Optical square is used to establish_____   (CO2)

  (d) The method performed to set out perpendicular using chain alone is_____   (CO2)

2. State fundamental principles of surveying.   (CO1)

3. Define plane surveying and Geodetic surveying.   (CO1)

4. Define Base line, check line and Tie line.   (CO2)

5. What are the instruments used in chain surveying.   (CO2)

PART- B   **3 x 8 = 24 Marks**

Instructions :(i) Answer all questions

       (ii) Each question carries EIGHT marks

       (iii) Answer should be comprehensive and the criterion for valuation is the content

       but not the length of the answer.

6. (A) Plot the following cross staff survey of a field ABCDEFG and calculate its area in hectares.

                                                      (CO2)

                      (OR)
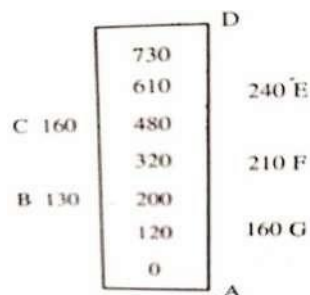
  (B) Explain with sketches the method of direct and indirect ranging..   (CO2)

7. (A) A chain was tested before starting the survey and was found to be 20m. At the end of the survey it was tested again and found to be 20.12m. Area of the plan of the field drawn to a scale of 10mm=6m, was 5040sqm. Find the true area of the field in Square meters.(CO2)

(OR)

(B) A survey line ABDE intersects a building between B and D. To overcome the obstacle a perpendicular BC 90m long, is set out at B. From C, two lines CD and CE are set out at angles 45° and60° respectively with CB. Find the lengths CD and CE such that points D and E fall on the prolongation of line AB. Also find the obstructed distance BD. (CO2)

8. (A) The following perpendicular offsets were taken from a survey to a hedge. (CO2)

Distance (m)	0	5	10	15	20	30	40	55	70
Offset (m)	3.29	4.05	6.23	5.75	4.76	5.26	4.32	3.92	2.91

Find the area between the survey line and the hedge by Trapezoidal rule and Simpsons rule.

(OR)

(B) What are the types of obstacle in chaining? Explain by any two methods how chaining is continued when a river comes across a chain line. (CO2)

-OO

Time: 90 Minutes	Unit Test –II	Maximum Marks : 40

	PART- A	**16 Marks**

Instructions :(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) Whole circle bearing of a line is 354°30'then Quadrantal bearing is _____   (CO3)

    (b) Line joining points of same declination is called_____   (CO3)

    (c) The arithmetical check formula in the case of Height of Instrument method of reduction of levels is_____   (CO4)

    (d) The readings taken on a staff at which instrument shifted is called_____(CO4)

2. Calculate back bearings for the following fore bearing of the lines.   (CO3)

    (i) 310°30'   (ii) 145°15'   (iii) 210°30'

3. Convert following Quadrantal bearings into whole circle bearings: (CO3)

    (i) N 45°15' E   (ii) S 45°20' E   (iii) S 10°45' W

4. Define the following terms: (CO4)

    (i) Back sight   (ii) Fore sight   (iii) Change point

5. Define (i) Level surface   (ii) Datum.   (CO4)

|	**PART- B**	**3 x 8 = 24 Marks**

Instructions :   **(i) Answer all questions**

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Draw the neat sketch of prismatic compass and explain the function of parts

(OR)   (CO3)

   (B) The bearings of the sides of the traverse ABCDEA are given below. Sketch and compute interior angles of the traverse.   (CO3)

Line	FB	BB
AB	110°15'	290°15'
BC	35°15'	215°15'
CD	276°30'	96°30'
DE	195°30'	15°30'
EA	132°15'	312°15'

7. (A) The following bearings were observed in a closed traverse ABCDA. Identify the stations effected by local attraction and correct it. (CO3)

Line	FB	BB
AB	46°10′	226°10′
BC	119°20′	298°40′
CD	169°30′	351°10′
DA	280°20′	99°20′

(OR)

(B). What are the instrumental errors that normally occur in doing survey with prismatic compass? How they can be avoided. (CO3)

8. (A) Draw the neat sketch of Dumpy level and mention its parts (CO4)

(OR)

(B) The following observations were observed on a continuously sloping ground:
0.605, 1.105, 1.895, 2.300, 0.950, 1.340, 1.975, 0.760, 1.785, 0.905 and 1.235.

The R.L of first point was 120.650.

Enter the readings properly into the levelling field book proforma. Reduce the levels by Height of Instrument method and Rise and Fall method. Apply the arithmetical check. (CO4)

-oOo

Time: 90 Minutes   Unit Test –III   Maximum Marks : 40
                                    PART- A   **16 Marks**

Instructions :
   (i) Answer all questions
   (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) B.S = 1.525 and R.L of B.M=+100.000 then Height of the Instrument is_____(CO4)

     (b) Line joining the points of same elevation is called_____   (CO4)

     (c) Level difference between any two consecutive contours is called _____ (CO4)

     (d) Pentagraph is used to _____   (CO5)

2.   Define (i) Contour interval and (ii) Contour gradient.   (CO4)

3.   What is reciprocal levelling? When it is resorted to?   (CO4)

4.   State any three characteristics of contours.   (CO4)

5.   State any three uses of Abney level.   (CO5)

                            PART- B   **3 x 8 = 24 Marks**

Instructions :   (i)   Answer all questions
              (ii) Each question carries EIGHT marks
              (iii) Answer should be comprehensive and the criterion for valuation is the content
              but not the length of the answer.

6. (A) The following reciprocal levels were taken with Dumpy level.   (CO4)

Instrument at	Staff readings on		Remarks
	A	B	AB = 1200m
A	1.156	2.597	RL of A = +625.555
B	0.987	2.418	

Find (i) True level difference between A and B (ii) RL of B (iii) The combined correction for curvature and refraction and (iv) The error in collimation adjustment of the level.

(OR)

(B) Describe briefly the effect of curvature and refraction in levelling. Derive an expression forcurvature correction, refraction correction and for combined correction.   (CO4)

7. (A) The following is the page of a level book entered in pencil. Some of the entries got erased, and have been marked with crosses. Calculate the missing readings. (CO4)

Station	BS	IS	FS	Rise	Fall	RL
1	x					150.000
2		2.457		0.827		X
3		2.400		x		X
4	2.697		x		x	148.070
5	x		2.051			148.716
6		2.500				149.784
7		2.896				149.388
8		x			0.124	X
9			2.672			149.612

(OR)

(B) The following observations were taken during the testing of a dumpy level. (CO4)

Instrument Near to	Staff Readings on	
	A	B
A	1.275	2.005
B	1.040	1.660

Is the instrument in adjustment? To what reading should the line of collimation be adjusted when the instrument is near to B.

8. (A) Workout the difference in levels between points A and B if curvature and refraction effects are taken into account in the following case: (CO4)

Level is setup over A, and the staff held at B

RL of A = 150.000,

Height of the Instrument at A = 1.000

Reading of staff at B = 1.800

Distance AB = 500m

(OR)

(B) The areas enclosed by the contours in a lake are as follows: (CO4)

Contour (m)	270	275	280	285	290
Area (sqm)	2050	8400	16300	24600	31500

Calculate the volume of water between the contours 270m and 290m by (i) Trapezoidal formula (ii) Prismoidal formula.

***

MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C–23)

DCE—FIRST YEAR EXAMINATION

SURVEYING-I (C-106)

<u>Time: 3 hours]</u>   [Total Marks: 80

PART—A   **10×3=30 Marks**

Instructions: **(1)   Answer all questions.**

(2) Each question carries three marks.

(3) **Answers should be brief and straight to the point and shall not exceed** *five* **simple sentence**

1)   State the Classification of Survey based on the Instruments used.   (CO1)

2)   What are the equipment used in Chain surveying?   (CO2)

3)   What is an Offset? Distinguish between perpendicular and oblique offsets.   (CO2)

4)   Distinguish between Magnetic bearing and True bearing of a Survey line.   (CO3)

5)   Convert the following Whole Circle Bearings to Quadrantal Bearings.

(i) $25^0 30'$ (ii) $165^0 20'$ (iii) $312^0 45'$ (CO3)

6)   Define (i) Back Sight (ii) Fore Sight (iii) Intermediate Sight   (CO4)

7)   State the relationship between the Fundamental Lines of a Level.   (CO4)

8)   Write the differences between Height of Inst and Rise and Fall methods.   (CO4)

9)   State any three uses of Contour Maps.   (CO4)

10) State any three uses of Abney Level.   (CO5)

PART – B   **5 x 10 = 50 marks**

Instructions:

i)   Answer any FIVE questions

ii)   Each question carries TEN marks.

iii)   Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11) State the fundamental principles of Surveying   (CO1)

12) From the following Cross Staff Survey of Field ABCDEFG and calculate its Area in Hectares. The readings are in meters.   (CO2)

121
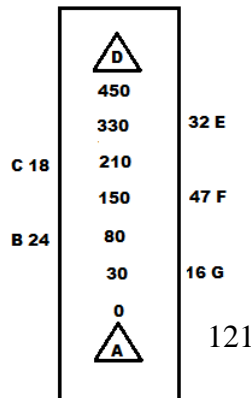
13) Calculate the area enclosed between the chain line and the irregular boundary using Trapezoidal and Simpson's rule from the data given. (CO2)

Distance(m)	0	3	6	9	12	15	18	21	24
Offset (m)	048	1.36	1.57	3.1	2.65	2.05	1.98	1.56	0.85

14) Draw a neat sketch of a Prismatic Compass and explain the function of the parts. (CO3)

15) The following bearings were observed in running a compass traverse. (CO3)

Line	F.B.	B.B.	Line	F.B.	B.B.
AB	$45^0 15'$	$225^0 15'$	BC	$123^0 15'$	$303^0 15'$
CD	$181^0 00'$	$1^0 00'$	DA	$289^0 30'$	$109^0 30'$

Calculate the interior angles of the traverse)(CO4)

16) The following readings were observed successfully with a levelling Instrument. The Instrument was shifted after 5th and 11th readings. Draw up a page of Level book and determine the R.L. of various points if R.L. of first reading was 158.340 m. Use Height of Collimationmethod.

0.475, 1.015, 1.625, 3.185, 3.925, 0.565, 1.275, 1.805, 2.495, 3.410, 3.785, 1.745, 0.615 and 0.580. (CO4)

17) Explain Contouring by i) Method of Squares and ii) Cross-Section Method. (CO4)

18) The following is the page of a level book entered in pencil. Some of the entries got erased, and have been marked with crosses. Calculate the missing readings. (CO4)

Station	BS	IS	FS	Rise	Fall	RL
1	x					150.000
2		2.457		0.827		X
3		2.400		x		X
4	2.697		x		x	148.070
5	x		2.051			148.716
6		2.500				149.784
7		2.896				149.388
8		x			0.124	X
9			2.672			149.612

ENGINEERING DRAWING

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-107	ENGINEERING DRAWING	06	180	40	60

S.No	Major Topics	Periods	COs Mapped
1	Importance of Engineering Drawing	01	**CO1**
2	Engineering Drawing Instruments	05	**CO1**
3	Free hand lettering & Numbering	06	**CO1**
4	Dimensioning Practice	09	**CO1**
5	Geometrical constructions	21	**CO2**
6	Projections of points, Lines, Planes & Solids	21	**CO3**
7	Auxiliary views	6	**CO3**
8	Sections of Solids	27	**CO3**
9	Orthographic Projections	33	**CO3**
10	Isometric Views	30	**CO4**
11	Development of surfaces	21	**CO5**
	Total	**180**	

COURSE OBJECTIVES:

Upon completion of the course the student shall able to	
Course Objectives	understand the basic graphic skills and use them in preparation of engineering drawings, their reading and interpretation

COURSE OUTCOMES:

Course Outcomes	CO1	C-107.1	Practice the use of engineering drawing instruments and Familiarise with the conventions to be followed in engineering drawing as per BIS
	CO2	C-107.2	Construct the i) basic geometrical constructions ii) engineering curves
	CO3	C-107.3	Visualise and draw the orthographic projections of i) Points ii) Lines iii) Regular Planes iv) Regular Solids V) Sections of Regular Solids .
	CO4	C-107.4	Visualise and draw the isometric views of objects .
	CO5	C-107.5	Draw the developments of surfaces of regular solids and thereby the components used in daily applications

LEARNING OUTCOMES:

Learning Outcomes	**1.0** Understand the basic concepts of Engineering Drawing **1.1** State the importance of drawing as an engineering communication medium
	1.2 State the necessity of B.I.S. Code of practice for Engineering Drawing.
	1.3 Explain the linkages between Engineering drawing and other subjects of Mechanical Engineering **2.0 Use of Engineering Drawing Instruments** **2.1** Select the correct instruments to draw the different lines / curves **2.2** Use correct grade of pencil to draw different types of lines and for

different purposes

2.3 Select and use appropriate scales for a given application.

2.4 Identify different drawing sheet sizes as per I.S. and Standard Lay- outs.

2.5 Prepare Title block as per B.I.S. Specifications.

2.6 Identify the steps to be taken to keep the drawing clean and tidy.

Drawing Plate 1: (Having two exercises)

3.0   Write Free Hand Lettering and Numbers

3.1 Write titles using sloping lettering and numerals of 7mm, 10mm and 14mm height

3.2 Write titles using vertical lettering and numerals of 7mm, 10mm and 14mm height

3.3 Select suitable sizes of lettering for different layouts and applications

Drawing plate 2: (Having 5 to 6 exercises)

4.0 Understand Dimensioning Practice

4.2 Acquaint with the conventions, notations, rules and methods of dimensioning in engineering drawing as per the B.I.S.

4.3 Dimension a given drawing using standard notations anddesiredsystem of dimensioning.

Drawing Plate 3: (Having 08 to10 exercises)

5.0 Apply Principles of Geometric Constructions

5.1 Practice the basic geometric constructions like

i) dividing a line into equal parts

ii) exterior and interior tangents to the given two circles iii) tangent arcs to two given lines and arcs

5.2 Draw any regular polygon using general method when

i) side length is given   ii) inscribing circle radius is given

iii) describing circle radius is given

 5.3   Draw the conics using general and special methods,

 5.4   Draw the engineering curves like i) involute ii) cycloidiii) helix

5.5 Identify the applications of the above constructions in engineering practice.

Drawing Plate -4: Having problems up to construction of polygon

Drawing Plate -5: Having problems of construction of conics

Drawing Plate -6: Having problems of construction of involutes, cycloid and helix

6.0 Apply Principles of Projection of points, lines, planes &auxiliary planes

6.1 Explain the basic principles of the orthographic projections

6.2 Visualise and draw the projection of a point with respect to reference planes (HP&VP)

6.3 Visualise and draw the projections of straight lines with respect to two reference Planes (up to lines parallel to one plane and inclined to other plane)

6.4 Visualise and draw the projections of planes (up to planes

perpendicular to one plane and inclined to other plane)

6.5   Identify the need of Auxiliary views for a given engineering drawing.

6.6   Draw the auxiliary views of a given engineering component

Drawing Plate -7: Having problems up to projection of points and Lines (15 exercises)

Drawing Plate -8: Having problems of projection of planes (6 exercises)

Drawing Plate -9: Having problems on auxiliary planes (Having 4 exercises)

7.0   Draw the Projections of Solids

7.1   Visualise and draw the projections of solids (up to axis of solids parallel to one plane and inclined to other plane)

Drawing plate No.10: Having problems of projection of solids (10 exercises)

8.0   Appreciate the need of Sectional Views

8.1   Identify the need to draw sectional views.

8.2   Differentiate between true shape and apparent shape of section

8.3   Draw sectional views and true sections of regular solids by applying the principles of hatching.

Drawing Plate–11: Having problems of section of solids (6 exercises)

9.0   Apply principles of orthographic projection

9.1   Draw the orthographic views of an object from its pictorial drawing.

9.2   Draw the minimum number of views needed to represent a given object fully.

Drawing Plate 12 : (Having 10 to 12 exercises)

10.0 Prepare pictorial drawings

10.1 identify the need of pictorial drawings.

10.2 Differentiate between isometric scale and true scale.

10.3 Prepare Isometric views for the given orthographic drawings.

Drawing plate 13: (Having 10 to 12 exercises)

11.0 Interpret Development of surfaces of different solids

11.1 State the need for preparing development drawing.

11.2 Draw the development of simple engineering objects (cubes, prisms, cylinders, cones, pyramid) using parallel line and radial line method.

11.3 Prepare development of surface of engineering components like i) funnel ii) 90^0 elbow

Drawing plate No. 14: (Having 05 exercises)

PO-CO Mapping

Course Code : C-107	Course Title ENGINEERING DRAWING Number of Course Outcomes: 06			No. of Periods 180	
POs	**Mapped with CO No.**	**CO Periods addressing PO in**		**Level (1,2,3)**	**Remarks**
		Column 1			
		No	**%**		
PO1	CO1, CO2, CO3, CO4, CO5	12	7	1	>40% Level.3 (Highly addressed)
PO2	CO1, CO2, CO3, CO4, CO5	12	7	1	25% - 40% Level.2 (Moderately addressed)
PO3	CO1, CO2, CO3, CO4, CO5	72	40	3	(Moderately addressed)
PO4	CO1, CO2, CO3, CO4, CO5	72	40	3	
PO5					5% - 25% Level.1 (Low addressed)
PO6	CO1, CO2, CO3, CO4, CO5	12	6	1	
PO7					<5% Not addressed

CO-PO Mapping

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	3	3		2		1	2	2
CO2	2	3	3	3		2		1	2	2
CO3	3	2	3	3		3		1	2	2
CO4	3	2	3	3		3		2	2	2
CO5	3	2	3	3		3		2	2	2
Average	2.6	2.2	3	3		2.6		1.4	2	2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

Key competencies to be achieved by the student

S.No	Major topic	Key Competency
1.	Importance of Engineering Drawing	• Explain the linkages between Engineering drawing and other subjects of study in Diploma course.
2.	Engineering Drawing Instruments	• Select the correct instruments to draw various entities in different orientation
3.	Free hand lettering & Numbering	• Write titles using sloping and vertical lettering and numerals as per B.I.S (Bureau of Indian standards)

4.	Dimensioning Practice	• Dimension a given drawing using standard notations and desired system of dimensioning
5.	Geometrical construction	• Construct ellipse, parabola, rectangular hyperbola, involute, cycloid and helix from the given data.
6.	Projection of points, Lines, Planes & Solids	• Draw the projections of points, straight lines, planes & solids with respect to reference planes (HP& VP)
7.	Auxiliary views	• Draw the auxiliary views of a given Engineering component • Differentiate between Auxiliary view and apparent view
8.	Sections of Solids	• Differentiate between true shape and apparent shape of section • Apply principles of hatching. • Draw simple sections of regular solids
9.	Orthographic Projection	• Draw the minimum number of views needed to represent a given object fully.
10.	Pictorial Drawings	• Differentiate between isometric scale and true scale. • Draw the isometric views of given objects,.
11.	Development of surfaces	• Prepare development of Surface of regular solids and other components like i) funnel ii) 90^0 elbow

COURSE CONTENT

NOTES: *1.B.I.S Specification should invariably be followed in all the topics.*

     2. A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.

1.0   The importance of Engineering Drawing

Explanation of the scope and objectives of the subject of Engineering Drawing Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46 –1988 – Mention B.I.S - Role of drawing in -engineering education – Link between Engineering drawing and other subjects of study.

2.0   Engineering drawing Instruments

Classifications: Basic Tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – Mentioning of names under each classification and their brief description -Scales: Recommended scales reduced & enlarged -Lines: Types of lines, selection of line thickness - Selection of Pencils - Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet, Drawing plate: Lay out of sheet – as per SP-46-1988 to a suitable scale - Simple Exercises on the use of Drawing Instruments. Importance of Title Block.

3.0   Free hand lettering & numbering

Importance of lettering – Types of lettering -Guide Lines for Lettering - Practicing of letters &numbers of given sizes (7mm, 10mm and 14mm) -Advantages of single stroke or simple style of lettering - Use of lettering stencils

4.0   Dimensioning practice

Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object -Definition of Dimensioning size description -Location of features, surface finish, fully dimensioned Drawing -Notations or tools of dimensioning, dimension line extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools -Placing dimensions: Aligned system and unidirectional system (SP-46- 1988)- Arrangement of dimensions Chain, parallel, combined progressive, and dimensioning by co-ordinate methods-The rules for dimensioning standard, features "Circles (holes) arcs, angles, tapers, chamfers, and dimension of narrow spaces.

5.0   Geometric Construction

Division of a line: to divide a straight line into given number of equal parts -Construction of tangent lines: to draw interior and exterior tangents to two circles of given radii and centre distance -Construction of tangent arcs: -i) To draw tangent arc of given radius to touch two lines inclined at given angle (acute, right and obtuse angles)-ii)Tangent arc of given radius touching a circle or an arc and a given line-iii)Tangent arcs of radius R, touching two given circles internally and externally -Construction of polygon: construction of any regular polygon by general method for given side length, inscribing circle radius and describing/superscribing circle radius - Conics: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and a loci of a moving point, Eccentricity of above curves – Their Engg. Applications viz., Projectiles, reflectors, P-V Diagram of a Hyperbolic process - Construction of any conic section of given eccentricity by general method -Construction of ellipse by concentric circles method, Oblong Method and Arcs of circles method -Construction of parabola by rectangle method and Tangent method -Construction of rectangular hyperbola - General Curves: Involute, Cycloid and Helix, explanations as locus of a moving point -their engineering application, viz., Gear tooth profile, screw threads, springs etc. –their construction

6.0   Projection of points, lines and planes & solids

Classification of projections, Observer, Object, Projectors, Projection, Reference Planes, Reference Line, Various angles of projections –Differences between first angle and third angle projections -Projections of points in different quadrants -Projections of straight line – (a)Parallel to both the planes (b)Perpendicular to one of the planes (c)Inclined to one plane and parallel to other planes - Projections of regular planes - (a) Plane parallel to one of the reference planes - (b) Plane perpendicular to HP and inclined to VP and vice versa - Projections of regular solids - (a) Axis perpendicular to one of the planes (b)Axis parallel to VP and inclined to HP and vice versa.

7.0   Auxiliary views

Need for drawing auxiliary views -Explanation of the basic principles of drawing an auxiliary views explanation of reference plane and auxiliary plane -Partial auxiliary view.

8.0   Sections of Solids

Need for drawing sectional views – what is a sectional view - Hatching – Section of regular solids inclined to one plane and parallel to other plane

9.0   Orthographic Projections

Meaning of orthographic projection -Using a viewing box and a model – Number of views obtained on the six faces of the box, - Legible sketches of only 3 views for describing object - Concept of front view, top view, and side view sketching these views for a number of engg objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of miter line in drawing a third view when other two views are given -Method of representing hidden lines -Selection of minimum number of views to describe an object fully.

10.0   Pictorial Drawings

Brief description of different types of pictorial drawing viz., Isometric, oblique, and

Perspective and their use - Isometric drawings: Iso axis, angle between them,

meaning of visual distortion in dimensions - Need for an isometric scale, difference

between Isometric scale, and ordinary scale difference between Isometric view and

Isometric projection - Isometric and non-Isometric lines -Isometric drawing of

common features like rectangles, circular - shapes, non-isometric lines - Use of box

and offset methods.

11.0   Development of Surfaces

Need for preparing development of surface with reference to sheet metal work-Concept of true length of a line with reference to its orthographic projection when the line is (i) parallel to the plane of projection (ii) inclined to one principal and parallel to the other - Development of simple solids like cubes, prisms, cylinders, cones, pyramid and truncation of these solids-Types of development: Parallel line and radial line development -Procedure of drawing development of funnels, 90^0 elbow pipes.

REFERENCE BOOKS:

1.   Engineering Drawing,N.D.Bhatt, Charotar Publications   :

2.   Engineering Graphics ,P I Varghese, McGraw-hill

3.   Engineering Drawing,Basant Agarwal & C.M Agarwal,McGraw-hill

4.   SP-46-1998, Bureau of Indian Standards.

S. No	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage			Question wise Distribution of Weightage			CO's Mapped
				R	U	Ap	R	U	Ap	
1	Importance of Engineering Drawing	1	-							CO1
2	Engineering Drawing Instruments	5	-							CO1
3	Free hand lettering & Numbering	6	5		5			1		CO1
4	Dimensioning Practice	9	5		5			1		CO1
5	Geometrical constructions	21	15		5	10		1	1	CO2
6	Projections of points, Lines, Planes & Solids	21	10			10			1	CO3
7	Auxiliary views	6	5		5			1		CO3
8	Sections of Solids	27	10			10			1	CO3
9	Orthographic Projections	33	10			10			1	CO3
10	Isometric Views	30	10			10			1	CO4
11	Development of surfaces	21	10			10			1	CO5
	Total	180	80		20	60		4	6	

Table specifying the scope of syllabus to be covered for Unit Test-I, Unit Test-II & Unit Test -III

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 6.6
Unit Test – II	From 7.1 to 7.9
Unit Test – III	From 10.1 to 11.3

MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C–23)
DCE—FIRST YEAR EXAMINATION
ENGINEERING DRAWING (C-107)

<u>Time: 3 hours]</u>   [Total Marks: 60
PART—A   (4 X 5 = 20 Marks)

Instructions: **(1) Answer all questions.**
                     (2)   Each question carries five marks.
                     (3)   All dimensions are in mm.

1.   Write the following in single-stroke vertical lettering of size 10 mm in capital letters:
        "CLEANAND GREEN IS OUR PERFECT DREAM"   (CO1)

2.   Redraw the following figure to full-scale and dimension it according to SP : 46—
        1988byusingalignedsystem:
                   (CO1)
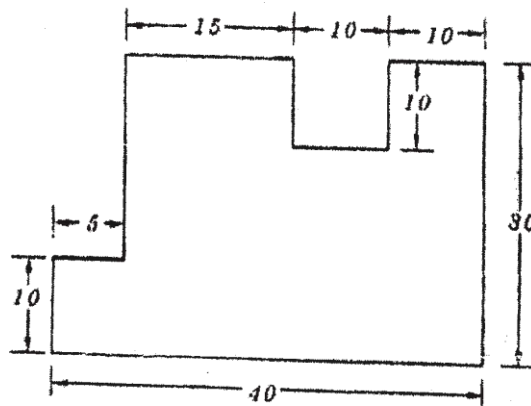
3.   Drawacommonexternaltangenttotwocirclesofradii25 mm and 20 mm. The distance between
        hecentresofcirclesis75mm.   (CO2)

4.   Draw the auxiliary view of the objects given below: (CO3)
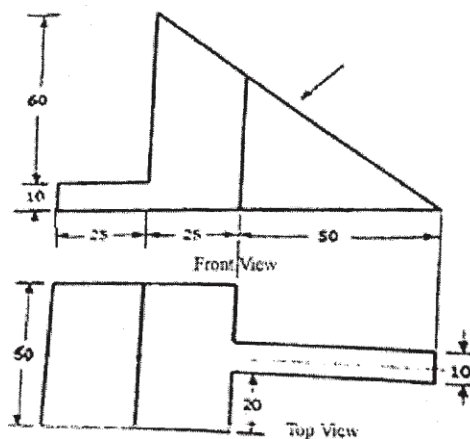
PART—B (4 x 10=40)

Instructions*: **(1) Answer** *any* **four questions.**

(2) Each question carries ten marks.

(3) All dimensions are in mm.

5. Drawahelixofcylinderdiameter50mmandpitch70mm. (CO2)

6. Draw the top view and front view of a circular plane, if the surface of the plane is perpendicular to HP and inclined at 30º to VP.

(CO3)

7. A hexagonal pyramid of base side 30 mm and axis 75 mm long is resting on its base in HP having a base side parallel to VP. It is cut by a section plane which is inclined at 30º to HP, perpendicular to VP and passing through a point on the axis at a distance of 35 mm from the vertex. Draw its sectional front view and sectional top view. (CO3)

8. Draw the Front view, top view and side view of the given figure: (CO3)
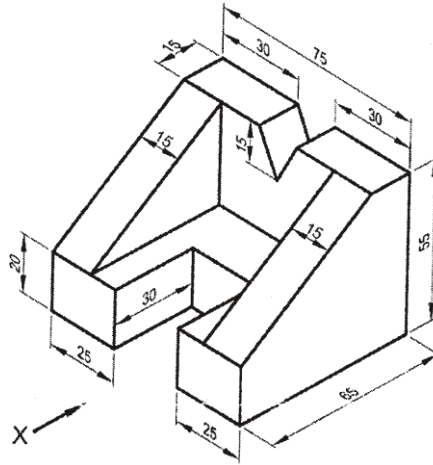
9. Draw the isometric view of the object for the views given below. (CO4)
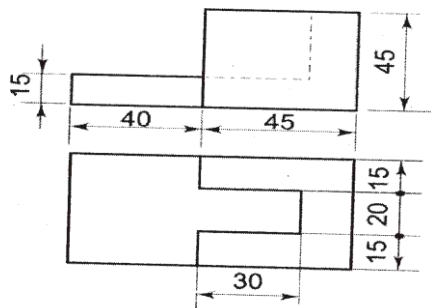
10. A right circular cone of diameter 50 mm and axis 75 mm long is resting on its base in HP. It is cut by a section plane which is perpendicular to VP, inclined at 60º to HP and passing through a point on the axis at a height of 40 mm from the base. Draw the surface development of the bottom position of truncated cone. (CO5)

133

SRVEYING-I PRACTICE & PLOTTING

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-108	SURVEYING-I PRACTICE & PLOTTING	04	120	40 (30 for class exercises + 10 for Survey camp)	60

S. No.	Major Topics	No. of Periods	COs MAPPED
1.	Chain surveying	28	CO1
2.	Compass Surveying	28	CO2
3.	Levelling	40	CO3
4.	Plotting	24	CO1,CO2,CO3
	Total	**120**	
5	A Survey camp, immediately after completion of all exercises, shall be conducted for 3 days during 8 AM to 12 noon & 2PM to 4 PM on each day followed by one day break and 2 days of plotting from 9AM to 5 PM, with one hour lunch break. (25% of total sessional marks shall be allocated to this activity. The skills learnt during class exercises shall be demonstrated in a simulated field like situation and shall be assessed appropriately)	6 days (Additional instructional duration & NOT to be included in the above 180 periods)	CO1, CO2, CO3

COURSE OBJECTIVES:

Course Objectives	(i)	Enhance knowledge about surveying instruments & methods adopted to carry out Field Survey with a professional approach.
	(ii)	Develop skills in using chain, tape, compass& Dumpy level

COURSE OUTCOMES:

Course Outcomes	CO1	C-108.1	Apply standard Practices to perform chain survey in the field and to plot from field data
	CO2	C-108.2	Apply Principles to Perform compass survey and plot from field data
	CO3	C-108.3	Conduct experiments on methods of levelling, Longitudinal and cross sectioning for the given alignment and analyse the data by Block levelling (contours) prepare the drawings.

Learning Outcomes	**1.0 Chain surveying**
	1.1. Practice unfolding and folding a chain.
	1.2. Perform direct ranging on level ground and measure the distance between two given stations and record the measurements in the field book.
	1.3. Perform indirect ranging and measure the distance between two given stations when a high ground intervenes to prevent indivisibility of ends of line.
	1.4. Set out a right angle to a given chain line by using chain only.
	1.5. Set and measure offsets for a given chain line by 1.Perpendicular offsets and 2.Oblique offsets.
	1.6. Perform triangulation survey of a given area with chain and cross staff and record all necessary details.
	1.7. Calculate the area bounded by the given points by chain triangulation and compare the result with the area calculated from plotting.
	1.8. Calculate the area bounded by the given points by chain and Cross staff compares the result with the area calculated from plotting.
	1.9. Carry out chain survey to overcome obstacles like pond, building etc and plot the Survey from field book measurements.
	1.10. Carry out chain traversing to survey an area bounded by more than three stations and plot the Survey from field book measurements.
	2.0 Compass Survey
	2.1 Identify the parts of a prismatic Compass
	2.2 Set up the compass at a station and carry out temporary adjustments.
	2.3 Take bearings of two points from instrument station and calculate the included angle.
	2.4 Perform an open traverse with Compass and Chain.
	2.5 Perform a closed traverse with compass and chain.
	3.0 Levelling
	3.1 Identify the component parts of a dumpy level / Auto level and Study different types of levelling staves
	3.2 Perform temporary adjustments of a dumpy level / Auto level for taking observations and Practice taking staff readings and recording them in level field book.
	3.3 Take staff readings for differential levelling and Compute the difference in elevation between two stations (take invert levels also)

	3.5	Conduct profile levelling along a route and compute the RLs at various stations
	3.6	Conduct profile levelling by taking cross sections across a route and compute the RLs at various stations
	3.7	Conduct profile levelling along a route by taking readings along both LS and CS and compute the RLs
	3.8	Conduct block levelling for the given area
	3.9	Locate the contour Points by direct (Radial) method in the field
	4.0	**PLOTTING**
	4.1	Understand the importance and relation between field work and plotting.

PO-CO Mapping:

Course Code: C-108	Course Title: SURVEYING –II Practice&Plotting No. of COs: 3				No. of Periods: 120	
POs	**Mapped with CO Nos.**	**CO periods addressing PO in Col.1**		**Level (1,2,3)**	**Remarks**	
		No.	**%**			
1	1,2,3	31	26	2	>40% Level.3	
2	1,2,3	18	15	1	(Highly addressed)	
3					25% - 40% Level.2	
4	1,2,3	50	42	3	(Moderately addressed	
5	1,2,3	7	6	1	5% - 25% Level.1	
					(Low addressed)	
6	1,2,3	7	6	1	<5% Not addressed	
7	1,2,3	7	5	1		

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2		2	2	2	2	2	2	2
CO2	2	3		2	2	2	2	2	2	2
CO3	3	2		3	3	3	2	2	2	2
Average	**2.3**	**2.3**		**2.3**	**2.3**	**2.3**	**2**	**2**	**2**	**2**

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz

(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT

1.0 Chain Surveying
- a) Practice unfolding and folding of a chain.
- b) Ranging and chaining of lines on level ground and recording in field book to measure the distance between two stations.
- c) Chaining a line involving indirect ranging.
- d) Setting and measuring the offsets-Perpendicular and Oblique offsets
- e) Measurement of land areas –cross staff survey
- f) Chain triangulation around the building covering a small area with other details taking offsets and recording.
- g) Chain triangulation involving a road with other details taking offsets and recording.
- h) Chain traversing to survey an area bounded by more than three stations.

2.0 Compass Surveying
- a) Setting up the compass – observations of bearings
- b) Calculation of included angles from the observed bearings
- c) Traversing with prismatic compass and chain – open Traverse – Recording.
- d) Traversing with prismatic compass and chain- closed traverse - recording.

3.0 Levelling
- a) Study of dumpy level, levelling staves – performing Temporary adjustments of level.
- b) Taking staff readings of various stations – booking of readings in level field book.
- c) Differential and Fly levelling – calculation of reducing levels by height of collimation and Rise & Fall methods (inverted levels also)
- d) Profile levelling along a route by taking readings along both LS and CS and compute the RLs
- e) Contouring – block levelling and locating contour points by Radial method

4.0 Plotting

a) Conventional signs in Surveying	2 Exercises
b) Plotting of perpendicular offsets	1 Exercise
c) Plotting of land surveys – Chain and cross-staff Surveying – Calculation of areas	3 Exercises
d) Plotting of chain triangulation Surveying of small areas around Buildings.	2 Exercises
e) Chain traversing to survey an area bounded by more than three stations	2 Exercises
f) Plotting of closed traverse by Compass surveying – location of Details and	2 Exercises
adjusting error byBow ditch method.	2 Exercises

g) Plotting of open traverse by Compass
   surveying and locating details   2 Exercises.

h) Compass survey by method of radiation-   1 Exercise
   calculation of area

i) Determination of the distance between   1 Exercise
   two accessible points involving single
   setting of the instrument

j) Determination of the distance between   2 Exercises
   two inaccessible points involving setting
   of the instrument at two stations.

k) Plotting of LS and CS   2 Exercises

l) Plotting of contours by Block levelling   2 Exercises
                                         - - - - - - - - - - -

                   Total   24 Exercises

                                         - - - - - - - - - - -

KEY competencies to be achieved by the student

S.NO.	Experiment Title	Key Competency
1	Field Exercises in Chain Surveying Ex 1.1 Ex 1.2 Ex 1.3 Ex 1.4 Ex 1.5 Ex 1.6 Ex.1.7 Ex.1.8 Ex 1.9 Ex 1.10	• Practice unfolding and folding a chain. • Perform direct ranging on level ground and measure the distance between two given stations and record the measurements in the field book. • Perform indirect ranging and measure the distance between two given stations when a high ground intervenes to prevent intervisibility of ends of line. • Set out a right angle to a given chain line by using chain only. • Set and measure offsets for a given chain line by 1. Perpendicular offsets and 2.Oblique offsets. • Perform triangulation survey of a given area with chain and cross staff and record all necessary details. • Calculate the area bounded by the given points by chain triangulation and compare the result

			with the area calculated from plotting.
			• Calculate the area bounded by the given points by chain and Cross staff compare the result with the area calculated from plotting.
			• Carry out chain survey to overcome obstacles like pond, building etc and plot the Survey from field book measurements.
			• Carry out chain traversing to survey an area bounded by more than three stations and plot the Survey from field book measurements.
2	Field Exercises in Compass Surveying Ex 2.1 Ex 2.2 Ex 2.3 Ex 2.4 Ex 2.5 Ex 2.6 Ex.2.7 Ex.2.8 Ex 2.9		• Identify the parts of a prismatic Compass • Set up the compass at a station and carry out temporary adjustments. • Take bearings of two points from instrument station and calculate the included angle. • Perform an open traverse with Compass and Chain. • Perform a closed traverse with compass and chain. • Plot the closed traverse from field data and adjust for closing error by Bowditch rule. • Determine the area bounded by the given points by the method of Radiation. • Determine the distance between two accessible points involving single setting of the instrument. • Determine the distance between two inaccessible points involving setting of the instrument at two stations.
3	Field Exercises in Levelling Ex 3.1 Ex 3.2		• Identify the component parts of a dumpy level / Auto level and Study different types of levelling staves • Perform temporary adjustments of a dumpy

	Ex 3.3	level / Auto level for taking observations and Practice taking staff readings and recording them in level field book
	Ex 3.4	
	Ex 3.5	• Take staff readings for differential levelling and Compute the difference in elevation between two stations (take invert levels also)
	Ex 3.6	
	Ex.3.7	• Determine the true difference in elevation between two far off stations by conducting reciprocal levelling
	Ex.3.8	
	Ex 3.9	• Determine the collimation error of a dumpy level by conducting reciprocal levelling
	Ex 3.10	• Conduct profile levelling along a route and compute the RLs at various stations
		• Conduct profile levelling by taking cross sections across a route and compute the RLs at various stations
		• Conduct profile levelling along a route by taking readings along both LS and CS and compute the RLs
		• Conduct block levelling for the given area
		• Locate the contour Points by direct (Radial) method in the field

ENGINEERING PHYSICS LAB
(C-23 curriculum common to all Branches)

Subject Title	:	**Engineering Physics Lab**
Subject Code	:	**C -109**
Periods per week	:	**03**
Total periods per year	:	**45**

TIME SCHEDULE

S.No	List of experiments	No. of Periods
1.	Vernier calipers	03
2.	Micrometer (Screw gauge)	03
3.	Verification of Lami's theorem using concurrent forces	03
4.	Determination of g using simple pendulum	03
5.	Focal length and power of convex lens	03
6.	Refractive index of solid using travelling microscope	03
7.	Verification of Boyle's law using Quill tube	03
8	Determination of pole strength of the bar magnet through magnetic field lines	03
9	Resonance apparatus – Determination of velocity of sound in air	03
	Experiments for demonstration	
10	Meter bridge – Determination of resistance and specific resistance of a wire	03
11	Verification of Newton's law of cooling	03
12	Photo electric cell – Study of its characteristics	03
	Revision	06
	Test	03
	Total:	**45**

Objectives:

Upon completion of the course the student shall be able to

1.0   Practise with Vernier calipers to determine the volumes of a cylinder and sphere..

2.0   Practise with Screw gauge to determine thickness of a glass plate and cross sectionalarea of a
        wire.

3.0   Verify the Lami's theorem using concurrent forces.

4.0   Determine the value of acceleration due to gravity using Simple Pendulum. To verify theresult
        from l-T^2 graph.

5.0   Calculate the Focal length and focal power of convex lens using distant object method,U-V
         method , U-V graph and $1 / U – 1 / V$ graph methods.

6.0   Determine the refractive index of a solid using travelling microscope

7.0   Verify the Boyle's law using Quill tube. To draw a graph between P and 1/l.

8.0   Determination of magnetic pole strength of a bar magnet by drawing magnetic lines offorce
        and locating null points (either N-N or N-S method)

9.0   Determine the velocity of sound in air at room temperature and its value at zero degree
         centigrade.

10.0 Determine the resistance and specific resistance of material of a wire using Meter Bridge

11.0   To verify the Newton's law of cooling.

12..0   To study the characteristics of photo electric cell.

S.No	List of experiments	No. of Periods	COs
1.	Vernier calipers	03	CO1
2.	Micrometer (Screw gauge)	03	
3.	Verification of Lami's theorem using concurrent forces	03	
4.	Determination of g using simple pendulum	03	CO2
5.	Focal length and power of convex lens	03	
6.	Refractive index of solid using travelling microscope	03	
7.	Verification of Boyle's law using Quill tube	03	CO3
8	Determination of pole strength of the bar magnet through magnetic field lines	03	
9	Resonance apparatus – Determination of velocity of sound in air	03	
10	Meter bridge – Determination of resistance and specific resistance of a wire	03	CO4
11	Verification of Newton's law of cooling	03	
12	Photo electric cell – Study of its characteristics	03	

SUBJECT	SUBJECT CODE	TOTAL PERIODS	NUMBER PERIODS PER WEEK
PHYSICS LAB	COMMON -109	45	03

Course objectives	(1) To provide strong practical knowledge of Physics to serve as a tool for various device applications in Engineering. (2) To enhance scientific skills of the students by incorporating new experiments so as to enrich the technical expertise of the students as required for industries.

	CO1	Improving accuracy in various measurements; understanding the nature of the forces keeping the body in equilibrium.
	CO2	Estimating the acceleration caused by the gravity of earth; Practical study of the concepts of refraction of light at curved/plane surface
COURSE OUTCOMES	CO3	Understanding the pressure of the gas as function of its volume; study of the combined magnetic field of the earth and an artificial magnet to estimate its pole strength; Estimating the velocity of sound in air through resonance phenomenon.
	CO4	Applying Kirchoff's laws to evaluate the specific resistance of a wire; Study of exchange of heat from system to surrounding by graphical analysis; Conversion of light to micro currents as potential engineering application.

➢ CO-PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
C0.1	3	2	2	2	2	1	2
C0.2	3		1	1	1	1	1
C0.3	3	2			1		
C0.4	3	2	2			1	2

Competencies and Key competencies to be achieved by the student

Name of the Experiment(No of Periods)	Competencies	Key competencies
1. Hands on practice on Vernier Calipers(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate the physical quantitiesof given object	• Read the scales • Calculate the requisite physical quantities of givenobjects
2. Hands on practice on Screw gauge(03)	• Find the Least count • Fix the specimen in posit • Read the scales • Calculate thickness of glass place and cross section of wireand other quantities	• Read the scales • Calculate thickness of givenglass plate • Calculate cross section of wireand other quantities
3. Verification of Parallelogram law of forcesand Triangle law of forces(03)	• Fix suitable weights • Note the positions of threadson drawing sheet • Find the angle at equilibriumpoint • Construct parallelogram • Compare the measured diagonal • Construct triangle • Find the length of sides • Compare the ratios	• Find the angle at equilibriumpoint • Constructing parallelogram • Construct triangle • Compare the ratios offorce and length
4. Simple pendulum(03)	• Fix the simple pendulum to thestand • Adjust the length of pendulum • Find the time for number of oscillations • Find the time period • Calculate the acceleration dueto gravity • Draw l-T and l-T^2 graph	• Find the time for number ofoscillations • Find the time period • Calculate the acceleration dueto gravity • Draw l-T and l-T^2 graph

Name of the Experiment(Periods)	Competencies	Key competencies
5. Focal length and Focal power ofconvex lens (Separate & Combination) (03)	• Fix the object distance • Find the Image distance • Calculate the focal length and power of convex lens and combination of convex lenses • Draw u-v and 1/u – 1/v graphs	• Calculate the focal length and power of convex lens • Draw u-v and 1/u – 1/v graphs
6 Refractive index of solid usingtraveling microscope(03)	• Find the least count of vernier on microscope • Place the graph paper below microscope • Read the scale • Calculate the refractive indexof glass slab	• Read the scale • Calculate the refractive indexof glass slab
7 . Boyle's law verification (03)	• Note the atmospheric pressure • Fix the quill tube to retort stand • Find the length of air column • Find the pressure of enclosedair • Find and compare the calculated value P x l	• Find the length of air column • Find the pressure of enclosedair • Find the value P x l
8. Mapping of magnet lines offorce(03)	• Draw magnetic meridian • Placed the bar magnet in NN and NS directions • Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines	• Draw magnetic lines of force • Locate the neutral points along equatorial and axial lines

| 9. Velocity of sound in air
   –Resonance method (03) | • Arrange the resonance apparatus
• Adjust the reservoir level for booming sound
• Find the first and second resonanting lengths
• Calculate velocity of sound | • Adjust the reservoir level
• Find the first and second resonanting lengths
• Calculate velocity of sound at room temperature
Calculate velocity of sound at 0^0 C |
| 10 Meter bridge(03) | • Make the circuit connections
• Find the balancing length
• Calculate unknown resistance
• Find the radius of wire
• Calculate the specific resistance | • Find the balancing length
• Calculate unknown resistance
Calculate the specific resistance |

Scheme of Valuation for END Practical Examination :

A. Writing Aim, Apparatus, Formula, Graph, Precautions carries   **10 (Ten) Marks**

B. For Drawing the table, taking Readings, Calculation work,
Drawing the graph, finding result carries   **15 (Fifteen) Marks**

C. Viva Voice   **05 (Five) Marks**

                Total   **30 (Thirty) Marks**

CHEMISTRY LABORATORY
(C-23 curriculum common to all Branches)

SubjectTitle   : **Chemistry Laboratory**
SubjectCode   : **Common -110**
Periodsperweek   : **03**
Totalperiodsperyear   : **45**

CO1	Operate and practice volumetric apparatus and preparation of standard solution
CO2	Evaluate and judge the neutralization point in acid base titration
CO3	Evaluate the end point of reduction and oxidation reaction
CO4	Judge the stable end point of complex formation, stable precipitation
CO5	Judge operate and demonstrate and perform precise operations with instrument for investigation of water pollution parameters

PO- CO mapping

Course code Common-110	Chemistry Laboratory No of Cos:5			No Of periods 45
s	pped with CO No	periods addressing PO in Col 1 NO %	vel 1,2,3	narks
1	1,CO2,CO3, CO4,CO5	66		0% level 3 (highly addressed) 25% to 40%
2	1,CO2,CO3, CO4,CO5			level2(moderately addressed 5% to 25%
3				level1 (Low addressed <
4	1,CO2,CO3, CO4,CO5	66		5%(not addressed)
5	2,CO3, CO4,CO5	66		
6				
7				

COs-POs mapping strength (as per given table)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3		1				1		
CO2	2	3		2	2			1		
CO3	2	3		2	2			1		
CO4	2	3		2	2			1		
CO5	2	3		2	2			1		

3=strongly mapped   2= moderately mapped   1= slightly mapped

Note: The gaps in CO and PO mapping will be achieved by one or more appropriate activities
from the following: i) Seminars ii) Tutorials iii) Guest Lectures iv) Assignments v) Quiz competitions
vi) Industrial visit vii) Tech Fest viii) Mini project ix) Group discussions x) Virtual classes
xi) Library visit for e-books

TIMESCHEDULE

S.No	Name of the Experiment	No. of Periods	Mapped with COs
1.	Recognition of chemical substances and solutions used in the laboratory by senses. Familiarization of methods for Volumetricanalysis	03	CO1
2.	eparation of Std Na_2CO_3 and making solutions of different dilution	03	CO1
3.	Estimation of HCl solution using Std.Na_2CO_3 solution	03	CO2
4.	Estimation of NaOH using Std.HCl solution	03	CO2
5	termination of acidity of water sample	03	CO2
6	termination of alkalinity of water sample	03	CO2
7.	timation of Mohr's Salt using Std.$KMnO_4$	03	CO3
8.	timation of Ferrous ion by using Std. $K_2Cr_2O_7$	03	CO3
9.	termination of total hardness of water using Std. EDTA solution	03	CO4
10.	timation of Chlorides present in water sample	03	CO4
11.	timation of Dissolved Oxygen(D.O)in water sample	03	CO5
12.	Determination of pH using pH meter	03	CO5
13	Determination of conductivity of water and adjusting ionic strength	03	CO5
14.	Determination of turbidity of water	03	CO5
15.	Estimation of total solids present in water sample	03	CO5
	Total:	**45**	

Objectives:
  Upon completion of the course the student shall be able to
1.0 Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc. To identify the chemical compounds and solutions by senses.
2.0 Practice making standard solutions with pre weighed salts and to make solutions of desired dilutions using appropriate techniques.
3.0 Conduct titrations adopting standard procedures and using Std. Na_2CO_3solutionfor estimation of HCl
4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH
5.0 Conduct titrations adopting standard procedures to determine the acidity of given samples of water (One ground water and one surface / tap water, and rain water if available)
6.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water)
7.0 Conduct titrations adopting standard procedures and using Std.$KMnO_4$ solution for estimation of Mohr'sSalt
8.0 Conduct titrations adopting standard procedures and using Std.$K_2Cr_2O_7$ solution for estimation of Ferrous ion.

9.0   Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (One ground water and one surface / tap water) using Std. EDTA solution

10.0   Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and wastewater (One ground water and one surface / tap water)

11.0   Conduct the test using titrometric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tap water)

12.0   Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter

13.0   Conduct the test on given samples of water / solutions
        a)   To determine conductivity
        b)   To adjust the ionic strength of the sample to the desired value

14.0   Conduct the test on given samples of solutions (coloured and non- coloured) to determine their turbidity in NTU

15.0   To determine the total solids present in given samples of water (One ground water and one surface / tap water)

Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
miliarization of methods for Volumetric analysis.Recognition of chemical substances And	-	--
eparation of Std Na_2CO_3 and making solutions of different dilution(03)	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipetteand graduated pipette ▪ Making appropriate dilutions	▪ Weighing the salt to the accuracy of .01 mg ▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette ▪ Making appropriate dilutions
Estimation of HCl solution using Std. Na_2CO_3solution (03)	▪ Cleaning the glassware and rinsing with appropriate solutions ▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Filling the burette with titrant ▪ Fixing the burette to the stand ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations ▪ Calculating the results	▪ Making standard solutions ▪ Measuring accurately the standard solutions and titrants ▪ Effectively Controlling the flow of the titrant ▪ Identifying the end point ▪ Making accurate observations
Estimation of NaOH using Std.HCl solution (03)		
Determination of acidity of water sample (03)		
termination of alkalinity of water sample (03)		
timation of Mohr's Salt using Std.$KMnO_4$ (03)		
timation of Ferrous ion by using Std.$K_2Cr_2O_7$ (03)		
etermination of total hardness of water using Std.EDTA solution (03)		
stimation of Chlorides present in water sample (03)		

stimation of Dissolved Oxygen(D.O) in water sample (By titration method) (03)		
Determination of pH using pH meter (03)	▪ Familiarize with instrument ▪ Choose appropriate 'Mode' / 'Unit' ▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately ▪ Follow Safety precautions	▪ Prepare standard solutions / buffers, etc. ▪ Standardize the instrument with appropriate standard solutions ▪ Plot the standard curve ▪ Make measurements accurately
Determination of conductivity of water and adjusting ionic strength to required level (03)		
Determination of turbidity of water (03)		
Estimation of total solids present in water sample (03)	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate ▪ Drying the crucible in an oven	▪ Measuring the accurate volume and weight of sample ▪ Filtering and air drying without losing any filtrate ▪ Accurately weighing the filter paper, crucible and filtrate

SCHEME OF VALUATION

A)	Writing Chemicals, apparatus ,principle and procedure	5M
B)	Demonstrated competencies	20M
	Making standard solutions	
	Measuring accurately the standard solutions and titrants	
	Effectively controlling the flow of the titrant	
	Identifying the end point	
	Making accurate observations	
C)	Viva-voce	5M
	Total	30M

Computer Fundamentals Lab

Course code	Course Title	No. of Periods/Weeks	Total No. of periods	Marks for FA	Marks for SA
C-111 (common to all branches)	Computer Fundamentals Lab	3	90	40	60

Time schedule:

S.No.	Chapter/Unit Title	No. of sessions each of 3 periods duration	No.of Periods
1.	Computer hardware Basics	2	6
2.	Windows Operating System	2	6
3.	MS Word	8	24
4.	MS Excel	7	21
5.	MS PowerPoint	5	15
6.	Adobe Photoshop	6	18
	Total periods	30	90

S.No.	Chapter/Unit Title	No.of Periods	CO's Mapped
1.	Computer hardware Basics	6	CO1
2.	Windows Operating System	6	CO1
3.	MS Word	24	CO2
4.	MS Excel	21	CO3
5.	MS PowerPoint	15	CO4
6	Adobe Photoshop	18	CO5
	Total periods	90	

Course Objectives	i) To know Hardware Basics
	ii) To familiarize operating systems
	iii) To use MS Office effectively to enable to students use these skills in future courses
	iv) To use Adobe Photoshop in image editing.

Course Outcomes			At the end of the course students will be able to
	CO1	C-111.1	Identify hardware and software components
	CO2	C-111.2	Prepare documents with given specifications using word processing software
	CO3	C-111.3	Use Spread sheet software to make calculation and to draw various graphs / charts.
	CO4	C-111.4	Use Power point software to develop effective presentation for a given theme or topic.
	CO5	C-111.5	Edit digital or scanned images using Photoshop

CO-PO/PSO MATRIX

CO NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
C-111.1	3	3	3	3	3	3	3	3	2	3
C-111.2	3	3	3	3	3	3	3	3	2	3
C-111.3	3	3	3	3	3	3	3	3	2	3
C-111.4	3	3	3	3	3	3	3	3	2	3
C-111.5	3	3	3	3	3	3	3	3	2	3
Average	3	3	3	3	3	3	3	3	2	3

3=Strongly mapped , 2=moderately mapped, 1=slightly mapped

Learning Outcomes:

I. Computer Hardware Basics

1. a).To Familiarize with Computer system and hardware connections

   b).To Start and Shut down Computer correctly

   c).To check the software details of the computer

2. To check the hardware present in your computer

II. Windows's operating system

3. To Explore Windows Desktop

4. Working with Files and Folders

5. Windows Accessories: Calculator – Notepad – WordPad – MS Paint

III. Practice with MS-WORD

6. To familiarize with Ribbon layout of MS Word

   Home – Insert- Page layout – References – Review- View.

7. To practice Word Processing Basics

8. To practice Formatting techniques

9. To insert a table of required number of rows and columns

10. To insert Objects, Clipart and Hyperlinks

11. To use Mail Merge feature of MS Word

12. To use Equations and symbols features

IV.Practice with MS-EXCEL

13. To familiarize with MS-EXCEL layout

14. To access and enter data in the cells

15. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells

16. To use built in functions and Formatting Data

17. To create Excel Functions, Filling Cells

18. To enter a Formula for automatic calculations

19. To sort and filter data in table.

20. To present data using Excel Graphs and Charts.

21. To develop lab reports of respective discipline.

22. To format a Worksheet in Excel, Page Setup and Print

V. Practice with MS-POWERPOINT

23. To familiarize with Ribbon layout features of PowerPoint 2007.

24. To create a simple PowerPoint Presentation

25. To set up a Master Slide in PowerPoint

26. To insert Text and Objects

27. To insert a Flow Charts

28. To insert a Table

29. To insert a Charts/Graphs

30. To insert video and audio

31. To practice Animating text and objects

32. To Review presentation

VI. Practice with Adobe Photoshop

33. To familiarize with standard toolbox

34. To edit a photograph.

35. To insert Borders around photograph.

36. To change Background of a Photograph.
37. To change colors of Photograph.
38. To prepare a cover page for the book in your subject area.
39. To adjust the brightness and contrast of the picture so that it gives an elegant look.
40. To type a word and apply the shadow emboss effects.

Key competencies:

Expt No	Name of Experiment	Competencies	Key competencies
1 (a).	To familiarize with Computer system and hardware connections	**a.** Identify the parts of a Computer system: i). CPU ii). Mother Board iii) Monitor iv) CD/DVD Drive v) Power Switch vi) Start Button vii) Reset Button **b.** Identify and connect various peripherals **c.** Identify and connect the cables used with computer system **d.** Identify various ports on CPU and connect Keyboard & Mouse	Connect cables to external hardware and operate the computer
1 (b).	To Start and Shut down Computer correctly	a. Log in using the password b. Start and shut down the computer c. Use Mouse and Key Board	a. Login and logout as per the standard procedure b. Operate mouse &Key Board
1 (c).	To Explore Windows Desktop	a. Familiarize with Start Menu, Taskbar, Icons and Shortcuts b. Access application programs using Start menu, Task manager c. Use Help support	a. Access application programs using Start menu b. Use taskbar and Task manager
2.	To check the software details of the computer	a. Find the details of Operating System being used b. Find the details of Service Pack installed	Access the properties of computer and find the details
3.	To check the hardware present in your computer	a. Find the CPU name and clock speed b. Find the details of RAM and Hard disk present c. Access Device manager using Control Panel and check the status of devices like mouse and key board	a. Access device manager and find the details b. Type /Navigate the correct path and Select icon related to the details

		d.Use My Computer to check the details of Hard drives and partitions e.Use the Taskbar	required
4.	Working with Files and Folders	a. Create folders and organizing files in different folders b.Use copy / paste move commands to organize filesand folders	a. Create files and folders Rename , arrange and search for the required folder/file
	Working with Files and Folders Continued....	c. Arrange icons – name wise, size, type, Modified d.Search a file or folder and find its path e.Create shortcut to files and folders (in other folders) on Desktop f. Familiarize with the use ofMy Documents g.Familiarize with the use of Recycle Bin	b. Restore deleted files from Recycle bin
5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	a. Familiarize with the use of Calculator b.Access Calculator using Run command c. Create Text Files usingNotepad and WordPad and observe the difference in filesize d.Use MS paint and create .jpeg, .bmp files using MS Paint	a. Use windows accessories and select correct text editor based on the situation. b. Use MS pain to create /Edit pictures and save in the required format.
6.	To familiarize with Ribbon layout of MS word. – Home – Insert- page layout-References-Review-View	a. Create/Open a document b.Use Save and Save as features c. Work on two Word documents simultaneously d.Choose correct Paper size and Printing options	a. Create a Document and name appropriately and save b. Set paper size and print options
7.	To practice Word Processing Basics	a. Typing text b.Keyboard usage c. Use mouse (Left click / Right click / Scroll) d.Use Keyboard shortcuts e.Use Find and Replace features in MS- word f. Use Undo and Redo Features g.Use spell check to correct Spellings and Grammar	a.Use key board and mouse to enter/edit text in the document. b. Use shortcuts c. Use spell check/ Grammar features for auto corrections.

8.	To practice Formatting techniques	a. Formatting Text b. Formatting Paragraphs c. Setting Tabs d. Formatting Pages e. The Styles of Word f. Insert bullets and numbers g. Themes and Templates h. Insert page numbers, header and footer	a. Format Text and paragraphs and use various text styles. b. Use bullets and numbers to create lists c. Use Templates /Themes d. Insert page numbers date, headers and footers
9.	To insert a table of required number of rows and columns	a. Edit the table by adding the fields – Deleting rows and columns –inserting sub table – marking borders. Merging and splitting of cells in a Table b. Changing the background colour of the table c. Use table design tools d. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features e. Convert Text to table and Table to Text f. Use Sort feature of the Table to arrange data in ascending/descending order	a. Insert table in the word document and edit b. Use sort option for arranging data.
10.	To Insert objects, clipart and Hyperlinks	a. Create a 2-page document. &Insert hyperlinks and t Bookmarks. b. Create an organization chart c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.	a. Insert hyperlinks &Bookmarks b. Create organization charts/flow charts
11.	To Use Mail merge feature of MS Word	a. Use mail merge to prepare individually addressed letters b. Use mail merge to print envelopes.	Use Mail merge feature
12.	To use Equations and symbols features.	a. Explore various symbols available in MS Word b. Insert a symbol in the text	Enter Mathematical symbols and Equations in the word

		c. Insert mathematical equations in the document	document
13.	To Practice with MS-EXCEL	a. Open /create an MS Excel spreadsheet and familiarize with MS Excel 2007 layout like MS office Button- b. Use Quick Access Toolbar-Title Bar- Ribbon-Worksheets-Formula Bar-Status Bar	a. Familiarize with excel layout and use b. Use various features available in toolbar
14.	To access and Enter data in the cells	a. Move Around a Worksheets-Quick access -Select Cells b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel	a. Access and select the required cells by various addressing methods b. Enter data and edit
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	a. Insert and Delete Columns and Rows-Create Borders-Merge and Center b. Add Background Color-Change the Font, Font Size, and Font Color c. Format text with Bold,Italicize, and Underline-Work with Long Text-Change a Column's Width	Format the excel sheet
16.	To use built in functions and Formatting Data	a. Perform Mathematical Calculations verify -AutoSum b. Perform Automatic Calculations-Align Cell Entries	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	a. Enter formula b. Use Cell References in Formulae c. Use Automatic updating function of Excel Formulae d. Use Mathematical Operators in Formulae e. Use Excel Error Message and Help	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	a. Use Reference Operators b. Work with sum, Sum if , Count and Count If Functions c. Fill Cells Automatically	a. Create Excel sheets involving cross references and equations

			b. Use the advanced functions for conditional calculations
19.	To sort and filter data in table	a. Sort data in multiple columns b. Sort data in a row c. Sort data using Custom order d. Filter data in work sheet	a. Refine the data in a worksheet and keep it organized b. Narrow a worksheet by selecting specific choice
20.	To Practice Excel Graphs and Charts	a. Produce an Excel Pie Chart b. Produce c. Excel Column Chart	a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph b. Produce a Pictograph in Excel
21.	To develop lab reports of respective discipline	Create Lab reports using MS Word and Excel	a. Insert Practical subject name in Header and page numbers in Footer
22.	To format a Worksheet in Excel, page setup and print	a. Shade alternate rows of data b. Add currency and percentage symbols c. Change height of a row and width of a column d. Change data alignment e. Insert Headers and Footers f. Set Print Options and Print	a. Format Excel sheet b. Insert headers &footers and print
23.	To familiarize with Ribbon layout &features of PowerPoint 2007.	Use various options in PowerPoint a. Home b. Insert c. Design d. Animation e. Slideshow f. View g. Review	Access required options in the tool bar
24.	To create a simple PowerPoint Presentation	a. Insert a New Slide into PowerPoint b. Change the Title of a PowerPoint Slide c. PowerPoint Bullets d. Add an Image to a PowerPoint Slide	a. Create simple PowerPoint presentation with photographs/ClipArt and text boxes b. Use bullets option

		e. Add a Textbox to a PowerPoint slide	
25.	To Set up a Master Slide in PowerPoint and add notes	a. Create a PowerPoint Design Template b. Modify themes c. Switch between Slide master view and Normal view d. Format a Design Template Master Slide e. Add a Title Slide to a Design Template f. The Slide Show Footer in PowerPoint g. Add Notes to a PowerPoint Presentation	a. Setup Master slide and format b. Add notes
26.	To Insert Text and Objects	a. Insert Text and objects b. Set Indents and line spacing c. Insert pictures/ clipart d. Format pictures e. Insert shapes and word art f. Use 3d features g. Arrange objects	Insert Text and Objects Use 3d features
27.	To insert a Flow Chart / Organizational Charts	a. Create a Flow Chart in PowerPoint b. Group and Ungroup Shapes c. Use smart art	Create organizational charts and flow charts using smart art
28.	To insert a Table	a. PowerPoint Tables b. Format the Table Data c. Change Table Background d. Format Series Legend	Insert tables and format
29.	To insert a Charts/Graphs	a. Create 3D Bar Graphs in PowerPoint b. Work with the PowerPoint Datasheet c. Format a PowerPoint Chart Axis d. Format the Bars of a Chart e. Create PowerPoint Pie Charts f. Use Pie Chart Segments g. Create 2D Bar Charts in PowerPoint h. Format the 2D Chart e. Format a Chart Background	Create charts and Bar graphs, Pie Charts and format.

30.	To Insert audio & video, Hyperlinks in a slide Add narration to the slide	a. Insert sounds in the slide and hide the audio symbol b. Adjust the volume in the settings c. Insert video file in the format supported by PowerPoint in a slide d. Use automatic and on click options e. Add narration to the slide f. Insert Hyperlinks	a. Insert Sounds and Video in appropriate format. b. Add narration to the slide c. Use hyperlinks to switch to different slides and files
31.	To Practice Animation effects	a. Apply transitions to slides b. To explore and practice special animation effects like Entrance, Emphasis, Motion Paths &Exit	Add animation effects
32.	Reviewing presentation	a. Checking spelling and grammar b. Previewing presentation c. Set up slide show d. Set up resolution e. Exercise with Rehearse Timings feature in PowerPoint f. Use PowerPoint Pen Tool during slide show g. Saving h. Printing presentation (a) Slides (b) Hand-out	a. Use Spell check and Grammar feature b. Setup slide show c. Add timing to the slides d. Setup automatic slide show

33	To familiarize with standard toolbox	a. Open Adobe Photoshop
		b. Use various tools such as
		  i. The Layer Tool
		  ii. The Color& Swatches Tool
		  iii. Custom Fonts & The Text Tool
		  iv. Brush Tool
		  v. The Select Tool
		  vi. The Move Tool
		  vii. The Zoom Tool
		  viii. The Eraser
		  ix. The Crop Tool
		  x. The Fill Tool
			Open a photograph and save it in Photoshop

34	To edit a photograph	a. Use the Crop tool b. Trim edges c. Change the shape and size of a photo d. Remove the part of photograph including graphics and text	a. Able to edit image by using corresponding tools.
35	To insert Borders around photograph	a. Start with a single background layer b. Bring the background forward c. Enlarge the canvas d. Create a border color e. Send the border color to the back f. Experiment with different colors	Able to create a border or frame around an image to add visual interest to a photo
36	To change Background of a Photograph	a. open the foreground and background image b. Use different selection tools to paint over the image c. Copy background image and paste it on the foreground. d. Resize and/or drag the background image to reposition. e. In the Layers panel, drag the background layer below the foreground image layer.	Able to swap background elements using the Select and Mask tool and layers.
37	To change colors of Photograph	a. Change colors using: i) Color Replacement tool ii) Hue/Saturation adjustment layer tool	Able to control color saturation
38	To prepare a cover page for the book in subject area	a. open a file with height 500 and width 400 for the cover page. b. apply two different colors to work area by dividing it into two parts using Rectangle tool. c. Copy any picture and place it on work area→ resize it using free transform tool. d. Type text and apply color and style e. Apply effects using blended options	Able to prepare cover page for the book

39	To adjust the brightness and contrast of picture to give an elegant look	a. open a file. b. Go to image→ adjustments→ Brightness/Contrast. c. adjust the brightness and contrast. d. Save the image.	Able to control brightness/contrast.
40	To type a word and apply the shadow emboss effects	a. open a file b. Select the text tool and type text. c. Select the typed text go to layer→ layer style→ blended option→ drop shadow, inner shadow, bevel and emboss→ contour→ satin→ gradient overlay d. Save the image.	Able to apply shadow emboss effects

Table specifying the scope of syllabus to be covered for unit tests

Unit Test	Learning outcomes to be covered
Unit test-1	From 1 to 8
Unit test-2	From 9 to 22
Unit test-3	From 23 to 40

SCHEME: C-23   **SUBJ CODE: C-111**
MAX MARKS:40   **TIME:90MIN**

1.   Identify the internal hardware components of a PC and assemble them.

2.   Identify the external components or peripherals of a PC and connect them.

3.   Identify the components on motherboard.

4.   Perform the process of placing processor on CPU slot.

5.   Perform the process of removing and placing the RAM in the corresponding slot.

6.   Identify the CMOS battery and test whether it is working it or not.

7.   Find details of following:

     a) Operating System being used.

     b) Processor name

     c) RAM

     d) Hard disk

8.   Create a folder by your name, search a file or folder and find its path.

9.   Draw the National Flag using MS Paint.

10. Create a word document that contains TEN names of your classmates (boys-5 & girls-5) and

     perform the following tasks:

     a) Save the document to your desktop.

     b) Sort the names in each list alphabetically.

     c) Set line spacing to 1.15.

     d) Use bullet points for the names in both lists separately.

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SCHEME: C-23   **SUBJ CODE:CM-111**
MAX MARKS:40   **Time:90Min**

1. Write individually addressed letters to your friends about the Republic Day celebration using Mail Merge.

2. Create a Word document about your college and insert page numbers in footer and College Name in header.

3. Create your class time table using Tables in MS Word.

4. Create a 2-page document about your College& insert hyperlinks for courses offered in the college and insert Bookmarks next to College Name.

5. Write individually addressed letters to your friends (at least 5 members) to intimate the External Examination time table using Mail Merge.

6. Write an equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ in MS word.

7. Create the organizational structure of your college in MS Word.

8. Create a spreadsheet by totaling marks of 3 or more subjects, then calculate percentage and hence find grade based on boundary conditions of FIVE students:

    Grades O >= 90%, A >=80%, B >=70%, C >=60%, D >=50%, E >=40%, F <40%

9. Create a Excel spreadsheet for the following data, making sure that the cell marked with Category (A1) is pasted in cell A1 in the spreadsheet and perform the questions below.

Category (A1)	Product Name	Quantity	Inventory	Price per Unit	Total Price
Office Supplies	Binder	2	20	12.99	25.98
Office Supplies	Pencil	20	20	0.99	
Electronics	Samsung 4K Smart TV	1	5	399.00	
Electronics	Bluetooth Speakers	4	5	44.49	
Computers	Lenovo X230 12in Laptop	2	2	279.90	

   a). Change the format of the "Total Price" column to "Currency" format.
   b) Calculate Total Price by writing formula.
   c) Turn on filtering for the table.
   d) Sort the table by column "Category" from A to Z.

10. Create a spreadsheet to calculate Cumulative monthly attendance for a period of Three months.

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Year Internal Lab Examination
UNIT TEST - III
MODEL QUESTION PAPER
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20   **SUBJ CODE: COMMON-110**
MAX MARKS:40   **Time:90Min**

1.   Create a PowerPoint Presentation about your College in 5 slides only.

2.   Create a PowerPoint Presentation on Computer Hardware in minimum 5 slides.

3.   Create a PowerPoint Presentation on Computer Fundamentals with *Entrance, Emphasis* effects in minimum 5 slides.

4.   Create a PowerPoint Presentation on any topic with special animation effects like *Entrance, Motion Paths &Exit.*

5.   Resize the image using Photoshop.

6.   Change the background of a Photograph.

7.   Edit an image by using

       a) Crop tool.

       b) Resize the image

       c) Save the new image with new name keeping original image as it is.

8.   A Picture of two parrots (parrots.jpg) is given to you. Make anyone of one of the parrots in Black & White.

9.   Convert a colour image to monochrome and improve quality of photograph.

10.   Copy three pictures and fit into the empty frames.

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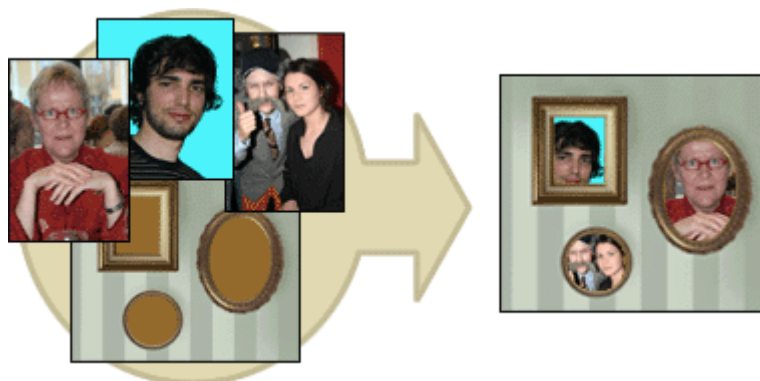
MODEL PRACTICAL QUESTION PAPER-YEAR END EXAM
COMPUTER FUNDAMENTALS LAB

SCHEME: C-20   **SUBJ CODE:CM-110**

MAX MARKS:60   IME: 3HOURS

1.   Identify the internal hardware components of a PC and assemble them.

2.   Identify the external components or peripherals of a PC and connect them.

3.   Write the procedure to create the files and folders

4.   Write the procedure to access Calculator, Paint and Notepad application

5.   Write the procedure to perform the following in MS Word

   (a)   Change the Font Size

   (b)   Change the Font Style

   (c)   Change the Text Size

6.   Write the procedure to perform the following in MS Word

   (a)   Change the Font Colour.

   (b)   Use Various Text Alignment Options.

   (c)   Format text in Bold, Italic and Underline.

7.   Create the hierarchy of your family in MS Word.

8.   Write the procedure to perform the following in MS Word:

   (a)   Insert a Table

   (b)   Add a Row

   (c)   Add a column

   (d)   Delete a Row

   (e)   Delete a column

9.   Write the procedure to use Equation $\frac{(x+y)^2}{(x-y)^2} = \frac{x^2+2xy+y^2}{x^2-2xy+y^2}$ and Symbols.

10.   Write the procedure to perform the following in MS Excel

   (a)   To Modify Column Width

   (b)   To Modify Row Height

(c)   Format text in Bold, Italic, and Underline.

11.   Write the procedure to create charts and Graphs in MS Excel.

12.   Write the procedure to create simple Power Point Presentation on your college in Three

        slides.

13.   Write the procedure to perform Animation on Text and Objects in your presentation.

14. Take a photographic image. Give a title for the image. Put the border. Write your names. Write the Name of Institution and Place.

15. Prepare a cover page for the book in your subject area. Plan your own design.

16. You are given a picture of a flower and associated background (Extract.jpg).Extract the Flower only from that and organize it on a background. Select your own background for organization.

17. You are given a picture (BrightnessContrast.jpg). Adjust the brightness and contrast of the picture so that it gives an elegant look.

18. You are given a picture (position.jpg). Position the picture preferably on a plain background of a colour of your choice - Positioning include rotation and scaling.

19. Remove the arrows and text from the given photographic image(Filename: photo.jpg).

20. Type a word; apply the following effects. Shadow Emboss.

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III SEMESTER

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2020
THIRD SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examination			
		Theory	Practical		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
C-301	Engineering Mathematics –II	4		60	3	20	80	100
C-302	Mechanics of Solids & Theory of Structures	5		75	3	20	80	100
C-303	Hydraulics	5		75	3	20	80	100
C-304	Surveying-II	4		60	3	20	80	100
C-305	Construction Materials	3		45	3	20	80	100
PRACTICAL								
C-306	Civil Engineering Drawing-I	-	4	60	3	40	60	100
C-307	CAD Practice-I		4	60	3	40	60	100
C-308	Surveying - II Practice & Plotting	-	4	60	3	40	60	100
C-309	Material Testing Practice	-	3	45	3	40	60	100
C-310	Hydraulics Practice	-	3	45	3	40	60	100
	Student Centric Learning Activities	-	3	45				
	Total	**21**	**21**	**630**		**280**	**720**	**1000**

ENGINEERING MATHEMATICS-II

Course Code	Course Title	No. of Periods/week	Total No. of periods	Marks for FA	Marks for SA
C-301	Engineering Mathematics-II	4	60	20	80

S.No.	Unit Title	No. of periods	COs mapped
1	Indefinite Integration	20	CO1
2	Definite Integration	10	CO2
3	Applications of Definite Integrals	10	CO3
4	Differential Equations	20	CO4
	Total Periods	60	

Course Objectives	(i) To understand the concepts of indefinite integrals and definite integrals with applications to engineering problems. (ii) To understand the formation of differential equations and learn various methods of solving first order differential equations. (iii) To learn the principles of solving homogeneous and non-homogeneous differential equations of second order.

Course Outcomes	CO1	Integrate various functions using different methods.
	CO2	Evaluate definite integrals.
	CO3	Solve engineering problems by applying definite integrals.
	CO4	Obtain differential equations and solve differential equations of first order and first degree. Solve homogeneous and non-homogeneous differential equations of second order.

ENGINEERING MATHEMATICS – II
Learning Outcomes
Unit-I

C.O. 1 Integrate various functions using different methods.

L.O.1.1. Explain the concept of Indefinite integral as an anti-derivative.

1.2. State the indefinite integral of standard functions and properties of $\int (u+v)\,dx$ and $\int k\,u\,dx$ where u, v are functions of x and k is constant.

1.3. Solve problems involving standard functions using the above rules.

1.4. Evaluate integrals involving simple functions of the following type by the method of substitution.

       i) $\int f(ax+b)\,dx$, *where f(x)* is in standard form.

       ii) $\int (f(x))^n\,f'(x)\,dx$

       iii) $\int [f'(x)/f(x)]\,dx$

       iv) $\int [f(g(x))]\,g'(x)\,dx$

1.5. Find the integrals of *tan x, cot x, sec x* and *cosec x* using the above.

1.6. Evaluate the Standard integrals of the functions of the type

$i)\dfrac{1}{a^2+x^2},\dfrac{1}{a^2-x^2},\dfrac{1}{x^2-a^2}$

$ii)\dfrac{1}{\sqrt{a^2+x^2}},\dfrac{1}{\sqrt{a^2-x^2}},\dfrac{1}{\sqrt{x^2-a^2}}$

$iii)\sqrt{x^2-a^2},\sqrt{x^2+a^2},\sqrt{a^2-x^2}$

1.7. Evaluate integrals using decomposition method.

1.8. Solve problems using integration by parts.

1.9 Use Bernoulli's rule for evaluating the integrals of the form $\int u.v\,dx$.

1.10. Evaluate the integrals of the form $\int e^x[f(x)+f'(x)]\,dx$

Unit-II

C.O.2 Evaluate definite integrals.

L.O.2.1. State the fundamental theorem of integral calculus

2.2. Explain the concept of definite integral.

2.3. Solve simple problems on definite integrals over an interval using the above concept.

2.4. State various properties of definite integrals.

2.5. Evaluate simple problems on definite integrals using the above properties.

> Syllabus for Unit test-I completed

Unit -III

C.O.3 Solve engineering problems by applying definite integrals.

L.O. 3.1. Find the area bounded by a curve and axes.

   3.2. Obtain the mean and R.M.S values of the simple functions.

   3.3. Solve some simple problems using Trapezoidal rule and Simpson's 1/3 rule for the   approximation of definite integrals.

Unit -IV

C.O. 4 Form differential equations and solve differential equations of first order and first degree and Solve homogeneous and non-homogeneous differential equations of second order

L.O.4.1. Define a Differential equation, its order and degree
    4.2 Find order and degree of a given differential equation.
    4.3 Form a differential equation by eliminating arbitrary constants.
    4.4 Solve the first order and first degree differential equations by variables separable method.
    4.5 Solve linear differential equation of first order of the form $\dfrac{dy}{dx} + Py = Q$, where P and Q are functions of x or

        constants.
    4.6 Solve homogeneous second order linear differential equations of the type $(aD^2 + bD + c)\, y = 0$ where a, b, c are
        real numbers and provide examples.
    4.7 Define complementary function, particular integral and general solution of a non-homogeneous linear
        differential equation of second order with constant coefficients.
    4.8 Describe the methods of solving f(D) = X, where f(D) is a polynomial of second order and X is a function of
        the forms k, $e^{ax}, sinax, cosax$ and x and their linear combinations.

Syllabus for Unit test-II completed

C-23
Engineering Mathematics – II
CO/PO – Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	2				3	1	2
CO2	3	2	2	2				3	1	2
CO3	3	3	3	3				3	3	3
CO4	3	3	3	3				3	3	3
Avg.	3	2.5	2.5	2.5				3	2	2.5

3 =Strongly mapped (High), **2** = Moderately mapped (Medium), **1** = Slightly mapped (Low)
PO5: Appropriate quiz programme may be conducted at intervals and duration as decided by concerned teacher.
PO6: Seminars on applications of mathematics in various engineering disciplines are to be planned and
       conducted.
PO7: Such activities are to be planned that students visit library to refer standard books on Mathematics and
       latest updates in reputed national and international journals, attending seminars, learning mathematical
       software tools.

PSO1: An ability to understand the concepts of basic mathematical techniques and to apply them in various areas
like computer programming, civil constructions, fluid dynamics, electrical and electronic systems and all
concerned engineering disciplines.
PSO2: An ability to solve the Engineering problems using latest software tools, along with analytical skills to
arrive at faster and appropriate solutions.
PSO3: Wisdom of social and environmental awareness along with ethical responsibility to have a successful career
as an engineer and to sustain passion and zeal for real world technological applications.

Engineering Mathematics – II
PO- CO – Mapping strength

PO no	Mapped with CO no	CO periods addressing PO in column I		Level (1,2 or 3)	Remarks
		Number	**%**		
1	CO1, CO2, CO3,CO4	60	100%	3	>40% Level 3 Highly addressed
2	CO3,CO4	30	50%	3	
3	CO3,C04	30	50%	3	25% to 40% Level 2 Moderately addressed
4	CO3,C04	30	50%	3	
5					
6					
7					
PSO 1	CO1, CO2, CO3,CO4	60	100%	3	5% to 25% Level 1 Low addressed
PSO 2	CO3,CO4	30	50%	3	
PSO 3	CO1, CO2, CO3,CO4	45	75%	3	<5% Not addressed

ENGINEERING MATHEMATICS – II
COURSE CONTENTS
Unit-I
Indefinite Integration:

1. Integration regarded as anti-derivative – Indefinite integrals of standard functions. Properties of indefinite integrals. Integration by substitution or change of variable. Integrals of tan x, cot x, sec x, cosec x.

Evaluation of integrals which are of the following forms:

$$i) \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2}$$

$$ii) \frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}}$$

$$iii) \sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}$$

Integration by decomposition of the integrand into simple rational algebraic functions.

Integration by parts, Bernoulli's rule and integrals of the form $\int e^x [f(x) + f'(x)] \, dx$.

Unit-II
Definite Integration

2. Definite integral-fundamental theorem of integral calculus, properties of definite integrals, evaluation of simple definite integrals.

Unit-III
Applications of Definite Integrals

3. Area bounded by a curve and axes. Mean and RMS values of a function on a given interval. Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a define integral. Simple examples.

Unit -IV
Differential Equations

4. Definition of a differential equation-order and degree of a differential equation- formation of differential equations-solutions of differential equations of first order and first degree using methods, variables separable, linear differential equation of the type $\frac{dy}{dx} + Py = Q.$ Solutions of homogenous and non-homogeneous linear differential equations of second order with constant coefficients.

Reference Books:
1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Schaum's Outlines Differential Equations, Richard Bronson & Gabriel B. Costa
4. M.Vygodsky, Mathematical Handbook: Higher Mathematics, Mir Publishers, Moscow.

Subject Title	:	Engineering Mathematics – II
Subject Code	:	C-301 (Common to all Branches)
Periods/Week	:	04
Periods/Semester	:	60

BLUE PRINT

S.No.	Chapter/Unit title	No. of Periods	Weightage Allotted	Short type			Essay type			COs mapped
				R	U	Ap	R	U	Ap	
Unit – I: Indefinite integration										
1	Indefinite integration	20	34	1	2	0	1/2	2	0	CO1
Unit – II: Definite integration										
2	Definite Integrals	10	16	0	2	0	0	1	0	CO2
Unit – III: Applications of Definite Integrals										
3	Area of curves	3	3	0	0	1	0	0	0	CO3
4	Mean and RMS values	3	8	0	0	1	0	0	1/2	CO3
5	Numerical Integration	4	10	0	0	0	0	0	1	CO3
Unit – IV : Differential Equations										
6	Introduction to Differential Equations	5	6	2	0	0	0	0	0	CO4
7	Solutions of first order differential equations	4	13	0	0	1	0	0	1	CO4
8	Solutions of second order homogeneous differential equations	4	10	0	0	0	0	0	1	CO4
9	Solutions of second order non-homogeneous differential equations	7	10	0	0	0	0	0	1	CO4
	Total	60	110	3	4	3	1/2	3	4 1/2	
	Marks			9	12	9	5	30	45	

R: Remembering Type   **:14 Marks**
U: understanding Type   **:42 Marks**
Ap: Application Type   **: 54 Marks**

C-23

Unit Test	Syllabus
Unit Test-I	From L.O 1.1 to L.O 2.5
Unit Test-II	From L.O 3.1 to L.O 4.8

UNIT TEST MODEL PAPERS   **C –23, C-301**
Unit Test I
State Board of Technical Education and Training, A. P
III SEM
Subject name: **Engineering Mathematics-II**
Sub Code: **C-301**

Time: 90 minutes   **Max. Marks: 40**

Part-A   **16 Marks**

Instructions: (1) Answer **all** questions.
(2) First question carries **four** marks and the remaining questions carry **three** marks each.
1.   Answer the following:

    a. $\int x^6 dx = ---$ **(CO1)**

    b. $\int \dfrac{1}{16+x^2} dx = --$ **(CO1)**

    c. $\int e^x \left(f(x) + f^{'}(x) \right) dx = e^x f(x) + c$: State TRUE/FALSE   **(CO1)**

    d. $\int\limits_{0}^{1} x dx = --$ **(CO2)**

2.   Evaluate $\int \left(\sec^2 x + 2e^x \right) dx.$ **(CO1)**

3.   Evaluate $\int \dfrac{\sin(\log x)}{x} dx.$ **(CO1)**

4.   Evaluate $\int\limits_{0}^{\frac{\pi}{2}} \cos x dx$ **(CO2)**

5.   Evaluate $\int\limits_{0}^{1/2} \dfrac{1}{\sqrt{1-x^2}} dx$ **(CO2)**

Part-B   **3×8=24 Marks**

Instructions: (1) Answer **all** questions. (2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.
6.   A) Evaluate $\int \sin^4 x \cos x dx.$ **or**   **(CO1)**

    B) Evaluate $\int \dfrac{1}{(x+1)(x+2)} dx.$ **(CO1)**

7.   A) Evaluate $\int \sqrt{1-\sin 2x} dx.$ **or**   **(CO1)**

    B) Evaluate $\int x^2 e^{3x} dx.$ **(CO1)**

8. A) Evaluate $\int_0^1 \frac{tan^{-1}x}{1+x^2} dx$ **or**   **(CO2)**

B) $\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$

(CO2)

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Unit Test II   C –23, C -301

State Board of Technical Education and Training, A. P
III Sem
Subject name: **Engineering Mathematics-II**
Sub Code: **C-301**

Time : 90 minutes   Max.marks:40

Part-A   **16 Marks**

Instructions: (1) Answer **all** questions.
(2) First question carries **four** marks and the remaining questions carry **three** marks each

1. Answer the following:
   a. Formula to find area bounded by $y = f(x)$ and X-axis from x=a to x=b is____ **(CO3)**
   b. Integrating factor of $\frac{dy}{dx} + P(x)y = Q(x)$ is $e^{\int P dx}$: State TRUE/FALSE   **(CO4)**
   c. The order of the differential equation $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} + y = 0$ is _____.   **(CO4)**

   d. The auxiliary equation of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$ is ____. **(CO4)**

2. Find the area bounded by the curve $y = 2x+3$, $x-$ axis, between the lines $x = 1, x = 2$. **(CO3)**
3. Find the mean value of $f(x) = 2x$ in the interval $[2,6]$.   **(CO3)**
4. Form the differential equation by eliminating the arbitrary constant m from $y = mx + 1$.

   (CO4)
5. Solve the differential equation $(D^2 - 9)y = 0$.   **(CO4)**

Part-B   **3×8=24 Marks**

Instructions: (1) Answer **all** questions.   (2) Each question carries **eight** marks
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. A) Find the R.M.S value of $\sqrt{x}$ over the range $x = 1$ and $x = 3$.   **or**   **(CO3)**

   B) Calculate the approximate value of $\int_1^6 x^2 dx$ by using Trapezoidal rule by dividing the range into 5

   equal intervals.   **(CO3)**
7. A) Solve $\frac{dy}{dx} = e^{2x+y}$ **or**   **(CO4)**

   B) Solve $\frac{dy}{dx} + \frac{y}{x} = x^2$.   **(CO4)**
8. A) Solve $(D^2 - 2D + 1)y = e^{-x}$ **or**   **(CO4)**
   B) Solve $(D^2 + 6D + 9)y = sin3x$ **(CO4)**

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STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS -- 301

TIME : 3 HOURS   **MODEL PAPER- I**   **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks.   **10x3=30M**

1. Evaluate $\int (5^x + 5x)dx$.   **CO 1**

2. Evaluate $\int (\sin 3x + \cos 2x)dx$.   **CO 1**

3. Evaluate $\int \frac{\sin^{-1} x}{\sqrt{1-x^2}}\, dx$ **CO 1**

4. Evaluate $\int_{0}^{1} (x^3 + 1)dx$ **CO 2**

5. Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin x\, dx$ **CO 2**

6. Find the area bounded by the curve $y = x^2$, the X-axis between the lines $x=1$ and $x=2$.   **CO3**

7. Find the mean value of the function $f(x) = \frac{1}{1+x^2}$ in the interval $[0,1]$.   **CO 3**

8. Find the order and degree of the differential equation $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 5y = 0$.   **CO4**

9. Form the differential equation for the family of curves $y = mx$ by eliminating the arbitrary constant m.

          CO4

10. Solve $x\, dy = y\, dx$ **CO4**

PART-B

Answer any five questions. Each question carries TEN marks.   **5x10=50M**

11. (a) Evaluate $\int \left(\cos 5x + 4\sec^2 x + 8e^{4x} + \frac{2}{x} \right)dx$.   **CO1**

(b) Evaluate $\int \sqrt{1 + \sin 2\theta}\, d\theta$ **CO1**

12. (a) Evaluate $\int \frac{1}{\sqrt{25x^2 + 9}}\, dx$ **CO1**

(b) Evaluate $\int \frac{3x+1}{(x-1)(x+3)}\, dx$.   **CO1**

13. (a) Evaluate $\int x^3 e^{2x}dx$.   **CO1**

(b) Evaluate $\int_{0}^{\pi/2} x\cos x\, dx$ **CO2**

14. (a) Evaluate $\int\limits_{0}^{\frac{\pi}{2}} \dfrac{\cos x}{\sin x + \cos x}\, dx$ **CO2**

    (b) Find the RMS value of $\sqrt{x}$ over the range x=1 and x=2.   CO3

15. Calculate the approximate value of $\int\limits_{2}^{10} \dfrac{1}{1+x}\, dx$ by using Simpson's $1/3^{\text{rd}}$ rule by dividing the   range into 8

    equal parts.   **CO3**

16. Solve $\dfrac{dy}{dx} + \dfrac{y}{x} = \dfrac{1}{x^2}$ **CO4**

17. (a) Solve $(D^2 + 4D + 4)y = 0$ **CO4**

(b) Solve $\left(D^2 + 3D + 2\right)y = 0.$ **CO4**

18. Solve $(D^2 + 5D + 6)y = e^{3x} + \sin 2x$ **CO4**

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STATE BOARD OF TECHNICAL EDUCATION, A.P
ENGINEERING MATHEMATICS -- 301

TIME : 3 HOURS   **MODEL PAPER- II**   **MAX.MARKS : 80M**

PART-A

Answer All questions. Each question carries THREE marks.   **10x3=30M**

1. Evaluate $\int (3^x + 3x)dx$.   **CO 1**

2. Evaluate $\int (\sin 2x + \cos 3x)dx$.   **CO 1**

3. Evaluate $\int \frac{\log x}{x} dx$ **CO 1**

4. Evaluate $\int_{0}^{\frac{\pi}{4}} \sec^2 x \, dx$ **CO 2**

5. Evaluate $\int_{-1}^{1} x^3 \, dx$ **CO 2**

6. Find the area bounded by $f(x) = 2x + 3$, X-axis and the lines x=0, x=1.   **CO3**

7. Find the mean value of the function $f(x) = x^2$ in the interval [1,2]   **CO3**

8. Find the order and degree of the differential equation $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = 0$ **CO4**

9. Form the differential equation for the family of curves $y = ae^x + be^x$ by eliminating the arbitrary constants a and b.

10. Solve $(1+x)\,dy = (1+y)\,dx$ **CO4**

PART-B

Answer All questions. Each question carries TEN marks.   **5x 10=50M**

11. (a) Evaluate $\int \left(1 - 2x + \sec x \tan x + \frac{3}{x}\right)dx$.   **CO1**

    (b) Evaluate $\int \sqrt{1 - \cos 2x} \, dx$ **CO1**

12. (a) Evaluate $\int \frac{9}{\sqrt{25-x^2}} dx$ **CO1**

    (b) Evaluate $\int \frac{1}{(x-1)(x+2)} dx$.   **CO1**

13. (a) Evaluate $\int x^2 e^{3x} dx$.   **CO1**

    (b) Evaluate $\int_0^1 (x+2)(2x-1)dx$ **CO2**

14. (a) Evaluate $\displaystyle\int_{0}^{\frac{\pi}{2}} \frac{\sin^3 x}{\sin^3 x + \cos^3 x}\,dx$ CO2

(b) Find the R.M.S. value of the function $f(x) = \sqrt{\sin x}$ over the range $x = 0$

and $x = \pi$ CO3

15. Find the approximate value of $\int_{1}^{11}(x + 1)\,dx$ using Trapezoidal rule by dividing the interval into 10 equal

parts.   CO3

16. Solve $\dfrac{dy}{dx} + y\,cotx = cosecx$ CO4

17. (a) Solve $(D^2 + 4)y = 0$ CO4

(b) Solve $\left(D^2 + 4D + 3\right)y = 0.$ CO4

18. Solve $(D^2 - 5D + 4)y = x + \sin 2x$ CO4

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MECHANICS OF SOLIDS AND THEORY OF STRUCTURES

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-302	MECHANICS OF SOLIDS AND THEORY OF STRUCTURES	05	75	20	80

S.No.	Major Topics	No. of Periods	COs Mapped
1.	Theory of simple bending	15	CO1
2.	Deflection of beams	15	CO2
3.	Columns and Struts	10	CO3
4.	Dams and Retaining walls	15	CO3
5.	Statically indeterminate beams	10	CO4
6.	Stresses in frames	10	CO5
	TOTAL	75	

COURSE OBJECTIVES:

Upon completion of the course, the student shall be able to		
Course Objectives	(i)	Understand the concepts of bending stresses, shear stresses and deflection induced in beams.
	(ii)	Understand the effect of loading on columns and their behaviour under loading, stability of Dams and Retaining walls under the action of lateral loads , effects of Loading on statically determinate beams and frames.

COURSE OUTCOMES:

Course Outcomes	CO1	C-302.1	Solve the problems pertaining to Bending equation and Shear stress distribution across the depth of various cross sections.
	CO2	C-302.2	Compute the Slope & Deflection in beams using double integration, Macaulay's & Mohr's Moment-Area methods.
	CO3	C-302.3	Compute 1. The load carrying capacity of columns and 2. Intensity of base pressure acting on dams and retaining walls.
	CO4	C-302.4	Explain the effects of Loading on propped cantilevers, fixed and continuous beams and sketch Shear force and Bending Moment diagram.
	CO5	C-302.5	Calculate the forces in trusses using method of joints and sections.

LEARNING OUTCOMES:

Learning Outcomes	**1.0 Theory of Simple Bending**
	1.1 Define simple / pure bending and explain the process of simple bending
	1.2 Define
	a) Neutral layer
	b) Neutral axis
	c) Radius of curvature
	1.3 List the assumptions made in the theory of simple bending and derive the bending equation for simple bending
	1.4 Define
	a) Bending Stress
	b) Moment of Resistance
	1.5 Explain and Sketch bending stress distribution across the depth of the beam for any cross section.
	1.6 Define Modulus of section and Flexural rigidity and derive the formula for section modulus of (solid and hollow sections)
	a) Square Section
	b) Rectangular Section
	c) Circular Section
	1.7 Solve problems on theory of simple bending for Symmetrical and Unsymmetrical sections to calculate
	a) Moment of Resistance or
	b) Load carried or
	c) Dimensions of cross section.

	1.8	State formula for calculation of Shear Stress in any layer of a cross section (Derivation of formulae not required) and Draw shear distribution across a) Rectangular section b) Solid circular section c) I - section d) T - section
	1.9	Determine shear stress at any layer and draw shear stress distribution diagram across a) Rectangular section b) I – section
	1.10	Determine the maximum shear stress in circular, rectangular and square sections (Derivation of formulae not required)
2.0	**Deflection of Beams**	
	2.1	Draw the deflected shapes of different types of beams (like simply supported, cantilever, fixed and overhanging beams) and Define -Elastic curve, slope and Deflection
	2.2	Distinguish between strength and stiffness of a beam.
	2.2	Derive relation between slope, deflection and radius of curvature
	2.3	Derive the equations for maximum slope and deflection by double integration method for: a) Cantilever beams with point loads and uniformly distributed loads b) Simply supported beams with central point load or uniformly distributed load throughout.
	2.4	Calculate the maximum slope and deflection in simply supported and cantilever beams using the above formulae
	2.5	Explain Mecaulay's method (for Simply supported beams) to find the slope and deflections
	2.6	Compute the maximum slope and deflection for Simply Supported beam carrying point loads and uniformly distributed loads by Mecaulay's method
	2.7	Explain the moment area method for slope and deflection and Define Mohr's theorem-I and Mohr's theorem-II
	2.8	Derive formulae for maximum slope and deflection of standard cases by moment area method.
	2.9	Compute the maximum slope and deflections for Cantilever andSimply Supported Beams by Mohr's theorem-I and Mohr's theorem-II (moment area method)
3.0	**Columns and Struts**	
	3.1	Define: i) Compression member ii) Axial Loading iii) List different types of compression members iv) Define: a) Buckling/Critical/Crippling Loadb) Actual length c) Least radius of gyration d) Safe loade) Factor of safety

3.2 Calculate least radius of gyration for solid/hollow circular, square and rectangular sections.

3.3 List different end conditions used for a column,

3.4 Define i) Effective/equivalent length
  i) Slenderness ratio

3.5 List the effective lengths of columns for different end conditions, Calculate the slenderness ratio for a given column/strut and Classify columns based on slenderness ratio or length and lateral dimensions, Distinguish between Long and short columns.

3.6 State Euler's formula for crippling load of a column/strut (derivation not required) and derive an expression showing limitations of Euler's formula, solve problems on limitations of Euler's formula, Calculate crippling and safe loads on a column/strut with simple/built up section using Euler's formula.

3.7 Explain the validity of Rankine's formula for short and long columns using basic Rankine's empirical formula, Obtain Rankine's formula for crippling load of a column/strut from basic empirical formula, calculate crippling or safe loads on a column/strut with simple/built up section using Rankine's formula.

3.8 Calculate the ratio of strengths of hollow and solid circular columns loaded under same conditions, Design a hollow circular cross section of a column for the given data.

4   Dams and Retaining Walls

4.1 Define a dam/retaining wall; List the forces acting on a dam/retaining wall.

4.2 Derive the formula for maximum and minimum stress intensities at the base of a Trapezoidal dam with vertical water face and sketch the stress distribution at the base of a dam/retaining wall for different conditions, Calculate the stress intensity at base of a rectangular/Trapezoidal dam with or without free board.

4.3 List the conditions for stability of a dam/retaining wall, define middle third rule, define minimum base width of a dam/retaining wall, Derive the formula for minimum base width of a dam with and without free board to avoid tension at the base for the following sections 1. Trapezoidal section 2. Rectangular section 3. Triangular section and calculate the minimum base width based on above formulae

		4.4 Explain the procedure to find the stresses at the base of a dam with battered water face and calculate the stresses at the base of a dam with battered water face, Solve the problems on checking the stability of a dam with vertical / inclined water face
		4.5 Define: i) Angle of repose of soil
		ii) Angle of Surcharge
		iii) Active earth pressure
		iv) Passive earth pressure
		4.6 Compute the lateral earth pressure on a retaining wall having soil face
		4.7 Calculate the stresses at the base of a retaining wall for the above cases, the minimum base width of a retaining wall with vertical soil face and levelled earth to avoid tension and sliding at base, the stresses at the base of a retaining wall with levelled earth
		4.8 Check the stability of a retaining wall with soil face vertical
		4.9 State Rankine's formula for minimum depth of foundation.
5	**Statically Indeterminate Beams**	
		5.1 Differentiate between a statically determinate and indeterminate structure, define degree of static indeterminacy and Calculate degree of static indeterminacy for Propped cantilever, Fixed beam and Two span continuous beam
		5.2 Calculate prop reaction of propped cantilever subjected to UDL throughout OR a single point load between fixed and propped ends and Calculate SF and BM values and draw SFD and BMD for a propped cantilever with above type of loading only, Calculate the location of point of contra flexure in propped cantilever for above loading.
		5.3 State the merits and demerits of continuous beams
6	**Stresses in Frames**	
		6.1 Define a frame.
		6.2 Classify the fames based on a) Number of members and b) Number of joints.
		6.3 Show the sign convention for different types of stresses in members of a truss/frame.
		6.4 Explain the rules for assuming the direction of stresses in the members.
		6.5 Explain the method of calculating stresses/forces in the members of a truss/frame by the method of joints.
		6.6 Calculate the forces in the members of a simply supported or cantilever truss/frame subjected to DL & LL at nodal points by the method of joints and prepare force table.
		6.7 Differentiate method of joints and method of sections.
		6.8 Calculate the forces in the members of a simply supported or cantilever truss / frame subjected to DL & LL at nodal points by the method of sections and prepare force table.

PO-CO Mapping:

Course Code: C-302	Course Title: Mechanics of solids and Theory of Structures No of COs : 5				No. of Periods: 75	
POs	**Mapped with CO No**	**CO periods addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**	
		Nos.	**%**			
PO1	CO1, CO2, CO3, CO4, CO5	39	52	3	>40% Level.3	
PO2	CO1, CO2, CO3, CO4,CO5	36	48	3	(Highly addressed)	
PO3					25% - 40% Level.2	
PO4					(Moderately addressed)	
PO5					5% - 25% Level.1	
PO6					(Low addressed)	
PO7					<5% Not addressed	

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3						2	3	1
CO2	2	2						2	3	1
CO3	2	2						2	3	1
CO4	3	2						2	3	1
CO5	3	2						2	3	1
Average	**2.4**	**2.2**						2	3	1

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT:

1.0   Theory of simple bending.

Theory of simple bending – assumptions – Neutral axis – Bending stress distribution – Moment of resistance – curvature of beams – Bending equation – strength of beams – Rectangular, circular, and L sections practical applications – simple problems- Shear stress in beams – Equation for shear stress in a layer of a beam (Derivation of formula not required) – ShearStress distribution diagrams for various beam sections such as rectangular, solid circular and I sections – Problems.

2.0   Deflection of Beams

Deflected shapes of beams with different support conditions – Strength and stiffness of beams – Relation between curvature, slope and deflection - Double integration method – Derivation of standard cases – Problems - Macaulay's method for slope and deflection – Simply supported beam under concentrated and uniformly distributed loads – Problems -d) Mohr's theorems for slope and deflection – Cantilevers and simply supported beams with symmetrical loading – Problems.

3.0   Columns and struts

Short and long columns – Axial loading only – solid circular, Hollow circular, Rectangle and I-section and Built up columns – different end conditions – slenderness ratio – calculation of safe load on columns by Euler's and Rankine's formula – Effective length, radius of gyration and slenderness ratio - limitation of Euler's formula – strength of columns – problems

4.0   Dams and retaining walls

Introduction – rectangular dams – trapezoidal dams having water face vertical and inclined – Conditions for the stability of a dam – conditions to avoid tension in the masonry dam at its base, to prevent the over – turning of the dam, the sliding of dam and to prevent the crushingof masonry at the base of the dam – Minimum base width of a dam - Active and passive earth pressure – Angle of internal friction – Angle of surcharge – calculation of active earth pressure by Rankine's formula without surcharge - General conditions of stability of retaining walls – middle third rule – Distribution of pressure on foundation of retaining walls – calculationof minimum base width

5.0   Statically indeterminate beams

Statically determinate and indeterminate structures – definition – degree of static indeterminacy - Cantilever beam with UDL on whole span and propped at free end – cantilever beams with point load between fixed and propped ends – Calculation of prop reaction – SFD and BMD -Fixed Beams: Introduction-Sagging and hogging Bending moments – merits and demerits
-Continuous Beams

6.0   Stresses in frames

Frames – Definition – classification based on number of members and number of joints – Determination of forces in members of statically determinate pin jointed frames – method of

sections and method of joints – Application to simple frames and trusses (simply supported and cantilever) under loads at joints.

REFERENCE BOOKS:

1) Strength of Materials, R.K. Rajput, S.Chand Publishers, New Delhi

2) Strength of Materials, S. Ramamurtham, Dhanpat Rai Publishers, New Delhi

3) Strength of Materials, B.C.Punmia, Lakshmi Publications, New Delhi

4) Strength of Materials, R.S. Khurmi, S.Chand Publishers, New Delhi

5) Strength of Materials, R.K. Bansal, Lakshmi Publications, New Delhi

MODEL BLUE PRINT:

S.NO	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage			Question wise Distribution of Weightage			COs Mapped
				R	U	Ap	R	U	Ap	
1	Theory of simple bending	15	26	3	3	20	1	1	2	CO1
2	Deflection of beams	15	26	3	3	20	1	1	2	CO2
3	Columns and Struts	10	13	3	--	10	1	--	1	CO3
4	Dams and Retaining walls	15	16	3	3	10	1	1	1	CO3
5	Statically indeterminate beams	10	16	3	3	10	1	1	1	CO4
6	Stresses in frames	10	13	3	--	10	1	--	1	CO5
	TOTAL	**75**	110	18	12	80	6	4	8	

R-Remember ,   U-Understand,   Ap-Apply,

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 3.9
Unit Test – II	From 4.1 to 6.9

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Third Semester:C-302 MECHANICS OF SOLIDS & THEORY OF STRUCTURES

Time: 90 Minutes   **Unit Test –I**   **Maximum Marks : 40**

PART- A   **16 Marks**

Instructions: **(i)** *Answer all questions*
                   (ii) First question carries FOUR marks, each question of remaining carries THREE
marks.

1.   (a)   A triangular beam of depth 300 mm is subjected to a max comp stress of 40N/mm^2 at the

            top. The tensile stress at the bottom of the beam is_____   (CO1)

       (b)   The formula for section modulus of rectangular beam of dimensions bxd is___(CO1)

       (c)   The maximum deflection of a cantilever beam of length 'L' subjected to u.d.l w kN/m

            acting throughout the length of the beam is_____   (CO2)

       (d)   The ratio between effective length of the column to its least radius of gyration is called

            as_____   (CO3)

2.   Find the moment of resistance of rectangular beam of breadth 240mm depth 400mm.If the

       bending stress is not to exceed 12 N/mm$^{2.}$ (CO1)

3.   Draw the shear stress distribution for a rectangular cross section.   (CO1)

4.   A cantilever beam of span 3m carries a point load of 10kN at free end. Find the slope and

       deflection at the free end using Moment area method. Take E = 210 kN/mm^2 and I = 42 X 10^6

       mm^4.   (CO2)

5.   Define (i) Critical load   (ii) Safe load   (iii) Slenderness ratio   (CO3)

       PART- B   **3 x 8 = 24 Marks**
Instructions : **(i)Answer all questions**
                   (ii) Each question carries EIGHT marks
                   (iii) Answer should be comprehensive and the criterion for valuation is the content
                    but not the length of the answer.

6.   (A) A T-Section shown in fig. is used as a beam over a span of 4m. Calculate the bending stress
       in the beam if it carries a UDL of 12 kN/m.   (CO1)

(OR)
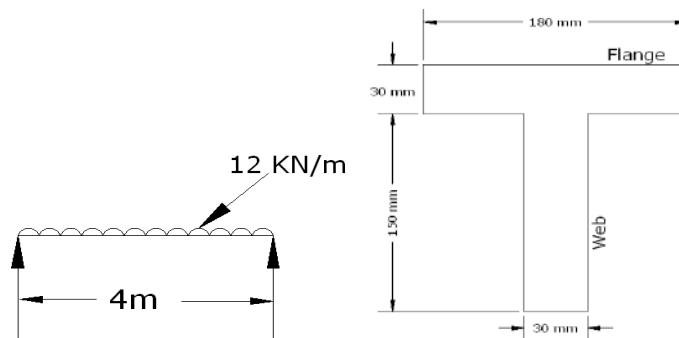
(B) A simply supported beam having a span of 8m carries a uniformly distributed load of 18kN/m over its entire span and a point load of 60kN at its centre. Design a suitable rectangular beam if b/d ratio is 0.45, the bending stress is not to exceed 18N/mm². (CO1)
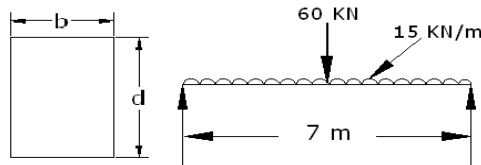
7. (A) A beam 6m long is Simply supported at its ends and carries a load of 20kN at a distance of 1m from each end. Calculate the values of Maximum slope and Maximum deflection occurring in the beam using Moment area method. Take EI = 42000 kNm². (CO2)

(OR)

(B) A beam of length 5m is fixed at one end and free at the other end, subjected to uniformly distributed load of 2 kN/m over a length of 3 m from the fixed end. Determine the maximum deflection at the free end. Take EI=1X10^{13} Nmm². (CO2)

8. (A) An I-Section Joist of top & bottom flanges 200x20mm and web 20x360mm is 6m long, used as a column with both ends fixed. Calculate Euler's crippling load for the column? Assume E = 2x 10^5 N/mm². (CO3)

(OR)

(B) A hollow cast iron column of external diameter 200mm, thickness of 20mm and 4.5m long, fixed at both ends. Calculate the safe load by Rankine's formula using a factor of safety 4. Also determine ratio of Euler and Rankine's critical load. Given E = 100 kN/mm², f_c = 550N/mm², a = 1/1600. (CO3)

OOo

Model Paper for Unit Test-II:
State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Third Semester:C-302 MECHANICS OF SOLIDS & THEORY OF STRUCTURES

Time: 90 Minutes	Unit Test –II	Maximum Marks: 40

PART- A **16 Marks**

Instructions :

> **(i) Answer all questions**

> **(ii) First question carries FOUR marks, each question of remaining carries THREE marks.**

1. (a) For no tension to occur at the base of the dam, the resultant force acting in the dam c/s should pass within the middle third points (TRUE/FALSE) (CO3)

    (b) If angle of repose of soil mass is 30°, the ratio between Co-efficient of passive earth pressure to Co-efficient of active earth pressure is_____ (CO3)

    (c) Degree of statical indeterminacy of propped cantilever is_____ (CO4)

    (d) The frame is said to be perfect, when it satisfies the condition: n=2j-3 (TRUE/FALSE) (CO5)

2. Draw the stress distribution diagrams at the base of dam for three possible cases. (CO3)

3. Define (i) Critical load (ii) Safe load (iii) Slenderness ratio (CO3)

4. A propped cantilever beam of span 3.5m subjected to u.d.l of 20 kN/m acting throughout the length of the beam. If prop is provided at free end, find the prop reaction. (CO4)

5. What are the assumptions made in the analysis of truss. (CO5)

PART- B **3 x 8 = 24 Marks**

Instructions : **(i) Answer all questions**
> **(ii) Each question carries EIGHT marks**
> **(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.**

6. (A) A trapezoidal concrete dam has its water face vertical with 2.5m top width, stores water to a depth of 14 m with a free board of 2.0m. Take density of concrete as 24 kN/m³. Calculate the minimum base width required. (CO3)

(OR)

(B) Calculate the stresses at the base of a masonry retaining wall of trapezoidal section given top width 1.0m, bottom width 3.0m, height 8m and the earth face vertical.It is retaining earth level with its top. $\emptyset$ =45°, γ =18 kN/m³, unit weight of masonry ρ= 24 kN/m3. (CO3)
(CO3)

7. (A) Plot SFD and BMD of a propped cantilever beam of span 4m subjected to u.d.l of 20 kN/m acting throughout length of the beam.   (CO4)

(OR)

(B) A propped cantilever beam of span 3.0m subjected to two-point loads 25 kN and 30 kN at 1m and 2m respectively from fixed end. If prop is provided at the free end, find the prop reaction and also plot SFD and BMD.   (CO4)

8. (A) Explain the procedure of finding the forces in the members of a pin jointed truss by using method of joints   (CO5)

(OR)

(B) Determine the forces in the frame shown below by method of joints.   (CO5)

oOo
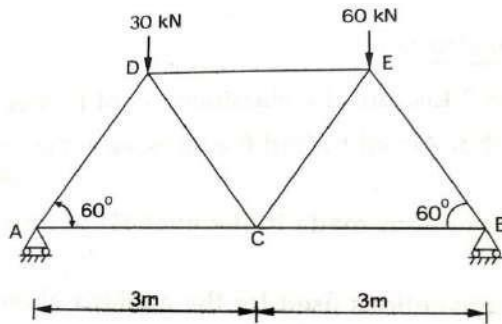
MODEL PAPER - DIPLOMA EXAMINATION, (C–23)
DCE—THIRD SEMESTER EXAMINATION
MECHANICS OF SOLIDS AND THEORY OF STRUCTURES (C-302)

Time : 3 hours]   [*Total Marks* : 80

<div align="center">

PART—A   3×10=30marks

</div>

Instructions :   **(1) Answer all questions.**
                (2) Each question carries three marks.
                (3) **Answers should be brief and straight to the point and shall not exceed** *five*
                   simple sentences.

1. State any three assumptions made in the theory of simple bending.   (CO1)
2. Define (i) Neutral Axis (ii) Flexural rigidity.   (CO1)
3. Distinguish between strength and stiffness of a beam.   (CO2)
4. State Mohr's theorem and its limitations.   (CO2)
5. Write any two differences between long columns and short columns.   (CO3)
6. State the stability conditions for the Dams.   (CO3)
7. Define the following terms:
     (a) Active earth pressure *(b)* Passive earth pressure.   (CO3)
8. What is meant by degree of static indeterminacy?   (CO4)
9. State the advantages of continuous beams.   (CO4)
10. Name three different methods used to find the stresses in the members of a frame.   (CO5)

<div align="center">

PART – B   **5 x 10 = 50 marks**

</div>

Instructions:
    i)   **Answer any FIVE questions**
    ii)   **Each question carries TEN marks.**
    iii)   **Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.**

11) Calculate maximum shear force and bending moment for a cantilever beam of span 3 m and carries an u.d.l. of 2 kN/m over a length of 1 m from free end and a point load of 10 kNis acting at a distance of 1 m from fixed end.   (CO1)

12) A beam of I—section, 150 mm deep and 80 mm wide has flanges 6·8 mm thick and web 4·8 mm thick is Simply Supported and carries a u.d.l of 20 kN/m over its entire span. Find the maximum permissible span without exceeding the shear stress of 60 N/mm2. Take *I xx* = 688.2 x10^4 mm^4 and A = 1808 mm^2.   (CO1)

13) A Simply supported beam of span 5m carries a point load of 50kN acting at 3m from Left hand support. Find the maximum deflection using Macaulay's method. Assume EI = 4500 kN-m^2. (CO2)

14) Two concentrated loads of 60 kN and 100 kN are placed on a simply supported beam of span 6 m at distances of 2 m and 3 m respectively from the left end. Determine the deflections under the two point loads, taking *EI* = 3000 kN/m^2.   (CO2)

15) A circular column of diameter 200mm and 4 m long is fixed at both ends. Calculate the safe load by Rankine's formula using a factor of safety 5. Also determine ratio of Euler and Rankine's critical load. Given E = 100 kN/mm², f_c = 500 N/mm², a = 1/1500.

(CO3)

16) A masonry dam 10 m high, 2 m at top and 6 m wide at bottom retains water to a depth of 7.5m, water face of dam is vertical. Find maximum and minimum stresses at base. Weight of masonry 23 kN/m³ and specific weight of water 10 kN/m³.   (CO3)

17) A propped cantilever beam of span 3.0m subjected to two-point loads 25 kN and 30 kN at1m and 2m respectively from fixed end. If prop is provided at the free end, find the prop reaction and also plot SFD and BMD.   (CO4)

18) Find the magnitude and nature of forces in all members of the truss shown below: (CO5)
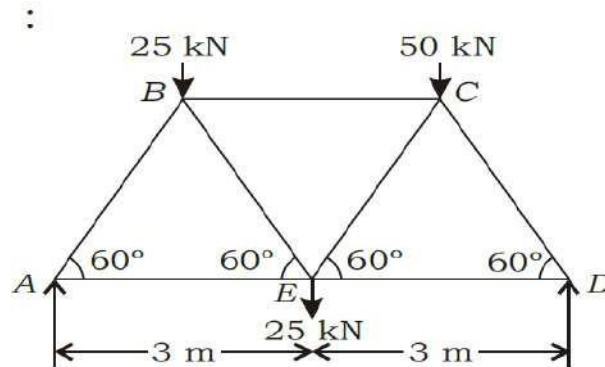
HYDRAULICS

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-303	HYDRAULICS	05	75	20	80

S.No.	Major Topics	No. of Periods	COs Mapped
1.	Properties of Fluids	04	CO1
2	Fluid pressure and its measurements	09	CO1
3.	Flow of Fluids	09	CO2
4.	Flow through orifice and mouth pieces	10	CO3
5.	Flow over notches and weirs	10	CO3
6.	Flow through pipes	10	CO4
7.	Flow through open channels	12	CO4
8.	Pumps and Turbines	08	CO5
9.	Hydroelectric power plants	03	CO5
	Total	75	

COURSE OBJECTIVES:

Upon completion of the course, the student shall be able to		
COURSE OBJECTIVES	(i)	Understand the properties of liquids, water pressure and its measurement, principles of flow of water, flow through Orifice and Mouth Pieces, Flow over notches & weirs, flow through pipes, open channels.
	(ii)	Understand the working principles of pumps & turbines and general lay-out of Hydro-electric Power Plants.

COURSE OUTCOMES:

COURSE OUTCOMES	CO1	C-303.1	Solve simple problems on properties of fluids and pressure measurements using various instruments.
	CO2	C-303.2	Solve the problems using the equation of continuity and energies of liquid in motion.
	CO3	C-303.3	Determine coefficient of discharge of a small orifice, mouth piece, Notches & Weirs and Venturimeter.
	CO4	C-303.4	Solve the problems of the major and minor losses of head of water flowing through pipes and channels using relevant formulae
	CO5	C-303.5	Justify the suitability of various Pumps and Turbines for the given conditions.

LEARNING OUTCOMES:

LEARNING OUTCOMES	**1.0 Properties of Fluids**
	1.1 Explain the term fluid and give an example
	1.2 Differentiate ideal and real fluids.
	1.3 Distinguish between fluids & liquids.
	1.4 Define the terms like - Mass density, Specific weight, Specific gravity, Adhesion, Cohesion, Surface tension, Capillarity, Compressibility, Viscosity and Vapour pressure.
	1.5 State formulae of dynamic viscosity, capillarity, surface tension of water drop and soap bubble.
	
	2.0 Fluid pressure and its measurements
	2.1 Define the terms: Atmospheric pressure, Gauge pressure and Absolute pressure.
	2.2 State the relation between the above three pressures.
	2.3 Describe the following pressure measuring instruments: Piezometers, U-tube manometers, Differential manometers and Pressure gauges.
	2.4 Compute the pressure of a flowing fluid given the readings on Piezometers, simple manometers, differential and inverted differential manometers.
	2.5 Define Total Pressure and Centre of Pressure. State the formulae for total pressure and centre of pressure on the following surfaces immersed in a liquid at rest:
	    1. Horizontal plane,
	    2. Vertical plane and
	    3. Inclined plane
	2.6 Calculate total pressure and centre of pressure for the above plane surfaces for the given conditions.
	
	3.0 Flow of fluids
	3.1 State the different types of flow of liquids

3.2 Define :

   i) Steady flow and Unsteady flow

ii) Uniform flow and Non-uniform flow,

   iii) Laminar flow and Turbulent flow.

3.3 Distinguish between different types of flow of liquids.

3.4 Define discharge, State units of discharge

3.5 State one dimensional continuity equation.

3.6 Compute the discharge/velocity at a section of flowing liquid in pipe for the given conditions.

3.7 Explain the following energies of liquid in motion

   1. Datum head,

   2. Pressure head and

    3. Velocity head.

3.8 State Bernoulli's theorem of total energy of a liquid in motion. List the limitations of Bernoulli's theorem. Compute the pressure/velocity at a section of flowing liquid in pipe for the given conditions using Bernoulli's equation. List three practical applications of Bernoulli's theorem.

3.9 Describe the working principle of

   1. Venturimeter

   2. Orifice meter and

   3. Pitot tube.

3.10 State the formulae to calculate the actual discharge of flowing liquid through Venturimeter and Orifice meter. Compute the actual discharge of flowing liquid through Venturimeter and Orifice meter.

4.0   Flow through Orifice and Mouth pieces

   4.1 Define orifice. List different types of orifices. Differentiate large orifice and small orifice.

   4.2 Define the terms: Vena-contracta, Cc, Cv, Cd and Cr (Hydraulic coefficients). State the relation between above coefficients.

   4.3 State the formula for theoretical discharge through small orifice

   4.4 Calculate the discharge, Cc, Cv, Cd and Cr for given conditions- Numerical Problems

   4.5 Discharge through Large Rectangular Orifice (No derivation)

   4.6 State the equations with standard notations for discharge through Fully submerged Orifice and Partially submerged Orifice (No Problems)

   4.7 State the formula for time of emptying of a prismatic tank by an orifice. Compute the time of emptying of a prismatic tank by an orifice.

   4.8 Define mouth piece. Differentiate mouth piece and orifice. Classify mouth pieces.

   4.9 State the formulae for discharge for different types of mouth pieces.

   4.10 Calculate discharge through a mouth piece for given data-Numerical Problems.

5.0 Flow over notches and weirs

    5.1 Define a notch. List different types of notches.

    5.2 State the formulae for the discharge through Rectangular Notch, Triangular notch and Trapezoidal notches. Calculate the discharge through the above notches from the given data.

    5.3 Define weir. List different types of weirs. State the formulae for discharge over Sharp crested weir and Broad crested weirs.

    5.4 State the formulae for discharge over above weirs with modifications for end contractions and velocity of approach.

    5.5 Determine the discharge over sharp crested and broad crested weirs under given conditions – Numerical Problems.

    5.6 Write the formulae to determine the discharge for rectangular weir - Francis, and 2. Bazin's empirical formula

6.0 Flow through Pipes

    6.1 List various losses that occur when water flow through pipes.

    6.2 Differentiate Major loss and Minor losses.

    6.3 State formulae to compute loss of head due to friction using Chezy, and Darcy.

    6.4 Solve numerical problems in pipes based on the above two formulae for given data- Numerical problems.

    6.5 State formulae for head loss due to various minor losses.

    6.6 Compute the above minor losses of head for given data –Numerical problems.

    6.7 Define the terms: Hydraulic gradient line and Total energy line.

    6.8 Calculate the discharge through Parallel and Compound (series) Pipes connected to reservoir for given data- Numerical Problems.

    6.9 Define the terms: Critical velocity and Reynold's number.

    6.10 State whether the flow is laminar or turbulent based on Reynold's number.

7.0 Flow through open channels

    7.1 Define open channel flow. Differentiate open channel flow and pipe flow.

    7.2 Define the terms: Wetted perimeter and Hydraulic mean depth.

    7.3 State Chezy's formula and Manning's formula for uniform flow through open channels.

    7.4 List the Values of 'C' for different surfaces. State the following formulae to evaluate 'C'.

        (i)   Kutter's, formula

        (ii)   Manning's formula and

        (iii)   Bazin's formula

    7.5 Calculate Velocity and Discharge in a channel using Chezy's and Manning's formulae for given conditions-Numerical problems.

    7.6 Define most economical section of a channel.

    7.7 List the conditions for most economical section of Rectangular channel and Trapezoidal channel.

    7.8 Design rectangular channel sections for the given conditions.

    7.9 Design trapezoidal channel sections for the given conditions.

8.0   Pumps and Turbines

    8.1 Define a Pump. List different types of Pumps. Describe the parts of Reciprocating Pump with a sketch.

    8.2 Describe the working principle of Single acting and Double acting reciprocating pumps.

    8.3 List the functions of air vessels in reciprocating pumps.

    8.4 Describes the different parts of centrifugal pumps. Explain the working principle of centrifugal pump. Explain the necessity of priming. Explain the use of Foot valve and Strainer in a centrifugal pump.

    8.5 List the pumps to be used for the condition of low head and maximum discharge and vice versa.

    8.6 Distinguish Mono block from Centrifugal pump. State any three advantages of Submersible pumps

    8.7 Define Turbine. List types of turbines. List the examples of Impulse Turbine and Reaction turbines. Differentiate between Impulse and Reaction turbines.

    8.8 Explain the working principle of Pelton wheel turbine.

    8.9 Describe the Parts of Francis Turbine. Explain the purpose of draft tube. List types of draft tubes.

9.0   Hydro-Electric Power Plants

    9.1 Sketch a typical layout of hydro-electric power plant installation.

    9.2 List different components of hydro-electric power plant installation.

    9.3 Define a surge tank.

    9.4 List the functions of surge tank.

PO-CO Mapping:

Course Code: C-303	Course Title: HYDRAULICS No of COs: 5			No. of Periods: 75	
POs	**Mapped with CO Nos.**	**CO periods addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		No.	**%**		
PO1	CO1, CO2, CO3, CO4, CO5	25	33	2	>40% Level.3 (Highly addressed)
PO2	CO1, CO2, CO3, CO4, CO5	50	67	3	
PO3					25% - 40% Level.2 (Moderately addressed)
PO4					
PO5					5% - 25% Level.1 (Low addressed)
PO6					
PO7					<5% Not addressed

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2						3	3	3
CO2	2	3						3	3	3
CO3	2	3						3	3	3
CO4	3	2						3	3	3
CO5	2	3						3	3	3
Average	2.4	2.6						3	3	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT:

1. Properties of liquids
Scope and importance of hydraulics in Civil Engineering - Fluids – classification - ideal and real fluids - Difference between fluids and liquids - Properties of liquids - Formulae for Dynamic viscosity, Kinematic viscosity, surface tension of water and soap bubble, capillarity.

2. Liquid pressure and its measurement
Atmospheric pressure, gauge pressure and absolute pressure and relationship - Pressure measuring Instruments – Piezometer- Manometers – U-tube, inverted U-tube and differential manometers – Description - Measurement of the Pressure of a flowing liquid – Piezometer - simple, differential and inverted differential manometers - Total pressure and Centre of pressure on plane surface immersed in liquid – Horizontal, Vertical and inclined plane surfaces

3. Flow of liquids
Types of Flow-Uniform flow, non-uniform flow, stream line flow, turbulent flow, steady flow and unsteady flow - Rate of flow or discharge-continuity equation – one dimensional – Principle - Numerical Problems - Energies of liquid in motion – datum head – pressure head and velocity head - Total energy of liquid in motion – Bernoulli's theorem (without proof) - limitations of Bernoulli's theorem - Numerical Problems - Practical applications of Bernoulli's theorem - venturi meter - orifice meter - pitot tube - Numerical Problems on venturi meter and orifice meter.

4. Flow through Orifices and Mouth Pieces

Orifice-types of Orifices-difference of small and large orifice-Determination of discharge through small Orifice - Vena Contracta-Hydraulic coefficients (Cv,Cc,Cd and Cr) – relation -(No derivation) - Numerical Problems – Discharge through Large Rectangular Orifice ((No derivation)- Flow through fully submerged and partially submerged orifices-explanation (No Problems)- Time of emptying of a prismatic tank by an orifice- Numerical Problems - Mouth piece-Difference between Orifice and Mouth piece - Types of Mouth pieces – equations for discharge-determination of discharge through a Mouth piece from the given details.

5. Flow over Notches and Weirs

Notches - types of notches - rectangular, triangular and trapezoidal notches - Formulae for the discharge over rectangular, triangular and trapezoidal notches-Numerical problems (Derivation of formulae not required) – Weirs - types of weirs – sharp crested and broad crested weirs - Formulae for the discharge over a sharp crested and broad crested weirs -Numerical problems (Derivation of formulae not required) - Equations of discharge for the above weirs with velocity of approach and end contractions - Empirical formulae for discharge over rectangular weir-Francis formula-Bazins formula-(Derivation of formulae not required).

6. Flow thorough pipes

Major and minor losses - Frictional loss in pipes - Chezy's formula and Darcy's formula (without proof) - Numerical problems - Minor Losses - Loss of head at entrance and exit of pipe, loss of head due to sudden enlargement, sudden contraction – Formulae - simple problems - Hydraulic gradient and total energy line - Discharge through parallel pipes and compound pipes (series) connected to a reservoir - Laminar and turbulent flow in pipes - critical velocity and Reynold's number – significance (no problems).

7. Flow through open Channels

Open channel flow - differences between open channel flow and pipe flow - Geometric properties of channel - Wetted perimeter and hydraulic mean depth - Discharge through open channel –Chezy's formula (derivation not necessary) - Numerical problems - Value of 'C' for different surfaces -Empirical formulae for value of 'C' - Kutter's formula, Manning's formula, Bazin's formula - Conditions for Most economical section of a channel – Design of rectangular and trapezoidal section.

8. Pumps and Turbines

Pumps - types - reciprocating pumps and centrifugal pumps - Reciprocating pumps- singe acting and double acting pumps- description and working – functions of air vessels - Centrifugal pumps - description of parts – working – priming - foot valve and strainer - Turbines - Classification of turbines-impulse and reaction turbines - Impulse turbine - Pelton Wheel, description and working(without problems) - Reaction turbines- Francis and Kaplan turbines - Description and working of Francis turbine (without problems) - Draft tube- purpose and types.

9. Hydro-electric Installation

Sketch a typical layout of a hydroelectric power plant - components – Intake works, Pressure tunnel, Penstock, surge tank, anchor blocks and tailrace - Functions of surge tank.

REFERENCE BOOKS:

1. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Publications.
2. Hydraulics and Fluid Mechanics Including Hydraulics Machines by P. N. Modi & S.M. Seth, Rajsons publications,Pvt.Ltd.
3. Hydraulics, Fluid Mechanics & Hydraulic Machines,R.S Khurmi &N.Khurmi, S.Chand Publications.
4. Fluid Mechanics,Frank white, SIE

MODEL BLUE PRINT

S. No.	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage			Question wise Distribution of Weightage			COs Mapped
				R	U	Ap	R	U	Ap	
1	Properties of Fluids	4	3	3	--	--	1	--	--	CO1
2	Fluid pressure and its measurements	9	13	3	--	**10**	1	--	**1**	CO1
3	Flow of Fluids	9	23	3	--	20	1	--	2	CO2
4	Flow through orifice and mouth pieces	10	13	3	--	10	1	--	1	CO3
5	Flow over notches and weirs	10	16	3	3	10	1	1	1	CO3
6	Flow through pipes	10	23	3	--	20	1	--	2	CO4
7	Flow through open channels	12	13	3	--	10	1	--	1	CO4
8	Pumps& Turbines	8	3	3	--	--	1	--	--	CO5
9	Hydroelectric power plants	3	3	3	--	--	1	--	--	CO5
	TOTAL	75	110	27	3	80	9	1	8	

R-Remember   U-Understanding   Ap-Application

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 5.2
Unit Test – II	From 5.3 to 9.4

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Third Semester:C-303 HYDRAULICS

Time: 90 Minutes   **Unit Test –I**   Maximum Marks : 40

PART- A   **16 Marks**

Instructions :

   (i) Answer all questions

   (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) Specific gravity has the same unit as that of mass density – True/False   (CO1)

      (b) Viscosity is the resistance to flow of fluids – True/False   (CO1)

      (c) The unit for measuring discharge in SI system is --------------   (CO2)

      (d) The ratio of actual discharge of orifice to the theoretical discharge is called.   (CO3)

2.   Define (a) Specific weight (b) Cohesion (c) Surface tension   (CO1)

3.   State the types of fluid pressure measuring devices   (CO2)

4.   State and briefly explain the equation of continuity   (CO3)

5.   Define a Notch and state the types based on its shape.   (CO3)

PART- B   **3 x 8 = 24 Marks**

Instructions :
      (i) Answer all questions
      (ii) Each question carries EIGHT mark
      (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6.   (A) A rectangular plate 3 m long and 1.5 m wide is immersed vertically in water in such a way that its 3m side is parallel to water surface and its top edge is 2.5m below the free surface. Find the total pressure and depth of centre of pressure on one side of the plate? (CO1)
                                        (OR)

      (B) A circular plate 2.1M diameter is immersed in water so that its plane makes an angle of 300 to the water surface and higher point of the plate is 2.0M below the surface. Calculate the total pressure and centre of pressure.   (CO1)

7.	(A) A pipe 340 m long has a slope 1 in 100 and tapers from 1.25 m diameter at the higher end to 625mm diameter at the lower end. Determine the pressure at lower end. If the pressure at the higher end $0.14N/mm^2$ and the discharge through the pipe is 108lit/sec of water. (CO2)

(OR)

(B) (i) write any three assumptions of Bernoulli's equation? (ii)A pipe of 0.3m diameter carries an oil of specific gravity 0.9 at the rate of 120 lit/sec. Pressure at a point A in the pipe is 24.5 kN/m^2. If the point A is 5m above the datum line calculate the total head in meters of oil.

(CO2)

8.	(A) A circular tank of diameter 3m contains water up to a height of 9m. An orifice of diameter 400mm is provided at the bottom of the tank. Calculate time required for empty the tank, if c_d =0.97.				(CO3)

(OR)

(B) A Right-angle triangular V-Notch was used to measure discharge of a centrifugal pump. If the depth of water at V-Notch is 200mm, calculate the discharge over the notch in lit per minute. Cd=0.62.				(CO3)

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State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Third Semester:C-303 HYDRAULICS

Time: 90 Minutes	Unit Test –II	Maximum Marks : 40

PART- A   **16 Marks**

Instructions :

    (i) Answer all questions

     (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) Weirs are used to find the discharge of rivers – True/False   (CO3)

     (b) If the Reservoirs are kept at the same level the head loss is zero – True/False   (CO4)

     (c) In open channel, If the flow characteristics unchanged with space the flow is called---(CO4)

     (d) Low specific speed of turbine implies it is a......... Turbine   (CO4)

2.   State (i) Darcy's equation (ii) Chezy's equation to find the Loss of head due to Friction(CO4)

3.   Define the terms (a) Reynold's number (b) Hydraulic mean Depth   (CO4)

4.   Sketch a Centrifugal pump and show its parts.   (CO5)

5.   State any three components of a Hydro Electric Power Station.   (CO5)

PART- B   **3 x 8 = 24 Marks**

Instructions :

    (i) Answer all questions

     (ii) Each question carries EIGHT mark

     (iii) Answer should be comprehensive and the criterion for valuation is the content but not
        the length of the answer.

6.   (A) Water is passing over a rectangular notch flows subsequently over a right-angled triangular notch. The length of the rectangular notch is 0.6 m and its coefficient of discharge is 0.62. If the coefficient for triangular notch is 0.59, what will be the head through the triangular notch when the head over rectangular notch is 0.15m?   (CO3)

                (OR)

     (B)A broad crested weir is constructed across the entire 3 m width of a rectangular channel. If the head on the weir crest is 56 cm, find the discharge over the weir. Take $C_d = 0 \cdot 96$. (CO3)

7. (A) Two reservoirs are connected by a pipe line 22 m long consisting of two pipes one of 15 cm dia. and length 6m and the other of diameter 22.5 cm and 16 m length. If the difference of water levels in two reservoirs is 6 m, calculate the discharge considering all losses. Take f = 0.04. (CO4)

(OR)

(B) Two Reservoirs are connected by a straight pipe 1500 m long. For the first 800m length it has 200 mm diameter and then reduced to 150mm diameter for the remaining length. The water levels in the two reservoirs differ by 25m. Determine all the losses of head and also the Discharge in cumecs. Take friction f = 0.01. (CO4)

8. (A) A Trapezoidal channel section has side slopes 1 vertical to 2 horizontal. The discharge in the channel is 16 m^3/sec, with a bed slope of 1 in 2000. Design the channel for the most economic section. Use manning formula with N = 0.012 (CO4)

(OR)

(B) A trapezoidal channel has side slopes 1 : 1 and is discharging 20 m^3/sec with bed slope of 0·5 m per 1000 m. Manning's n = 0·01. Determine the section of the channel. (CO4)

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MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C–23)
DCE—THIRDSEMESTER EXAMINATION
HYDRAULICS (C-303)

<u>Time: 3 hours]</u>   [Total Marks: 80

PART—A   **10×3 =30 Marks**

Instructions: (1) Answer all questions.
                   (2) Each question carries three marks.
                   (3) Answers should be brief and straight to the point and shall not
                        exceed five simple sentences.

1. Define the terms viscosity, capillarity and surface "tension".   (CO1)
2. State the relation among atmospheric pressure, gauge pressure and absolute pressure.
                                                                                           (CO1)
3. State the Bernoulli's theorem and express it in equation form   (CO2)
4. State the classification of mouth pieces according to shape and according to position.(CO3)
5. Find the discharge over a rectangular notch having width 2m and a constant head of 30cm.
    assume C_d = 0.62.   (CO3)
6. List the classification of weirs.   (CO3)
7. Define Reynold's number. How it is useful in determining the type of flow.   (CO4)
8. What do you understand by the term most economical section of channel?   (CO4)
9. List the functions of air vessels in reciprocating pumps.   (CO5)
10. State the component parts of a hydroelectric power plant.   (CO5)

PART – B   **5 x 10 = 50 marks**

Instructions:
    i)   Answer any FIVE questions
    ii) Each question carries TEN marks.
    iii) Answer should be comprehensive and the criterion for valuation is the content but
          not the length of the answer.

11. U-tube differential manometer is used to find out a pressure difference of liquids in pipe A and pipe
    B as shown in figure. If the pipe A contains liquid of specific gravity 1·6 and pipe B contains water,
    find the difference of pressure between the two points. Manometric liquid is mercury of specific
    gravity 13.6.   (CO1)
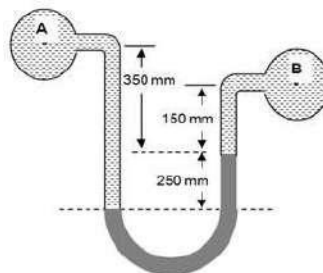
12. The diameter of a pipe changes gradually from 150mm at point A to 100mm at point B, which are

situated at 20m and 16mrespectively above the datum. Determine the pressure at B, if the pressure at A is 0.2 N/mm^2 and velocity of flow at A is 1.1m/sec. Neglect the losses between a and B.

13. A pipe 340 m long has a slope 1 in 100 and tapers from 1.25 m diameter at the higher endto 625mm diameter at the lower end. Determine the pressure at lower end. If the pressure atthe higher end 0.14N/mm^2 and the discharge through the pipe is 108lit/sec of water. (CO2)

14. Calculate the discharge passing through an orifice 80 cm wide and 60 cm deep in the side of tank. It is having a water level of 3·5 m above the upper edge of the orifice and tail water is 20 cm above the lower edge of the orifice. Take Cd = 0·62. (CO3)

15. Water passing over a rectangular notch flows subsequently over a right-angled triangular notch. The length of the rectangular notch is 0·6 m and the coefficient of discharge is 0·62. If the coefficient of discharge of triangular notch is 0·59, what will be the head through the triangular notch when the head over rectangular notch is 0·15 m? (CO3)

16. A compound piping system consists of three pipes of lengths 1500 m, 1200 m and 1000 m and diameters 0·5 m, 0·4 m and 0·3 m respectively are connected in series. Convert the system to (a) an equivalent Length of 0·4 m diameter pipe; (b) an equivalent size of pipe 3700 m long.

17. A 2 km long water main has to carry a discharge of 0·5 cumec. If the maximum allowable loss of head due to friction is 26 m, find the minimum diameter required. Use Darcy's equation. Assume f = 0.008. Neglect the minor losses.

18. A rectangular channel having most economical section is 6m wide. Find the discharge, if the bed slope is 1 in 1200. Assume 'C' as 50.. (CO4)

SURVEYING-II

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-304	SURVEYING-II	04	60	20	80

COURSE OBJECTIVES:

S.No.	Major Topics	No. of Periods	COs Mapped
1	Theodolite Survey	16	CO1
2.	Trigonometric levelling	10	CO2
3.	Tacheometry	10	CO3
4	Curves	16	CO4
5	Advanced surveying using GPS and GIS	8	CO5
	Total	60	

Upon completion of the course, the student shall be able to			
COURSE OBJECTIVES	(i)	Develop skills in using Theodolites and Know about applications of principles of Trigonometric levelling and Tacheometry.	
	(ii)	Understand the need for setting out the curves and methods of setting out simple curves	
	(iii)	Understand the principles of advanced surveying systems viz., GPS, GIS and their applications	

COURSE OUTCOMES:

COURSE OUTCOMES	CO1	C-304.1	Suggest with justification in the use of theodolite for Traversing
	CO2	C-304.2	Describe the principles of Trigonometrical Levelling and compute the distance and elevation for different conditions.
	CO3	C-304.3	Find the vertical and horizontal distances using stadia & tangential tacheometry.
	CO4	C-304.4	Calculate the data required for setting out simple circular curve
	CO5	C-304.5	Explain the concepts of GPS and GIS and their applications in Civil Engineering.

LEARNING OUTCOMES:

LEARNING OUTCOMES	
	1.0 Theodolite survey
	1.1 List the uses and types of a Theodolite, differentiate between transit and non-transit theodolites, List the parts of a transit Theodolite, explain the functions of parts of a transit theodolite.
	1.2 Define the terms Face left observation, Face right observation, Swing of telescope, Telescope normal and Telescope inverted, List the fundamental lines of a transit Theodolite, explain the relationship of fundamental lines of theodolite, Explain the steps involved in carrying out temporary adjustments of a transit theodolite for taking observations, Read the reading of vernier and least count
	1.3 Explain the method of measuring the horizontal angle by repetition method, rule out the page of a theodolite field book, calculate the angle by the method of repetition, List the errors eliminated in repetition method
	1.4 Explain the method of measuring of horizontal angle by reiteration method, Rule the page of a theodolite field book, explain the method of calculating angles by method of reiteration
	1.5 Explain the method of measurement of Direct angles and Deflection angles, explain the Steps involved in setting out angles using a theodolite.
	1.6 Explain the methods of measurement of vertical angles, magnetic bearing of a line, Explain the methods of prolonging a given survey line
	1.7 Explain the method of conducting traverse survey by Included angles method, Deflection angles method and Magnetic bearing method, Check the angular measurements and apply corrections in a closed traverse
	1.8 Define Latitude and Departure of a line, Compute the latitudes and departures of survey lines of a closed traverse, calculate the error of closure of a closed traverse
	1.9 Enumerate the difference between consecutive and independent co-ordinates, Calculate the consecutive and independent co-ordinates of stations of a closed traverse and calculate the area of a closed Traverse by independent co-ordinates
	1.10 List the types of errors in theodolite surveying.
	2.0 Trigonometric Levelling
	2.1 Define trigonometrical levelling
	2.2 Explain different cases that occur in trigonometrical levelling to find the elevation and distance of a given object (base of the object accessible or inaccessible)

	2.3 Derive formula for finding height and elevation of an object when the base of the object is accessible.
	2.4 Calculate the height and elevation of an object when the base of the object is accessible.
	2.5 Derive the formula to find the distance and elevation of the object when the base of the object is inaccessible and instrument stations and object are in the same vertical plane
	2.6 Calculate the distance and elevation of the object when the base of the object is inaccessible and instrument stations and object are in the same vertical plane
	2.7 Describe the procedure to find the distance and elevation of the object when the base of the object is inaccessible and instrument stations and object are not in the same vertical plane.
	2.8 Calculate the distance and elevation of the object when the base of the object is inaccessible and instrument stations and object are not in the same vertical plane.
	3.0 Tacheometry
	3.1 Define tacheometry and uses of tacheometry and explain the principles of stadia tacheometry, List the different methods of tacheometry, define staff intercept
	3.2 List the constants of tacheometry in stadia tacheometry
	3.3 Derive the formulae to determine the horizontal distance of staff station from the instrument station using stadia tacheometry, when the line of collimation is horizontal with staff held vertical
	3.4 Derive the formulae to determine the elevation of the staff station using stadia tacheometry, when the line of collimation is horizontal with staff held vertical, Calculate the horizontal distance of staff station from the instrument station and its elevation when the line of collimation is horizontal with staff held vertical.
	3.5 Explain the procedure for determining tacheometric constants, State the use of analytic lenses
	3.6 Write the formulae to determine the horizontal distance of staff station from the instrument station using stadia tacheometry When the line of collimation is inclined with staff held vertical (without derivation), Write the formulae to determine the elevation of the staff station using stadia tacheometry When the line of collimation is inclined with staff held vertical (without derivation)
	3.7 Calculate the horizontal distance of staff station from the instrument station and its elevation when the line of collimation is inclined with staff held vertical, Compute the horizontal distance and difference in elevations between any two staff stations (instrument station and staff stations are lying in the same vertical plane and when the instrument station and staff stations are not lying in the same vertical plane) using stadia tacheometry

3.8 Explain the principle of Tangential Tacheometry, enumerate the difference between Stadia and tangential tacheometry

4.0 Curves

4.1 List the types of horizontal curves

4.2 Define Simple curve

4.3 Define degree of curve and state the relation between the radius and degree of curve according to chord length / arc length and Calculate degree of curve using above relations

4.4 Sketch a simple circular curve and show its elements

4.5 Define various elements of a simple circular curve

4.6 Compute the length of curve, tangent length, length of long chord and mid ordinate, apex distance and chainages at salient points of a curve

4.7 List the linear and angular methods of curve setting

4.8 Explain the procedure for setting out a curve by linear methods

5.0 Advanced surveying using GPS and GIS

5.1 List the modern surveying techniques

5.2 Define GPS and explain the working principle of GPS

5.3 Explain the segments of GPS and Enumerate the types of GPS receivers

5.4 Explain taking coordinates of various points using GPS

5.5 List the applications of GPS in civil Engineering

5.6 List merits and demerits of GPS

5.7 Define GIS and State the components of GIS

5.8 List and explain the types of data used in GIS

5.9 Define map and list the types of map projections

5.10 List the uses and applications of GIS in civil Engineering

PO-CO Mapping:

POs	Mapped with CO Nos.	CO periods addressing PO in Col.1		Level (1,2,3)	Remarks
		No.	**%**		
1	CO1, CO2, CO3, CO4, CO5	24	40	3	>40% Level.3
2	CO1, CO2, CO3, CO4, CO5	15	25	2	(Highly addressed)
3					25% - 40% Level.2
4	CO1, CO2, CO3, CO4, CO5	15	25	2	(Moderately addressed)
5	CO2, CO4, CO5	6	10	1	5% - 25% Level.1
6					(Low addressed)
7					<5% Not addressed

Course Code: C- 304 — Course Title: SURVEYING-II, No. of COs: 5 — No. of Periods: 60

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2		2				1	2	2
CO2	2	2		3	2			1	2	2
CO3	3	2		3				1	2	2
CO4	3	3		3	2			1	2	2
CO5	3	3		2	2			1	2	2
Average	2.6	2.4		2.6	2			1	2	2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT:

1.0 Theodolite Surveying

Component parts of a transit theodolite and their functions – Definitions of technical Terms – Station, face left, face right, swinging the telescope, transiting - Fundamental lines of a transit theodolite – Horizontal axis, vertical axis, axis of telescope, axis of plate levels, axis of altitude bubble, line of collimation – Conditions of adjustments - Temporary adjustments of a transit theodolite - Measurement of horizontal angles by repetition and reiteration method - Measurement of vertical angles - Booking readings - Measurement of magnetic bearings, deflection angles, direct angles – Prolonging a straight line – by single transiting, double transiting and fore sighting methods -Errors in theodolite work - Theodolite Traversing -

223

Traversing with theodolite by included angles method, deflection angles method and magnetic bearing method - Checks for closed and open traverse - Traverse computations – Latitude and departure – closing error – balancing a closed traverse by Bowditch rule and transit rule – omitted measurements in a closed traverse (No problems)

2.0 Trigonometric levelling

Principle and necessity of Trigonometric levelling - Elevations and distances of objects whose base is accessible or inaccessible, with instruments stations and object in the same vertical planeor in different vertical planes.

3.0 Tacheometry

Tacheometry – principle – uses – types – stadia and tangential tacheometry -Stadia Tacheometry with staff held vertical and line of collimation horizontal or inclined – elevations and distances of staff stations – determination of Tacheometric constants - Tangential Tachometry – uses

4.0 Curves

Curves – types of horizontal curves – simple, compound and reverse curves – degree of curve – formulae for degree of curve using 20m / 30m chain – elements of simple circular curve – Point of commencement of curve, point of tangency, forward and back tangents, point of intersection, angle of intersection, deflection angle, length of curve, tangent length, long chord, mid ordinate, normal chord and sub chord -Calculation of elements of simple circular curve - Method of curve setting – chain and tape methods – offsets from long chord method, successive bisection of arcs method, off sets from tangent (radial and Perpendicular offsets) method and off sets from chords produced method –Problems

5.0 Advanced surveying using GPS and GIS

Global Positioning system (GPS) – principles – segments – space control and user segments – receivers – observation and data processing – applications in Civil Engineering – advantages and disadvantages of GPS – Geographical information systems (GIS) – definition – components – Map – Map projections – types of data used – use and application in civil engineering.

REFERENCE BOOKS:

1)   Surveying Vol.I&Vol.II by B.C Punmia, Ashok Jain & Arun Jain, Laxmi publications
2)   Surveying Vol.I&Vol.II by Dr.K.R. Arora, Rajsons Publications Pvt.Ltd
3)   Surveying Vol.I&Vol.II by T.P.Kanetkar and S.V. Kulakarni, Pune Vidyarthi GrihaPrakashan
4)   Surveying Vol.I&Vol.II by S.S Bhavikatti, I.K International Publishing House.
5)   Surveying Vol.I&Vol.II by S.K.Duggal, M.C.Graw Hill Publications.

MODEL BLUE PRINT

S. No.	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage			Question wise Distribution of Weightage			COs Mapped
				R	U	Ap	R	U	Ap	
1	Theodolite Survey	16	29	3	6	20	1	2	2	CO1
2	Trigonometric levelling	10	13	3	-	10	1	-	1	CO2
3	Tacheometry	10	26	3	3	20	1	1	2	CO3
4	Curves	16	26	3	3	20	1	1	2	CO4
5	Advanced surveying using GPS and GIS	8	16	3	3	10	1	1	1	C05
	Total	**60**	110	15	15	80	5	5	8	

R-Remember   U-Understanding   Ap-Application

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 2.8
Unit Test – II	From 3.1 to 5.10

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Third Semester:C-304 SURVEYING-II

<u>Time: 90 Minutes</u>   Unit Test –I   **Maximum Marks : 40**
                                   PART- A   **16 Marks**

Instructions :
    (i) Answer all questions
     (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) Swinging the telescope is revolving the telescope through 180° in a vertical plane
      (True/False)   (CO1)
      (b) Horizontal Axis of Theodolite is also called as ------------------   (CO1)
       (c)When the base of the object is inaccessible two instrument stations are used (True/False)
                                                                         (CO2)
        (d) When the Horizontal distance between an accessible object and instrument is D and angle
      of elevations is A then the height of the object is H = ...   (CO2)
2.   State any three errors that are eliminated by method of repetition.   (CO1)
3.   State three methods of traversing with a theodolite.   (CO1)
4.   Define (i) Latitude (ii) Departure   (CO1)
5.   What do you mean by Trigonometric levelling? When do you use it?   (CO2)
                                   PART- B   **3 x 8 = 24 Marks**

Instructions :
    (i) Answer all questions
     (ii) Each question carries EIGHT marks
     (iii) Answer should be comprehensive and the criterion for valuation is the content but not
the length ofthe answer.

6. (A) Sketch and explain the parts of a Transit Theodolite.   (CO1)
                                   (OR)
    (B) Explain the procedure to determine the horizontal angle by reiteration method (CO1)

7.   (A) Explain briefly the steps involved in Temporary adjustments of a theodolite. (CO1)
                                   (OR)

     (B) Explain the measurement of horizontal angles by repetition method.   (CO1)

8. (A) Determine the RL of top of Roof of a building "P", with the following observations:

Instrument at	Staff reading on	Vertical angle	Remarks
A	2.325	$16^0 45'$	AB = 40 m
B	1.435	$13^0 30'$	RL of BM = 225.00

                                                                         (CO2)
                                   (OR)

    (B) Describe the procedure to find the distance and elevation of the object when the base of the
      object is inaccessible and instrument stations and object are not in the same vertical plane.
                                                                         (CO2)
                                   oOo

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Third Semester:C-304 SURVEYING-II

Time: 90 Minutes   **Unit Test –II**   Maximum Marks : 40
                                                    PART- A   **16 Marks**

Instructions:
         (i) Answer all questions
         (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) A Tacheometer is used when a Theodolite is not available – True/False   (CO3)
       (b) Tacheometer has_____number of horizontal hairs   (CO3)

       (c) In linear method of setting out curve, Theodolite is used ------ True/False   (CO4)

        (d) The value of Radius if the value of Degree of curve D is given as 23.76m.   (CO4)

2.   State the methods of Tacheometry   (CO3)

3.   Define the terms (i) Point of intersection (ii) Mid-ordinate   (CO4)

4.   Briefly explain the working principle of GPS.   (CO5)

5.   State the components of GIS.   (CO5)

                                                    PART- B   **3 x 8 = 24 Marks**

Instructions:
         (i) Answer all questions
          (ii) Each question carries EIGHT mark
          (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length ofthe answer.

6. (A) A Tacheometer fitted with anallatic lens was set up at an intermediate station O on a line AB
      and the following observations were made on a vertically held staff at A and B. Take
      multiplying constant (f/i) =100.

Instrument at	Staff at	Vertical angle	Stadia readings
O	A	+ $15^0 30'$	1.850, 2.325, 3.225
	B	- $05^0 30'$	1.175, 1.450, 1.655

Compute the RL of B and if the RL of A is +325.50.   (CO3)
                                                    (OR)

 (B)Explain the procedure for determining tacheometric constants in the field.   (CO3)

7. (A) Two tangents intersect at a change of 1620 m, the deflection angle being 300. Calculate all the necessary data for setting out a circular curve of radius 320 m by the method of offsets from the chord produced, taking a peg interval of 30 m. (CO4)

(OR)

(B) Explain the procedure for setting out a curve by any one of the linear methods. (CO4)

8. (A) Explain various segments of GPS and their functioning. (CO5)

(OR)

(B) Discuss various applications of GIS in Civil Engineering. (CO5)

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Time: 3 hours]   **[Total Marks: 80**

PART—A   **10 x 3 = 30 Marks**

Instructions: **(1) Answer all questions.**

                 (2) Each question carries three marks.

                 (3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1)   Define the terms (i) Transiting (ii) Swinging (ii) Face left observation   (CO1)

2)   State the fundamental lines of a Transit Theodolite.   (CO1)

3)   Define the terms (i) Latitude (ii) Departure.   (CO1)

4)   State the different cases which come under trigonometric levelling.   (CO2)

5)   Define the situations where Tacheometry is suitable.   (CO3)

6)   List the methods of tacheometery.   (CO3)

7)   Draw neat sketch of simple curve and name its elements.   (CO4)

8)   State the methods of curve setting using chain and tape.   (CO4)

9)   Define the terms (i) GPS (ii) GIS   .   (CO5)

10)   State the segments of GPS.   (CO5)

PART – B   **5 x 10 = 50 marks**

Instructions:

   i)   **Answer any FIVE questions**

   ii)   **Each question carries TEN marks.**

   iii)   **Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.**

11)   Sketch and explain the parts of a Transit Theodolite.   (CO1)

12)   Explain various methods of Theodolite Traversing.   (CO1)

13)   Find the R.L. of top of chimney from the following data.   (CO2)

STATION	INSTRUMENT AT	ANGLE	RL	REMARKS
BM	A		1.578	RL OF BM 543.075
C	A	+10⁰12"		DIST B/W A&B=30
BM	B		1.269	
C	B	+8⁰20"		

14) (B) (i) Explain stadia Tacheometery and its classification.(CO3)

(ii) Find the constants of tacheometery

Inst. Station	staff	distance	Stadia interval
A	C	50	0.495
B	C	75	0.745

15) A Tacheometer fitted with anallatic lens was set up at an intermediate station O on a line ABand the following observations were made on a vertically held staff at A and B. Take multiplying constant (f/i) =100.

Instrument at	Staff at	Vertical angle	Stadia readings
O	A	$+ 15^0 30'$	1.850, 2.325, 3.225
	B	$- 05^0 30'$	1.175, 1.450, 1.655

Compute the RL of B and if the RL of A is +325.50.　　　　　　　　　　　(CO3)

(OR)

16) Two straight intersects at chainage 1060m and the angle of intersection is 120^0 if the radiusof the simply curve is 600m find a) tangent distance b) chainage of point of commencement c) chainage of point of tangency d) length of long cord.(CO4)

17) Explain the procedure for setting out a curve by any one linear method.(CO4)

18) (A) State the merits and demerits of GPS.　　　　　　　　　　　(CO5)

CONSTRUCTION MATERIALS

Course Code	Course title	No. of Periods per week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-305	Construction Materials	03	45	20	80

S.No	Major Topics	No. of Periods	COs Mapped
1	Stones	6	CO1
2	Bricks	6	CO2
3	Clay products & Sand	9	CO3
4	Cement	7	CO4
5	Mortars & Concrete	10	CO4
6	Timber, Plastics, Glass & Asbestos	7	CO5
	Total	45	

COURSE OBJECTIVES*:*

Upon completion of the course, the student shall be able to		
COURSE OBJECTIVES	(i)	Familiarize with the various materials used in civil engineering constructions.
	(ii)	Acquire the concepts of selection of appropriate construction materials for various Civil Engineering structures /elements.

COURSE OUTCOMES:

	CO1	C-305.1	Select appropriate stones and their acceptability for construction work
	CO2	C-305.2	Explain the acceptability of bricks for construction work.
COURSE OUTCOMES	CO3	C-305.3	Explain suitability of tiles, pipes and building sand for Construction
	CO 4	C-305.4	Check the suitability of cement, mortar and concrete for various construction works
	CO 5	C-305.5	Select different types of Wood, Plastics,Glass and Asbestos for construction work.

LEARNING OUTCOMES:

LEARNING OUTCOMES	**1.0**	**Stones**	
		1.1	Give Physical classifications of rocks.
		1.2	List characteristics of good building stone.
		1.3	List common varieties of stone used in different items of construction and their suitability for construction works (like Granite, marble, Kadapa slabs, Shahabad stones)
		1.4	Explain the purpose of dressing of stones.
		1.5	Select a type of a stone for a given situation / construction.
	2.0	**Bricks**	
		2.1	State the common sizes of bricks – as per IS specifications.
		2.2	List the characteristics of good bricks.
		2.3	List the standard tests on bricks like Water absorption test and Compressive strength test.
		2.4	Explain Water absorption test and Compressive strength tests on brick.
		2.5	Explain the uses of bricks for construction purposes - Refractory bricks, Fly ash bricks, Precast Solid Concrete Blocks, Hollow concrete blocks, High quality building blocks.
	3.0	**Clay products & Sand**	
		3.1	State the common varieties of tiles used for different purposes.
		3.2	List the characteristics of good tiles.
		3.3	List the uses of porcelain and glazed tiles.
		3.4	State the uses of stone ware pipes.
		3.5	List the characteristics of good sand.
		3.6	State the functions of building sand.
		3.7	State the percentage of bulkage allowance for construction work.
		3.8	State the need for the quarry dust as a substitute of sand.
		3.9	Select suitable tile, pipe and fine aggregate for construction work.
	4.0	**Cement**	
		4.1	State the chemical composition of cement.
		4.2	State rough and ready methods of examining cement
		4.3	Explain the method of manufacture of cement by dry process only.
		4.4	Give the Classification of cements
		4.5	List the three uses of various cements
		4.6	State the different standard tests on cement.
		4.7	Explain the tests on cement like Fineness, Consistency, Setting times and soundness.
		4.8	State grades of cement and their compressive strengths.
		4.9	State the importance of blended cement
		4.10	Explain the application of blended cement with fly ash and blast furnace slag.
	5.0	**Mortars and Concrete**	
		5.1	State Fine aggregate and Coarse aggregate. Explain the various tests conducted for Aggregates like water absorption and sieve analysis (Procedure of tests not necessary).

		5.2	Give the Classification of mortars. List the proportion of mortars for various works like plastering, masonry, flooring etc., Explain the method of preparation of cement mortar
		5.3	Explain the use of super plasticiser for improving workability and strength.
		5.4	List the ingredients of PCC and RCC. State the usual proportions of plain and reinforced concrete for different items of work.
		5.5	Define Hydration of cement, Water cement ratio, Workability, Curing. Explain the importance of Hydration of cement and water cement ratio.
		5.6	Explain the method of preparing concrete. List the steps involved in preparation of concrete from mixing to curing. List different curing compounds. List the methods of curing suitable for different surfaces.
		5.7	List different tests conducted for determining the workability of concrete. Explain the procedure of conducting the following tests on concrete i.e., Slump test and Compressive strength test.
		5.8	List various types of admixtures used in concrete. List uses of admixtures used in concrete. Explain about ready mix concrete. List the advantages and disadvantages of ready-mix concrete.
		5.9	List the uses of Fly ash, Quarry dust for improving durability and resistance to adverse exposure conditions.
		5.10	Differentiate normal strength concrete and high strength concrete. Understand the following special concretes (i) Fibre reinforced concrete (ii) FAL-G concrete (iii) Light weight concrete (iv) High density concrete (v) Polymer concrete (vi) Self-compacting concrete. Explain micro concrete and shotcrete.

6. Timber, Plastics, Glass & Asbestos

6.1 List characteristics of good timber. Define seasoning. Explain the importance of seasoning of timber

6.2 Name common varieties of timber used in A.P for various Civil Engineering works.

6.3 State various types of wood products used in construction work.

6.4 List the uses of wood products used in construction work.

6.5 List the uses of fibre reinforced plastic.

6.6 List the merits and demerits of plastics.

6.7 List the merits and demerits of asbestos products.

6.8 Explain suitability of different types of glasses as a buildingmaterial.

6.9 List the merits and four demerits of glass.

6.10 Explain suitability of Powder coated Aluminium and Steel sheetsas building material.

PO-CO Mapping:

Course Code : C-305	Course Title: CONSTRUCTION MATERIALS No. of COs: 5				No. of Periods: 60
POs	**Mapped with CO No.**	**CO Periods addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		No.	%		
PO1	CO1, CO2, CO3, CO4, CO5	30	67	3	> 40% Level 3 (Highly addressed)
PO2					addressed)
PO3					25% to 40% Level 2 (Moderately addressed)
PO4	CO1, CO2, CO3, CO4	12	25	2	(Moderately addressed)
PO5	CO4, CO5	3	8	1	5% to 25% Level 1 (Low addressed)
PO6					(Low addressed)
PO7					<5% Not Addressed

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			2					2	1
CO2	3			2					2	2
CO3	3			2					2	2
CO4	3			2	1				2	2
CO5	3				2				2	2
Average	3.0			2.0	1.5				2.0	1.8

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT

1) **Stones**

   Classification of rocks, physical classification - Characteristics of good building stone - Common varieties of stones - granite, marble, Kadapa slab, Shahabad stones - Dressing of stones – purpose.

2) **Bricks**

   Specification for bricks as per IS-1077-1971 - Characteristics of good bricks - Testing of bricks as per IS-3495-1966 – water absorption and compressive strength test on bricks - Refractory bricks and their uses - Fly ash bricks.

3) **Clay products & Sand**

   Tiles –Types of tiles roofing tiles (Mangalore tiles), floor tiles, Ceramic tiles, Vitrified tiles, Morbonite - Characteristics of good tiles - Porcelain – glazed tiles (uses only) - Stone ware pipes – uses - Characteristics of good sand, Functions of sand - Bulking of sand – percentage

of bulking – bulkage allowance to be permitted - Crushed stone powder as substitute ofsand.

4) **Cement**

Chemical composition of cement - Rough and ready method of testing cement - Methods of manufacture of cement – Dry process - Classification of cement – ordinary Portland cement, quick setting cement, white cement –Rapid hardening cement, Low heat cement, High alumina cement, Blast furnace slag cement and Pozzolana cement – uses of different types of cement - Tests on cement as per ISI – fineness, consistency, setting time, soundness tests - Blended cement.

5) **Mortars & Concrete**

Fine aggregate and course aggregate – Water absorption and sieve analysis of fine and coarse aggregates - Mortar – Classification of mortar – Lime mortar, cement mortar, Surkhi mortar, Blended mortar - Different proportions of mortars for various works - Preparation of cement mortar - Ingredients of plain concrete - Proportioning – usual proportions for different item of work - Foundation, Footings, Columns, Slabs & Beams for ordinary buildings
- Plain concrete and reinforced concrete - Water cement ratio – factors effecting water cement ratio - Workability – Slump test on fresh concrete, hardened concrete –compressive strength test on hardened concrete - Admixtures – definition – types – Chemical admixtures – Plasticizers (water reducers), super plasticizers, air entraining agents,accelerators, retarders and bonding admixtures – Mineral admixtures – Pozzolanas -fly ash, ground granulated blast furnace slag, silica fume, rice husk ash and metakaoline – Gas forming – Powered zinc, powdered aluminium and hydrogen peroxide – uses - Method of preparation of concrete – Hand and machine mixing - Procedure of mixing, conveyance, placing compaction, and curing of concrete - Curing –different curing compounds - methods
– suitability - Introduction to ready mix concrete – Advantages and disadvantages - Use of fly ash, quarry dust. Normal strength concrete - High strength concrete- Special concretes like Fibre reinforced concrete, FAL-G concrete, Light weight concrete, High density concrete, Polymer concrete and Self-compacting concrete - Micro concrete and Shotcrete.

6) **Timber, Plastics, Glass and Asbestos**

Characteristics of good timber - Seasoning of timber – Importance - Common varieties of timber used for different items of work – Doors and windows, form work, centring with particular references of A.P - Wood products-veneer – Ply wood, particle board, laminated board, straw board – Eco board - Types of plastics – fibre reinforced plastics for plastic doors and windows and water tanks - Use of asbestos – manufacture of asbestos sheets and pipes Types of glasses and uses.

REFERENCE:

1. Engineering Materials by Rangwala, Charotar Publishing House Pvt. Ltd
2. Building Materials by S.K. Duggal, New age International Publishers.
3. Building materials by M.L Gambhir, Neha Jamwal, Mc.Graw Hill Publications
4. Building Materials by P.C Varghese, PHI Learning.
5. Building Materials by Ravi Kumar Sharma, I.K International Publishing House Pvt. Ltd.

MODEL BLUE PRINT

S.NO	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage		Question wise Distribution of Weightage		COs Mapped
				R	U	R	U	
1	Stones	6	13	3	10	1	1	CO1
2	Bricks	6	13	3	10	1	1	CO2
3	Clay products & Sand	9	26	6	20	2	2	CO3
4	Cement	7	16	6	10	2	1	CO4
5	Mortars & Concrete	10	26	6	20	2	2	CO4
6	Timber, Plastics, Glass & Asbestos	7	16	6	10	2	1	CO5
	Total	45	110	30	80	10	8	

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 4.3
Unit Test-II	From 4.4 to 6.10

Model Paper for Unit Test-I:
State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Third Semester: C-305 CONSTRUCTION MATERIALS

Time: 90 Minutes   Unit Test –I   Maximum Marks: 40

PART- A   16 Marks

Instructions:
   (i) Answer all questions
   (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) Un-stratified rocks are not layered or stratified (True/False)   (CO1)

     (b) The colour of good bricks should be brown   (True/False)   (CO2)

     (c)The increase in the volume of sand in the presence of moisture is known as_____(CO2)

     (d) The process of making of cement was first developed by_____   (CO4)

2.   List any properties of granite stone   (CO1)

3.   State the classification of bricks as per ISI   (CO2)

4.   State any three important functions of sand.   (CO3)

5.   Write any three usages of stone ware pipes.   (CO3)

PART- B   3 x 8 = 24 Marks

Instructions:
   (i) Answer all questions
   (ii) Each question carries EIGHT marks
   (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6.   (A) State the physical classification of rocks.(CO1)
                              (OR)
     (B) Explain any eight characteristics of a good building stone.   (CO1)

7.   (A) State any eight qualities of good bricks   (CO2)
                              (OR)
     (B) Explain Water absorption test and compressive strength test on bricks   (CO2)

8.   (A) State any eight uses of cement.   (CO4)
                              (OR)
     (B) Describe the method of manufacture of cement by dry process.   (CO4)

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State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Third Semester: C-305 CONSTRUCTION MATERIALS

Time: 90 Minutes   Unit Test –II   Maximum Marks: 40

PART- A   16 Marks

Instructions:
    (i) Answer all questions
    (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) The soundness test on cement is done by using Lechatlier apparatus (True/False)(CO4)
   (b) The process by which the moisture in the timber is reduced is known as_____of timber. (CO5)
(c) The moisture content in a well seasoned timber is a.) 5% b.) 10% c.) 15% d.) 20% (CO5)
   (d) _____glass is used in the manufacture of superior quality apparatus (CO5)
2. State any six types of cements used in the construction industry. (CO4)
3. Define 'Water cement ratio' and state the effect of increased water cement ratio on concrete.

(CO4)
4. Define the term 'Mortar' and state different types of mortars. (CO4)
5. State any three characteristics of good timber. (CO5)

PART- B   3 x 8 = 24 Marks

Instructions:
    (i) Answer all questions
    (ii) Each question carries EIGHT marks
    (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) State different method of mixing of concrete and Describe the method of mixing of concrete by machine mixing. (CO4)

(OR)

(B) Explain the following types of glasses (CO5)

7. (A) Define admixture. Write short notes about (a) plasticizers and (b) super plasticizers (CO4)

(OR)

(B) State any two uses of the following : (a) Veneer (b) Plywood (c) Straw board (d) Laminated board (CO5)

8. (A) Explain 'Ready-mix concrete' and state any four advantages of ready mix concrete. (CO4)

(OR)

(B) i.) list the uses of glass
ii.) list the merits of plastic (CO5)

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Model Paper for end examination:
MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C23)
DCE-THIRD SEMESTER EXAMINATION
CONSTRUCTION MATERIALS (C-305)

<u>**TIME : 3 Hours]**</u>   **[Total Marks : 80**

PART – A   10 x 3 = 30 marks

Instructions : 1) Answer All Questions
2) Each question carries three marks
3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define the terms rock and stone.   (CO1)

2. Name the classification of bricks as per ISI.   (CO2)

3. What is meant by bulkage allowance of sand?   (CO3)

4. State the uses of porcelain?   (CO4)
5. State the classification of cement. (CO4)
6. What is the difference between ordinary cement & portaland cement?   (CO4)
7. What are the functions of mortar?   (CO4)

8. Describe any two methods of curing of concrete.   (CO4)

9. State any three advantages of float glass.   (CO5)

10. List the merits and demerits of asbestos products   (CO5)

PART – B   **5 x 10 = 50 marks**

Instructions:
  i)   **Answer any FIVE questions**
  ii) **Each question carries TEN marks.**
  iii) **Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.**

  11. (i) Explain the purpose of dressing of stones .   (CO1)
       (ii) List characteristics of good building stone

12. (A) Describe the stages of drying and burning of bricks in the brick manufacturing

    process.   (CO2)

13. (A) Briefly explain the characteristics of good sand.   (CO3)
14. Briefly explain the characteristics of good tiles. (CO3)
15. Explain the properties of Ordinary Portland cement.   (CO4)
16. Explain different steps involves in concreting. (CO4)

17. Differentiate normal strength concrete and high strength concrete.(CO4)
18. a) Name the common verities of timber used in civil engineering works.

     b) State the object of seasoning of timber. (CO5)

239

CIVIL ENGINEERING DRAWING-I

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-306	CIVIL ENGINEERING DRAWING-I	04	60	40	60

S.No.	Major Topics	No. of Periods	COs Mapped
1	Introduction	06	**CO1**
2	Residential Buildings	30	**CO2**
3	Public and Industrial Buildings	14	**CO3**
4	Working drawings	10	**CO4**
	Total	60	

COURSE OBJECTIVES:

Upon completion of the Course, the student shall be able to		
COURSE OBJECTIVES	(i)	Apply the standard practices in building drawing, understand setbacks, orientation of buildings and Vaastu Shastra.
	(ii)	Prepare drawings of different components of building, site plans, single storeyed buildings, line drawings of public & industrial buildings with fire safety, working drawings manually.

COURSE OUTCOMES:

COURSE OUTCOMES	CO1	C-306.1	Practice drawing different components of buildings and drawing site plans as per local bye laws, orientation of buildings and Vaastu Shastra.
	CO2	C-306.2	Practice drawing plan, elevation and section of residential buildings, framed structures, given line diagram and specifications.
	CO3	C-306.3	Draw the line diagrams of Hospitals, Hostels, Schools and Apartments for the given requirements with fire safety and provision for Physically disabled and aged people.
	CO4	C-306.4	Draw the working drawings for foundation marking, electrical Layout and solar water heater.

LEARNING OUTCOMES:

LEARNING OUTCOMES	1.0	**INTRODUCTION**
		1.1 Sketch the conventional signs of Civil Engineering materials, Plumbing and Electrical fixtures.
		1.2 Draw the cross section of load bearing wall and name all components below and above ground level.
		1.3 Draw the plan of one Brick wall meeting at corner showing alternative courses of header and stretchers in English bond.
		1.4 Draw the following views of a fully panelled door and label the parts 1. Elevation and 2. Sectional plan
		1.5 Draw the following views of fully panelled window and glazed window and label the parts. 1. Elevation and 2. Sectional plan
		1.6 Draw the following views of glazed window and label the parts. 1. Elevation and 2. Sectional plan
		1.7 Draw the elevation of the following trusses and label the parts with the given data (details of joints not required) 1. King post truss and 2. Queen post truss
	2.0	**RESIDENTIAL BUILDINGS**
		2.1 Draw the site plan of a residential building as per local byelaws and NBC (National Building Code).
		2.2 Draw the following views of single storeyed load bearing type residential building from the given line diagram and set of specifications for a) One room with veranda b) one-bedroom house c) two-bedroom house 1. Plan 2. Section and 3. Elevation
		2.3 Draw the following views of single storied framed structure type residential building from the given line diagram and set of specifications for a) One-bedroom house b) Two-bedroom house 1. Plan, 2. Section and 3. Elevation
		2.4 Draw the following views of a dog legged stair with given specifications. 1. Plan, and 2. Section
		2.5 Draw the following views of two- storied residential building (framed Structure) from the given the line diagram and set of specifications. 1. Plans of first and second floors and 2. Elevation
		2.6 Prepare the drawings in the standard format for obtaining sanction from a local body for a residential building (Two storeyed, two bed room building) including a rain water harvesting structure

| | 2.7 | Principles of Vastu with Scientific approach. |

3.0 PUBLIC AND INDUSTRIAL BUILDINGS

3.1 Rural hospital of 10 beds capacity

3.2 Hostel for 50 students

3.3 Primary school of 250 to 300 students

3.4 Apartments - Plan of one floor with 6 to 10 units @ 90 –150 sq.m /unit

3.5 Provisions of Fire Safety

3.6 Provision for Physically disabled and aged people.

4.0 WORKING DRAWINGS

4.1 Prepare a working drawing for the purpose of marking the width of foundation for the given plan of a building

4.2 Calculate the following for the given plan of a building
1. Plinth area,
2. Carpet area and
3. Floor area ratio/ Floor spaces Index.

4.3 Prepare a working drawings for electrical layout for a given residential building (2 bed room buildings-ground floor only).

4.4 Draw the typical layout of active solar water heating system.

PO-CO Mapping:

Course Code: C-306	Course Title: Civil Engineering Drawing – I No. of COs: 4			No. of Periods: 60	
POs	**Mapped with CO Nos.**	**CO periods addressing PO in Col.1**		**Level (1,2,3)**	**Remarks**
		No.	**%**		
PO1	1,2,3,4	11	19	1	>40% Level.3
PO2	1,2,3,4	29	48	3	(Highly addressed)
PO3	1,2,3,4	20	33	2	25% - 40% Level.2
PO4					(Moderately addressed 5% - 25% Level.1
PO5					(Low addressed)
PO6					<5% Not addressed
PO7					

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3					3	3	3
CO2	3	3	3					3	3	3
CO3	2	2	2					3	3	3
CO4	2	2	2					3	3	3
Average	2.5	2.5	2.5					3	3	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

 (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz

 (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT

1.0   Introduction
   1.1   Conventional signs for materials like bricks, stone, concrete, wood, glass, earth, steel and electrical fixtures like ceiling fan, bulb, main switch, refrigerator, bell push, buzzer, A.C motor, and water supply and sanitary fixtures like tap, wash basin, sink, W.C pan (Indian and European type), shower, flush tank.
   1.2   Cross section of a load bearing wall showing all the components below and above the ground level.
   1.3   Plan of one brick wall meeting at a corner showing odd and even courses in English bond,
   1.4   Plan and Cross section of a Fully panelled door
   1.5   Plan and Cross section of a Fully panelled window and glazed window showing all the component parts
   1.6   Elevation of King post and Queen post trusses with the given
            Data (details of joints not required)

2.0   Residential Buildings
   2.1   Setbacks and orientation principles for planning residential buildings as per local bye laws and NBC.
   2.2   Single storied two bed room load bearing residential building
   2.3   Single storied framed structure two-bedroom residential building
   2.4   Two-storied residential building (framed structure type)
   2.5   Dog legged stair
   2.6   The standard format for obtaining sanction from local body for a residential Building (up to two-bedroom building–G+1 floors) including a rainwater harvesting structure.
    2.7 Principles of Vastu with Scientific approach

3.0   Public and industrial buildings
            Draw the line diagrams only showing the functional requirements of
   3.1   Rural hospital of 10 beds capacity
   3.2   Hostel for 50 students
   3.3   Primary school of 250 to 300 students
   3.4   Apartments - Plan of one floor with 6 to 10 units @90 – 150 sq.m / unit
   3.5   Provisions of Fire Safety
   3.6   Provision for Physically disabled and aged people.

4.0   **Working drawings**

    4.1   Working drawing for the purpose of marking from the given plan and width of foundation.

    4.2   Calculates the following for the given plan of a building

        1. Plinth area,

        2. Carpet area and

        3. Floor area ratio/ Floor spaces Index.

    4.3   Prepares a working drawings for electrical layout for a given residential building (2 bed room buildings-ground floor only).

    4.4   Draws the typical layout of active solar water heating system.

REFERENCE BOOKS:

    1.   Civil Engineering Drawing by Chakraborthy, UBS Publications.

    2.   Civil Engineering Drawing & House Planning by B.P Verma, Khanna Publishers.

    3.   Building Planning & Drawing by Dr.N.Kumara swamy, A.Kameswararao, Charotar Publishing
House Pvt.Ltd.

    4.   Building Planning & Drawing by S.S Bhavikatti, M.V Chitawadagi, I.K International publishing house Pvt.Ltd.

MODEL BLUE PRINT

S.NO	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage		Question wise Distribution of Weightage		COs Mapped
				R	U	R	U	
1	Introduction	6	8	8	--	2	--	
2	Residential Buildings	30	29	4	25	1	1	CO1 & CO2
3	Public and Industrial Buildings	14	19	4	15	--	1	CO1 & CO3
4	Working drawings	10	4	4		2		CO1, CO2, CO3& CO4
		Total	60	20	40	5	2	

Note: In question paper, Part –A consists of FIVE questions of 4 marks each and Part –B consists of two questions of 25 & 15marks each from the chapters 2 (25 marks, Residential Buildings) and 3 (15 marks, Public and Industrial Buildings)

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 2.7
Unit Test-II	From 3.1 to 4.4

MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C–23)
DCE—THIRD SEMESTER EXAMINATION
CIVIL ENGINEERING DRAWING- I (C-306)

Time: 3 hours   Max. Marks: 60

PART – A   **5 X 4 = 20**

Instructions: *1. Answer **all** questions.*
   2. Part – A need not be drawn to a scale.
   3. Any missing data may be assumed suitably.

1. Draw at the site plan of a residential building as per local bye-laws to plot of size12 m x 18 m.

2. Draw the cross section of a load bearing wall and label the parts.

3. Draw the elevation of fully paneled door and label the parts.

4. Prepare Electric Layout for a single room of 4.0 m x 6.0 m with 300 mm
    wall thickness..

5. Draw the foundation plan of a single room 3.25 m x 4.75 m having wall thickness380 mm and width of foundation 1100 mm.

Instructions: 1.   Answer **all** questions.

2.   *Any missing data may be assumed suitably..*

6.   Draw the following items to a scale of 1:50 for

a) Fully Dimensioned Plan   15 M

b) Section along A-A.   10 M

Specifications:

(i)   Foundation:

a) Overall depth of foundation= 1000 mm

b) C.C. Bed (1:3:6) : 1000 mm x 300 mm

c) First Footing : R.R Masonry in CM (1: 6) : 1000 mm x 300 mm

d) Second Footing : R.R Masonry in CM(1: 6) : 1000 mm x 300 mm

(ii) Basement : R.R Masonry in CM(1: 6) : 450 mm x 600 mm

(iii) Super structure: Brick masonry CM(1: 6) : 300 mm thick and

Height 3000 mm.

(iv) Roof: R.C.C. (1:1.5:3) 120 mm thick.
*

(V) Lintels: On all wall openings 300 mm x 250 mm

(vi) Sunshades: On all external openings, projected lengths 700

mm.And 50mm uniform thickness.

(vii) Parapet wall: Brick masonry in CM (1:6) of 100 mm thick and

viii)   (a) Doors: D1 : 1000 x 2000 mm ; D2 : 800 x 2000 mm

(b) Windows: W1: 1200 mm x 1200 mm; W2: 1000x 1200 mm

(c) Ventilators: V: 600 mm x 450 mm.

(ix) Flooring: C.C (1:2:4) 40 mm thick over C.C. (1:4:8) OF 100 mmThick.

(x) Steps: Rise : 150 mm, Tread: 300 mm.
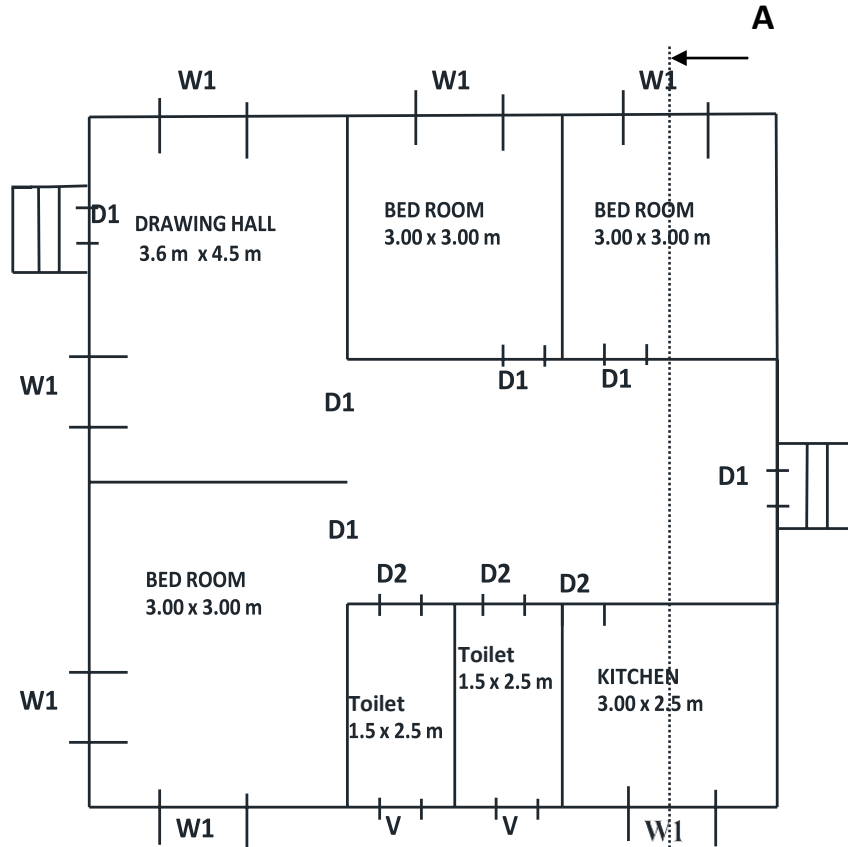
7. Draw the line diagram of an Apartment Plan of the Floor with 6 Units each @ 90 to 120 sq.m. **15 m**

*

CAD PRACTICE-I

Course code	Course Title	No. of periods/week	Total No. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-307	CAD Practice-I	04	60	40	60

S. No.	CHAPTER/UNIT TITLE	No. of Periods	COs Mapped
1.	Introduction to Computer Aided Drafting	08	CO1
2.	Practice on CAD software	16	CO2
3.	Preparation of 2-D drawings for residential buildings using CAD Software as per building bye laws in Panchayat / Municipality/Corporation	24	CO3
4	Preparation of 3-D drawings using CAD software	12	CO4
	Total	60	

COURSE OBJECTIVES:

Course Objectives	(i)	Know the importance of Computer Aided Drafting (CAD) and to Practice CAD, drawing editor and to perform different operations using CAD Commands
	(ii)	Prepare drawings of different components of building, site plans, single storeyed buildings, line drawings of public & industrial buildings, working drawings by using CAD 2D and 3D.

COURSE OUTCOMES:

Course Outcomes	CO1	C-307.1	Dimensions a given drawing using standard notation and desired system of dimensioning, Practices drawing different components of buildings.
	CO2	C-307.2	Practices drawing plan, elevation and section and site plan of residential buildings, and framed structures as per local bye laws
	CO3	C-307.3	Practices drawings to be submitted to Panchayat/Municipality/Corporation for Residential and Commercial building approval
	CO4	C-307.4	Practices 3-D drawings using CAD software

LEARNING OUTCOMES:`

Learning Outcomes	**1.0 INTRODUCTION TO COMPUTER AIDED DRAFTING**
	• State the applications and advantages of CAD • State the advantages of CAD • State the features of CAD as drafting package • State the hardware requirements to run CAD **2.0 PRACTICE ON CAD SOFTWARE** • Study the drawing editor screen. • Practice the methods of selecting/entering commands to start new drawing accessing CAD commands by selecting from menus, tool bars and entering Commands on command line. • Set the limits of the drawing to get the needed working area. • Practice the 'setting commands' Grid, Snap, & Ortho Commands. • Practice 'Draw commands'- point, line, pline, rectangle, circle, tangent, ellipse, arc, polygon and spline. • Dimension the given figures. • Practice 'modify commands' – erase, copy, mirror, move, rotate, scale, stretch, trim, extend, break, chamfer, fillet, explode, Pedit, Mledit. • Practice 'construct commands' – offset, array, Divide measure. • Practice 'edit commands' – Undo, Redo, Oops, Copy Clip, Paste Clip, Del. • Practice 'view commands' – Redraw, Regen, Zoom, Pan. • Practice 'Hatch commands' – Bhatch, Hatch. • Practice 'insert commands' – Block, Wblock, Insert, Minsert. • Practice dividing a line into number of segments. • Practice drawing external/internal common tangents for circles of same/different radii. • Practice drawing external/internal common arcs for circles of same/different radii. • Practice construction of ellipse, parabola, hyperbola, cycloid, and helix **3.0 Practice 2-D drawings of residential buildings using CAD Software** • Practice conventional signs used in civil engineering. • Practice drawing elevation of panelled door partly panelled and partly glazed door/window shutter. • Practice drawing cross section of Load bearing wall showing different components. • Practice drawing Plan, Elevation, section and site plan of one roomed building. • Practice drawing Plan, Elevation, section and site plan of 2BHK building.

	• Practice drawing Double line diagram of primary school building.
	• Practice drawing Plan of Rural Hospital.
	• Practice drawing typical floor Plan of Apartment

4.0 Preparation of 3-D drawings using CAD Software

- Practice 3D commands. – View commands – solids command – solid editing/modify commands.
- Draw 3-D view of different simple objects.
- Draw 3D view of Isolated Column footing.
- Draw 3D view of wall foundation.
- Draw Single roomed building in 3D.
- Draw double roomed building in 3D.

KEY competencies to be achieved by the student

S.NO.	Experiment Title	Key Competency
1.	Introduction to computer	• Open/close CAD program • Understands CAD Graphic User Interface(GUI) and various toolbars
2	Practice on CAD software Geometric Constructions	• Practices the methods of selecting/entering commands • Sets the limits of the drawing • Learns Draw commands • Learns Modify commands • Learns Edit commands • Learns View commands • Learns Hatch commands • Learns Dimensioning Commands • Draws simple geometrical shapes like circles, tangents
3	Preparation of 2-D drawings using CAD Software	• Draws 2-D drawings • Practice conventional signs used in civil engineering. • Draws elevation of panelled door partly panelled and partly glazed door/window shutter. • Draws cross section of Load bearing wall showing different components. • Draws Plan, Elevation, section and site plan of one roomed building. • Draws Plan, Elevation, section and site plan of 2BHK building. • Draws Double line diagram of primary

4	Preparation of 3-D drawings using CAD software	• Learns 3-D commands • Draws simple 3-D elements • Draws 3-D views of Isolated Column footing • Draws 3-D views of wall foundation • Draws 3-D Views Single roomed and double roomed building in 3D

(continued from previous: school building. • Draws Plan of Rural Hospital. • Draws typical floor Plan of Apartment)

PO-CO MAPPING:

Course Code : C-307	Course Title: CAD PRACTICE-I Number of COs: 04				No. of Periods: 60	
POs	**Mapped with CO No.**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**	
		No	**%**			
PO1	CO1, CO2, CO3, CO4	15	26	2	>40% Level 3 (Highly Addressed)	
PO2	CO1, CO2, CO3, CO4	7	11	1		
PO3	CO1, CO2, CO3, CO4	7	11	1	25% to 40% Level 2 (Moderately Addressed)	
PO4	CO1, CO2, CO3, CO4	24	40	3		
PO5	CO1, CO2, CO3, CO4	4	7	1	5% to 25% Level 1 (Low Addressed)	
PO6						
PO7	CO1, CO2, CO3, CO4	3	5	1	<5% Not Addressed	

CO-PO MAPPING:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	3	2	3		2	2	2	3
CO2	2	3	2	3	3		2	2	2	3
CO3	3	2	2	3	2		2	2	2	3
CO4	2	2	2	2	2		2	2	2	3
Average	2.25	2.5	2.25	2.5	2.5		2	2	2	3

Note: The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
   (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
   (vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ..etc.

COURSE CONTENT

1.0   Introduction to computer aided drafting (CAD)
   a)   Computer graphics
   b)   Definition of CAD
   c)   Applications of CAD
   d)   Advantages of CAD
   e)   Introduction to CAD as drafting package

2.0   Practice on CAD
   a)   Study of drawing editor screen
   b)   List the methods to access CAD commands.
   c)   Practice of setting up of drawing area using utility commands, and using setting commands.
   d)   Practice entity draw commands.
   e)   Draw the given geometrical figures using draw commands.
   f)   Practice of Modify commands.
   g)   Practice of construct commands.
   h)   Practice of edit commands
   i)   Practice of view commands.
   j)   Practice of Hatch commands.
   k)   Practice of insert commands.
   l)   Dimension the figures using dimensioning commands.
   m)   Practice of Print/Plot commands
   n)   Divide a line into number of segments.
   o)   Draw an external/internal common tangent for two given circles of same/different radii.
   p)   Draw external/internal arcs for two given circles of same/different radii.
   q)   Construct ellipse, parabola, hyperbola, cycloid, and helix.

3.0   Preparation of 2-D drawings using CAD Software
   Draw conventional signs, symbols used in civil engineering drawing.
   a)   Draw the elevation of fully panelled door, partly glazed and partly panelled door/window shutter.
   b)   Draw the section of a load bearing wall.
   c)   Prepare Building Drawing – One roomed building with site plan.
   d)   Prepare Building Drawing – 2BHK building with site plan.
   e)   Prepare plan of primary school Building.
   f)   Prepare Plan of Rural Hospital building.
   g)   Prepare a typical floor plan of Apartment consisting of G+5 floors.

4.0   Preparation of 3-D drawings using CAD Software
   a)   Practice 3D commands. – View commands – solids command – solid editing/modify commands.
   b)   Draw 3-D view of different simple objects.
   c)   Draw 3D view of Isolated Column footing.
   d)   Draw 3D view of wall foundation.
   e)   Draw Single roomed building in 3D.
   f)   Draw double roomed building in 3D.

REFERENCE BOOKS:

   1. Drafting and Design (Engineering Drawing Using Manual and CAD Techniques), Kicklighter & Brown – Goodheart-Willcox Publisher

SURVEYING-II PRACTICE & PLOTTING

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-308	SURVEYING-II PRACTICE & PLOTTING	04	60	40 (30 for class exercises + 10 for Survey camp)	60

S.No.	Major Topics	No. of Periods	COs Mapped
1.	Theodolite Survey	20	CO1
2.	Trigonometric Levelling	8	CO2
3.	Tacheometry	12	CO3
4.	Curves	12	CO4
5.	Plotting	8	CO1,CO2,CO3,CO4
	Total	**60**	
6.	A Survey camp, immediately after completion of all exercises, shall be conducted for 4 days during 6 AM to 12 noon & 2PM to 5 PM on each day followed by one day break and 2 days of plotting from 9AM to 5 PM, with one hour lunch break. (25% of total sessional marks shall be allocated to this activity. The skills learnt during class exercises during I year & III semester shall be demonstrated in a simulated field like situation and shall be assessed appropriately)	7 days (Additional instructional duration & NOT to be included in the above 60 periods)	CO1,CO2,CO3,CO4

COURSE OBJECTIVES:

Upon completion of the Course, the student shall be able to		
Course Objectives	1	Develop knowledge about surveying instruments & methods adopted to carry out Field Survey with a professional approach.
	2	Develop skills in students in using Theodolite and curve setting.

COURSE OUTCOMES:

Course Outcomes	CO1	C-308.1	Apply the knowledge of Theodolite in different operations in civil engineering projects and to plot from field data.
	CO2	C-308.2	Apply the principles of Trigonometrical Levelling and computation of distance and elevation for different conditions and to plot from field data.
	CO3	C-308.3	Find the constants of Tacheometer and apply principles of Tacheometry and compute the distances and elevations for different conditions.
	CO4	C-308.4	Compute the elements of Simple curve and sets the Simple Curve by using different methods and to plot from field data.

LEARNING OUTCOMES:

LEARNING OUTCOMES	**1.0 Theodolite Surveying** • Identify the component parts of a theodolite • Perform temporary adjustment of theodolite. • Measure horizontal angle by repetition method and record the observations in the field book • Measure horizontal angles by reiteration methodand record the observations in the field book • Measure Vertical angles and record the observations in the field book • Measure the horizontal distance between two inaccessible points using theodolite • Measure bearing of a survey line • Conduct (i) Theodolite traversing (closed) (ii) Compute latitudes and departures and (iii)Calculate the area of traverse **2.0 Trigonometric Levelling** • Determine the Horizontal and Vertical Distance of an object whose base is accessible • Determine the Horizontal and Vertical Distance of an object whose base is inaccessible and the two instrument stations and the object in the same vertical plane • Determine the Horizontal and Vertical Distance of an object whose base is inaccessible and the two instrument stations and the object are not in the same vertical plane

3.0 Tacheometry

- Determine the Tacheometric constants 'K' and 'C'.
- Determine Horizontal Distance and Elevation by principle of stadia Tacheometry.

4.0 Curves

- Sets out Simple Curve using Chain and Tape.
- Sets out Simple Curve using One Theodolite.

5.0 Plotting

- Measure the horizontal distance between two inaccessible points by plotting the data observed in theodolite survey
- Plot the closed traverse of theodolite, distribute the closing error by Bowditch / transit rule
- Calculate the area of traverse from the traverse Plotting
- Plot the Simple curve after setting out in the field

PO-CO Mapping:

Course Code: C-308	Course Title: SURVEYING –II PRACTICE & PLOTTING No of COs : 4			No. Of periods: 60	
POs	**Mapped with CO No**	**CO Periods Addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
1	CO1, CO2, CO3, CO4	5	8.3	1	>40% Level.3
2	CO1, CO2, CO3, CO4	15	25	2	(Highly addressed)
3	CO1, CO2, CO3, CO4	25	41.7	3	25% - 40% Level.2
4	CO1, CO2, CO3, CO4	6	10	1	(Moderately addressed) 5% - 25% Level.1
5	CO1, CO2, CO3, CO4	5	8.3	1	(Low addressed)
6	CO1, CO2, CO3, CO4	4	6.7	1	<5% Not addressed
7					

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	2		3	3	3
CO2	2	3	2	2	2	2		3	3	3
CO3	3	2	3	3	3	3		3	3	3
CO4	3	2	2	2	3	3		3	3	3
Average	2.5	2.25	2.25	2.25	2.5	2.5		3	3	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz

(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT:

1.0   Theodolite surveying
a)   Identification of the component parts of a theodolite
b)   Performing temporary adjustment of theodolite.
c)   Measurement of horizontal angle by repetition method and record the observations in the field book
d)   Measurement of horizontal angles by reiteration method and record the observations in the field book
e)   Measurement of Vertical angles and record the observations in the field book
f)   Measurement of the horizontal distance between two inaccessible points using theodolite
g)   Measurement ofbearing of a survey line
      h) Conducting (i) Theodolite traversing (closed) (ii) Compute latitudes and departures and (iii) Calculate the area of traverse

2.0   Trigonometric Levelling
a)   Determination of the Horizontal and Vertical Distance of an object whose base is accessible
b)   Determination of the Horizontal and Vertical Distance of an object whose base is inaccessible and the two instrument stations and the object in the same vertical plane
c)   Determination of the Horizontal and Vertical Distance of an object whose base is inaccessible and the two instrument stations and the object are not in the same vertical plane

3.0   Tacheometry
   a)   Determination of Constants of Tacheometer
   b)   Determination of Horizontal distance and elevation by stadia Tacheometry.

4.0   Curves
   a)   Setting out a simple curve by chain and tape method.
   b)   Setting out a simple curve by one Theodolite

5.0   Plotting
   a)   Measurement of horizontal distance between two inaccessible points by plotting the data
         observed in theodolite survey
   b)   Plot the closed traverse of theodolite, distributing the closing error by Bowditch / transit
         rule and calculate the area of traverse
   c)   Plot the Simple curve after setting out inthe field

KEY competencies to be achieved by the student

S.No.	Experiment Title	Key Competency
1	Field Exercises in Theodolite Surveying Ex 1.1 Ex 1.2 Ex 1.3 Ex 1.4 Ex 1.5 Ex 1.6 Ex.1.7 Ex.1.8 Ex 1.9	• Identify the component parts of a theodolite, Perform temporary adjustments of theodolite. • Measure horizontal angles. • Record the observations in the field book. • Measure horizontal angle by repetition method. • Measure horizontal angles by reiteration method. • Measure Vertical angles. • Measure the horizontal distance between two inaccessible points using theodolite. • Measure bearing of a survey line. • Conduct theodolite traversing (closed), Compute latitudes and departures, Calculate the area of

		traverse.
2	Field Exercises in Trigonometric levelling Ex 2.1 Ex 2.2 Ex 2.3	• Determine the Horizontal and Vertical Distance of an object whose base is accessible • Determine the Horizontal and Vertical Distance of an object whose base is inaccessible when the two instrument stations and the object are in the same vertical plane • Determine the Horizontal and Vertical Distance of an object whose base is inaccessible when the two instrument stations and the object are not in the same vertical plane
3	Field Exercises in Tacheometric Survey Ex 3.1 Ex 3.2	• Determine the Tacheometric constants 'K' and 'C' • Determine Horizontal Distance and Elevation by principle of stadia tacheometry
4	Field Exercises in Curves Ex 4.1 Ex 4.2	• Sets out Simple Curve using Chain and Tape. • Sets out Simple Curve using One Theodolite.

MATERIAL TESTING PRACTICE

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-309	Material Testing Practice	03	45	40	60

S.No.	Topics	No. of periods	COs Mapped
1	Tests on bricks	12	CO1,CO2,CO3,CO4,CO5
2	Tests on Cement	12	CO1,CO2,CO3,CO4,CO5
3	Tests on Aggregates	15	CO1,CO2,CO3,CO4,CO5
4	Tests on metals	06	CO1,CO2,CO3,CO4,CO5
	Total	45	

COURSE OBJECTIVES:

Upon completion of the course, the student shall be able to		
Course objectives	(i)	Familiarize with the knowledge of different materials, tools used in Material Testing Lab.
	(ii)	Use various basic implements used in testing of various Civil Engineering construction materials.
	(iii)	Know the etiquette of working with the fellow work force
	(iv)	Reinforce theoretical concepts by conducting relevant experiments/exercises.

COURSE OUTCOMES:

Course Outcomes	CO1	C-309.1	Demonstrate the skill of planning and organising experimental set up for conducting various tests on Civil Engineering construction materials
	CO2	C-309.2	Perform precise operations/tasks with Engineering equipment/instrument used for testing of different Civil Engineering construction materials
	CO3	C-309.3	Observe various parameters, their variations and graphically represent the same
	CO4	C-309.4	Analyse the experimental results to draw inferences, to make recommendations
	CO5	C-309.5	Practice ethics & etiquette while working in a group and display professionalism while communicating as a member and leading group.

LEARNING OUTCOMES:

LEARNING OUTCOMES	1.0 **Tests on bricks**
	(a) Water absorption test on bricks
	• Using of balance to weigh bricks and recording its weight.
	• Placing the specimen/ bricks in an oven at const. temperature.
	• Placing the end of the bricks in the dish, the depth of immersion in water being 25 mm.
	• Giving identification marks to bricks.
	• Immersing the bricks at a given temperature.
	• Wiping out water traces.
	• Placing the whole arrangement in a warm (for example,20 to 30°C) well ventilated room
	• Heating the specimen/ bricks in an oven at constant temperature.
	• Calculating % of water absorption.
	• Examining the bricks for efflorescence after the second evaporation and report the results.
	(b) Crushing Strength test on bricks
	• Operation of compression Testing machine /UTM.
	• Placing of bricks in CTM.
	• Applying of load gradually at the rate of $14N/mm^2/min$ Switching off the CTM.
	• Taking adequate no of bricks randomly.
	• Cleaning the surface of bricks.
	• Immersing the bricks in clean water tub.
	• Wiping off the surface of bricks with cloth after taking from water tub.
	• Applying CM 1:1 on the rough surfaces and filling up the frog with prepared CM.
	• Storing of plastered bricks under jute bags for 24 hours and immersing in clean water for 3days.
	• Wiping off surplus water after removing from clean water.
	• Preparing 1:1 cement mortar.
	• Applying the load gradually at the rate of $14 N/mm^2$ per minute till failure occurs.
	• Recording the load at failure(crushing)
	• Tabulating the observations.

- Calculating the average crushing strength.

2.0 Tests on cement

(a) Fineness Test on cement

- Selecting the required IS sieve No.9.
- Weighing cement.
- Sieving of cement.
- Weighing of residue after sieving
- Calculating % of residue of cement left on the pan.

(b) Normal Consistency Test on Cement

- Weighing of cement.
- Transferring of cement into non-absorbent tray.
- Using of stopwatch.
- Measuring the required % of water.
- Reading of Vicat's scale/noting down the plunger penetration and recording.
- Mixing cement with water and transferring the paste into mould within gauge time.
- Releasing of Vicat's plunger to penetrate into the paste.
- Reading of Vicat's scale/noting down the plunger penetration and recording.
- Reading of Vicat's scale/noting down the plunger penetration and recording.
- Repeating the process varying % of water and noting the penetration of plunger from the bottom of the mould till the penetration value is between 5-7mm.

(c) Setting Time Test on cement

- Weighing of cement.
- Transferring cement into non-absorbent tray.
- Using of stopwatch.
- Measuring the required % of water
- Mixing cement with water and transferring the paste into mould within gauge time.
- Releasing of Vicat's needle to penetrate into the paste
- Reading of Vicat's scale/noting down the needle penetration and recording.
- Repeating the procedure until the needle, when brought in contact with the cement block and released, fails to pierce the block between 5-7 mm measured from the bottom of the mould.

(d) Compressive Strength of cement

- Using of stopwatch.
- Operating the vibrating machine for uniform compaction
- Operating the compression testing machine
- Transferring the cement into non-absorbent tray.
- Mixing cement with water and transferring the paste into mould within gauge time.
- Filling of mixed cement mortar into standard mould
- Weighing of cement.
- Mixing of 3 grades of Ennore sand.
- Measuring of water (P/5 +3.5) % of combined weight of cement and sand.
- Reading the compressive strength of cubes and recording

3.0 Tests on Aggregates

(a) Water absorption test on sand

- Taking appropriate quantity of fine aggregate (sand) and clean it thoroughly by washing it thorough 75μ sieve till the fine dust is fully removed.
- Finding weight of sand in pycnometer and pouring distilled water till sand in inundated. Cleaning the pycnometer on its outside surface and finding its weight after 24 hours saturation and let the weight be "A".
- Emptying the pycnometer and filling it with distilled water only. Taking its weight "B".
- Cleaning the aggregate with soft clothes until the aggregate become saturated surface dry and let its weight be "C".
- Keeping the aggregate in oven for drying at a temperature of 110oc for period of 24hours.
- Removing the aggregate from the oven, cooling to room temperature in the air tight desiccators and let the weight be "D"
- Repeating the entire procedure for second sample also.

(b) Test on Bulking of sand

- Placing of sand in cylindrical container.
- Measuring water using graduated glass jar.
- Measuring Initial volume, Final volume of sand and volume of water.
- Uniform mixing of water and sand.
- Transferring the mixed sand from pan into measuring jar carefully.

| | Converting percentage of water into volume of water. Calculating accurately the % of bulking for every equal increment of water added. Drawing ordinary Graph with % of water added on X-axis and % of bulking on Y-axis. Recording maximum percentage of bulking of sand corresponding to the percentage of water added from the curve of the Graph, record. Calculating the volume of sand required taking into consideration the bulkage. **(c) Test on determination of bulk density and percentage of voids in Coarse and Fine aggregate** Using of balance and recording weight. Measuring the volumes of fine and coarse aggregate using cylindrical metal measure in loose and compacted states. Weighing of cylindrical metal measures. Weighing of cylindrical metal measures. Tamping the aggregate in 25 strokes with tamping rod. Calculating of bulk density of coarse and fine aggregates both in loose and completed states. **(d) Sieve analysis of coarse and fine aggregates** Using of balance to weigh coarse and fine aggregates and recording their weight. Arranging the set of sieves used for sieve analysis of coarse aggregate. Arranging the set of sieves used for sieve analysis of fine aggregate. Sieving of coarse and fine aggregate on a machine or sieve shaker Calculating the cumulative percentage weight retained for coarse and fine aggregate. Calculating the fineness modulus of coarse and fine aggregates. **(e) Field method to determine fine silt in aggregate** Measuring the sand by graduated cylinder/jar. Measuring the amount of fines forming a separate layer. Adding of correct quantity of water to sand. Calculating the silt content. |

4.0 Tests on metals

(a) Tension test on mild steel rod

- Mounting the specimen in the grips of movable and fixed heads of UTM.
- Adjusting the load points to zero, after jaws hold the specimen firmly.
- Keeping left valve in open position and right valve closed position.
- Switch off the instrument. Measuring the diameter of the rod.
- Making specimen of convenient length.
- Applying the load slowly and gradually.
- Removing the specimen from the grips.
- Marking the center point
- Measuring the gauge length.
- Keeping the left valve in closed position after completion of the experiment
- Observing the load decreasing and neck formation.
- Noting the yield point, ultimate load and breaking point.
- Plot the stress and strain graph

(b) Hardness test on metals

- Keeping the specimen ready for testing
- Setting of dial to zero
- Identifying Ball and diamond indenters
- Identifying A, B, and C scale
- Applying minor load
- Reading of hardness number using microscope

(c) Izod/Charpy Impact test on metals

- Preparing the standard specimen and fixing the specimen in the position of anvil.
- Clutching the striking hammer.
- Adjusting the pointer.
- Fixing the specimen in the position of anvil.
- Adjusting the pointer.
- Releasing pendulum to strike the specimen by taking safety precaution
- Preparing the standard specimen
- Recording down the reading by observing the appropriate scale

	(d) Deflection test on beam
	• Operating UTM.
	• Fixing and reading of dial gauge
	• Placing of specimen over the brackets centrally.
	• Selection of load range for the test.
	• Adjusting the load gauge and deflectometer to zero.
	• Applying of load at the rate of 2.5 mm per minute.
	• Noting down the deflection for each increment of load.
	• Drawing of graph between load vs deflection
	• Calculating of Young's modulus from the graph

PO-CO Mapping:

Course Code : C-309	Course Title: Material Testing Practice	Number of Course Outcomes: 05		No. of Periods: 45	
POs	**Mapped with CO No.**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO3, CO4	13	29	2	> 40% Level 3
PO2	CO1,CO3, CO4	12	27	2	Highly addressed
PO3	CO1, CO3, CO4	12	27	2	25% to 40% Level 2
PO4	CO2	4	8.5	1	Moderately addressed
PO5	CO5	4	8.5	1	5 to 25% Level 1
PO6					Low addressed
PO7					< 5% Not addressed

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2					2	3	3
CO2				3				2	3	2
CO3	2	3	2					2	3	2
CO4	2	3	3					2	3	2
CO5					2			2	3	3
Average	2	2.7	2.3	3	2			2	3	2.4

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

 (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

KEY Competencies to be achieved by the student

S.No	Experiment Title	Competency	Key Competency
1	Water Absorption on bricks	Taking weight of dry bricks and wet bricks	
2	Crushing strength test on bricks	1. Preparation of 1:1 cement mortar and application cement mortar over top and bottom faces of brick	Preparation of 1:1 cement mortar Application of load gradually at the rate 14 N/mm^2 per minute till failure a occurs
		2. Application of load gradually at the rate 14 N/mm^2 per minute till failure a occurs	
		3. Recording the load at FAILURE	
3	Fineness test on cement	Taking weight of cement sample and its residue	
4	Normal consistency test on cement	1. Measurement of required percentage of water to cement accurately	Preparation of sample in the mould Reading of Vicat's scale/noting down the plunger penetration
		2. Preparation of sample in the mould	
		3. Reading of Vicat's scale/noting down the plunger penetration	
5	Setting times of cement	1. Measurement of required percentage of water to cement accurately	Preparation of sample in the mould Reading of Vicat's scale/noting down the needle penetration
		2. Preparation of sample in the mould	
		3. Reading of Vicat's scale/noting down the needle penetration	
		4. Recording time at required needle penetration	
6	Compressive strength test on cement	1. Taking weights of different grades of standard sand and cement accurately	Application of load at required rate and recording of load at failure accurately

		2. Addition of required percentage of water to cement accurately	
		3. Application of load at required rate and recording of load at failure accurately	
7	Water absorption of sand	Accurate weighing of dry sand and wet sand	
8	Bulking of sand	1. Measuring of sand and water accurately	Measuring of increasing in volume of sand
		2. Addition of water to sand in accurate increments	
		3. Measuring of increasing in volume of sand	
9	Determination of necessary adjustment for bulking of fine aggregate by field method	Measurement of volume of sand accurately	--
10	Bulk density and Percentage of voids in coarse and fine aggregates	1. Taking of weight of cylindrical metal measure accurately	Taking weight of aggregate and containers
		2. Calculating of bulk density of coarse and fine aggregates both in loose and compacted states	
		3. Taking weight of aggregate and containers	
11	Sieve analysis of coarse and fine aggregate	1. Correct arrangement of sieves used for the sieve analysis of fine or coarse aggregate	Correct arrangement of sieves used for the sieve analysis of fine or coarse aggregate
		2. Weighing of residue in each sieve accurately	
12	Field method of determining fine silt in aggregate	1. Measuring sand by graduated cylinder accurately	--
		2. Measuring correct quantity of water to be added to sand	
13	Tension test on mild	1. Marking of gauge length on	

	steel rod	the MS Rod	Fixing the specimen correctly in between jaws Application of load at required rate carefully
		2. Fixing the specimen correctly in between jaws	
		3. Application of load at required rate carefully	
		4. Measuring the load at failure accurately	
14	Torsion test on mild steel rod	1. Measurement of length and diameter of specimen accurately	Application of load accurately Measuring the angle of rotation accurately
		2. Application of load accurately	
		3. Measuring the angle of rotation accurately	
15	Brinell/Rockwell	1. Placing of specimen at exact position	--
		2. Application and release of load at required rate	
16	Izod/Charpy test on mild steel/brass	1. Preparation of standard specimen and fixing the specimen in the right position of anvil	Preparation of standard specimen and fixing the specimen in the right position of anvil
		2. Recording down the reading by observing the appropriate scale	
17	Deflection test on beams	1. Measuring the dimensions of specimen accurately	Measurement of deflection accurately
		2. Application of load at exact point of application	
		3. Measurement of deflection accurately	
		4.Measurement of deflection of springs	

COURSE CONTENT

1. **Tests on Bricks**
    Water absorption - Crushing strength

2. **Tests on Cement**
    Fineness test - Normal consistency test - Setting times of cement - Compressive strength of cement.

3. **Tests on Aggregates**
    Water absorption of Sand - Bulking of Sand - To determine necessary adjustment for bulking of fine aggregate by Field method - Bulk density and Percentage of voids in Coarse and fine aggregates - Sieve analysis of coarse and fine aggregates - Field method to determine fine silt in aggregate.

4. **Tests on Metals**
     Tension test on mild steel rod - Torsion test on mild steel rod - Brinell/Rockwel hardness test on steel and Brass with different surface finish - Izod/Charpy tests on mild steel/brass - Deflection Test on beam (Steel beam or wooden beam)

REFERENCE BOOKS:

1. Laboratory manual of strength of materials and soil mechanics, SBTET, A.P.

HYDRAULICS PRACTICE

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-310	Hydraulics Practice	03	45	40	60

S.No	Major Topics	No. of Periods	COs Mapped
1	Determination of Hydraulic Coefficients / factors / Constants / Verification of Principles / Laws	36	CO1, CO2, CO3, CO4
2	Study on Hydraulic Machines	09	CO5
	Total	**45**	

COURSE OBJECTIVES:

		Upon completion of the Course, the student shall be able to
Course Objectives	1	Understand the principles of Hydraulics in flow measurements and Pumps & Turbines.
	2	Critically observe/examine and Measure the discharges through flow measuring devices.
	3	To know the etiquette of working with the fellow work force.
	4	To reinforce theoretical concepts by conducting relevant experiments/exercises.

COURSE OUTCOMES:

Course Outcomes	CO1	C-310.1	Conduct Experiment to determine Hydraulic Coefficients of Orifices, Mouthpieces and notches.
	CO2	C-310.2	Conduct a test employing Bernoulli's theorem (i) to observe head variation (ii) To determine discharges by varying the head.
	CO3	C-310.3	Conduct Experiment to determine flow rates, pressure changes, and major head loss for flow through pipes.
	CO4	C-310.4	Conduct open channel flow to measure chezy's constant.
	CO5	C-310.5	Conduct relevant test to evaluate the performance of Hydraulic machines

LEARNING OUTCOMES:

LEARNING OUTCOMES	**1.1 Determine coefficient of discharge of a small orifice by constant head method and variable head method.** • Measure dimensions of collecting tank using meter scale and record its dimensions. • Measure the diameter of Orifice using Vernier calipers. • Priming of motor is to be done before switching on. • Operate outlet valve of collecting tank for taking T & H for calculation of Qa, without overflowing it. • Measure the time required (T) to rise the water level to a desired height (H) after closing outlet valve in the colleting tank. • Maintain constant head in supply tank. • Preparation of graph with the observed values and adding a trend line, measuring slope of it and finding out the Cd from graph. **1.2 Determine coefficient of discharge of a small orifice by variable head method.** • Measure the diameter of Orifice Using Vernier calipers • Priming of motor is to be done before switching on • Measure dimensions of orifice tank • Measure the diameter of Orifice using Vernier calipers • Switch on the Pump (If pump is not working, go for Priming) • Record the time taken to descend the water level in the orifice tank from head H_1 to head H_2. **1.3 Determine the hydraulic coefficients of an orifice.** • Switching on the motor after priming • Operation of different valves • Measure diameter of Orifice Using Vernier callipers • Measure the internal dimensions of the tank. • Operation of stop watch • Operation of sliding Vernier scale • Reading a piezometer values without parallax by maintaining the constant head • Note the time for collecting specified quantity of water and subsequent valve operations. • Reading on piezometer has to be taken corresponding to lower meniscus level. • Identify the location of Vena-Contracta. • Note down the Initial co-ordinates taken at vena-contracta and final co-ordinates taken at any random point on jet

1.4 Determine coefficient of discharge of a mouthpiece by constant head method.

- Use meter scale to measure dimensions of collecting tank and recording its dimensions.
- Use vernier calipers to know the diameter of mouthpiece
- Note the time elapsed for collecting specified quantity of water using stop watch.
- Operate outlet valve to know the rise of water in collecting tank.
- Operate inlet valve to maintain constant head
- Measure time required to constant rise in collecting tank after Closing outlet valve.
- Record values accurately.
- Calculate C_d for mouth piece.
- Plot the graph with specific parameters.
- Compare graph with standard values.

1.5 Determine coefficient of discharge of a rectangular notch.

- Measure the size of Notch and collecting tank
- Fix hook gauge with sharp edge needle in Notch tank.
- Note the least count of point gauge
- Allow the water into notch tank up to crest level of notch and record the point gauge reading.
- Control Valves to regulate the flow of water to maintain constant depth over crest of notch.
- Measure the head over Notch.
- Measure the depth of flow.
- Note the time using the stop watch for 10cm rise of water in collecting tank.
- Note the Readings of Piezometer at collecting tank without parallax error.

1.6 Determine coefficient of discharge of a triangular notch.

- Measure the size of Notch and collecting tank
- Fix hook gauge with sharp edge needle in Notch tank.
- Note the least count of point gauge
- Allow the water into notch tank up to crest level of notch and record the point gauge reading.
- Control Valves to regulate the flow of water to maintain constant depth over crest of notch
- Measure the head over Notch.
- Measure the depth of flow.
- Note the time using the stop watch for 10cm rise of water in collecting tank.
- Note the Readings of Piezometer at collecting tank without parallax error.

1.7 Verify Bernoulli's theorem.
- Priming operation is to be done before switching on the motor.
- Stop watch reading.
- Maintain constant head by operating appropriate valves.
- Measurement of areas and piezometer reading at given sections without parallax.
- Measure the dimensions of collecting tank.
- Note down the time taken for 10 cm rise in collecting tank without parallax.
- Calculate actual discharge.
- Calculate velocity and velocity heads at various sections of piezometers.
- Calculate and verify total heads at various sections.

1.8 Determine coefficient of discharge of a venturimeter.
- Operate the control valve for varying flow rate.
- Check condition of valves for manometer, collecting tank,
- venturimeter conduit or pipe.
- Check for working of stop watch and Pump (If pump is not working go for Priming)
- Release air bubbles in U tube manometer by using respective valves.
- Release valves of collecting tank, noting the time taken for specific rise in water level in it.
- Adjust control valve for required flow rate
- Record readings of u tube manometer.
- Calculate Cd of venturi meter.

1.9 Determine friction factor in pipe flow.
- Use Vernier callipers to determine diameter of the pipe.
- Perform Priming of Centrifugal Pump.
- Identify the points in the pipe to know the Pressure difference.
- Regulate the flow in pipe to avoid air bubbles.
- Operate Inlet Valve to Maintain Constant Head.
- Operate Control valves for Reservoir and collecting tank.
- Operate Control valves for Creating Pressure Difference between two points.
- Take Differential Manometer reading.
- Allow water to a measurement of 100mm rise in collecting tank.
- Note the time elapsed for 100mm rise by stop watch in sec.

1.10 Determine Chezy's constant in open channel flow.
- Before starting the motor, priming should be done is necessary.
- Operating valves to maintain steady flow.
- Taking the water level reading using the gauge.
- Read the piezometer reading without parallax error.
- Stop watch operation.
- Care should be taken to avoid overflow of the collecting tank.

	- Note down the slope of the channel. - Maintain steady flow. - Note the time taken for 10cm rise in the collecting tank - Head should be read carefully on the point gauge. - Calculate the values of chezy's constant for different discharges. **2.0 Tests on Hydraulic machines.** **2.1 Conduct performance test on a single stage Centrifugal pump** - State the Aim / apparatus /equipment required - Perform test and record observations - Identify the component parts of a reciprocating pump. - State the functions of each component. - State field applications. **2.2 Determine the efficiency of a Reciprocating pump** - State the Aim/apparatus/equipment required. - Perform test and record observations. - Identify the component parts of a reciprocating pump. - State the functions of each component. - State field applications and compare with Reciprocating pump. **2.3 Study on Hydraulic Turbines** - Identify the component parts of Pelton wheel, Francis or kaplan turbines. - State function of each component. - State field applications.

PO-CO Mapping:

Course Code: C-310	Course Title: HYDRAULICS PRACTICE No of COs : 5				No. of Periods: 45
POs	Mapped with CO No.	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	%		
PO1	CO1, CO2, CO3, CO4, CO5	10	22	1	> 40% Level 3 Highly addressed 25% to 40% Level 2 Moderately addressed 5 to 25% Level 1 Low addressed < 5% Not addressed
PO2	CO1, CO2, CO3, CO4, CO5	12	27	2	
PO3	CO1, CO2, CO3, CO4, CO5	7	15	1	
PO4	CO1, CO2, CO3	4	9	1	
PO5					
PO6	CO1, CO2, CO3, CO4, CO5	12	27	2	
PO7					

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	2		3		1	3	2
CO2	3	3	2	2		3		1	3	2
CO3	3	3	2	2		3		1	3	2
CO4	3	3	2			3		1	3	2
CO5	3	3	2			3		1	3	2
Average	3.0	3.0	2.0	2.0		3.0		1	3	2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT:

LIST OF EXPERIMENTS
I   Determination of Hydraulic Coefficients/factors/Constant/Verification of Principles/ Laws
   a.   Determination of coefficient of discharge of a small orifice by constant head method
   b.   Determination of coefficient of discharge of a small orifice by variable head Method
   c.   Determination of Cc of an orifice by finding C_v and C_d.
   d.   Determination of coefficient of discharge of a mouthpiece by constant Head method.
   e.   Determination of coefficient of discharge of a triangular notch.
   f.   Determination of coefficient of discharge of a rectangular notch.
   g.   Determination of coefficient of discharge of a trapezoidal notch.
   h.   Verification of Bernoulli's theorem.
   i.   Determination of coefficient of a discharge of a venture meter.
   j.   Determination of friction factor in pipe flow.
   k.   Determination of Chezy's constant in open channel flow.
II   Study of Fluid machines
   a.   Tests on reciprocating pump and centrifugal pump.
   b.   Study on turbines – Pelton / Francis / Kaplan.

KEY Competencies to be achieved by the student

S. No	Experiment Title	Competency	Key Competency
1	Coefficient of discharge of small orifice by constant head.	1) Regulate the flow 2) Operate stop clock accurately 3) Draw graph between Q vs $H^{1/2}$	1) Regulate the flow 2) Operate stop clock accurately 3) Draw graph between Q vs $H^{1/2}$
2.	Coefficient of discharge of small orifice by variable head	1) Note readings of head at intervals. 2) Operate stop clock accurately 3) Draw graph between Q vs $H^{1/2}$	
3	Hydraulic coefficients of orifice.	1) Regulate flow. 2) Note co-ordinate values and measure volume 3) Operate stop clock accurately 4) State the relation.	
4.	Coefficient of discharge of mouth piece by constant head.	1) Regulate the flow 2) Operate stop clock accurately 3) graph between Q vs $H^{1/2}$	
5.	Coefficient of discharge of rectangular notch.	1) Note readings of head 2) Operate stop clock accurately 3) Draw graph between Q vs $H^{3/2}$	1) Regulate the flow 2) Operate stop clock accurately
6.	Coefficient of discharge of triangular notch	1) Note readings of head 2) Operate stop clock accurately 3) Draw graph between Q vs $H^{5/2}$	1) Regulate the flow 2) Operate stop clock accurately

7	Verify Bernoulli's theorem	1) Note readings of head at various locations 2) Plot hydraulic gradient line and total energy line	Plot hydraulic gradient line and total energy line
8	Coefficient of discharge of venturimeter.	1) Note readings of head 2) Operate stop clock accurately 3) Draw graph between Q vs $H^{1/2}$	1) Regulate the flow 2) Operate stop clock accurately
9	Friction factor in pipe flow.	1) Note readings of head 2) Observe the significance of friction factor of pipe flow.	Observe the significance of friction factor of pipe flow
10	Chezy's constant	1) Note readings of head 2) Observe the significance in design of section of open channel	Observe the significance in design of section of open channel

IV SEMESTER

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2020
FOURTH SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examination			
		Theory	Practical		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
C-401	Construction Technology & Valuation	4		60	3	20	80	100
C-402	Design and Detailing of R.C.Structures	5		75	3	20	80	100
C-403	Construction Practice	4		60	3	20	80	100
C-404	Transportation Engineering	4		60	3	20	80	100
C-405	Irrigation Engineering	4		60	3	20	80	100
PRACTICAL								
C-406	Civil Engineering Drawing-II		6	90	3	40	60	100
C-407	Concrete & Soil Testing Practice		3	45	3	40	60	100
C-408	Communication Skills		3	45	3	40	60	100
C-409	Surveying-III Practice		3	45	3	40	60	100
C-410	CAD Practice-II		3	45	3	40	60	100
	Student Centric Learning Activities		3	45				
	Total	**21**	**21**	**630**		**300**	**700**	**1000**

Construction Technology and Valuation

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-401	Construction Technology and Valuation	04	60	20	80

TIME SCHEDULE:

S. No.	Major Topics	No. of Periods	COs Mapped
1.	Concrete Technology	15	CO1
2.	Construction Machinery and Equipment	10	CO2
3.	Building Services	10	CO3
4.	Earthquake Resistant Structures	10	CO4
5.	Building Valuation	15	CO5
	Total	**60**	

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Familiarize with basic concepts of Concrete Technology and Understand the various Machinery and Equipment used in Construction and Familiarize the concepts of various services in a Building.
	(ii)	Understands the basic concepts of Earth quake Resistant Structures and its related codal provisions.
	(iii)	Understands the concepts of Valuation and fixes the rent of a building.

COURSE OUTCOMES (COs):

	CO1	C-401.1	Explain basic concepts of Concrete Technology.
Course Outcomes	CO2	C-401.2	Understands different Construction Machinery and Equipment used in Construction.
	CO3	C-401.3	Understands the different services in a Building.
	CO4	C-401.4	Understands the Earth quake Structures and Ductile Detailing as per codal provisions
	CO5	C-401.5	Understands the basic concepts of Valuation and fixes the rent of a building.

281

LEARNING OUTCOMES:

1. Concrete Technology	1.1. State the ingredients of Concrete.
	1.2. Define
	1. Workability and 2. Water/Cement ratio
	1.3. Explain the relation between strength of concrete, workability and water/ cement ratio
	1.4. Understand 'Grades' of concrete.
	1.5. State the grades of concrete recommended for different types of works.
	1.6. Differentiate 'Normal strength concrete and High strength concrete'
	1.7. Differentiate between 'Ordinary Concrete and Controlled Concrete'
	1.8. State the functions of Admixtures in concrete
	1.9. List out different admixtures being used.
	1.10. State the Principles of Concrete Mix Design.
	1.11. State the factors affecting variability of concrete strength.
	1.12. Explain the procedure of Concrete Mix design using IS Code method
	1.13. Understand the following special concretes
	1. Fiber Reinforced Concrete,
	2. Fal-G-Concrete,
	3. Light weight concrete,
	4. High density concrete,
	5. Polymer concrete and
	6. Self compacting concrete
	1.14. Understand concreting under special exposure conditions like
	1. Under- water concreting,
	2. Cold weather concreting,
	3. Hot weather concreting and
	4. Concreting in high rise buildings
	1.15. Explain 'Micro concrete' and 'Shotcrete'.
	1.16. State the need for Expansion and Construction joints in concretestructures.
	1.17. Explain the method of providing various joints in RCC roofs.
2. Construction Machinery and Equipment	2.1. Understand the need for mechanization and construction activities
	2.2. State different types of construction equipment with help of neat sketch
	2.3. Explain the uses of different construction equipment
	2.4. State the factors to be considered for the selection of type of construction equipment.
3. Building Services	3.1. Explain the hot water supply distribution using solar water heating system with of help of neat circuit diagram.
	3.2. State the requirements of good lighting in building.
	3.3. Define the terms 1. Glare and 2. Day light factor
	3.4. State the precautions to be taken to avoid glare in building
	3.5. State the requirements of good electrical wiring.
	3.6. List the power rating of different domestic electrical appliances.
	3.7. List the different types of electrical wirings.
	3.8. State the objectives of electrical earthing.

	3.9. Explain the method of earthing
	3.10. State the requirements of good ventilation.
	3.11. Explain 1. Natural ventilation and 2. Artificial ventilation.
	3.12. State the functions of
	1. Sunshades,
	2. Louvers,
	3. Sun breakers and
	4. Blinds
	3.13. State the principles of fire protection in buildings.
	3.14. State the causes of fire.
	3.15. Explain about fire fighting.
	3.16. State different fire detectors and fire extinguishers.
	3.17. State different fire extinguishers
	3.18. State different fire-resistant building materials.
	3.19. Explain about air conditioning.
	3.20. State different types of cooling systems.
4. Earthquake Resistant Structures	4.1. List causes seismic waves, basic terminology
	4.2. Explain 1. Magnitude, 2. Intensity and 3. Energy release
	4.3. Characteristics of earthquake
	4.4. Understand basic terminology of earthquake
	4.5. Explain seismic zoning
	4.6. Explain seismic construction with brick stone masonry buildings as per codal provisions.
	4.7. Explain seismic construction with stone masonry buildings as per codal provisions.
	4.8. Understand seismic construction and detailing of R.C. buildings as per codal provisions.
5. Building Valuation	5.1. Define the terms: 1. Value and 2. Cost and price
	5.2. State the need for valuation.
	5.3. Explain the following terms:
	1. Depreciation,
	2. Sinking fund,
	3. Annuity and
	4. Capitalized value
	5.4. Lists different methods of valuation of buildings.
	5.5. Explains different methods of valuation of buildings.
	5.6. State methods of rent fixation of building.
	5.7. Explain methods of rent fixation of building.

PO-CO MAPPING:

Course Code: C-401	Course Title: Construction Technology and Valuation No of COs: 4				No. of periods: 60
POs	**Mapped with CO No**	**CO Periods Addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		Nos.	**%**		
PO1	CO1, CO2, CO3, CO4, CO5	14	23	1	>40% Level 3 (HighlyAddressed)
PO2	CO3, CO4, CO5	03	5	0	
PO3	C04	01	2	0	25% to 40% Level 2 (Moderately Addressed)
PO4	-	-	0	0	
PO5	C01, CO2, CO3, CO4, CO5	12	20	1	5% to 25% Level 1 (Low Addressed)
PO6	C02	2	3	0	
PO7	C01, CO2, CO3, CO4, CO5	28	47	3	<5% Not Addressed

CO-PO MAPPING:

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	-	-	-	2	-	3
CO2	1	-	-	-	2	2	3
CO3	2	1	-	-	1	-	3
CO4	1	1	1	-	1	-	3
CO5	1	1	-	-	2	-	3
Average	1.4	1	1	0	1.6	2	3

Note: The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
(vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ...etc.COURSE CONTENT

1.0 Concrete Technology

Introduction – Ingredients of Concrete – Properties of Concrete – Workability - Factors influencing workability – Water / Cement Ratio – Relation between Strength of concrete and Water / Cement Ratio - Curing of Concrete - Method of curing - Grade of concrete - Controlled concrete and Ordinary Concrete - Normal strength concrete and High strength concrete

Admixtures – Types of admixtures – Accelerators – Retarders – Plasticizers – Super plasticizers- Uses - Mix design – Factors influencing mix design – Methods of Mix design – IS: 10262-2009 method of mix design.

Special Concretes – fiber reinforced Concrete – Fal G-Concrete, high density Concrete, Light weight Concrete, polymer Concrete and micro-Concrete – Self Compacting Concrete-Properties – uses.

Concreting under special exposure condition – cold weather Concreting – hot weather Concreting – under water concreting – Shotcrete – Concreting in high rise buildings.

Joints – Necessity of joints – Joints in RCC roofs – Expansion joint – Contraction joint – Construction joint.

2.0 Construction machinery and equipment

Need for use of construction Machinery - Factors affecting selection of equipment.

Types – Crawler and Pneumatic tyred - Excavation equipments – Tractors, Bulldozer, Grader, Scrapper, Shovel, Dragline, Clamshell, Dredgers – description – Uses - Compaction equipment – Rollers, tamping roller – Smooth wheeled roller – Pneumatic tyred rollers – Vibrating compactors – Description – uses - Hauling equipments – Trucks, Dump trucks, Dumpers - Cranes –Tower cranes - Conveying equipments – Belt conveyors.

3.0 Building Services

Hot water supply using solar water heating system - Lighting requirements in a building – daylight factor – glare.

Electrical services – Requirements of good electrical wiring – types of electrical wirings – earthing – methods - Ventilation – Requirement of good ventilation – Natural and Artificial ventilation – purpose of sunshades, louvers, and blind - Air conditioning – Purpose – Air conditioning layout – Components – Types of cooling systems – Air coolers – Air conditioner – Centralized Airconditioner – Split type Air Conditioner.

4.0 Earth quake resistant structures

Causes of seismic waves – Magnitude, intensity and energy release –basic terminology – Characteristics of earthquake – seismic zoning - Seismic construction of brick and stone masonry buildings – Provisions of I S: 4326 - Seismic construction of R.C. Buildings – Detailing as per Provisions of I S: 13920.

a. Building Valuation

Definition – Value, Cost and Price, Scrap value, Salvage value, Market value, Book value, sinking fund and its meaning – purpose of valuation –factors governing valuation - Depreciation – Sinking fund – Annuity – Capitalized value - Methods of valuation – Land & building method, Development method, Depreciation method, Rental method, Capitalization method, Profit method, Simple problems on each of the above method.

`Rent fixation – Rent fixation of building – principles of rent fixation by CPWD – Fair rent method – simple problems.

REFERENCE BOOKS

1. Concrete Technology by M S Shetty
2. Building Technology and valuation   TTTI, Chennai
3. Hand book on Design of Concrete mixes S.P.23
4. Valuation of Real Properties by S.C. Rangwala

MODEL BLUE PRINT

S. No.	Chapter Name	Periods allocated	Weightage allotted	Mark wise Distribution of Weightage		Question wise Distribution of Weightage		COs Mapped
				R	U	R	U	
1.	Concrete Technology	15	26	6	20	2	2	CO1
2.	Construction Machinery and Equipment	10	16	6	10	2	1	CO2
3.	Building Services	10	26	6	20	2	2	CO3
4.	Earthquake Resistant Structures	10	16	6	10	2	1	CO4
5.	Building Valuation	15	26	6	20	2	2	CO5
	Total	60	110	30	80	10	8	

TABLE SPECIFYING THE SCOPE OF SYLLABUS TO BE COVERED FOR UNIT TEST-I & II

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.7
Unit Test-II	From 3.8 to 5.7

Model Test Paper
State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-401 CONSTRUCTION TECHNOLOGY AND VALUATION

Time: 90 Minutes	**Unit Test – I**	Maximum Marks: 40
	PART – A	16 Marks

Instructions:
- (i) Answer all questions
- (ii) First question carries FOUR marks.
- (iii) Remaining questions carries THREE marks.

1. (i) Which one of the following is an ingredient of concrete? (C01)
     - i. Binding material
     - ii. Fine aggregate
     - iii. Both (a) and (b)
     - iv. Neither (a) nor (b)

    (ii) A _____ is used to level the ground and spreads the loose material. (C02)

    (iii) A Fire detector cannot detect the following, (C03)
     - i. Radiation
     - ii. Heat
     - iii. Light
     - iv. Smoke

    (iv) Water cement ratio is defined as the ratio of (C01)
     - i. Volume of water to volume of cement
     - ii. Weight of water to weight of cement
     - iii. Volume of cement to volume of water
     - iv. Weight of cement to weight of water

2. Define workability. (C01)

3. State any one example of each of the following Machinery / Equipment, (C02)
    (i) Excavation Equipment, (ii) Compaction Equipment and (iii) Hauling Equipment

4. Define Daylight factor. (C03)

5. State any three causes of Fire. (C03)

	PART – B	3 X 8 = 24 Marks

Instructions:
- (i) Answer all questions
- (ii) Each question carries EIGHT marks.
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

287

6. (A) Explain the procedure of Concrete Mix Design as per IS. (C01)

OR

(B) Explain the relation between strength of concrete, workability and w/c ratio. (C01)

7. (A) Explain the uses of any one excavation equipment and any one conveying
   equipment. (C02)

   OR

   (B) Explain the uses of any one compaction equipment and any one hauling
   equipment. (C02)

8. (A) Explain hot water supply distribution using solar water heating system with
   the help of circuit diagram. (C03)

   OR

   (B) Write any eight requirements of good lighting in building. (C03)

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Model Test Paper
State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-401 CONSTRUCTION TECHNOLOGY AND VALUATION

Time: 90 Minutes _____ **Unit Test – II** _____ Maximum Marks: 40

PART – A 16 Marks

Instructions:
  (i)   Answer all questions
  (ii)   First question carries FOUR marks.
  (iii) Remaining questions carries THREE marks.

1. (i)   Which of the following parameters does not affect the lift waiting time? (C03)
     I.   Rated load
     II.   Number of stops
     III. Door closing time
     IV.   Handling capacity

   (ii)   _____ is the built-up covered area of a building measured at floor level of any story.
          (C05)

   (iii) _____ is required to make out an estimate for a work. (C03)

   (iv)   The Earthquakeforce is a function of _____. (C04)

2. Define the magnitude, intensity and energy release of an Earthquake. (C04)

3. Define the terms value, cost and price. (C05)

4. What is a seismic zone? How many seismic zones INDIA is made of? (C04)

5. State the causes of fire. (C03)

Instructions:
   (i)   Answer all questions
   (ii)   Each question carries EIGHT marks.
   (iii)   Answer should be comprehensive and the criterion for valuation is the content but not
           the length of the answer.

6. (A) Explain about firefighting.   (C03)

                                    OR

   (B) Explain about air conditioning.   (C03)

7. (A) Explain the seismic construction with brick stone masonry buildings as per
        codal provisions.   (C04)

                                    OR

8. (B) Explain the seismic construction and ductile detailing as per codal provisions. (C04)

9. (A) Explain the methods of valuation of buildings.   (C05)

                                    OR

   (B) Explain the methods of rent fixation of buildings.   (C05)

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Model Test Paper

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-401 CONSTRUCTION TECHNOLOGY AND VALUATION

Time: 180 Minutes   _ **End Examinations** _____   Maximum Marks: 80
                              PART – A   10 x 3 = 30 Marks
Instructions:
   (i)   Answer all questions
   (ii)   First question carries THREE marks.
   (iii)   Answer should be brief and straight to the point and shall not exceed
           five simple sentences.

1. State any three grades of concrete recommended for different types of work.   (C01)

2. State any three reasons for need of mechanization of construction work.   (C02)

3. State any three requirements of good electrical wiring.   (C03)

4. List any three characteristics of earthquake. (C04)

5. State any three needs for valuation. (C05)

6. List any three methods of fixing the rent of a building. (C05)

7. State any three causes of seismic waves. (C04)

8. List any three fire extinguishers. (C03)

9. State any one example each of the following machinery, (a) crane,
(b) conveying equipment and (c) Rollers. (C02)

10. List any three factors affecting variability of concrete strength. (C01)

PART – B   10 x 5 = 50 Marks

Instructions:
    (i)   Answer any FIVE questions
    (ii)   Each question carries TEN marks.
    (iii)   Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Explain about 'Mirco concrete' and 'Shotcrete'. (C01)

12. Explain uses of Clamshell and Dumpers. (C02)

13. Explain about Natural ventilation and Artificial ventilation. (C03)

14. Explain about seismic zoning with the help of neat sketch. (C04)

15. Explain the terms, (i) Depreciation, (ii) Sinking Fund and (iii) Annuity (C05)

16. Explain any two methods of valuation of a building. (C05)

17. Explain about Polymer concrete and Hot weather concreting. (C01)

18. Explain about firefighting. (C03)

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DESIGN AND DETAILING OF R.C. STRUCTURES

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-402	Design and Detailing of R.C. Structures	05	75	20	80

S. No.	Major Topics	No. of Periods	COs Mapped
1.	Introduction to R.C.C and Principles of Working Stress Method	08	CO1
2.	Philosophy of Limit State Design	05	CO2
3.	Analysis and Design of Rectangular Beams	15	CO2
4.	Design of Slabs	12	CO2
5.	Analysis of T-beams	12	CO3
6.	Design of columns	12	CO4
7.	Design of footings	11	CO4
	Total	75	

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Make student to be familiar with the principles of methods of design of R.C. Elements subjected to flexure, compression, shear and torsion.
	(ii)	Enable the student to design various R.C. Building Elements.

COURSE OUTCOMES:

Course Outcomes	CO1	C-402.1	Explain principles of Working stress design
	CO2	C-402.2	Design singly reinforced & doubly reinforced R.C.C rectangular beams and slabs using Limit state method
	CO3	C-402.3	Design of T-beam using Limit state method.
	CO4	C-402.4	Design columns & footings using Limit state method

LEARNING OUTCOMES:

Learning Outcomes	**1.0 Introduction to R.C.C and Principles of Working Stress Method**
	1.1 Differentiate Cement concrete and reinforced cement concrete. List the advantages and disadvantages of R.C.C.
	1.2 List the material used in R.C.C. and their functions in R.C.C. State the reasons for using steel as reinforcement.
	1.3 List the different codes used in R.C.C. List the Loads to be considered in the design of R.C. elements.
	1.4 State the different grades of concrete and different permissible stresses in concrete (Working Stress Method) as per IS 456 – 2000. Differentiate the nominal mix concrete and design mix concrete.
	1.5 Write the equations of tensile strength and modulus of elasticity of concrete as per IS 456 – 2000. State properties of concrete viz., Poisson's ratio, Creep, Shrinkage, Workability and Unit weight.
	1.6 List different types of steel and their permissible stresses in steel (Working Stress Method) as per IS 456 – 2000. State modulus of elasticity and unit weight of steel.
	1.7 State different methods of designing R.C. elements.
	1.8 State the assumptions made in Working Stress Method as per IS 456 – 2000. Define modular ratio. Write the equation of modular ratio in working stress method. Sketch the stress distribution and transformed area of R.C. section.
	1.9 Define Effective depth, Neutral axis, Lever arm and Moment of resistance. Describe balanced section, under reinforced section and over reinforced sections with sketches.
	1.10 Calculate Neutral axis, Lever arm and Moment of resistance for a singly reinforced rectangular beam.
	2.0 Philosophy of Limit State Design
	2.1 Define Limit State.
	2.2 State different limit states.
	2.3 Distinguish 'strength' and 'service ability' limit states
	2.4 List different IS: 456 – 2000 code provisions for Limit state method of design.
	2.5 Define characteristic strength of materials and characteristic loads.
	2.6 Differentiate Nominal Mix and Design Mix.
	2.7 Explain the role of partial safety factors in limit state design.
	2.8 Define Design strength of materials and Design loads.
	2.9 State the assumptions made in the limit state design.
	2.10 State the differences between the Working stress method and Limit state method of design of R.C. elements.
	3.0 Analysis and Design of Rectangular Beams
	3.1 Sketch stress and strain diagrams for a singly reinforced rectangular beam indicating appropriate stress and strain values in compression zone and tension zone of the beam, also the strain value at the junction of parabolic and rectangular stress blocks. Calculate the depth of rectangular and

parabolic stress blocks.

3.2 Calculate the total compressive force and total tensile force resisted by the singly reinforced rectangular beam. Calculate the depth of neutral axis from the equilibrium condition. Define lever arm. Write the equation for lever arm for a singly reinforced rectangular beam.

3.3 Explain – why the over reinforced sections are not recommended? Calculate the maximum depth of neutral axis. Calculate the limiting value of moment of resistance with respect to concrete and steel. Calculate the limiting percentage of steel.

3.4 State the general design requirements for beams in limit state design as per IS 456 – 2000 (Effective span, limiting stiffness, minimum tension reinforcement, maximum tension reinforcement, maximum compression reinforcement, spacing of main bars, Cover to reinforcement, side face reinforcement.)

3.5 Calculate the depth of neutral axis for a given section and decide whether the section is balanced or under reinforced or over reinforced and calculate the moment of resistance for the respective case. Calculate the area of steel for a given beam with given cross section and loading.

3.6 Design a singly reinforced beam as per IS 456 – 2000 for flexure only with the given grade of steel and concrete and check the designed beam for deflection as per IS 456 – 2000.

3.7 Explain the effect of shear on beam. Explain the shear stress distribution across a homogeneous section and reinforced concrete section with sketches. Explain the design shear strength and maximum shear stress in different grades of concrete as per IS 456 – 2000. Explain the need for shear reinforcement and different forms of shear reinforcement provided in beams. Explain the critical section for shear.

3.8 Calculate the shear strength of concrete, shear resistance of vertical stirrups, shear resistance of bent up bars as per IS 456 – 2000. State the minimum shear reinforcement and maximum spacing of shear reinforcement as per IS 456 – 2000. Calculate the nominal shear stress, shear resisted by bent up bars and spacing of vertical stirrups.

3.9 Design the shear reinforcement for beams. Design a singly reinforced beam as per IS 456 – 2000 with the given grade of steel and concrete and check the designed beam for shear and deflection as per IS 456 – 2000 and design the shear reinforcement as per 456 – 2000.

3.10 State the situations which require doubly reinforced beams.

3.11 Determine the moment of resistance for a given doubly reinforced section (given $d'/d – f_{sc}$ values)..

3.12 Calculate the allowable working load on singly reinforced beam

3.13 Calculate the development length of bars in compression, tension, and the curtailment position for main tension bars. State the importance of anchorage values of reinforcement.

3.14 Design a singly/doubly reinforced simply supported rectangular beams for the given grades of materials, span and loading for flexure including shear design with the curtailment of reinforcements and check for the deflection using simplified approach of the code.

4.0 Design of Slabs

    4.1   Distinguish one-way slabs and two way slabs.

    4.2   List the types of slabs based on support conditions.

    4.3   Explain the general design requirements of slabs as per IS 456 – 2000.

    4.4   Explain the functions of distribution steel in slabs.

    4.5   Sketch the general reinforcement details for a
            1) One-way slab simply supported on two parallel sides
            2) One-way slab simply supported on four sides
            3) Two way simply supported slab
            4) One-way continuous slab
            5) Cantilever slab continuous over a support and

    4.6   Explain the edge strip and middle strip of a two-way slab.

    4.7   Sketch the general reinforcement details for a continuous two-way slab for its edge strip and middle strip using straight bars and bent up bars.

    4.8   Design one-way slab for given grades of materials, loads and span for flexure and including shear check, check for deflection using stiffness criteria.

    4.9   Explain Load distribution in two-way slabs.

    4.10 Classify the stairs based on the structural behaviour or support condition. Sketch the detailing of reinforcement in stairs spanning longitudinally (Dog legged staircase only)

5.0 Analysis of T-beams

    5.1   Distinguish T- beam and L- beam.

    5.2   List the advantages of a T- beam.

    5.3   Write formula for effective width of flange of a T- beam and L- beam as per IS 456 – 2000.

    5.4   Calculate the effective width of flange of an isolated T- beam as per IS 456 – 2000.

    5.5   Describe the three cases of determining Neutral axis of T-beams with sketches and notations.

    5.6   Calculate the depth of neutral axis and moment of resistance of the given Tee section using the expressions given in the code.

    5.7   State the minimum and maximum reinforcement in T- beams as per 456 – 2000.

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7.0 Design of columns

7.1	Define a column/compression member. Differentiate among Column, Strut, Pedestal and Post
7.2	Explain the need for providing reinforcement in column.
7.3	State the effective length of column for different end conditions as per theory and as per code.
7.4	Classify the columns based on type of reinforcement, loading and slenderness ratio.
7.5	State the slenderness limits for column to avoid buckling of column.
7.6	State the minimum eccentricity of column.
7.7	Calculate the load carrying capacity of a short column with lateral ties and with helical reinforcement as per IS 456 – 2000.
7.8	Differentiate between short and long columns and understand their failure behaviour.
7.9	Explain the design requirements of columns as per IS 456 – 2000.
7.10	Design a Short Square, rectangular, circular column with lateral ties (subjected to axial load only).

8.0 Design of Footings

8.1	Define Footing
8.2	State different types of Footings (Square/ Rectangular Isolated footings of Uniform/Tapered sections).
8.2	State the Rankine's formula for minimum depth of foundation.
8.3	State the code provisions for the design of R.C.C footings.
8.3	Explain the procedure of checking the footing for one-way shear, two-way shear, bearing stress and for development length.
8.5	Design isolated square footing of uniform thickness under a column for flexure only.

Note: Students may be encouraged to use design aids SP-16, SP-34 and SP-23 for design of slabs, beams for general practice. I.S.456 – 2000 is allowed in the Examination.

PO-CO Mapping:

POs	Mapped with CO No	CO Periods addressing PO in Column 1		Level (1,2,3)	Remarks
		No	**%**		
PO1	CO1,CO2, CO3, CO4	19	25.5	2	> 40% Level 3 (Highly addressed)
PO2	CO1,CO2,CO3, CO4	30	40	3	
PO3	CO1,CO2, CO3, CO4	19	25.5	2	25% to 40% Level 2 (Moderately addressed)
PO4	CO1,CO2	2	3	-	
PO5					5 to 25% Level 1 (Low addressed)
PO6					
PO7	CO1,CO2, CO3, CO4	5	6	1	< 5% (Not addressed)

Course Code : C-402 — Course Title: Design and Detailing of R.C. Structures — No of COs : 4 — No. of Periods: 75

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	-	1	3	3	3
CO2	3	3	3	1	-	-	1	3	3	3
CO3	3	3	3	-	-	-	1	3	3	3
CO4	3	3	3	-	-	-	1	3	3	3
Average	3.0	2.75	2.75	1.0	1	-	1	3	3	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
(vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ..etc.

COURSE CONTENT

1.0   Introduction to R.C.C and Principles of working stress method
Introduction - advantages and disadvantages of R.C.C - Loads to be considered in design - Introduction to I.S Codes - Assumptions in working stress method - Behaviour of concrete and steel under working loads - Modular ratio – critical percentage of steel -   Balance, under reinforced, over reinforced sections - Critical and actual depth of neutral axis of a singly reinforced beams – M.R of simply supported singly reinforced beam sections

2.0   Philosophy of limit state Design
Codes of practice of R.C.C design - Characteristic compressive strength - Modulus of elasticity of concrete - Nominal Mix – Design Mix – differences - Loads to be adopted in R.C.C. design – Dead load, Live load, Wind load (IS 875-1987) - Earth quake load (IS-1893) -

Strength and serviceability limit states - Characteristic strength of materials and characteristic loads - Partial safety factors - Design strength of materials and design loads - Assumptions made in the limit state design.

3.0   Analysis and design of Rectangular beams

Stress-strain diagram of singly reinforced R.C.C. beam - Depth of neutral axis, lever arm – M.R of singly reinforced Rectangular section – Balanced, under and over reinforced sections - Critical percentage of steel - Calculation of moment of resistance of the given section - Design of singly reinforced rectangular beam for the given load as per IS 456-2000 - Doubly reinforced sections – Necessity – use (No problems on Doubly reinforced sections) - Shear in singly reinforced beams - Nominal shear stress - Permissible shear stress - Methods of providing shear reinforcement in the form of vertical stirrups - combination of vertical stirrups and bent up bars - Code provisions for spacing of stirrups and minimum shear reinforcement (no derivation of equations) - Development of bond stress in reinforcing bars
- Design bond stress - Development length – Bond and anchorage concepts and their importance - Curtailment of tension reinforcement - Simple problems on development length - Design of simply supported singly and doubly reinforced rectangular beams for flexure including shear and check for deflection using stiffness criteria - Use of design aids (SP-16).

4.0   Design of slabs

Slabs as structural and functional members - One way and two way slabs - Minimum reinforcement and maximum spacing of reinforcement concrete cover - Stiffness criterion-stiffness ratios for simply supported, cantilever and continuous slabs - One way and two way slabs with various end conditions as per I.S:456 code - Design of one-way slab for flexure and shear for the given grades of concrete, steel, span and loading - Check for deflection using simplified approach of stiffness criteria -Deflection check using stiffness criteria - Use of design aids (SP-16) - Detailing of reinforcement in stairs spanning longitudinally (No problems)

5.0   Design of T-beam

Conditions needed for design of a beam as T-Section – Advantages - Code provisions for effective flange width - Three cases of tee beams - Neutral axis, lever arm and moment of resistance for under reinforced, balanced sections using the equations given in the code (no derivations of equations) - Calculation of the moment of resistance of Tee section using the equations given in the code - Use of design aids (SP16).

6.0.   Design of columns

Definition of column – Difference between Column and Pedestal - Types of columns (Long and Short) - Effective length for different end conditions - Code provisions for design of columns - Square, rectangular and circular columns with lateral ties - Determination of Load carrying capacity of short column - Square, rectangular, circular, helically reinforced column subjected to axial load only - Design of short square, rectangular and circular columns (with lateral ties only).

7.0   Design of Footings

Footings - Need for footings - Footings under isolated columns - Loads on footings - Code provisions for design of footings - Size of footings for given bearing capacity - Procedure of checking the footing for one-way shear - Two-way shear - Bearing stress - Development length - Design of an isolated square footing of uniform thickness under a column for flexure only.

REFERENCE BOOKS:

1.   I.S:456- 2000 Code Book

2. I.S:875 – 1987 Code Book
3. SP-34 - Handbook on concrete reinforcement and detailing (1987).
4. Limit state design of R.C.C structures, Dr. B.C. Punmia, Ashok K.Jain, Laxmi Publication.
5. Design of Reinforced Concrete Structures, S. Ramamrutham, Dhanpatrai publishing company.
6. Design of Reinforced Concrete Structures, V.N. Vazirani and M.M. Ratwani –Khanna publishers.
7. Limit state design of reinforced concrete, P.C. Verghese, PHI Learning
8. Reinforced Concrete Design, N. Krishna Raju & R N Pranesh, New age international publishers.
9. Reinforced Concrete Design, S. Unni Krishna Pillai &Devdas Menon, McGrawHill Education.

MODEL BLUE PRINT

S. No.	Chapter Name	Periods allocated	Weightage allotted	Mark wise Distribution of Weightage		Question wise Distribution of Weightage		COs Mapped
				R	U	R	U	
1.	Introduction to R.C.C and Principles of Working Stress Method	08	1	3		1	--	CO1
2.	Philosophy of Limit State Design	05	3	3		1		CO2
3.	Analysis and Design of Rectangular Beams	15	26	6	20	2	2	CO2
4.	Design of Slabs	12	26	6	20	2	2	CO2
5.	Analysis of T-beams	12	13	3	10	1	1	CO3
6.	Design of columns	12	23	3	20	1	2	CO4
7.	Design of footings	11	16	6	10	2	1	CO4
	Total	75	110	30	80	10	8	

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 4.8
Unit Test – II	From 4.9 to 7.5

Model Paper for Unit Test-I
State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-402 Design and Detailing of R.C. Structures

Time: 90 Minutes   Unit Test –I   Maximum Marks : 40

                                PART- A   **16 Marks**

Instructions:
        (i) Answer all questions
        (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a)   The value of factor of safety adopted for concrete as per working stress method is_____
                                                                            (CO1)

    (b)   Partial safety factor adopted for material strength steel as per IS 456 is_____
                                                                            (CO2)

    (c)   As per IS456-200, the basic value of span to depth ratio for simply supported beams for spans upto 10m is_____   (CO2)

    (d)   When the ration between longer span to shorter span is greater than 2 such slabs are to be designed as two-way slab (TRUE/FALSE).   (CO4)

2. What is the necessity of providing the reinforcement in concrete? Why steel is used as reinforcement.   (CO1)

3. State the methods of design of reinforced concrete structures.   (CO2)

4. The dimensions of a singly reinforced, simply supported rectangular beam are 300x450mmdeep effective, provided with Fe-415 steel and M20 grade concrete. Determine the Limiting moment of resistance of the beam.   (CO2)

5. Distinguish between one way slabs and two way slabs.   (CO2)

                                PART- B   **3 x 8 = 24 Marks**

Instructions :
        (i) Answer all questions
        (ii) Each question carries EIGHT marks
        **(iii)Answer should be comprehensive and the criterion for valuation is the content but not
            the length of the answer.**

6. (A) Calculate the area of reinforcement required for a simply supported reinforced concrete beam 230x400mm effective depth to resist ultimate moment of 80kN-m. Assume M20 concrete Fe415 steel.   (CO2)

                                        (OR)

(B) Design a rectangular simply supported reinforced concrete beam over a clear span of 4.3m. The superimposed load is 20kN/m and support width is 230mm each, use M20 concrete Fe415 steel. Check the design for deflection   (CO2)

7. (A) Calculate the ultimate Moment of Resistance of an R.C. beam of rectangular section 300x400mm effective depth. Area of steel consists of 6nos 16mm dia in tension zone and 3nos 16mm dia in compression zone. Assume steel of grade Fe415 and concrete of gradeM20 and effective cover to compression reinforcement is 40mm.   (CO2)

(OR)

(B) Design a rectangular reinforced rectangular concrete beam for a clear span of 4.0m. The Super imposed load is 35kN/m and the size of the beam is restricted to 250x400mm overall depth. Use M20 grade concrete Fe415 grade steel. Support width is 300mm and effective cover is 40mm.   (CO2)

8. (A) An R.C.C. beam 250mm wide and 450mm effective depth is reinforced with 6nos 16mm diameter bars in tension zone of which two bars are cranked up near the support. If the design shear is 120 kN, design the shear reinforcement considering bent up bars. use M20 concrete Fe415 steel.   (CO2)

(OR)

(B) A simply supported R.C.C. slab has to be provided for a roof slab of a room of clear dimensions 3x8m. Width of supporting wall is 300mm. The weight of weathering course over the slab is 1 kN/sqm. Take Live load on the slab 2 kN/sqm. Design the slab using M20 grade concrete and Fe415 grade steel. Check the design for stiffness.   (CO2)

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-402 Design and Detailing of R.C. Structures
Time: 90 Minutes   Unit Test –II   Maximum Marks : 40

PART- A   **16 Marks**

Instructions :
   (i) Answer all questions
   (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a)   Maximum diameter of the bar in the slab shall not exceed_____times total thickness of the slab.   (CO2)
      (b)   Minimum %of tensile reinforcement in slabs when HYSD bars are used____   (CO2)
      (c)   The effective width of flange of T-Beam is given by_____   (CO3)

(d) Minimum no. of longitudinal bars to be used in the circular R.C.C. column is _ (CO4)

2. Find the effective flange width of the following simply supported T-beam.   (CO3)

   Effective span   =   5.0m
   c/c distance between adjacent panels   =   4m
   breadth of web   =   300mm
   Thickness of slab   =   110mm.

3. A continuous R.C.C. rectangular beam of size 250x500mm overall is supported on 300x300mm masonry column at a clear interval of 4.0m. Calculate the effective spans.   (CO3)

4. For a square column 450x450mm reinforced with 8bars 20mm diameter of grade Fe415 and grade of concrete is M20. Calculate load carrying capacity as per IS code.   (CO4)

5. A reinforced concrete column of size 300x300mm carries a load of 700kN. The SBC of soil is 200kN/m^2. Find the size of the footing. Use M20 concrete and Fe415 grade steel. (CO4)

PART- B   3 x 8 = 24 Marks

Instructions :
   (i) Answer all questions
   (ii) Each question carries EIGHT marks
   (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A)   Calculate the ultimate moment resistance of a T-beam for the following data. (CO3)

   Width of flange   = 1500mm
   Depth of flange   = 150mm
   Effective depth   = 600mm
   Width of rib   = 300mm
   Area of steel in tension   = 3nos 25mm dia.
   Concrete grade M20 and steel Fe415.

(OR)

(B) A T-beam floor consists of 150mm thick R.C.C. slab monolithic with 300mm wide beams. The beams are spaced at 3.5m intervals and their effective span is 6.0m. If the super imposed load on the slab is 5 kN/m^2, design the intermediate T-beam. Use M20 Concrete and Fe415 steel. (CO3)

7. (A) Design a short column square in section to carry an axial load of 2000kN using M20 Concrete and Fe415 steel. Take load factor of 1.5.   (CO4)

(OR)

(B) Design a short circular column to carry an axial load of 1500kN using M25 Concreteand Fe415 steel. Take load factor of 2.

8 (A) Design an R.C.C. footing of uniform thickness to carry an axial load of 1000kN from a square column of size 350x350mm. The SBC of the soil is 180 kN/m^2 use M20 Concrete and Fe415 steel.   (CO4)

(or)

(B) Explain the design procedure of isolated square footing of uniform depth under a square column. (C04)

Model Test Paper

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-402 DESIGN AND DETAILING OF R.C.STRUCTURES

Time: 180 Minutes _____ **End Examinations** _____ Maximum Marks: 80
PART – A 3 x 10 = 30 Marks

Instructions:
  (i) Answer all questions
  (ii) First question carries THREE marks.
  (iii) Answer should be brief and straight to the point and shall not exceed
    five simple sentences.

1. State the types of steel used in R.C. members. Why is steel used as reinforcement? (C01)

2. State the loads to be considered in the design of beams as per IS: 875. (C02)

3. State various limit states to be considered in limit state design. (C02)

4. What are the types of bond? Write the anchorage value for a standard U-type hook.(C02)

5. Write any three differences between oneway slab and two way slab (C02)

6. State the functions of distribution steel in one way slabs (CO2)

7. Find the effective flange width of simply supported T-beam with the following data:

   Effective span—530 m, breadth of web—300 mm, C/C of adjacent panels—4·0 m,

   Thickness of slab—100mm. (C03)

8. State any three design specifications of column. (C04)

9. List any three design specifications of footing. (C04)

10. A reinforced concrete column of size 400x400mm carries a load of 1000kN. The SBC of
    soil is 250 kN/m^2. Find the size of the footing. Use M20 concrete and Fe415 grade steel.
    (CO4)

PART – B 5 x 10 = 50 Marks

Instructions:
  (iv) Answer any FIVE questions
  (v) Each question carries TEN marks.
  (vi) Answer should be comprehensive and the criterion for valuation is the content but not
    the length of the answer.

11. Design a rectangular simply supported beam over a clear span of 6·0 m to carry a super imposed load of 30
    kN/m,the support width is 230 mm. Check for deflection. (C02)
12. Design a rectangular simply supported reinforced concrete beam over a clear span of 4 m. The superimposed
    load is 20 kN/m and support width is 250 mm each, use M25 concrete Fe500 steel. Check the design for
    deflection (C02)

13. Design a simply supported R.C.C. slab over a roof of a room of clear dimensions 2·5 m x 5·5 m. The width of supporting wall is 300 mm. The slab carries a superimposed load of 2·5kN/m2 and floor finish of 1kN/m^2.Use M20grade concrete and Fe415steel.   (CO2)

14. A simply supported R.C.C. slab has to be provided for a roof slab of a room of clear dimensions 3 x 8m. Width of supporting wall is 300mm. The weight of weathering course over the slab is 1 kN/sqm. Take Live load on the slab 2 kN/sqm. Design the slab using M20 grade concrete and Fe415 grade steel. Check the design for stiffness.   (C02)

15. Find the moment carrying capacity of a T-beam of effective flange width 1300 mm,thickness of slab 110 mm, rib width 300 mm and effective depth 520 mm, reinforced with 4-number of Fe 415 grade steel bars of 16 mm diameter. The concrete used is of grade M20.   (C03)

16. Design the reinforcement for an axially loaded short square column to carry an axial load of 1200 kN. Use M25 grade concrete and Fe 415 steel.   (C04)

17. Design a square column 400mm x 400mm, 3·3 m long subjected to a working load of 1000 kN. Use M 20 and Fe 415. The column is effectively held in position and direction at both the ends.   (C04)

18. A reinforced concrete column of size 300mm x 300mm carries a load of 750 kN. The safe bearing capacity of soil is 200 kN/m^2. Design an isolated column footing with uniform thickness. Use M 20 grade concrete and Fe 415 steel. Check for development length and check for bearing pressure is not required.   (C04)

CONSTRUCTION PRACTICE

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-403	Construction Practice	04	60	20	80

S. No.	Major Topics	No. of Periods	COs Mapped
1.	Classification, Planning of buildings and foundations	12	CO1
2.	Masonry	10	CO2
3.	Doors, Windows and Lintels, Sunshades	10	CO3
4	Roofs, Floorings and Stair Cases	12	CO4
5	Scaffolding and Form work	06	CO5
6.	Protective, decorative finishes and Termite proofing	10	CO5
	TOTAL	**60**	

COURSE OBJECTIVES:

Upon completion of the Course, the student shall be able to		
Course Objectives	(i)	Gain useful knowledge of concepts, principles and procedures pertaining to building construction system
	(ii)	Understand the skills for the effective execution of building construction work, carry out repairs and maintenance works with safety and quality.

COURSE OUTCOMES:

	CO1	C-403.1	Design of foundations as per NBC
Course Outcomes	CO2	C-403.2	Explain general principles to be followed in construction of masonry work
	CO3	C-403.3	Explain types of doors, windows, ventilators, Lintels and sunshades for effective ventilation.
	CO4	C-403.4	Explain construction methods of roofs, different types of floor finishes and types of Stair cases
	CO5	C-403.5	Justify the arrangement of scaffolding, formwork, Protective and decorative finishes, Termite Proofing for given construction work.

LEARNING OUTCOMES:

Learning outcomes	**1.0 Classification, Planning of buildings and foundations**
	1.1 List the components of a building. Explain the functions of the components of a building
	1.2 Classify the buildings according to National Building Code with examples.
	1.3 Explain the investigations required for foundation as per N.B.C.
	1.4 Describe line diagrams of Spread footings, Raft foundation, Pile foundation and Well foundation.
	1.5 Explain the terms Bearing capacity, Safe bearing capacity and Ultimate bearing capacity of soil.
	1.6 State the loads to be considered in design of foundation.
	1.7 List rules for minimum depth, width of foundation and thickness of concrete bed for spread footing foundation.
	1.8 Explain the method of constructing spread footing foundation.
	1.9 Lists the causes of dampness at basement level. Lists the effects of dampness at basement level. Lists the measures for prevention of dampness at basement level.
	1.10 Introduction to Physical factors in designing a building. States various factors to be considered in planning. Inter relationship of different rooms. Aspect, prospect, furniture requirements, roominess, grouping, circulation, privacy, sanitation, elegance and economy. Explain Orientation, Ventilation, stock protection from excessive sun, rain, dust, insects etc., Case study of an existing house over the above factors
	2.0 Masonry
	2.1 List different types of stone masonry.
	2.2 Explain the different types of stone masonry.
	2.3 State the general principles to be observed in stone masonry construction
	2.4 Explain Bond, Course, Header and Stretcher in brick masonry.
	2.5 List general principles of brick masonry.
	2.6 Explain with sketches, English bond for alternate layers brick masonry of various wall thicknesses.
	2.7 Explain masonry with Pre-cast concrete solid blocks, Hollow blocks, high quality building blocks maintaining bond with sketches.
	3.0 Doors, windows, Lintels and sunshades
	3.1 State the principles of locating doors, windows and ventilators in buildings.
	3.2 Explain with sketches common and special types of doors, windows and ventilators.
	3.3 List the uses of different types of doors, windows and ventilators.
	3.4 Explain the fittings and fastenings of doors, windows and ventilators.
	3.5 Explain the functions and types of lintels.
	3.6 Explain the functions of sunshades, canopy, sun-breakers and porticos.
	3.7 Explain about thin lintel developed by CBRI with simple sketches.

4.0 Roofs, Floorings and staircases

4.1 State the functions and classification of roofs.

4.2 State the classification of trusses based on material and shape.

4.3 Explain with sketches king post truss, queen post truss, fan roof truss, north light roof trusses.

4.4 Explain with sketches A type, B type steel trusses using structural angles and tubular sections as per the provisions of IS code.

4.5 State the common and decorative ceilings used in construction work. Explain the method of fixing Plaster of Paris and fibre glass ceilings.

4.6 State the component parts and functions of flooring. List the requirements of good floor.

4.7 Explain method of construction of C.C flooring, stone slab flooring, tiled flooring, mosaic flooring, Ceramic flooring, and Marble flooring.

4.8 Explain terms: rise, tread, landing, flight, going, hand rail, newal post, baluster and balustrade.

4.9 Draw the line diagrams of different stairs.

5.0 Scaffolding and Formwork

5.1 State the purpose of scaffolding.

5.2 Define scaffolding and mention the types.

5.3 List the component parts of tubular scaffolding.

5.4 Sketch and explain about tubular scaffolding.

5.5 State the advantages of tubular scaffolding.

5.6 State the principles of locating stairs.

5.7 State different types of formwork

5.8 Briefly describe the arrangement of formwork for columns, beams, slabs and walls.

6.0 Protective, decorative finishes and Termite Proofing

6.1 State the objects and methods of plastering. State the steps in providing cement plastering on masonry walls.

6.2 State the use of wall putty as a decorative finish on masonry walls.

6.3 State the objects and types of pointing.

6.4 State the objects of painting. Explain the method of painting new and old walls surfaces. State the paints suitable for painting wood work and steel work.

6.5 Explain briefly the method of white washing, colour washing, distempering the brick masonry wall.

6.6 Define termite proofing. Explain the method of termite proofing.

PO-CO Mapping:

Course Code : C-403	Course Title: CONSTRUCTION PRACTICE No. of COs : 5				No. of Periods: 60
POs	**Mapped with CO No.**	**CO Periods Addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		No.	**%**		
PO1	CO1, CO2, CO3, CO4, CO5	22	36.7	2	>40% Level 3 (Highly
PO2	CO1, CO4	6	10.0	1	Addressed)
PO3	CO1	2	3.3		25% to 40% Level 2
PO4	CO5	2	3.3		(Moderately Addressed)
PO5	CO1, CO2, CO4, CO5	28	46.7	3	5% to 25% Level 1
PO6					(Low Addressed)
PO7					<5% Not Addressed

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	1		2			3	2	2
CO2	3	2			2			3	2	3
CO3	3							3	1	2
CO4	3	2			1			3	1	1
CO5	2	2		1	2			3	2	3
Average	2.6	2.0	1.0	1.0	1.75			3	1.6	2.2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz

(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT :

1) **Classification, Planning of buildings and foundations**
   Component parts of a building – Their functions - Classification of buildings according to National building code - Site investigation for foundation as per N.B.C, Trial pit, auger boring - Bearing capacity of soils –safe and ultimate bearing capacity - Spread footing foundation for columns and walls - Raft foundation - Pile foundation – RCC Piles – Bearing piles, friction piles and under reamed pile - Well foundation – component parts – sinking of well foundation - Different loads to be considered for the design of foundation as per IS 875 – 1987 - Spread foundation – Depth of foundation by Rankin's formulae– width of foundation
   – Thickness of concrete bed - Construction of foundation – (spread footing foundation only) - Causes, effects and prevention of dampness at basement level - Principles of planning - Orientation – factors affecting orientation, orientation criteria for Indian conditions – points for obtaining orientation - Ventilation – Stock Protection from excessive sun – sun – rain – dust – insects etc.,

2) **Masonry**
   Classification of stone masonry - Ashlar, Random rubble and Coursed Rubble Masonry - General principles to be observed while constructing stone masonry - Brick Masonry - Bonds in brick masonry (English bond only) for various wall thicknesses - General principles to be observed in construction of brick masonry.

3) **Doors, Windows, Lintels and Sunshades**
   Doors and windows – parts of door window – positioning - Common types of doors-panelled, Glazed and Flush doors - Special types of doors – Flush doors with modern construction materials, revolving doors, collapsible doors, rolling shutters, sliding doors, referring to A.P.D.S.S for size of doors and windows - Windows – Panelled and Glazed - Ventilators – fixed, swinging type and louvered - Fittings and fastenings for doors and windows - Lintels – Functions – Types of lintels – R.C.C., wood, stone and steel - Sunshade, canopy and sun breakers – lintel cum sunshade.

4) **Roofs, Floorings and Stair Cases**
   Roof – functions of roofs - Classification of roofs – flat roofs – pitched roofs - Different types of trusses – classification based on material and shape king post truss, queen post truss, fan roof truss, north light roof truss, steel trusses of A type and B type using angular and tubular sections as per IS code - Weather proof course on R.C.C. roof - Decorative ceilings for auditoriums – method of fixing Plaster of Paris –Fibre glass - Parts of flooring – Requirements of a good floor - Methods of constructing flooring – cement concrete flooring, stone slab (Kadapa slab, Shahabad stone) floorings, cement plaster flooring, Tiled flooring, mosaic flooring-Terms: rise, tread, landing, flight, going, hand rail, newel post, baluster and balustrade-Line diagrams of different stairs- Location of stairs - Types of different stairs – straight, Quarter turn, half turn, Dog legged, open well, bifurcated, spiral/helical stair case, free standing and slab less stairs/staircase.

5) **Scaffolding and Formwork**
   Scaffolding – Purpose and types – component parts of tubular scaffolding - advantages of tubular scaffolding-different types of formwork- arrangement of formwork for columns, beams, slabs and walls.

6) **Protective, decorative finishes and Termite proofing**

   Plastering – purpose – Types of plastering – procedure for plastering - external finishing - sand faced, pebble dash, acoustic plastering and marble chips – Internal finishing – wall paper and wall putty finishing - Pointing – purpose –Types of pointing - Painting – objects – method of painting new and old wall surfaces, wood surface and metal surfaces – powder coating and spray painting on metal surfaces - White washing – colour washing – Distempering – internal and external walls - Termite proofing – method.

REFERENCE BOOKS:

1. Building Construction by Dr. B.C Punmia, Er. Ashok K.Jain, Dr. Arun K.Jain, Laxmi Publications.
2. Building Construction by Rangwala, Charotar Publications.
3. Building Construction by Sushil Kumar, Standard Publishers Distribution.
4. Building Construction by S.P. Arora & S.P. Bindra, Dhanpat Rai Publications.

MODEL BLUE PRINT

S.NO	Major Topics	No. of Periods	Weightage of marks	Marks wise Distribution of Weightage				Question wise Distribution of Weightage				COs Mapped
				R	U	Ap	An	R	U	Ap	An	
1.	Classification, planning of buildings and Foundations	12	26	06	20	--	--	2	2	-	--	CO1
2.	Masonry	10	13	03	10	--	--	1	1	--	--	CO2
3.	Doors, Windows and Lintels, Sunshades	10	13	03	10	--	--	1	1	--	--	CO3
4	Roofs, Floorings and Stair Cases	12	26	06	20	--	--	2	2	--	--	CO4
5	Scaffolding and Form work	06	16	06	10	--	--	2	1	--	--	CO5
6.	Protective, decorative finishes and Termite proofing	10	16	06	10	--	--	2	1	--	--	CO5
	Total	60	110	30	80	--	--	10	8	--	--	

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 3.4
Unit Test – II	From 3.5 to 6.6

Model Test Paper

State Board of Technical Education and Training, A.P.

Diploma in Civil Engineering (DCE)

Fourth Semester: C - 403 CONSTRUCTION PRACTICE

Time: 90 Minutes	**Unit Test – I**	Maximum Marks: 40
	PART – A	16 Marks

Instructions:
- (i) Answer all questions
- (ii) First question carries FOUR marks.
- (iii) Remaining questions carries THREE marks.

1. (i) The full form of DPC is _____.   (C01)

   (ii) The queen closer is a brick of full length and thickness but half the width.
                                                                    (True/False) (C02)

   (iii) The depression made in the brick on its surface during manufacturing

   is called _____   (C02)
   (iv) The full form of DPC is _____.   (C01)

2. Define the bearing capacity.   (C01)

3. Draw the top view of two consecutive layer of one brick wall in English bond.   (C02)

4. State three principles of locating doors in building.   (C03)

5. State any three types of windows.   (C03)

PART – B	3 X 8 = 24 Marks

Instructions:
- (i) Answer all questions
- (ii) Each question carries EIGHT marks.
- (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain any two classifications of buildings as per NBC with examples.   (C01)

                                     OR

   (B) Explain any two investigations required for foundation as per NBC.   (C01)

7.   (A) What are the general principles to be in stone masonry construction?   (C02)

OR

(B) Explain with the neat sketches, the construction of brick masonry wall in English
    bond for alternate layers of one brick wall thickness.   (C02)

8.   (A) Explain about any four component parts of a Paneled door with a neat sketch. (C03)

OR

(B) Explain any two special types of doors and windows.   (C03)

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Model Test Paper

State Board of Technical Education and Training, A.P.

Diploma in Civil Engineering (DCE)

Fourth Semester: C - 403 CONSTRUCTION PRACTICE

Time: 90 Minutes _____ **Unit Test – II** _____ Maximum Marks: 40
PART – A   16 Marks

Instructions:
  (i)   Answer all questions
  (ii)   First question carries FOUR marks.
  (iii) Remaining questions carries THREE marks.

1. (i)   A lintel is constructed above openings to increase the strength of wall. (True/False)
                                                                    (C03)

   (v)   The trusses provided in workshops by the use of glazing on steeper pitch for lighting purpose
          are called _____.   (C03)

   (vi)   The steel scaffolding is generally not preferred as it rusts quickly. (True/False)(C05)

   (vii) The temporary support for forming structural building components is known as
          _____.   (C05)

2. State any three functions of Lintels.   (C03)

3. Draw the line diagrams of any two types of staircase.   (C04)

4. State any three advantages of steel formwork over timber formwork.   (C04)

5. State any three methods of termite proofing.   (C05)

Instructions:

    (iv)   Answer all questions

    (v)   Each question carries EIGHT marks.

    (vi)   Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the functions of sunshade, canopy and sun breakers.   (C03)

                        OR

   (B) Sketch and explain about (i) King and (ii) Queen post trusses.   (C04)

7. (A) Describe the construction of Mosaic flooring.   (C04)

                        OR

   (B) Explain the seismic method of providing weather proof course on roofs.   (C04)

8. (A) Sketch and Explain about the tubular scaffolding.   (C05)

                        OR

   (B) Explain the method of white washing and color washing.   (C05)

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Model Test Paper

State Board of Technical Education and Training, A.P.

Diploma in Civil Engineering (DCE)

Fourth Semester: C - 403 CONSTRUCTION PRACTICE

Time: 180 Minutes   **End Examinations**   Maximum Marks: 80

PART – A   3 x 10 = 30 Marks

Instructions:

    (i)   Answer all questions

    (ii)   First question carries THREE marks.

    (iii)   Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. State any three objectives of soil exploration.   (C01)

2. State the situations under which under reamed piles are used.   (C01)

3. Define the following terms, (i) Header, (ii) Stretcher and (iii) Course.   (C02)

4. State any three functions of sun shade.   (C03)

5. Draw the line diagram of plan of dog-legged and label the parts. (C04)

6. State any three types of trusses used in pitched roofs. (C04)

7. List any three types of scaffolding. (C05)

8. State any four objectives of plastering. (C05)

9. Define termite proofing. (C05)

10. State any three uses of wall putty. (C05)

PART – B   5 x 10 = 50 Marks

Instructions:
    (vii)   Answer any FIVE questions
    (viii) Each question carries TEN marks.
    (ix)   Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Explain the method of construction of any two spread footings. (C01)

12. Explain any four functions of any two components of a building. (C01)

13. Explain about pre-cast concrete solid block and hollow blocks with neat sketches. (C02)

14. Explain about any two types of fittings and fastenings. (C03)

15. Explain the method of construction of C.C flooring. (CO4)

16. Write the principles considered for the location of a staircase. (C04)

17. Explain with the help of neat sketch the arrangement of form work for columns (CO5)

18. Explain about the method of anti-termite treatment for the soil before construction of a building. (C05)

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TRANSPORTATION ENGINEERING

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-404	Transportation Engineering	04	60	20	80

S.No.	Major Topics	No. of Periods	COs Mapped
1	Introduction to Highways and Geotechnical Engineering.	11	CO1
2	Highway Surveys and Traffic Engineering	11	CO2
3	Highway Constructions and Maintenances	12	CO3
4	Introduction and Permanent way of Railways	11	CO4
5	Station yards and Maintenance of Railways	07	CO4
6	Basics of Bridge Engineering	8	CO5
	Total	**60**	

COURSE OBJECTIVES:

Upon completion of the syllabus, the student shall be able to		
Course Objectives	(i)	Understand the functions of various components of roads and learn the fundamentals of Geotechnical Engineering
	(ii)	Understand the importance of surveys, alignment and geometric features of Highways, bridges and Railways.
	(iii)	Differentiate between types of highway pavements, their construction and maintenance
	(iv)	Understand the concepts of permanent way, points and crossings, station yards in railways, basics terms used in bridge engineering and state different types of bridges.

COURSE OUTCOMES:

Course Outcomes	CO1	C-404.1	Explain the technical terms of Geo-technical Engineering related to highway engineering
	CO2	C-404.2	Describe different surveys to be conducted for fixing the alignment of highway.
	CO3	C-404.3	Discuss the (i) construction of roads (ii) equipment used for high way construction (iii) Maintenance of WBM Road
	CO4	C-404.4	Describe the components of (i) Permanent way (ii) Station Yards (iii) Maintenance measures of a railway track
	CO5	C-404.5	Explain the basics of bridge engineering.

LEARNING OUTCOMES:

Learning **Outcomes**	**1.0 Introduction to Highways and Geotechnical Engineering**
	1.1. State the importance of transportation engineering.
	1.2. State the importance of I.R.C & List the functions of I.R.C
	1.3. Classify roads as per I.R.C
	1.4. Define the terms:
	    1. Width of pavement, 2. Shoulder,3. Formation width,
	    4. Right of way, 5. Camber, 6. Gradient,
	    7. Super elevation, 8. Sight distance.
	1.5. Explain the components of a road with a sketch.
	1.6. State the three types of gradients
	        1. Ruling gradient, 2. Limiting gradient and
	        3. Exceptional gradients and their recommended values.
	1.7. State recommended values of gradients by I.R.C
	1.8. State the need for providing super elevation and write the formula for super elevation
	1.9 State the need for curves in highways and state the different types of horizontal curves adopted in road. State the different types of vertical curves adopted in road
	  1.10. List physical properties of soils & define the following properties of soils:
	        1. Plasticity, 2. Cohesion, 3. Consolidation, 4. Compaction,
	        5. Permeability, 6. Compressibility
	  1.11. State the different systems of classification of soils &Explain the textural classification of soils and I S Classification of soils.
	  1.12. Define the following terms:
	        1. Ultimate bearing capacity of soil,
	        2. Safe bearing capacity, and
	        3. Net safe bearing capacity.
	2. Highway Survey and Traffic Engineering
	  2.1. Define alignment of road.
	  2.2. State the factors influencing selection of alignment for a road in plain and hilly areas.
	  2.3. List the surveys required for fixing alignment.
	  2.4. State the different data required for the preparation of highway project.
	  2.5. Explain various engineering surveys conducted to fix the alignment of a road.
	  2.6. State the importance of traffic census/traffic surveys.
	  2.7. List various traffic surveys conducted.
	  2.8. Explain the following with sketches:
	        1. Traffic islands
	        2. Interchanges.
	  2.9. State types of pavement markings with sketches and state its functions
	  2.10. State the purpose of traffic signs. State the functions of traffic signs with sketches.

3. Highway construction and Maintenance

3.1. State the need for road drainage.

3.2. Explain the methods of providing surface and sub-surface drainage.

3.3. State the materials used in construction of different types of roads

3.4. List the tests on Bitumen.

3.5. State the equipment/machinery used in construction of different roads.

3.6. Explain the methods of construction of different types of roads.

3.7. Explain the maintenance of WBM of roads.

3.8. Explain the different types of joints used in C.C roads with sketches.

3.9. State the need for joints in C.C roads.

4. Introduction to Permanent way of Railways

4.1. State the advantages of Railways.

4.2. Define gauge and

4.3. Classify gauges.

4.4. State the component parts of a permanent way

4.5. List the functions of each component parts of a permanent way

4.6. State the requirements/characteristics of
   1. Good rail,
   2. Rail joint,
   3. Sleeper and
   4. Ballast.

4.7. State the different types of
   1. Rails,
   2. Joints,
   3. Rail fittings,
   4. Sleepers,
   5. Ballast used in Indian Railways with sketches
      (where ever required).

5. Station yard and Maintenance of Railways

5.1 Describe different types of turnouts with sketches.

5.2 Describe different types of crossings with sketches

5.3 Classify stations.

5.4 State different maintenance measures of a railway track.

5.5 State the duties of a permanent way inspector.

6. Basics of Bridge Engineering

6.1. Classify the bridges based on materials, position of bridge floor and form/type of super structure.

6.2. Define the terms:
   1. Waterway,
   2. Linear waterway,
   3. Afflux,
   4. Vertical clearance,
   5. Scour depth, and
   6. Free board.

6.3. State the factors influencing selection of site for a bridge.

	6.4. State component parts of a bridge sub-structure with sketches
	6.5. List the functions of a bridge sub-structure
	6.6. Distinguish between deck and through bridge.
	6.7. Draw different types of bridge super structures.
	6.8. List different types of 1. Causeways and 2. Culverts.
	6.9. State suitability of different types of culverts and causeways.
	6.10. Sketch different types of causeways and culverts

PO-CO Mapping:

Course Code: C-404	Course Title: TRANSPORTATION ENGINEERING No of COs : 5				No. Of periods :60
POs	**Mapped with CO No**	**CO Periods Addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1,CO2,CO3,CO4,CO5	16	27	2	>40% Level 3 (Highly Addressed)
PO2	CO1,CO2,CO3,CO4,CO5	28	47	3	
PO3					25% to 40% Level 2 (Moderately Addressed)
PO4	CO3,CO4	8	13	1	
PO5	CO3,CO4	8	13	1	5% to 25% Level 1 (Low Addressed)
PO6					
PO7					<5% Not Addressed

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2						2	3	3
CO2	2	3						2	3	3
CO3	3	2		2	2			2	3	3
CO4	3	3		2	2			2	2	3
CO5	3	3						2	3	3
Average	2.6	2.6		2	2			2	3	3

Note: The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
(vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ..etc.

COURSE CONTENT

1. **Introduction to Highways and Geotechnical Engineering**
   Importance of transportation engineering- Importance of I.R.C - List the functions of I.R.C – Classification of roads as per I.R.C – Define (i) Width of pavement (ii) Shoulder (iii) Formation width (iv) Right of way (v) Camber (vi) Gradient (vii) Super elevation and (viii) Sight distance

components of a road - types of gradients and their recommended values by I.R.C - need for providing super elevation and its formula – Necessity of curves in highways - types of horizontal curves and vertical curves adopted in roads – Physical properties of soil like plasticity, cohesion, consolidation, compaction, Permeability and compressibility - Soil moisture content – Specific gravity and density - Types of soils – Residual soil – Transported soil – sand – silt – clay – peat – Till – Tull – loess – Bentonite – Soils in India - Different systems of classification of soils – Textural classification – I S classification of soils - Bearing Capacity – Definition – Importance in foundation design.

2. **Highway Survey and Traffic Engineering**
   Alignment of Road - Definition - factors influencing selection of alignment for a road in plain and hilly areas - List the surveys required for fixing alignment - Different data required for the preparation of highway project - Various engineering surveys conducted to fix the alignment of a road - Traffic census/traffic surveys - Importance – Types – Traffic islands and Interchanges - types of pavement markings and its functions - purpose of traffic signs and its functions

3. **Highway construction and Maintenance**
   Necessity of road drainage - Methods of providing surface and sub-surface drainage - materials used in construction of different types of roads - Tests on Bitumen - equipment/machinery used in construction of different roads - Methods of construction of different types of roads - maintenance of WBM of roads - Different types of joints used in C.C roads - necessity for joints in C.C roads

4. **Introduction and Permanent way of Railways**
   Railways - advantages – Definition and classification of gauges – Functions of each component part of a permanent way and its requirements/characteristics - Different types of 1. Rails, 2. Joints, 3. Rail fittings, 4. Sleepers, 5. Ballast used in Indian Railways with sketches (wherever required).

5. **Station yard and Maintenance of Railways**
   Classification of stations - Types of turnouts and crossings with sketches maintenance measures of a railway track - Duties of a permanent way inspector.

6. **Basics of Bridge Engineering**
   Classification of bridges based on materials, position of bridge floor and form/type of super structure - Factors influencing selection of site for a bridge - Data required for preparation of bridge project. Definitions - 1. Waterway 2. Linear waterway 3. Afflux 4. Vertical clearance 5. Scour depth, and 6. Free board - Formulae for economical span and afflux - component parts of a bridge sub-structure with sketches - Functions of a bridge sub-structure - Distinguish between deck and through bridge – sketches of different types of bridge super structures - List different types of 1. Causeways and 2. Culverts - suitability of different types of culverts - suitability of different types of causeways – Sketches of different types of causeways – Sketches of different types of culverts

REFERENCE BOOKS:

1. Highway Engineering by S. C. Rangwala,Charotar Books Distributors

2. Railway Engineering by S. C. Rangwala,Charotar Publishing House Pvt. Ltd.

3. Bridge Engineering by S. C. Rangwala,Charotar Publishing House Pvt. Ltd.

4. Highway Engineering by Khanna and Justo-Nem Chand & Sons

5. Transportation Engineering by L.R.Kadiyali,Khanna Publishing House

MODEL BLUE PRINT

S. No.	Chapter Name	Periods allocated	Weightage allotted	Mark wise Distribution of Weightage		Question wise Distribution of Weightage		COs Mapped
				R	U	R	U	
1	Introduction toHighways andGeotechnical Engineering	11	16	6	10	2	1	CO1
2	HighwaySurveysand TrafficEngineering	11	23	3	20	1	2	CO2
3	HighwayConstructions andMaintenances	12	26	6	20	2	2	CO3
4	IntroductionandPermanentwayof Railways	11	13	3	10	1	1	CO4
5	Station yardsandMaintenance of Railways	07	16	6	10	2	1	CO5
6	Basics ofBridge Engineering	8	16	6	10	2	1	CO5
	Total	60	110	30	80	10	8	

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 3.5
Unit Test – II	From 3.6 to 6.10

Model Paper for Unit Test-I
State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-404 TRANSPORTATION ENGINEERING

Time: 90 Minutes   Unit Test –I   Maximum Marks : 40

                                 PART- A   **16 Marks**

Instructions:
        (i) Answer all questions
        (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) The longitudinal slope of a road is called_____   (CO1)

     (b) Rise of the outer edge of the road above the inner edge is called_____(CO1)

     (c) Example for mandatory sign is _____   (CO2)

     (d) The purpose of catch basin in the road drainage system is to _____   (CO3)

2.   Define the terms (a) Liquid limit (b) Plasticity index   (CO1)

3.   Draw the cross section of flexible pavement showing various components.   (CO2)

4.   What are the traffic signs? State the classification.   (CO2)

5.   Write any three requirements of good highway drainage system.   (CO3)

                                 PART- B   **3 x 8 = 24 Marks**

Instructions:
        (i) Answer all questions
        (ii) Each question carries EIGHT marks
        (iii)Answer should be comprehensive and the criterion for valuation is the content
           but not the length of the answer.

6. (A) Explain how different engineering surveys are conducted for locating the alignment of road.
                                                 (CO2)
                              (OR)
  (B) State factors influencing selection of alignment for road project.   (CO2)

7. (A) State objects of traffic survey and state various studies that are generally carried out.
                                                 (CO2)
                              (OR)
  (B) Explain about various traffic signs used in highways.   (CO2)

8. (A) State and explain about surface drainage and sub-surface drainage with the help of neat sketches.   (CO3)
                              (OR)
  (B) Explain various types of machinery used in highway construction.   (CO3)

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State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-404 TRANSPORTATION ENGINEERING

Time: 90 Minutes   Unit Test –II   Maximum Marks : 40
PART- A   **16 Marks**

Instructions:
   (i) Answer all questions
   (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (i) The expansion of W.B.M_____ (ii)Which of the following causes stresses in Sleepers?

   a)   Eccentric vertical loads
   b)   Contact shear stress of wheel and rail
   c)   Lateral deflection of sleepers   (CO3)
   d)   Track components   (CO4)

   (iii) Pick up the incorrect statement from the following:

(a)Fish plates fit the underside of the rail head

(b) Fish plates fit the top of the rail foot

 (c) Fish plates fit the web of the rail section

 (d) Cross sectional area of fish plates, is normally the same as that of the rail section (CO4)

   (iv) The difference between the bridge and culvert is with respect to_____   (CO5)

2.   Distinguish between rigid pavement and flexible pavement.   (CO3)
3.   Write any three functions of railway sleepers.   (CO4)
4.   Define gauge. State different types of gauges adopted in Indian railways.   (CO4)
5.   State any three facilities provided in loco yards.   (CO4)

PART- B   **3 x 8 = 24 Marks**

Instructions:
   (i) Answer all questions
   (ii) Each question carries EIGHT marks
   (iii)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Explain the method of construction of W.B.M road.   (CO3)
                              (OR)
   (B) Explain different stages involved in the construction of cement concrete pavement.
                                                                             (CO3)
7. (A) Explain different types of rail joints with a neat sketch.   (CO4)
                              (OR)
   (B) Draw a neat sketch of cross section of a permanent way and indicate the parts and mention the purpose of each part.   (CO4)

8. (A) Explain different types of yards with neat sketches.   (CO4)
                              (OR)
   (B) State the factors to be considered for selection of site for a bridge.   (CO5)

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Model Test Paper

State Board of Technical Education and Training, A.P.

Diploma in Civil Engineering (DCE)

Fourth Semester: C - 404 TRANSPORTATION ENGINEERING

Time: 180 Minutes   **End Examinations**   Maximum Marks: 80

PART – A   3 x 10 = 30 Marks

Instructions:
    (i)   Answer all questions
    (ii)   First question carries THREE marks.
    (iii)   Answer should be brief and straight to the point and shall not exceed
       five simple sentences.

1. State any three important functions of I.R.C.`   (C01)

2. List any three types of soils.   (C01)

3. State the necessity of widening of roads in curves.   (C02)

4. What is meant by grade separation on roads?   (C03)

5. State the need for joints in Cement Concrete roads.   (C03)

6. Define the terms (i) Freeboard, (ii) Scour depth and (iii) Afflux.   (C04)

7. State the classification of bridges based on materials and type of super structure. (C04)

8. State the classification of stations   (CO4)

9. Define the terms   (i) Water way   (ii) Afflux   (CO5)

10. List any three types of causeways.   (C05)

PART – B   5 x 10 = 50 Marks

Instructions:
    (i)   Answer any FIVE questions
    (ii)   Each question carries TEN marks.
    (iii)   Answer should be comprehensive and the criterion for valuation is the content but not
       the length of the answer.

11. Explain the components of a road with a neat sketch   (CO1)

12. What are the factors influencing alignment of road in plain and hilly areas. (C02)
13. Explain the traffic islands with neat sketches   (CO2)

14. Explain the methods of providing sub surface drainage   (C03)

15. Explain the method of construction of WBM road   (CO3)

16. Explain any four types of rail joints with neat sketches.   (C04)

17. Describe different types of turnouts with neat sketches   (CO4)

18. Sketch a bridge sub structure and explain the component parts   (C05)

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IRRIGATION ENGINEERING

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-405	Irrigation Engineering	04	60	20	80

S. No.	Major Topics	No. of Periods	COs Mapped
1.	Nature and scope of Irrigation Engineering	6	CO1
2.	Elements of Hydrology	8	CO2
3.	Head works	8	CO2
4.	Gravity dams and Earth dams	12	CO3
5.	Distribution works	10	CO4
6.	Soil Erosion, Water logging, River Training works and Water management	10	CO5
7.	Water and Watershed Management	6	CO5
	Total	60	

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Aware of necessity and scope of Irrigation Engineering, Hydrology, calculation of average annual rainfall of an area and maximum flood discharge
	(ii)	Enable to gain knowledge about Storage and diversion Head Works, component parts, effect of percolation, Gravity dams and Earthen dams –failures of these dams and remedial measures.
	(iii)	Know about the Distribution works, maintenance of canals, uses of Cross drainage works, causes, effects and prevention of Soil erosion, Water logging, types and uses of river training works, Systems of Water management and Watershed Management.

COURSE OUTCOMES:

Course Outcomes	CO1	C-405.1	Explain various methods of irrigation.
	CO2	C-405.2	Describe the (i) Elements of Hydrology (ii)Diversion and storage head works.
	CO3	C-405.3	Analyse different types of failures of dams in construction
	CO4	C-405.4	Discuss the alignment of canals, cross drainage works and their maintenance
	CO5	C-405.5	Describe 1. Soil erosion 2. Water logging 3.Systems of Water management and Watershed Management

LEARNING OUTCOMES:

Learning Outcomes	**1.0** **Nature and scope of Irrigation**
	1.1 Define Irrigation
	1.2 State the necessity of irrigation.
	1.3 List advantages and disadvantages of irrigation.
	1.4 State different types of irrigation
	1.5 Distinguish between
	1. Perennial and inundation irrigation,
	2. Flow and Lift irrigation, and
	3. Storage and Direct irrigation.
	1.6 State Principal crops in India and their seasons and explain Kharif crops and Rabi Crops
	1.7 Define the following terms:
	1. Duty,
	2. Delta,
	3. Base period and
	4. Crop period
	1.8 Explain different methods of expressing duty
	1.9 State the relationship between duty and delta.
	1.10 Explain the factors affecting duty
	1.11 State the duty figures for principal crops and Solve simple problems on duty
	2.0 Elements of Hydrology
	2.1 Describe Hydrological cycle
	2.2 Explain the term Precipitation
	2.3 State different types of rain gauges and explain the method of measurement of rainfall using Simon's Rain gauge and Float type automatic recording rain gauge
	2.4 Explain precautions in setting and maintenance of rain gauges. State uses of rain fall records
	2.5 Explain method of calculation of average annual rainfall of an area by Theissen's Polygon method and solve the problem on calculation of average annual rainfall by Theissen's Polygon method
	2.6 Define the following:

1. Catchment,
 2. Intercepted catchment,
 3. Free catchment and
 3. Combined catchment area
2.7 State the characteristics of
 1. Good catchment,
 2. Average catchment and
 3. Bad catchment
2.8 Explain the term Run-off and factors affecting runoff
2.9 Explain methods of estimating runoff and solve the problems on estimating run-off
2.10 Understand the term maximum flood discharge and explain various methods of determining maximum flood discharge from rain fall records.
2.11 State Ryve's and Dicken's Formulae and solve simple problems on estimating maximum flood discharge
2.12 Explain the importance of river gauging and Lists the factors for selecting suitable site for a gauging station

3.0   Head works
3.1 Classify the head works and State the suitability of different types of head works under different conditions
3.2 State the factors for selecting suitable site for diversion head works
3.3 Describe the component parts of Diversion works with sketch
3.4 Distinguish between barrages and Weirs
3.5 Describe head regulator and scouring sluice with sketch
3.6 Describe flood banks and other protective works
3.7 Define the terms: Percolation, Percolation gradient, Uplift, scour and uplift pressure
3.8 Explain the effects of percolation on irrigation works

4.0   Gravity dams and Earth dams
4.1 Distinguish between Rigid dams and Non-rigid dams
4.2 State factors influencing selection of site for reservoirs and dams.
4.3 Define the terms: Full reservoir level, Maximum water level, Top bund level, Dead storage, Live storage, Free board, Gravity dam and Spillway.
4.4 Explain the causes of failure of gravity dams and their remedies.
4.5 Draw the elementary profile of a gravity dam for a given height and draw the practical profile of a low dam.
4.6 Explain uplift pressure and explain need for drainage galleries with sketches
4.7 Explain construction and contraction joints with sketches
4.8 State need and types of grouting of foundations and explain the method of grouting of foundations in gravity dams
4.9 State different types of spillways and their suitability and draw sketches
4.10 State the situations in which earth dams are suitable
4.11 State the three types of earth dams with sketches of typical cross sections
4.12 Explain causes of failure of earthen dams and their precautions

328

4.13 Explain the terms with sketches Saturation gradient and Phreatic line

4.14 Explain drainage arrangements in earth dams with a neat sketch

4.15 Explain the maintenance of earth dams

5.0   Distribution works

5.1   Classify canals.

5.2   State the different methods of canal alignment and the situations in which each is suitable.

5.4 Sketch typical cross sections of canals in cutting, embankment and Partial cutting. Explain balanced depth of cutting and its necessity

5.5   State the need for canal lining and State advantages and disadvantages of canal linings. Explain different types of canal linings

5.6   Explain the maintenance required for canals and their regulation

5.7   Explain Lacey's regime theory and Kennedy's silt theory (only explanation of formulae) (No problems)

5.8   State need for cross drainage works and State different types of cross masonry works (cross regulator, drainage & communication) and their objectives.

5.9 Describe the following with sketches
1. Aqueduct,
2. Super passage,
3. Under tunnel, siphon,
4. Level crossing and
5. Inlet and outlet

6.0 Soil erosion, water logging, River training works

6.1 Explain terms: Soil erosion, Reclamation and Water logging.

6.2 State causes of soil erosion and ill effects of soil erosion

6.3 Explain various methods of prevention of soil erosion.

6.4 State causes of water logging and ill effects of water logging

6.5 Explain various methods of prevention of water logging

6.6 State methods of land reclamation.

6.7 State different stages of flow of rivers

6.8 Explain characteristics of Delta Rivers

6.9 Explain term meandering of river

6.10 State objectives of river training works and Explain various types of groynes and bell's bunds with sketches

7.0 Water and watershed management

7.1   State soil-water plant relationship.

7.2 Describe the following irrigation methods: Broader irrigation, Check basin irrigation, Furrow irrigation, Sprinkler irrigation and Drip irrigation

7.3 Explain on farm development and Describe 1. Warabandi system and 2. Water user associations

7.4 State the duties of water user associations

7.5 Explain the concept of Water shed and Water shed management

7.6 State need for watershed development in India and Describe different approaches to water shed management

7.7 Explain water harvesting and explain methods of 1. Rain water

	harvesting and 2. Catchment harvesting
	7.8 Explain soil moisture conservation methods
	7.9 Explain method of water harvesting through check dams
	7.10 Explain different methods of artificial recharge of ground water
	7.11 Explain artificial recharges of ground water using percolation tanks

PO-CO Mapping:

Course Code: C-405	Course Title: Irrigation Engineering No of COs : 5				No. of periods: 60
POs	**Mapped with CO No**	**CO Periods Addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		Nos.	**%**		
PO1	CO1,CO2,CO3,CO4,CO5	24	40	3	>40% Level 3 (Highly Addressed)
PO2	CO2,CO3,CO4,CO5	24	40	3	
PO3					25% to 40% Level 2 (Moderately Addressed)
PO4	CO2,CO3,CO4,CO5	5	8	1	
PO5	CO2,CO3,CO4,CO5	4	7	1	5% to 25% Level 1 (Low Addressed)
PO6					
PO7	CO5	3	5	1	<5% Not Addressed

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	-						2	3	2
CO2	2	3		2	3			2	3	2
CO3	2	3		3	2			2	3	2
CO4	2	3		3	3			2	3	2
CO5	3	2		2	2		3	2	3	2
Average	2.25	2.75		2.5	2.5		3	2	3	2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
(vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ..etc.

COURSE CONTENT

1. **Nature and scope of Irrigation Engineering**

    Definitions- Necessity of irrigation - Advantages and disadvantages - Perennial and Inundation irrigation - Flow and Lift irrigation-Direct and Storage irrigation.

    Principal crops - Kharif and Rabi crops -Dry and wet crops - Definition of duty, delta, base period, and crop period, Duty-different methods of expressing duty-base period-relationship between duty and delta- factors affecting duty – Requirements for precise statement of duty - Duty figures for principal crops-simple problems on duty.

2. **Elements of Hydrology**

    Precipitation – Types of rain gauges – Simon's rain gauge - Float type automatic - recording gauge – precautions in setting and maintenance – rain fall records – Hydrological cycle-average annual rainfall of an area -Theissen's polygon method.

    Catchment basin in catchment area - Free catchment - combined catchment - Intercepted catchment – Run- off - Factors affecting run-off - Nature of catchment, run off coefficient - Methods of estimating run off - Empirical formulae

    Maximum flood discharge - Methods of determining maximum flood discharge from rainfall records, Ryve's and Dicken's formulae, H.F.L Marks, Gauge reading – Simple problems on M.F.D. - River gauging – Importance – Site selection for river gauging

3. **Head Works**

    Classification of head works - Storage and diversion, head works - their suitability under different conditions - Suitable site for diversion works - General layout of diversion works-brief description of component parts of diversion works, brief description of component parts of a weir - Barrages and Weirs.

    Head Regulator-scouring sluice-flood banks and other protective works. Percolation - Percolation gradient-uplift pressures - Effect of percolation on irrigation works.

4. **Gravity dams and Earth dams**

    Dams - Rigid and non-rigid dams - main gravity dams-failures of gravity dams and remedial measures - elementary profile – limiting height of dam - low dam and high dam - free board and top width – Practical profiles of low dam - uplift pressure - drainage gallery - Contraction joints - Grouting of foundations - spillways

    Earth dams – situations suitable for Earth Dams - Types of earth dams - Causes of failure of earth dams and precautions – Saturation gradient and phreatic line-drainage arrangements - Construction details of earth dams - breaching sections - breach filling - Maintenance of earth dams.

5. **Distribution works**

    Canals-classification-different methods of canal alignment-typical cross section of canal in cutting, embankment, partial cutting and embankment – Berms - standard dimensions - balancing depth of cutting - canal lining - Necessity - types – Maintenance of canals.

    Lacey's regime Silt Theory and Kennedy's Silt Theory (only explanation of formulae)-Comparison of two theories (No problems)

    Cross drainage works - Necessity – General description of aqueducts – Super passage – Under tunnel - siphon level crossing- Inlet and outlet.

6. **Soil erosion, Water logging and River Training works**

Soil erosion-methods of prevention of soil erosion-causes and effects- of water logging-preventing water logging methods-land reclamation - Different stages of flow of rivers-characteristics of Delta Rivers - Meandering - Object of river training - River training works-List out the various types of groynes and Bell's bunds.

7. **Water and Watershed management**

Soil - water plant relationship -Irrigation methods-Broader Irrigation, check basin irrigation-Furrow Irrigation-Sprinkler irrigation-Drip irrigation – farm development, water user associations &Warabandi system, Concept of Watershed Management – Objectives of watershed Management – Need for watershed development in India – Integrated and multidisciplinary approach for water shed management, Water Harvesting: Rainwater harvesting, Catchment harvesting – Soil moisture conservation – Check dams – Artificial recharges and percolation tanks.

REFERENCE BOOKS:
1. Irrigation and Water Power Engineering, B.C. Punmia,Dr. Pande B.B. Lal, Ashok Kumar Jain,Arun Kumar Jain – Laxmi Publication.
2. Irrigation and Water Power Engineering Das and Madan Mohan Das & Mimi Das Saikia , PHI Publication
3. Irrigation Engineering and Hydraulic structures, Santhosh Kumar Garg , KHANNA PUBLISHERS
4. Irrigation Engineering, N NBasak , McGrawHill Publications

MODEL BLUE PRINT

S. No.	Chapter Name	Periods allocated	Weightage allotted	Mark wise Distribution of Weightage		Question wise Distribution of Weightage		COs Mapped
				R	U	R	U	
1.	Nature andscope ofIrrigation Engineering	6	03	3	--	1	--	CO1
2.	Elementsof Hydrology	8	13	3	10	1	1	CO2
3.	Head works	8	13	3	10	1	1	CO2
4.	Gravity damsand Earth dams	12	26	6	20	2	2	CO3
5.	Distribution works	10	26	6	20	2	2	CO4
6.	Soil Erosion, Waterlogging, River Training works and Water management	10	26	6	20	2	2	CO5
7.	Water and Watershed Management	6	03	3	--	1	--	CO5
	Total	60	110	30	80	10	8	

TABLE SPECIFYING THE SCOPE OF SYLLABUS TO BE COVERED FOR UNIT TEST-I & II

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 4.9
Unit Test-II	From 4.10 to 7.11

Model Test Paper

State Board of Technical Education and Training, A.P.

Diploma in Civil Engineering (DCE)

Fourth Semester: C - 405 IRRIGATION ENGINEERING

Time: 90 Minutes   **Unit Test – I**   Maximum Marks: 40
PART – A   16 Marks

Instructions:
    (i)   Answer all questions
    (ii)   First question carries FOUR marks.
    (iii)   Remaining questions carries THREE marks.

1.   (i) The inundation irrigation system is functional through the year. (True/False)   (C01)

    (ii) The process of measurement of discharge and water level of a river is known as _____. (C02)

    (iii) When the percolating water exerts pressure and when the apron is not
          sufficiently strong, it fails due to _____.   (C02)

    (iv) The difference between 'Gross Storage' and 'Dead Storage' is known as _____. (C03)

2.   Define the terms (a) Delta, (b) Base period and (c) Crop period.   (C01)

3.   List the use of rainfall records.   (C02)

4.   Sketch the cross section of a weir and show the components.   (C02)

5.   List any three situations where earthen dams are suitable.   (C03)

PART – B   3 X 8 = 24 Marks

Instructions:
    (i)   Answer all questions
    (ii)   Each question carries EIGHT marks.
    (iii)   Answer should be comprehensive and the criterion for valuation is the content but not
          the length of the answer.

6. (A) Explain the method of measurement of rainfall using Symons's rain gauge.   (C02)
OR
    (B) State any ten points to be considered for site selection of canal head works. (C02)

6. (A) Draw the layout of head woks and explain any four component parts of head works. (C02)

OR

(B) State any eight points to be considered for selection of site for a gravity dams. (C02)

7. (A) Define spillway and list any six types of spillways provided in a gravity dam. (C03)

OR

(B) Write short notes on (i) Drainage gallery and (ii) Construction joints in a dam. (C03)

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Model Test Paper

State Board of Technical Education and Training, A.P.

Diploma in Civil Engineering (DCE)

Fourth Semester: C - 405 IRRIGATION ENGINEERING

Time: 90 Minutes _____ **Unit Test – II** _____ Maximum Marks: 40

PART – A   16 Marks

Instructions:
   (i)   Answer all questions
   (ii) First question carries FOUR marks.
   (iii) Remaining questions carries THREE marks.

1. (i)   Which of the following statement is correct with reference to earthen dams? (C03)

   (a) These dams are very costly as compared to other types.
   (b) Gravity dams are less susceptible to failure as compared to rigid dams.
   (c) Highly skilled labour is generally not required.
   (d) These dams are suitable for construction on almost every type of foundation.

   (ii) The entire system of canals by which the irrigation water is carried from the head works to the irrigated lands with necessary regulation works is called _____. (C04)

   (iii) Pick the correct sequence of the part of a canal system from the following, (C04)
   (a) Head works-distributaries-branch canal-minor.

   (b) Head works-main canal-branch canal-distributaries-minor.

   (c) Head works-main canal-branch canal-minor-distributaries.

   (d) Head works-branch canal-main canal-distributaries-minor.

335

(iv)   The process in which the soil is made in fertile and non-productive due to excessive moisture being present in its pores creating anaerobic conditions is called _____. (C05)

2. State any three situations that are suitable for construction of earthen dams.   (C04)

3. Draw typical cross sections of canal in cutting, partial cutting and embankment.   (C04)

4. State any three objectives of river training works.   (C05)

5. State any three advantages of drip irrigation.   (C05)

6. (A) List different types of earthen dams and draw neat sketches showing each type.   (C03)

OR

    (B) Explain any four causes of failure of earthen dams and their preventive measures.   (C03)

7. (A) List out cross drainage works and explain about any two types.   (C04)

OR

    (B) Explain two methods of aligning a canal with neat sketches.   (C04)

8. (A) Explain any four types of groynes with neat sketches.   (C05)

OR

    (B) List the methods of land reclamation and explain any two methods.   (C05)

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Model Test Paper

State Board of Technical Education and Training, A.P.

Diploma in Civil Engineering (DCE)

Fourth Semester: C - 405 IRRIGATION ENGINEERING

Time: 180 Minutes   **End Examinations**   Maximum Marks: 80

PART – A   3 x 10 = 30 Marks

Instructions:

(i)   Answer all questions

(ii)   First question carries THREE marks.

(iii)   Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. State any three advantages of irrigation.   (C01)

2. List any three functions of a canal head regulator.   (C02)

3. Write any three characteristics of good catchment area.   (C02)

4. State any three situations where earthen dams are suitable.   (C03)

5. List the loads coming on gravity dams.   (C03)

6. What is meant by 'balancing depth of cutting'.   (C04)

7. State the classification of canals based on their alignment.   (C04)

8. State any three effects of water logging.   (C05)

9. State the ill effects of soil erosion   (CO5)

10. What are the methods of water harvesting through check dams.   (C05)

PART – B   5 x 10 = 50 Marks

Instructions:

(iv)   Answer any FIVE questions

(v)   Each question carries TEN marks.

(vi)   Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Explain the functions of different component parts of a weir with a neat sketch.   (C02)

12. Sketch and explain briefly the working of Symon's rain gauge.   (C02)

13. Explain any four failures of gravity dams. (C03)

14. Explain about any four types of common spill ways. (C03)

15. Compare between Kennedy's and Lacey's silt theories. (C04)

16. Explain the need for canal lining. And write two advantages and two disadvantages of canal lining. (C04)

17. Describe about Warabandi system of water management. (C05)

18. Explain artificial recharges of ground water using percolation tanks. (C05)

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CIVIL ENGINEERING DRAWING – II

Course code	Course Title	No. of periods/week	Total No. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-406	Civil Engineering Drawing – II	06	90	40	60

S.No.	Chapter/Unit title Name	No. of periods	COs Mapped
1.	Culverts & Bridges	30	CO1
2.	Public health engineering drawings	15	CO2
3.	Irrigation drawings	45	CO3
	Total Periods	90	

COURSE OBJECTIVES:

Upon completion of the Course, the student shall be able to		
Course Objectives	1	Prepare to scale the different views of culverts, T-beam bridge, public health buildings and basic irrigation engineering drawings.
	2	Impart skills to student to prepare different views of Irrigation Engineering & Public Health Engineering works using CAD.

COURSE OUTCOMES:

	CO1	C-406.1	Draw plan, cross section and longitudinal section of Culverts and Bridges from given data
Course Outcomes	CO2	C-406.2	Draw plan, cross section and longitudinal section of Public health engineering works viz., Septic tank, Sanitary block, Overhead tank for a given set of specifications
	CO3	C-406.3	Draw Plan, cross section and Longitudinal section of Earthen bund, Tank surplus weir, Canal drop, Tank sluice with tower head and canal regulator for a given set of specifications

LEARNING OUTCOMES:

Learning Outcomes	1.0 Culverts & T-Beam bridges
	1.1 Draw the plan, cross sectional elevation and longitudinal sectional elevation of 1.Pipe culvert, 2. R.C.C slab culvert
	1.2 Identify the component parts of the pipe culvert and R.C.C. slab culvert from the given set of specifications.
	1.3 Label the component parts of a given R.C.C.T-beam bridge
	1.4 Draw the sectional elevation, plan and cross section of Two span R.C.C. T-beam bridge with square wing walls
	2.0 Public health Engineering works
	2.1 Label the component parts of given Public health engineering structures
	2.2 Draw the sectional elevation, plan and cross section of Public health Engineering works viz., septic tank, sanitary block, overhead tank, from the set of given specifications
	3.0 Irrigation Engineering structures
	3.1 Label the component parts of given Irrigation Engineering
	3.2 Draw the sectional elevation, plan and cross section of different Irrigation engineering structures bridge from the set of given specifications

PO-CO Mapping:

Course Code: C-406	Course Title:Civil Engineering Drawing – II No of COs: 3				No. of Periods: 90
POs	**Mapped with CO**	**CO Periods Addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3	18	20	1	>40% Level 3 (Highly Addressed)
PO2	CO1, CO2, CO3	36	40	3	
PO3	CO1, CO2, CO3	36	40	3	25% to 40% Level 2 (Moderately Addressed)
PO4					
PO5					5% to 25% Level 1 (Low Addressed)
PO6					
PO7					<5% Not Addressed

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2					2	3	2
CO2	3	3	2					2	3	2
CO3	3	3	2					2	3	2
Average	3	3	2					2	3	2

Note: The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
(vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ..etc.

COURSE CONTENT
1. **Simple Culverts & Bridges**

   Draw the plan, cross-sectional elevation and longitudinal sectional elevation of
   1. Pipe culvert (Single Pipe)
   2. R.C.C slab culvert with square returns.
   3. R.C.C slab culvert with splayed wings
   4. Two-Span R.C.C T-beam bridge with square return walls

2. **Public health engineering drawings**
   1. Septic tank with details of connections to a dispersion trench/soak pit
   2. Sanitary block for a public building
   3. R.C.C. rectangular/square overhead tanks

3. **Irrigation engineering drawings**
   1. Earthen bunds – Three types.
      a) Homogeneous type b) Zoned embankment type c) Diaphragm type
   2. Tank surplus weir with splayed wing walls.
   3. Canal drop (Notch type)
   4. Tank sluice with tower head.
   5. Canal regulator

REFERENCE BOOKS:
1. Civil Engineering Drawing-II by N.Srinivasulu -Radiant Publishing House
2. Civil Engineering Drawing-II by M.Chakraborthy -UBS Publications
3.Civil Engineering Drawing-II by Bajaj,Kataria& Raheja -North publication

MODEL BLUE PRINT

S. No	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage		Question wise Distribution ofWeightage		CO's Mapped
				R	U	R	U	
1.	Culverts & Bridges	30	25+12 = 37	25	8	2	1	CO1
2.	Public health engineering drawings	15			4	1		CO2
3.	Irrigation drawings	45	23	15	8	2	1	CO3
	Total	90	60	40	20	5	2	

Model Paper for End Examination:

MODEL PAPER – BOARD DIPLOMA
EXAMINATION, (C–23)DCE—FOURTH SEMESTER
EXAMINATION
CIVIL ENGINEERING DRAWING- II (C-406)

Time: 3 hours]   [Total Marks:60

PART—A   5×4 =2 0

Instructions :   (1) Answer **all** questions.

(2) Each question carries **four** marks.

(3) *Part—A* may be drawn not to scale.

(4) Assume suitable data if necessary.

1.   Draw the cross-section of a pipe along with bedding and benching fora pipe culvert and name the parts.

2.   Draw the cross-section of a stone masonry abutment of an RCC bridge with the following data.

Thickness of C.C. foundation bed	−400 mm.
Bottom width of foundation bed	−1500 mm.
Bottom width of abutment	−900 mm.
Top width of abutment	−600 mm. (Water face vertical)
Height of an abutment	−4000 mm
Width of bed block	−600 mm
Thickness of bed block	−300 mm.

3.   Name any four facilities to be provided in a lavatory or sanitary blockof a large building.

4.   Draw the cross-section of a homogeneous earthen bund and namethe parts.

5.   Name any four component parts of a tank sluice with tower head.

Instructions :   (1) Answer **all** questions.

(2) Assume suitable data if necessary.

6. Draw the following views of a septic tank to a scale of 1:20 from the given specifications :

(a) Plan   25

(b) Longitudinal section

Specifications :

Internal dimensions	= 1000 × 2800 mm
Brick masonry wall thickness	= 230 mm Thickness
of CC bed	= 450 mm
CC offset for masonry walls	= 300 mm
Depth of water	= 1000 mm
Free board	= 300 mm
Thickness of RCC roof panels	= 120 mm and width 450 mm fitted with bent handles for lifting.
Scum board	= RCC precast slab 90 mm thick fixed at a heightof 300 mm from floor level and extending upto a height of 150 mm below roof. This shall be fixedat a distance of 900 mm from inside of wall at inflow end into a groove of 90 mm deep.
Standing baffle	= RCC precast slab 90mm thick kept on floor at a distance of 650 mm from inside of wall at out flow end. The top of baffle shall be 150 mm belowwater level.
Inflow and outflow pipes	= 100 mm dia. tee shaped pipes
Vent pipe	= 50 mm dia. AC pipe with a cowl extending to a height of 2·0 m above G.L.
Masonry pedestal	= 450 mm dia. circular brick masonry pedestal shall be provided around the vent pipe up to G.L.
General ground level	= 300 mm above top of RCC precast roof panels.

7. Draw the longitudinal section of a canal drop to a scale of 1:50 from the following specifications : 15

(a) **Canal particulars** :

	U/S SIDE	D/S SIDE
Ground level at the site	+120·600	+120·600
Bed level	+120·000	+118·600
FSL	+120·500	+119·100
Canal bund level (CBL)	+121·100	+121·100
Canal bed width	1·60 m	1·30 m
Canal bund width	1·00 m	1·00 m
Canal slopes in cutting	1:1	1:1
Level of 1·0 m wide berm	+120·600	+120·600

Slopes in embankment :

Water face	1·5:1	1·5:1
Rear face to connect GL	2:1	2:1

(b) **Body wall :**

Top level	=	+120·000
Bottom level	=	CCfoundation top level = +118·600
CC foundation bottom level	=	+117·850
Top width	=	600 mm
Bottom width	=	1200 mm with U/S face vertical
Length	=	8·5 m
Width of CC foundation	=	1·80 m with equal offset

(C) Notch wall or Notch pier :

Thickness of notch wall	=	450 mm
Top level of notch wall	=	CBL = +121·100

Notch wall is constructed over body wall and one No. of notch isprovided at the centre

with its sill level at bed level of canal of U/S.

* *(d)* **CC apron on D/S of drop** :

CC apron shall be provided in continuation with CC bed under body wall with same thickness. Length of CC apron from the edgeof CC bed under body wall is 2·75 m

Top level of CC apron = Bed level of canal on D/S = +118·600 Bottom level of CC

apron   = +117·850

(e) **Rough stone bed pitching** :

Upstream side : Bed pitching consists of 300 mm size stone boulders to a length of 1·5 m including toe. Bottom level of the toe wall +119·25

Downstream side : Bed pitching consists of 300 mm size stone boulders to a length of 3·5 m including toe. Bottom level of the toe wall +117·85

(f) **Revetment to canal slopes** :

Upstream side : Revetment is provided to the sides of canal from bed level to FSL for a length of 2·8 m. A slope of 1:1 is given at the end of revetment to connect the revetment with bed level.

Downstream side : To the side slopes of canal revetment starts from canal bund level at the notch wall and is taken to a level of
+120·500 (FSL on U/S) at the end of CC apron in an inclined direction.

From the end of CC apron, revetment is continued at the same level (+120·500) up to the end of rough stone bed pitching and vertically dropped to the level of +119·50. From this point revetmentis continued at the same level for a distance of 3·0 m.

Rough stone boulders of size 300 mm are used for revetment to canal slopes.

CONCRETE & SOIL TESTING PRACTICE

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-407	Concrete & Soil Testing Practice	03	45	40	60

S. No.	Major Topics	No. of Periods	COs Mapped
1.	Tests on Aggregates	12	CO1
2.	Tests on Concrete	15	CO2
3.	Non-Destructive Tests	6	CO3
4.	Tests on Soils	12	CO4
	Total	45	

COURSE OBJECTIVES:

Upon completion of the Course, the student shall be able to		
Course Objectives	(i)	Familiarize with the knowledge of different materials and tools used in Concrete and Soil Testing.
	(ii)	Use various basic implements used in testing of various Civil Engineering construction materials.
	(iii)	Know the etiquette of working with the fellow work force
	(iv)	Reinforce theoretical concepts by conducting relevant experiments/exercises.

COURSE OUTCOMES

Course Outcomes	CO 1	C-407.1	Determine the Specific Gravity of fine and coarse aggregate, Impact value, Crushing value, Abrasion value, Flakiness index and Elongation index of coarse aggregate
	CO 2	C-407.2	Perform the Workability test of concrete by Slump Cone Test, Compaction factor test and determines the compressive strength and the split tensile strength of concrete and learns to Design a concrete mix
	CO 3	C-407.3	Perform the Rebound hammer test and Ultrasonic Tests on concrete to know the strength and durability of concrete structures
	CO 4	C-407.4	Perform various tests on soil to know its properties

LEARNING OUTCOMES:

Learning Outcomes	**1.0 Tests on Aggregate**
	
	    1.1 Specific Gravity of fine and coarse aggregate
	• Study the importance of specific gravity of fine and coarse aggregate
	• State the range of specific gravity values for various naturally available fine and coarse aggregate
	• Use the apparatus required for conducting specific gravity test on both fine and coarse aggregate
	• Perform the specific gravity tests for both fine and coarse aggregate
	
	    1.2 Impact value of coarse aggregate
	• Study the significance of impact value of aggregate used for road construction
	• State the standards on impact value of aggregate used for various civil engineering works as per IS-383
	• Use the apparatus required for conducting impact test on aggregate
	• State the procedure for preparing the sample and no. of samples required for the given work
	• Explain the procedure for conducting impact test on aggregate
	• Perform impact test on given sample of coarse aggregate
	• Draw inferences by conducting impact test on different types of natural aggregate
	
	    1.3 Crushing value of coarse aggregate
	• Study the significance of crushing value of aggregate used for various civil engineering works
	• State the standards on crushing value of aggregate used for various civil engineering works as per IS-383
	• Use the apparatus required for conducting crushing test on aggregate
	• State the procedure for preparing the sample and no. of samples required for the given work
	• Explain the procedure for conducting crushing test on aggregate
	• Perform crushing test on a given sample of coarse aggregate
	• Draw inferences by conducting crushing test on different types of natural aggregate
	
	    1.4 Abrasion value of coarse aggregate
	
	• Study the significance of abrasion value of aggregate used for various civil engineering works
	• State the standards on abrasion value of aggregate used for various civil engineering works as per IS-383
	• Use the apparatus required for conducting abrasion test on

aggregate
- State the procedure for preparing the sample and no. of samples required for the given work
- Explain the procedure for conducting abrasion test on aggregate
- Perform abrasion test on given sample of coarse aggregate
- Draw inferences by conducting abrasion test on different types of natural aggregate

1.5 Flakiness Index of coarse aggregate
- Study the significance of flakiness index of aggregate on strength and workability properties of concrete
- State the standards on flakiness index of aggregate
- Use the apparatus required for conducting flakiness index of coarse aggregate
- Explain the procedure for conducting the flakiness index test on coarse aggregate
- Determine the flakiness index of a given sample of coarse aggregate

1.6 Elongation Index of coarse aggregate
- Study the significance of elongation Index of aggregate on strength and workability properties of concrete
- State the standards on elongation Index of aggregate
- Use the apparatus required for conducting elongation Index of coarse aggregate
- Explain the procedure for conducting the elongation Index test on coarse aggregate
- Determine the flakiness index of a given sample of coarse aggregate

2.0 Tests on concrete
- Determine suitability of fresh and hardened concrete for the given conditions of workability and strength
- Study the importance of workability on strength properties of concrete
- State various types of tests used for measuring the workability of fresh concrete
- State standards on workability of concrete used for different places of construction work

2.1 Slump cone test
- Use apparatus required for conducting slump test
- Explain the procedure for conducting slump test of workability
- Perform slump test on the concrete made of given sample of ingredients
- Draw inference from test results on slump test of workability of concrete made with coarse aggregate having different elongation index

	• Draw inference from test results on slump test of workability of concrete made with coarse aggregate having different flakiness index
	• Compare the slumps of concrete made with gap graded coarse aggregate and well graded coarse aggregate
	• Study the changes in workability with different water-cement ratios
	• Study the changes in workability by adding dry cement to poorly workable concrete
	2.2 Compaction factor test
	• State the purpose of compaction of concrete
	• Use apparatus required for conducting compaction factor test
	• Explain the procedure for conducting compaction factor test of workability
	• Perform compaction factor test on the concrete made of given sample of ingredients
	• Draw inference from test results on compaction factor test of workability of concrete made with coarse aggregate havingdifferent elongation index values
	• Draw inference from test results on compaction factor test of workability of concrete made with coarse aggregate havingdifferent flakiness index values
	• Compare the compaction factors of concrete made with gap graded coarse aggregate and that made with well graded coarse aggregate
	• Study the changes in compaction factor of a poorly workable concrete by admixtures
	• Study the methods of enhancing workability of concrete without using any admixtures
	2.3 Casting of Cement concrete cubes
	• Study the purpose of casting of concrete cubes
	• Use equipment required for casting of cement concrete cubes
	• Explain the procedure for casting concrete cubes
	• Cast the concrete cubes with given ingredients
	2.4 Testing of cement concrete cubes for compression
	• Study the importance of testing concrete cubes
	• Use equipment required for conducting compression test concrete cubes
	• State the precautions to be taken for testing of concrete cubes
	• Explain the procedure for conducting compression test on concrete cubes
	• Draw inference from test results on compressive strength of concrete cubes made with coarse aggregate having different elongation index values
	• Draw inference from test results on compressive strength of concrete cubes made with coarse aggregate having different flakiness index values
	• Compare the compressive strengths of concrete cubes of concrete

made with gap graded coarse aggregate and that made with well graded coarse aggregate
- Compare the compressive strengths of concrete cubes made and cured with potable water and concrete cubes made and cured with non-potable water

2.5 Split Tensile Strength of concrete
- Study the importance of split tensile strength of concrete
- Cast the concrete cylinders with given ingredients
- Explain the procedure for conducting split tensile strength test on concrete cylinders
- Perform split tensile strength test on concrete cylinder

2.6 Design mix of concrete proportion as per IS: 10262 – 2009
- Study the various elements of design mix of concrete as per IS:10262-2009
- Conduct tests to find specific gravity, bulk density and sieve analysis of aggregate for the preparation of design mix of concrete
- Write the procedure for design mixing of concrete
- Calculate the proportions of ingredients of concrete as per IS:10262-2009
- Cast cubes of trail mixes to decide the proportion of concrete
- Perform the compression tests on concrete cubes casted as per design mix

3.0 Non-Destructive Tests on concrete
- State the importance of non-destructive tests
- State the apparatus/equipment required for the non-destructive tests
- Explain the procedure for conducting non-destructive tests
- Perform the non-destructive tests like Rebound hammer tests, ultrasonic tests on the given hardened concrete
- Record the observations of tests
- Draw the inferences from the test results

4.0 Tests on Soils

   4.1 Sieve Analysis – Classification of soil
- Study the classification of various types of soils
- Use apparatus required for conducting sieve analysis of soils
- Explain the procedure for conducting sieve analysis of soils
- Perform sieve analysis over a given soil sample

   4.2 Atterberg Limits of Soil
- Study the significance of Atterberg limits of soil in civil engineering activities
- Study Atterberg limits of soils
- Use apparatus required for conducting tests to determine Atterberg limits of soil
- Explain the procedure for conducting (a) Liquid Limit (b) Plastic Limit (c) Shrinkage Limit tests
- Perform Limit Test, Plastic Limit Test & Shrinkage Limit Test over given sample of soil
- Compare the observations of tests conducted on different types of

	soils
	• Calculate the Plasticity Index value of a given soil sample from the observations of test
	• Classify given soil sample based on sieve analysis and Atterberg limits
	4.3 Field Density of soil (Sand Replacement Method)
	• Study the significance of field density of soil
	• Use the apparatus required for conducting field density of soil
	• Explain the procedure for conducting field density test on soil by sand replacement method
	• Perform field density test of soil by sand replacement method
	4.4 Proctor Compaction Test
	• Study the significance of proctor compaction test
	• Use the apparatus required for conducting Proctor's compaction test
	• Explain the procedure for conducting Proctor compaction test
	• Perform Proctor compaction test over given sample of soil
	• Compare the observations of tests conducted on different types of soils
	• Draw the graph for Proctor's compaction test
	• Calculate the values OMC and MDD of given soil sample from the observations of test

PO-CO MAPPING:

Course Code : C-407	Course Title: Concrete & Soil Testing Practice Number of COs: 04				No. of Periods: 45
POs	**Mapped with CO No.**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3, CO4	6	13	1	> 40% Level 3 Highly addressed
PO2	CO1, CO2, CO3, CO4	18	40	3	
PO3					
PO4	CO1, CO2, CO3, CO4	6	13	1	25% to 40% Level 2 Moderately addressed
PO5	CO1, CO2, CO3, CO4	7	17	1	
PO6	CO1, CO2, CO3, CO4	8	17	1	5 to 25% Level 1 Low addressed
PO7					<5% Not addressed

CO-PO MAPPING:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3		2	3	2		2	2	3
CO2	2	3		3	3	2		2	2	3
CO3	3	2		3	2	2		2	2	3
CO4	2	2		2	2	2		2	2	3
Average	2.25	2.5		2.5	2.5	2		2	2	3

Note: The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
(vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ..etc.

KEY Competencies to be achieved by the student

S. No	Experiment Title	Competencies	Key Competency
1	Specific Gravity of fine and coarse aggregate	• Take weights of empty pycnometer, pycnometer with water and pycnometer with aggregate accurately • Record the observations accurately • Calculate the values correctly	• Take weights of empty pycnometer, pycnometer with water and pycnometer with aggregate accurately
2	Impact value of coarse aggregate	• Prepare of sample correctly • Weigh the cup and aggregate accurately • Count number of strokes accurately • Weigh residue retained on 2.36 mm sieve correctly	
3	Crushing value of coarse aggregate	• Prepare of sample correctly • Weigh the mould and aggregate accurately • Apply the load at required rate and to the required period accurately • Weigh residue retained on 2.36 mm sieve correctly	• Apply the load at required rate and to the required period accurately

4	Abrasion value of coarse aggregate	• Weigh the aggregate accurately • Count the required number of rotations correctly • Weigh residue retained on 1.70 mm sieve accurately	
5	Flakiness Index of coarse aggregate	• Arrangement of sieves in correct order • Weighing the aggregate passing through thickness gauge correctly	
6	Elongation Index of coarse aggregate	• Arrange the sieves in correct order • Weigh the aggregate retaining over length gauge correctly	
7	Slump cone test on concrete	• Weigh the material accurately • Apply required no. of tampings for each layer of concrete • Measure the subsidence accurately	• Measure the subsidence accurately
8	Compaction factor test on concrete	• Weigh the material accurately • Weigh the mould and concrete accurately • Calculate the compactor factor correctly	
9	Casting of Cement concrete cubes	• Weigh the material accurately • Vibrate the concrete filled in moulds to the required time correctly • Cure the demoulded cubes to the required period	• Weigh the material accurately • Vibrate the concretefilled in moulds to the required time correctly
10	Testing of cement concrete cubes for compression	• Apply the load at required rate correctly • Record the load at FAILURE accurately • Calculate the compressive strength accurately	• Apply the load at required rate correctly
11	Split Tensile Strength of concrete	• Apply the load at required rate correctly • Record the load at FAILURE accurately • Calculate the split tensile strength accurately	• Apply the load at required rate correctly • Calculate the split tensile strength accurately
12	Design mix of concrete proportion	• Calculate the proportions of material correctly • Weigh the ingredients of concrete accurately as per design mix calculations	• Calculate the proportions of material correctly

13	Non-destructive tests on concrete	• Applying the load at required rate as per procedure correctly • Calculating the strength of hardened concrete from graphs accurately	• Applying the load at required rate as per procedure correctly
14	Sieve Analysis – Classification of soil	• Arrangement of sieves in correct order • Sieving the soil to the required time • Weigh of residue in each sieve accurately	
15	Atterberg Limits	• Weigh the material accurately • Prepare the soil sample and place in the mould correctly • Count the blows correctly • Record the readings accurately • Draw the graphs accurately	
16	Field Density of soil(Sand Replacement Method)	• Calibrate the apparatus correctly • Weigh the samples accurately • Calculate the density accurately	• Calibrate the apparatus correctly • Weigh the samples accurately
17	Proctor Compaction Test	• Weigh the soil correctly • Measure the water accurately • Apply required no. of blows of compaction accurately • Record the observations correctly • Draw graph correctly	• Weigh the soil correctly • Measure the water accurately • Draw graph correctly

COURSE CONTENT

1. **Tests on aggregate**
   a. Specific Gravity of fine and coarse aggregate
   b. Impact value of coarse aggregate
   c. Crushing value of coarse aggregate
   d. Abrasion value of coarse aggregate
   e. Flakiness index of coarse aggregate
   f. Elongation index of coarse aggregate

2. **Tests on concrete**
   a. Workability test by Slump Cone Test
   b. Workability test by Compaction factor test
   c. Casting of Cement concrete cubes
   d. Testing of Cement concrete cubes for compression
   e. Split tensile strength of concrete
   f. Design mix of concrete proportion

3. **Non-destructive tests on concrete**
   a. Surface hardness of concrete by Rebound hammer test
   b. Ultrasonic Test

4. **Tests on Soil**
   a. Sieve analysis-classification of soil.
   b. Atterberg Limits
   c. Field density of soil by sand replacement method
   d. Proctor Compaction Test

REFERENCE BOOKS:

1. Concrete Technology, M.S. Shetty & A.K. Jain, S.CHAND Publication
2. Concrete Technology, M.L. Gambhir , McGrawHill Publications.
3. Soils Mechanics and Foundations, B.C. Punmia, Dr. Ashok K. Jain &Dr. Arun K. Jain, Laxmi Publications
4. Engineering Properties of soils and their measurement, Joseph E. Bowles, McGraw Hill Book Company.

Course Title : Communication Skills	Course code: C23-C- 408 { Common to all Branches}
Year/ Semester : IV Semester	Number of Periods : 45 (3 hrs per week)
Type of Course : Practical	Max Marks : 100 { Internal 40 + External 60 }

Course Objectives: The students shall

- communicate effectively in diverse academic, professional and everyday situations

- exhibit appropriate body language and etiquette at workplace

- be employable through preparing appropriate job applications and attend interviews confidently with all necessary skills

Course Outcomes: The students shall

CO1: Listen and comprehend the listening inputs related to different genres effectively

CO2: Communicate effectively in interpersonal interactions, interviews, group discussions and presentations

CO3: Acquire employability skills: job hunting, resume writing, attending interviews

CO4: Practise appropriate body language and professional etiquette

Course Delivery: Text book: **"Communication Skills"**
by State Board of Technical Education and Training, AP

Sl No	Unit	Teaching Hours
1	Listening Skills	6
2	Work place Etiquette	3
3	Introduce oneself	3
4	Short presentation (JAM)	6
5	Group Discussion	6
6	Resume Writing and Cover Letter	3
7	Interview Skills	9
8	Presentation Skills	9
	Total	*45*

Course Content:

UNIT I: Listening Skills   **6 periods**
Pre – While- Post-listening activities- Listening to audio content (dialogues/ speech/ narrations) - answering the questions and fill in the blanks- vocabulary

UNIT 2: **Work place Etiquette**   **3 periods**
Basics of Etiquette- politeness/ courtesy, good manners- features of work place etiquette- adaptability, positive attitude, body language.

UNIT 3: Introducing Oneself   **3 periods**
Speak about oneself - introduce oneself to a gathering/ formal & informal situations- Know about others- filling in the grid- introducing oneself in interviews

UNIT 4:   Short Presentation   **6 periods**
Dos and Don'ts in short presentation- speak for a minute without repetition, deviation & hesitation - the techniques to speak fluently – defining and describing objects, people, phenomena, events.- speaking on randomly chosen topics.

UNIT 5: Group Discussion   **6 periods**
Fundamentals of Group Discussion- Dos and Don'ts- filling the Grid- possible list of topics- practice sessions- sample videos-Group activity

UNIT 6: Resume Writing and Cover Letter   **3 periods**
Pre activity: answer the questions- jotting down biographical information- sample resumes- tips, Dos and Don'ts- model resumes- practice exercises on Resume writing

UNIT 7: Interview Skills   **9 periods**
Pre –while-post activities: - things to do at three stages – respond to notifications- know the information about the organisation-practice FAQs - preparation of good/ suitable C V,   Body language, tips for success in interviews, model / mock interviews.

UNIT 8: Presentation Skills   **9 periods**
Preparatory work: observe pictures and answer questions- different kinds of presentations- PPTs, Flash cards, Posters, Charts. - tips to prepare aids, slide show, model PPTs, - checklist on pre, while and post presentations.

Mapping Course Outcomes with Programme Outcomes:

PO	1	2	3	4	5	6	7
CO	**POs 1 to 5 are applications of Engineering Principles, can't be directly mapped to Communication Skills**					1,2,3,4	1,2,3,4

CO –PO Mapping

CO	Course Outcome	Cos / Unit Mapped	POs mapping	Cognitive levels as per Bloom's Taxonomy R/U/A/An (Remembering / Understanding / Applying/ Analyising)
CO 1	Listen and comprehend listening inputs related to different genres effectively	Unit 1	6,7	R/U/A
CO2	Communicate effectively in interpersonal interactions, interviews, group discussions and presentations	3,4,5,7,8	6,7	R/U/A/An
CO3	Acquire employability skills: job hunting, resume writing, attending interviews	6,7	6,7	R/U/A/An
CO4	Practise appropriate body language and professional etiquette	2, 3, 4,5,7,8	6,7	R/U/A

ASSESSMENT
C23-Common-408: English Communication Skills Lab

- The assessment for C23-Common 408 : 'English Communication Skills' is on par with all other practical subjects comprising 40 marks for Internal assessment and 60 marks for External examination attaining the final total of 100 Marks.
- The Internal Assessment can be conducted in the form of Assignments in all the 8 Units. One or Two assignments can be conducted in each Unit, awarding 10 marks for each assignment and the total marks can be averaged to 40 marks as suggested below.
- These assignments should focus mostly on LISTENING and SPEAKING skills rather than writing. However, for the practice sake, students can write down their assignments in a separate note book to enable them speak/present in the end exam fluently. The students should submit these assignment note books to the teacher.
- Questioning styles vary from Unit to Unit as different skills are assessed in each Unit with specific parameters as given in the workbook.
- Listening skills can be tested by playing different Audio/ Video clips (appropriate in content and language, preferably without subtitles) and test their skill of listening comprehension . Follow pre-while-

post stages of listening activity and students should answer general, specific, inferential, vocabulary questions.

- Personal profile, describing a place/a thing/ a person/ an event / a picture, JAM, presentations, Direct interaction with the teacher/ examiner are the topics for individual speaking skills.
- Role plays, GD and Interview skills should be made as group activities and the teacher assesses various skills of the students as given in the workbook.
- Teacher should maintain a record of the following Assessment sheet (one for each student) to award Internal marks.

Calculating Internal marks through Assignments :				
Name of the Student:	PIN: Branch: Academic Year:			
S. No.	Title of the Unit	Assignment 1: 10 Marks	Assignment 2: 10 Marks	Total Marks in each Unit (Average for 10 Marks)
1	Listening Skills			
2	Workplace etiquette			
3	Introducing Oneself			
4	Short Presentations (JAM)			
5	Group Discussion			
6	Resume & Cover Letter			
7	Interview Skills			
8	Presentation Skills			
	Marks Scored			Ex: 65
	Total No. of Units			8
	Internal Assessment : Average for 40 Marks	(65/8) X4 = 32.5		33 (for 40 Marks)

End Exam Model paper: C23-Common-408 : Communication Skills Lab
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Guidelines to prepare the question paper of the Lab End exam for 60 marks:
I. Listening Skills:
   Students listen to the audio / watch the video clip (without subtitles) and answer the questions supplied to them in advance; observe the three stages of the Listening activity.   : 10 Marks
II. Individual Speaking skills:
a) Speak for a minute (JAM) on the given topic, can be allotted through chits/lots: 10 M. b) Individual speaking skills on any given topic ….descriptions / role play etc: 10 Marks
c) Direct Interaction/ dialogue with the examiner to test his/her speaking skills : 10 M.
III.   Pair / Group Speaking Activities.   : 20 Marks
   a) Role Plays / dialogue making
   b) Group Discussion
   c) Interview skills
Note: If the students are more in number and the time is not sufficient to conduct the Viva for all the students in a single spell, the examiner can also adapt the blended mode of exam. A few significant questions can be tested orally and one or two questions can be answered in writing. (Ex: Resume, cover letter, FAQs in Interview skills etc.) along with the answers of Listening Test.

Aspects to be evaluated to test speaking skills			
S.No	Language Aspects	Organising Aspects	Body Language aspects
1	Content: Quality, clarity and relevance of ideas	Coherence, cohesion of relevant ideas	Postures
2	Fluency	Proper beginning, topic sentence, expansion/details, conclusion	Gestures,
3	Vocabulary	Using proper Linkers	Eye contact
4	Pronunciation	Avoid repetitions, clichés, fillers	Audibility, pitch, Permissible pauses
5	Grammar (Syntax, semantics)		Other Permissible body movements

SURVEYING – III PRACTICE

Course code	Course Title	No. of periods/week	Total No. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-409	Surveying-III Practice	03	45	40 (30 for class exercises + 10 for survey camp)	60

S.No.	Major Topics	No. of Periods
1	Field Exercises using Total Station	36
2	Global Positioning System	6
3	Digitization of Maps	3
	Total	45
4	Survey camp for 3 days during 6 AM to 12 noon & 2PM to 5 PM on each day immediately after completion of exercises on Total station (25% of total sessional marks shall be allocated to this activity)	3 days (additional instructional duration & NOT to be included in the above 60 periods)

Survey Camp: one of the following Surveying activity involving Total Station operations shall be allotted to one or two batches of the students:
   a) *Land Survey*
   b) *Road Survey*
   c) *Contour Survey*
   d) *Other Surveys*

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Develop knowledge about Modern surveying instruments & methods adopted to carry out Field Survey with a professional approach.
	(ii)	Develop skills in students in using Total Station, GPS and acquire knowledge in digitization of Maps

COURSE OUTCOMES:

Course	CO1	C-409.1	Apply the knowledge of Total Station in different operations in Civil Engineering projects
Outcomes	CO2	C-409.2	Perform precise operations/skills involved in using GPS and digitization of Maps.

LEARNING OUTCOMES:

Learning Outcomes	
	1.0. **Field Exercises using Total Station**
	1.1 Study of component parts, accessories and functions Total Station, Initialization of Total Station over ground station and measure the distance between two given points, Measure areaof given field.
	1.2 Conduct traversing survey (closed Traverse).
	1.3 Find the Height and width of an elevated object.
	1.4 Determine the elevation of Instrument point by making observation to point with known elevation and measure multiple sets (rounds) of observations.
	1.5 Perform a station setup on a known point by making observations to one or more back sight points and establish the position of an occupied point relative to a base line or a boundary line.
	1.6 Mark or establish points, Lines and Arcs on the ground.
	1.7 Mark Centre line of a building on the ground.
	1.8 Conduct survey for L.S and C.S of a proposed road/canal/pipe line on the ground.
	1.9 Perform post processing.
	1.10 Plot contour map of an area using surfer software.
	2.0. **Global Positioning System**
	2.1 Identify the components and the functions of Global Positioning System.
	2.2 Determine the Coordinates of various points on the ground.
	2.3 Perform the linking the G.P.S data with Total Station.
	3.0. **Digitization of Maps**
	3.1 Study the concept of digitization.
	3.2 Digitization of any given contour map Using the available soft wares
	3.3 Digitization of given Town map and creating different layers for roads, railways, water supply lines and drainage lines etc., Using the available soft wares

PO-CO Mapping:

Course Code: CE-409	Course Title: SURVEYING –III Practice No.of COs: 02				No. of Periods: 45
POs	**Mapped with CO Nos.**	**CO periods addressing PO in Col.1**		**Level (1,2,3)**	**Remarks**
		No.	**%**		
PO1	CO1, CO2	5	10	1	>40% Level 3 (Highly Addressed)
PO2	CO1, CO2	4	10	1	
PO3	CO1, CO2	18	43	3	25% to 40% Level 2 (Moderately Addressed)
PO4	CO1, CO2	11	25	2	
PO5	CO1, CO2	3	9	1	5% to 25% Level 1 (Low Addressed)
PO6	CO1, CO2	4	9	1	
PO7					<5% Not Addressed

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	3	2	2	2	3	2	3
CO2	2	3	3	2	2	3	2	3	2	3
Average	2	2.5	2.5	2.5	2	2.5	2	3	2	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
(vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ..etc.

COURSE CONTENT
1.0 Field Exercises using Total Station
    a) Study of component parts, accessories and functions Total Station, Initialization of Total Station over ground station and measure the distance between two given points, Measure area of given field.
    b) Conduct traversing survey (closed Traverse).
    c) To find Height and width of an elevated object.
    d) To determine the elevation of Instrument point by making observation to point with known elevation, to measure multiple sets (rounds) of observations.

e) To perform a station setup on a known point by making observations to one or more back sight points and to establish the position of an occupied point relative to a base line or a boundary line.

f) To mark or establish points, Lines and Arcs on the ground.

g) To mark Centre line of a building on the ground.

h) L.S and C.S of proposed road/canal/pipe line on the ground.

i) Understand post processing.

j) To plot contour map of an area using surfer software.

2.0 Global Positioning System

a) Identifies the components and the functions of Global Positioning System.

b) Determines the Coordinates of various points on the ground.

c) Linking the G.P.S data with Total Station.

3.0 Digitization of Maps

a) Study the concept of digitization.

b) Digitization of any given contour map Using the available soft wares

c) Digitization of given Town map and creating different layers for roads, railways, water supply lines and drainage lines etc., Using the available soft wares

KEY competencies to be achieved by the student

S.NO.	Experiment Title	Key Competency
1	Field Exercises using Total Station a) Ex 1.1 b) Ex 1.2 c) Ex 1.3 d) Ex 1.4 e) Ex 1.5 f) Ex 1.6 g) Ex 1.7 h) Ex 1.8 i) Ex 1.9	• Places total station on tripod, checks batteries and switches on total station • Centering of total station over a given point and sighting reflecting prism to measure distance • Measure area of given field • Conduct traversing survey (closed Traverse) and gets plotting • Finds Height and width of an elevated object • Finds the elevation of Instrument point by making observation to point with known elevation • Understands errors by taking multiple sets (rounds) of observations • Knows station setup on a known point by making observations to one or more back sight points • Establish the position of an occupied point relative to a base line or a boundary line • Establish points, Lines and Arcs on the ground • Locates Centre line of a building on the ground • Collects data for L.S and C.S of proposed road/canal/pipe line on the ground • Understand post processing • Plots contour map of an area using SURFER software
2	Global Positioning System a) Ex 2.1	• Identifies the parts and the functions and learns operating GPS

	b) Ex 2.2 c) Ex 2.3	• Determines the Coordinates of various points on the ground • Linking the G.P.S data with Total Station
3	Digitization of Maps a) Ex 3.1 b) Ex 3.2 c) Ex 3.3	• Understands software • Digitizes of any given contour map using available software. • Digitizes of given Town map and creating different layers for roads, railways, water supply lines and drainage lines etc., Using the available software.

CAD PRACTICE – II

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-410	CAD PRACTICE-II	03	45	40	60

S. No.	Major Topics	No. of Periods	COs Mapped
1.	Culverts and Bridge Drawings	15	CO1
2.	Public Health Engineering Drawings	15	CO2
3.	Irrigation Engineering Drawings	15	CO3
	Total	45	

COURSE OBJECTIVES:

	Upon completion of the Course, the student shall be able to
Course Objectives	1. Gain the skills in drawing of Engineering Structures such as Culverts, Bridges, Public Health and Irrigation Engineering drawings using CADsoftware

COURSE OUTCOMES:

Course Outcomes	CO 1	C-410.1	Draw different views of culverts and bridges.
	CO 2	C-410.2	Draw the Components of Public health Engineering Structures
	CO 3	C-410.3	Draw the different views of Irrigation Engineering Structures

LEARNING OUTCOMES:

Learning Outcomes	**1.0**	**Culverts and Bridge Drawings**
	1.1	Draws the plan, cross sectional elevation and longitudinal sectional elevation of pipe culverts, R.C.C.- slab culvert and identifies the component parts from the given set of specifications.
	1.2	Draws the sectional elevation, plan and cross section of two span R.C.C. T-beam bridges from the given set of specifications.
	2.0	**Public Health Engineering Drawings**
	2.1	Draws the sectional elevation, plan and cross-section of public health engineering works : Septic Tank, RCC Overhead tank (Square)
	2.2	Draw the Layout of water supply and drainage connections in residential buildings.
	3.0	**Irrigation Engineering structure Drawings**
	3.1	Draw the sectional elevation, plan and cross section of Earthen bunds –Homogeneous and Non Homogeneous
	3.2	Tank surplus weir with splayed wing walls
	3.3	Canal drop (notch type)
	3.4	Tank sluice with tower head.
	3.5	Canal regulator

PO-CO MAPPING:

Course Code : C-410	Course Title: CAD PRACTICE-II Number of COs: 03				No. of Periods: 45
POs	**Mapped with CO No.**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3,	11	26	2	> 40% Level 3 Highly addressed
PO2	CO1, CO2, CO3	5	11	1	
PO3	CO1, CO2, CO3,	5	11	1	
PO4	CO1, CO2, CO3,	18	40	3	25% to 40% Level 2 Moderately addressed
PO5	CO1, CO2, CO3,	3	7	1	
PO6					
PO7	CO1, CO2, CO3	3	5	1	5 to 25% Level 1 Low addressed

CO-PO MAPPING:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	3	2	3		2	2	2	3
CO2	2	3	2	3	3		2	2	2	3
CO3	3	2	2	3	2		2	2	2	3
Average	2.3	2.6	2.3	2.6	2.6		2	2	2	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT

1.0   Culverts and Bridge Drawings

Preparation of Plan, cross sectional elevation and longitudinal sectional elevation of
   a. Pipe Culvert (Single Pipe)
   b. R.C.C. slab culvert with square returns
   c. Two-span R.C.C. T-beam bridge with square walls.

2.0   Public Health Engineering Drawings

Preparation of Layouts of water supply & Sanitary lines in buildings
   a. Sanitary block of a large building showing internal water supply and sanitary fittings and plumbing fixtures (Plan & Section across each unit)
   b. Water supply & sanitary connections to a residential building
   c. Septic tank with details of connection to a residential building.
   d. R.C.C overhead square tank(four columns with accessories).

3.0   Irrigation Engineering Drawings

Preparation of Plan, cross sectional elevation and longitudinal sectional elevation of
   a. Earthen bunds –
   a) Homogeneous   b) Non Homogeneous (Zoned embankment)
   b. Tank surplus weir with splayed wing walls
   c. Canal drop (notch type)
   d. Tank sluice with tower head.
   e. Canal regulator.

Key competencies to be achieved by the student

S.NO	Experiment Title	Key Competency
1.	Culverts and Bridge Drawings	• Draws the plan, cross sectional elevation and longitudinal sectional elevation of pipe culverts& identifies the component parts. • Draws the plan, cross sectional elevation and longitudinal sectional elevation of R.C.C.- slab culvert and identifies the component parts. • Draws the sectional elevation, plan and cross section of two span R.C.C. T-beam bridges from the given specifications
	Public Health Engineering Drawings	• Draws the sectional elevation, plan and cross-section of Septic Tank. • Draws the sectional elevation, plan and cross-section of RCC Overhead tank(Square). • Draw the Layout of water supply and drainage connections in residential buildings. • Draw the Sanitary block of large building showing the internal water supply and sanitary fittings and plumbing fixtures.
	Irrigation Engineering Drawings	• Draw the sectional elevation, plan and cross section of Earthen bunds – Homogeneous and Non Homogeneous • Draw the sectional elevation, plan and cross section of Tank surplus weir with splayed wing walls • Draw the sectional elevation, plan and cross section of Canal drop (notch type) • Draw the sectional elevation, plan and cross section of Tank sluice with tower head. • Draw the sectional elevation, plan and cross section of Canal regulator

V SEMESTER

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2020

FIFTH SEMESTER

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examination			
		Theory	Practical		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
THEORY								
C-501	Steel Structures	4		60	3	20	80	100
C-502	Environmental Engineering	5		75	3	20	80	100
C-503	Quantity Surveying	5		75	3	20	80	100
C-504	Advanced Civil Engineering Technologies	4		60	3	20	80	100
C-505	Construction Management & Entrepreneurship	3		45	3	20	80	100
PRACTICAL								
C-506	Structural Engineering Drawing		4	60	3	40	60	100
C-507	Field Practices		4	60	3	40	60	100
C-508	Life Skills		3	45	3	40	60	100
C-509	Computer Applications in Civil Engineering		4	60				
C-510	Project work		3	45	3	40	60	100
	Student centric learning		3	45				
	Total	**21**	**21**	**630**		**280**	**720**	**1000**

STEEL STRUCTURES

Course code	Course title	No. Of period/week	Total no. Of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-501	Steel Structures	04	60	20	80

S.No.	Major Topics	No. Of Periods	Cos Mapped
1.	Introduction and Fundamentals of Limit State Design of Steel structures	04	CO1
2.	Design of fillet welded joints	10	CO2
3.	Design of Tension members	10	CO3
4.	Design of Compression members, Columns & Column bases	17	CO4
5.	Design of Beams	15	CO5
6.	Roof Trusses	4	CO5
	Total	60	

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Understand the fundamentals of Limit state design of steel structures and design aspects of fillet welded joint.
	(ii)	Design tension members, compression members and flexural members by following IS Codal provisions.

COURSE OUTCOMES:

	CO 1	C-501.1	Explain the fundamentals of limit state design of steel structures.
Course Outcomes	CO 2	C-501.2	Design Fillet Welded Joints
	CO 3	C-501.3	Design of Tension Members in Steel Structures
	CO 4	C-501.4	Design Compression Members, Columns and Column bases
	CO 5	C-501.5	Design Steel Beams and State different types of roof trusses and their suitability

LEARNING OUTCOMES:

Learning Outcomes	**1.0 Introduction and fundamentals of limit state design of steel structures**
	1.1 State common types of steel structures,their merits and demerits.
	1.2 List the loads considered in the design of steel structures as per I.S:875-1987 and describe them
	1.3 Understand the code of practice I.S. 800-2007
	1.4 List physical and mechanical properties of structural steel.
	1.5 Sketch different types of rolled steel sections and explain its classification based on their cross sections.
	1.6 List types of elements.
	1.7 Explain the concept of Limit State Design, define 'limit state' and state the types.
	1.8 Define Characteristic action, Design action and Design strength.
	1.9 State the partial safety factor values for loads in limit state of strength and serviceability and for materials in limit state.
	1.10 State the deflection limits for Simply supported beam, Cantilever beam and Purlins
	2.0 Design of Fillet Welded Joints
	2.1 State different types of joints.
	2.2 Differentiate the welded joints and Riveted joints
	2.3 Sketch the different forms of welded joints.
	2.4 Explain the features of a fillet welded joint.
	2.5 State stresses in welds as per I.S.800-2007.
	2.6 State formula for design strength of a fillet welded joint.
	2.7 Calculate the design strength of a fillet welded joint.
	2.8 Design a fillet welded joint for a given load, thickness of a plate and permissible stresses as per code.Design a fillet welded joint for a single angle connected to the gussetplate by fillet welds along the sides and at ends carrying axial loads.Design a fillet welded joint for a double angle connected to the gussetplate by fillet welds along the sides and at ends carrying axial loads.
	3.0 Design of Tension Members
	3.1 Define ' tie'
	3.2 State the applications of tension members.
	3.3 Sketch different forms of tension members and understand their behaviour of tension members.
	3.4 State and describe different modes of failures of tension members with sketches
	3.5 State the maximum values of effective slenderness ratios as per code.
	3.6 Determine the net effective area of single angle connected to gusset plate by welding.
	3.7 Determine the design strength due to yielding of gross section, rupture of critical section and block shear failure of a single angle connected by welding
	3.8 Understand design procedure of tension members. Design a single angle tension member connected by welding only.

4.0 Design of Compression Members, Columns and Column bases

4.1 Understand, State and sketch different types of compression members (like column, strut)

4.2 Sketch different forms of compression members and understand and Their behaviour and state the classification of cross sections.

4.3 Define the terms 1. Least radius of gyration and 2. Slenderness Ratio and distinguish between actual length and effective length and also state effective lengths to be used for different end conditions.

4.2 Understand buckling class of cross section based on Imperfection factor, stress reduction factor and column buckling curves and state maximum values of effective slenderness ratios as per code

4.3 Understand the design compressive stress for different column buckling Classes, Determine the design strength of compression members

4.4 Understand design procedure of compression members and design of columns with I sections and built-up channel sections.

4.5 Understand design details , effective sectional area , codal provisions for angle struts and design single angle and double angle struts.

4.6 Understand codal provisions of lacing and battening systems for built-up columns.

4.7 Design a slab base along with a cement concrete pedestal and also design the welded connection.

5.0 Design of Steel Beams

5.1 Understand the concept of limit state design of beams , Define the terms: Elastic moment of resistance, Plastic moment of resistance, Elastic section modulus, Plastic section modulus and Shape factor.

5.2 Determine the shape factor values for rectangular, Tee and I-sections.

5.3 Understand the behaviour of steel beams, Classify beams based on lateral restraint of compression flange.

5.4 Determine the design strength in bending (flexure) and in shear of laterally supported beams and list the factors affecting lateral stability and influence of type of loading.

5.5 Distinguish between web buckling and web crippling and understand the failure of beams by flexural yielding and list the types of failure of beams by flexural yielding

5.6 Understand laterally supported beam, holes in tension zone, shear lag effects and design bending strength.

5.7 Understand laterally unsupported beam, lateral torsional buckling of beams (theoretical concept only – no problems) and explain effective length of compression flanges.

5.8 Understand concept of shear in beams and resistance to shear buckling., shear buckling design methods like Simple post critical method and Tension field method and also understand the design of simple beams with solid webs.

5.9 Understand component parts of plate girders with sketches and describe different types of Stiffeners with their suitability.

5.10 Design laterally supported simply supported beam considering all codal requirements.

6.0 Roof Trusses

6.1   List types of trusses viz., Plane trusses and Space trusses.
6.2   Understand the situations where roof trusses are used.
6.3   Sketch different types of roof trusses with their suitability for a given span.
6.4   Sketch a roof truss and name the component parts.
6.5   Understand the configuration of trusses like Pitched roof and Parallel chord trapezoidal trusses.
6.6   Understand cross sections of truss members.
6.7   Understand the loads on roof trusses as per I.S – 875-1987
6.8   Calculate the live load on roof covering and live load on truss.

PO-CO Mapping:

Course Code : C-501	Course Title: Steel Structures Number of Cos: 05				No. Of Periods: 60
PO #	**Mapped with CO #**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3, CO4, CO5	24	40	3	**> 40% Level 3 Highly addressed** **25% to 40% Level 2 Moderately addressed** **5 to 25% Level 1 Low addressed**
PO2	CO1,CO2,CO3, CO4, CO5	24	40	3	
PO3	CO2,CO3,CO4,CO5	6	10	1	
PO4					
PO5	CO2,CO3,CO4,CO5	6	10	1	
PO6					
PO7					

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3				1	3	3	3
CO2	2	3	2				1	3	3	3
CO3	2	3	2				1	3	3	3
CO4	2	3	1				1	3	3	3
CO5	3	2	2							
Average	2.4	2.6	2				1	3	3	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz

(vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT

1. **Introduction and fundamentals of limit state design of steel structures**

   Merits and demerits of steel structures – Loads considered in the design of steel structures as per I.S:875 -1987 – Introduction to I.S. 800-2007 – Mechanical properties of structural steel – yield stress (f_y), ultimate tensile stress (f_u) and maximum percent elongation (table -1 of IS:800-2007) – Standard structural sections – Classification of cross sections – class 1(plastic) class2(compact) class3(semi compact) and class4(slender) – types of elements – internal elements, outstands and tapered elements – Concept of Limit State Design – limit state of strength – limit state of serviceability – classification of actions – strength – partial safety factors for loads and materials – deflection limits.

2. **Design of Fillet Welded Joints**

   Different types of joints – lap joints – butt joints – Differentiation of welded joints and riveted joints – Different forms of welded joints – sketches of fillet and butt weld joints – Fillet welded joint – detailed sketch showing the component parts – Stresses in welds as per I.S.800-2007 – Codal requirements of welds and welding – Problems on calculation of strength of a fillet welded joint – Design of fillet welded joint for a given load, thickness of a plate and permissible stresses as per code – Design of fillet welded joint for single or double angles carrying axial loads.

3. **Design of Tension Members**

   Introduction – different forms of tension members – Behaviour of tension members – Different modes of failures – gross section yielding, net Section rupture and block shear failure – Maximum values of effective slenderness ratios as per code – Calculation of net effective sectional area of single angle with welded connection only – Calculation of the design strength due to yielding of gross section, rupture of critical section and block shear – problems on single angle with welded connection only – Design procedure of tension members – Problems on design of tension members single angle with welded connection only.

4. **Analysis and design of Compression Members, columns and column Basis**

   Introduction – different forms of compression members – Behaviour of compression members – classification of cross sections – class 1 (plastic), class2 (compact), class3 (semi compact) and class4 (slender) – Effective lengths to be used for different end conditions – table 11 of I.S:800 – Buckling class of cross section – imperfection factor and stress reductionfactor for different buckling classes – column buckling curves – Maximum values of effective slenderness ratios as per code – design compressive stress for different column buckling classes – Calculation of design strength of compression members – problems – Designprocedure of compression members – problems on simple sections only (no built-up sections) – Design details – effective sectional area – codal provisions for angle struts –single angle and double angle – discontinuous and continuous struts –Codal provisions of single / double lacing and battening for built-up columns (no problems) – Design of slab base along with a cement concrete pedestal, design of welded connection of base plate and column – problems.

5. **Analysis and design of Steel Beams**

   Concept of limit state design of beams – shape factor and plastic properties of beams – Problems on shape factor – Behaviour of steel beams – design strength in bending (flexure) – Factors affecting lateral stability – influence of type of loading – web buckling and web crippling – Beams failure by flexural yielding – Laterally supported beam – holes in tension zone – shear lag effects – design bending strength – lateral torsional buckling of beams – (theoretical concept only – no problems) – Effective length of compression flanges - Concept of shear in beams – resistance to shear buckling – Shear buckling design methods – simple post critical method – tension field method – Design of laterally supported simple beams with solid webs – Component parts of plate girders with sketches – brief description of different types of stiffeners - Design of laterally supported simply supported beam considering all codal requirements.

6. **Design of Roof Trusses**

   Types of trusses – plane trusses, space trusses – Sketches of different roof trusses with their suitability for a given span – Cross sections of truss members – Loads on roof trusses as per I.S. 875 -1987 –Determination of live load given pitch of the truss.

REFERENCE BOOKS:

1. IS 800-2007 –Indian Standard General construction in steel — code of practice
2. Design of Steel Structure by N Subramanian, Oxford University Press, New Delhi.
3. Limit state design of steel structures by S K Duggal, Tata McGraw Hill Education, New Delhi
4. Fundamentals of structural steel design M L Gambhir, Tata McGraw Hill Education Private Limited, New Delhi
5. Steel Structures: Design and Practice by N Subramanian,Oxford Publishers, New Delhi
6. Design of steel structure by Limit State Method as per IS 800- 2007 by Bhavikatti S S, I.K. International Publishing House, New Delhi
7. Limit state design of Steel Structure by Ramchandra & Gehlot, Scientific Publishers, Pune.
8. Teaching Resource Material   : http://www.steel-insdag.org

MODEL BLUE PRINT

S. No	Major Topics	No. Of periods	Weightage ofmarks	Marks wise Distribution of Weightage				Question wise Distribution of Weightage				Cos Mapped
				R	U	Ap	An	R	U	Ap	An	
1.	Introduction and Fundamentals of Limit State Design of Steel structures	04	03	03	--	--	--	1	-	-	--	CO1
2.	Design of fillet welded joints	10	26	03	03	20	--	1	1	2	--	CO2
3.	Design of Tension members	10	26	03	03	20	--	1	1	2	--	CO3
4.	Design of Compression members, Columns & Column bases	17	26	03	03	20	--	1	1	2	--	CO4
5.	Design of Beams	15	26	03	03	20	--	1	1	2	--	CO5
6.	Roof trusses	4	03	03	--	--	--	1	--	--	--	CO5
	Total	60	110	18	12	80		6	4	8		

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 3.10
Unit Test – II	From 4.1 to 6.8

MODEL PAPER
UNIT TEST-I

STEEL STRUCTURES, C-501   **C-23**

Time: 90 Minutes   **Maximum Marks: 40**

PART- A   **16 Marks**

Instructions:
(i) Answer all questions
(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) Unit mass of steel is ………………. (CO1)

(b) Minimum size of fillet weld is based on thickness of thinner part (True/False) (CO2)

(c) Length of end return should not be less than…………times size of weld (CO2)

(d) Tension member also known as ……………….. (CO3)

2. Define (a) Permanent Action (b) Variable Action (c) Accidental Action (CO1)

3. Sketch a fillet weld and name various parts. (CO2)

4. Define (a) Size of fillet weld (b) Throat thickness of fillet weld (CO2)

5. Differentiate Net Area and Net Effective Area (CO3)

PART- B   **3 x 8 = 24 Marks**

6. (A) An angle ISA 130X130X10mm carrying an axial load of 220kN is connected to a gusset plate 12mm thick. Design the welded connection with side and end welds if ultimate shear stress in weld is 410MPa, connections are made in shop. (CO2)

(OR)

(B) A tie member of a roof truss consists of 2 ISA 100mmx65mmX8mm.The angle are connected to either side of a 10 mm gusset plate and the member is subjected to a working load of 280kN.Design the side fillet weld only. Assume connections are made in the workshop. Take fu =410N/mm2 (CO2)

7. (A) Design a single angle tension member to carry a tensile force of 250kN.The angle is to be connected to a gusset plate with longer leg by fillet welds. Take fy =250N/mm2
fu =410N/mm2. Assume length of the connection as 150mm. (CO3)

(OR)

(B) Determine the design strength of a tensile member ISA 150mmX75mmX10mm when its longer leg is connected to 10mm gusset plate by 7mm fillet welds. The effective length of the weld is 170mm. Take fy =250MPa & fu =410 MPa. (CO3)

8 (A) Determine the design strength of a tensile member ISA 125mmX75mmX8mm when its shorter leg is connected to 10mm gusset plate by 7mm fillet welds. The length of the weld is 180mm. Take fy =250MPa & fu =410 MPa. (CO3)

(OR)

(B) Write the design specifications for fillet weld as per IS 800-2007 (CO2)

Time: 90 Minutes   **Maximum Marks: 40**

                                    PART- A   **16 Marks**

Instructions:

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) Compression member in a truss is called ……………….   (CO4)

(b) In plate girder, flange plate is designed to resists……………   (CO5)

 (c) The value of shape factor for circular section is ……………   (CO5)

(d) The top chord member of a roof truss is called ………………..   (CO5)

2. Write any three codal provisions of batten system as per IS: 800-2007   (CO4)

3. Define (a) shape factor   (b) plastic moment of resistance   (CO5)

4. State the situations where plate girders are necessary   (CO5)

5. Determine the live load on truss if angle of slope of roof is 250   (CO5)

                                    PART-B   **3X8 = 24Marks**

6. (A) Design a slab base for a column ISHB 300 @ 577 N/m carrying an axial load of 1000kN.Also design the concrete pedestal if the SBC of soil is 190kN/m3.M20 concrete is used for foundation. Yield stress of steel is 250 M Pa. (CO4)

                                    (OR)

 (B) Write the design specifications for lacing as per IS: 800-2007 (CO4)

7. (A) Design a steel column section to carry an axial load of 410kN.The column is 4.2m long and restrained against translation and free against rotation. Yield stress of steel is 250 M Pa. (CO4)

                                    (OR)

Design a single angle section to carry a compression of 100kN. The c/c distance between end connections is 2m. Assume that the end connection is done by the fillet welds. The grade of steel is E-250. (CO4)

8. (A) Determine the shape factor of a symmetrical I-section with flange dimensions 140mmX16mm and web dimensions 8.9mm x 368mm. (CO5)

                                    (OR)

(B) A simply supported beam ISLB 300 @370N/m has an effective span of 5 m.

   Find the (i) design bending strength of beam (ii) design shear strength of beam. Assume Fe 250 grade steel. The beam is laterally supported.   (CO5)

<u>**Time:3 hours]**</u>   **[TotalMarks:80**

PART—A   **3×10=30Marks**

Instructions:

(1)Answer all questions. Each question carries three marks

(2)Answers should be brief and shall not exceed five simple sentences

(3) Use of IS: 800-2007 and steel tables are permitted

1. List the mechanical properties of structural steel.   (CO1)

2. Define the following terms: (CO2)

    (a)Size of fillet weld (b)Throat thickness o f fillet weld

3. What shall be the maximum size of the fillet weld applied to the   (CO2)

    ii) square edge of a plate, and(b) round edge of a flange

4. Write any three applications of tension members.   (CO3)

5. Define the following terms: (CO4)

    iii)Least radius of gyration and (b) Slenderness ratio

6. Write any three codal provisions to be followed in the design of lacing

system as per IS: 800-2007   (CO4)

7. Write any three provisions for design of double angle strut as IS800-2007.   (CO5)

8. Draw the cross section of plate girder and label the component parts.   (CO5)

9. Define elastic moment and plastic moment of resistance.   (CO5)

 10. Determine the live load per square meter of plan area of the pitched roof of slope 26°.(CO5)

Instructions:

    i) **Answer any FIVE questions**

    ii) **Each question carries TEN marks.**

    iii) **Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.**

11. An angle ISA 100 mm × 100 mm × 12 mm is carrying an axial design tensile force of 220 kN acting through the CG of the angle isto be connected to a gusset plate 12 mm thick by a lap joint using side welds and end welds, at site. Design the joint taking the ultimate design stress in the filet weld as 410N/mm2.   (CO2)

12. Determine the design strength of a tensile member ISA 100 mm × 75 mm × 10 mm when its longer leg is connected to 10 mm gusset plate by 7 mm size fillet welds. The effective length of the weldis170mm.[Takef y=250Mpa andf u=410Mpa.]   (CO3)

13. Design a double angle tension member to carry an axial tension of 480 kN, using steel of yield stress 250 N/mm2& ultimate stress 410 N/mm2. The effective length of the member is 6 m. The angle are tobeconnectedoneithersideof12mm gusset plate by fillet welds.   (CO3)

14. Design a steel column using a single rolled I-section to carry an axial load of 800 kN. One end of the column is restrained against translation and rotation and the other end is restrained against translation and free against rotation. The actual length of the column between intersections is 6 m and the yield stress of steel is250Mpa.   (CO4)

15. Design a slab base for a column consisting of ISHB 350 @724 N/m. The column carries an axial load of 520kN. M20 grade concrete is used for foundation. Assume Fe-410 grade steel used.   (CO4)

16. Determine the design compressive strength of single angle discontinuous strut ISA 80 mm ×80 mm × 10 mm of length 2 m when connected to gusset plate through one leg by fillet welds at each end. Yield stress of steel used is 340 Mpa and modulus of elasticity of steel is 2 x 10^5 Mpa. The gusset fixity may be taken as hinged.   (CO4)

17. Find the shape factor for an I Section with top and bottom flange 200mmX10mm and web 380mmX10mm.   (CO5)

18. A roof a hall measuring 8m X 12m consists of 100mm thick RCC slab supported on steel I beam spaced at 3m apart. The finishes load may be taken as 1.5kN/m2,l ive load as1.5 kN/m2 and self weight of beam as 0.5 kN/m. Design the steel beam. Assume E=2x105 N/mm2 and fy=250 N/mm2   (CO5)

ENVIRONMENTAL ENGINEERING

Course code	Course Title	No. Of periods/week	Total No. Of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-502	Environmental Engineering	05	75	20	80

S.No.	Major Topics	No. Of periods/week	Cos Mapped
1	Water Supply Scheme & Sources and Conveyance of Water	12	CO1
2	Quality and Purification of Water	16	CO2
3	Distribution system and water supply arrangements in a Building	8	CO2
4	Introduction to Sanitary Engineering & Quantity of Sewage	6	CO3
5	Laying of Sewers & Sewer appurtenances	7	CO3
6	Characteristics of Sewage, treatment & disposal	14	CO4
7	Rural Water Supply and Sanitation	8	CO5
8	Air Pollution	4	CO5
	Total Periods	**75**	

COURSE OBJECTIVES:

		Upon completion of the course the student shall be able to
Course Objectives	(i)	History ofwater supply, Understand the sources, quality & quantity, collection, conveyance, testing and treatment techniques of water.
	(ii)	Understand the storage, distribution and water supply arrangements in buildings.
	(iii)	Learn basic knowledge of the sanitary Engineering, Sewerage works, methods of sewage collection, basic concepts of design of sewers, their laying with appurtenances
	(iv)	Explain the methods of sewage treatment and disposal, methods of solid waste collection & disposal and sanitation in buildings, in Rural areas and fundamentals of air pollution.

COURSE OUTCOMES:

Course Outcomes	CO1	C-502.1	Explain the terms (i) Water supply scheme (ii) Per capita demand (iii) Sources (iv) conveyance of water
	CO2	C-502.2	Explain the quality and treatment of water, systems of distribution, methods of water supply and water supply arrangements in buildings
	CO3	C-502.3	Describe the basics of sanitary engineering, sewer design, laying of sewers and sewer appurtenances.
	CO4	C-502.4	Explain the methods of Sewage treatment and disposal
	CO5	C-502.5	Discuss (i) Sanitation in Building (ii) Rural water supply and Sanitation (iii) Fundamentals of air pollution.

LEARNING OUTCOMES:

Learning Outcomes	**1. Water supply scheme, Sources and conveyance of water** 1.1. Explain the importance and development of water supply 1.2. States the need for protected water supply, objectives of protected water supply scheme and draw the flow chart of a typical water supply scheme of a town. 1.3. List the factors affecting per capita demand of a town/city and state the requirements of water for various purposes: Domestic purpose, Industrial use, Firefighting, Commercial and institutional needs and public use. Explain the variation in demand for water supply. 1.4. Estimate the quantity of water required by different towns, State the need and methods of forecasting population, Solve problems on forecasting population by different methods. 1.5. State the common sources of water for a water supply scheme, different types of surface & sub surface sources of water,merits and demerits of surface and sub surface water sources,salient features of surface sources. 1.6. Define Aquifer, Aquiclude and Ground water table,classify wells according to construction,Define Draw down, Critical depression head, Circle of influence, Cone of depression, Confined aquifer, unconfined aquifer and

Specific yield, Explain the procedure for determining yield of a well by pumping tests (Constant Pumping and Recuperation Tests).

- 1.7. Explain with sketches: Infiltration galleries and Infiltration wells
- 1.8. Explain intakes for collection of water (reservoir intake, river intake, canal intake and Lake Intake) with sketches.
- 1.9. Explain different methods of conveyance of water, merits and demerits of different types of pipes, different joints used for connecting pipes with sketches, method of Pipe laying and testing.

2. Quality and purification of water

- 2.1. State different types of impurities, need for laboratory tests, explain themethod of obtaining samples for testing, different tests for analysing quality of water with their significance.
- 2.2. Define: Ecoli index and Most Probable Number (MPN), State the significance of Ecoli in water analysis, Explain the importance of chemical and bacteriological analysis of water used for domestic purpose.
- 2.3. State the various water borne diseases in India, State the maximum acceptable limits of Turbidity, Hardness, Nitrates and Fluorides for the public drinking water.
- 2.4. State the objectives of treatment of water, Sketch the layout of a water treatment plant indicating the different stages, List the points to be considered in locating a treatment plant.
- 2.5. State the objectives and explain the process of Aeration, Plain sedimentation, Sedimentation with coagulation, Filtration and Disinfection.
- 2.6. Describe different types of sedimentation tanks.
- 2.7. Describe the construction and operation of slow sand filters, Rapid sand filters and pressure filters and compares them.
- 2.8. Define disinfection of water, Explain the need for disinfecting water, methods of disinfection of water and types of Chlorination.
- 2.9. List the substances responsible for causing colour, taste and odour, Explain the temporary hardness and permanent hardness, various methods of removal of hardness.

3. Distribution system and Water supply arrangements in Buildings

- 3.1. State the requirements and classification of distribution system,explain different systems of distribution with sketches
- 3.2. List and explain the different methods of water supply system and state their merits and demerits.
- 3.3. State the necessity for service reservoirs, Draw sketches of rectangular overhead service reservoir showing all accessories.
- 3.4. Explain with sketches the different layouts in distribution system, state their merits and demerits and their suitability for a given locality.
- 3.5. List and Explains with sketches the location and functioning of various appurtenances used in a distribution system.
- 3.6. Explain methods of detecting leakages, methods of rectification and prevention of leakages in water supply mains.
- 3.7. Define terminology used while making water supply arrangements in buildings, State the principles in laying pipelines within the premises of a building.
- 3.8. Explain the general layout of water supply connections of buildings, explain water Supply arrangements for single and multi-storeyed buildings as per I.S. Code.

4.9. State the general precautions to be taken in plumbing work for buildings.

4.10. Explain the water supply connection to a building from a water main and uses of different fittings: ferrule, goose neck, stopcock.

4. Introduction to sanitary engineering and quantity of sewage

4.1. State the objectives of sewage disposal works.

4.2. Define the terms: Sewage, Sewer and Sullage,Sewerage, Refuse and Garbage

4.3. List the objectives of sewerage works and explain various methods of sewage collection works and compare them.

4.4. Explain the different sewerage systems, compare them, discus theirsuitability

4.5. State the main constituents of sewage for calculating quantity, define Dry weather flow, discuss the factors affecting, state the factors affecting the quantity of storm sewage and explain the variation in rate of sewage.

5. Laying of sewers and Sewer appurtenances

5.1. State various shapes of sewers, explain them with sketch, discuss their merits and demerits.

5.2. Mention different materials used for sewers discuss their merits and demerits.

5.3. Explain the method of laying the sewers as per given alignment, the necessity of providing sewer appurtenances on the sewer lines.

5.4. Explain the construction, function and location of the different sewer appurtenances.

5.5. State the situations under which sewage pumping is necessary,explain the component parts of a pumping station and factors influencing its location.

5.6. Explain the construction and working of Shone's ejector with the help of a sketch.

5.7. Describe the testing of sewers.

6. Characteristics of sewage, Treatment and disposal

6.1. Define strength of sewage, describe the method of sampling sewage.

6.2. State the physical, chemical and biological characteristics of sewage.

6.3. Define C.O.D and B.O.D. State the significance of tests like i) Total Solids (ii) C.O.D. (iii) B.O.D. (iv) PHValue (v) Chlorides.

6.4. State the characteristics of industrial waste water, explain the principles of treatment of industrial waste water.

6.5. State the objects of sewage treatment. Draw the conventional sewage treatment plant of a town and indicate the units.

6.6. State the function of screens, skimming tanks and grit chambers and explain their working.

6.7. Explain with sketch wherever necessary the treatment works :

	Sedimentation tank, Trickling filters, Activated sludge process, Oxidation ditch, Oxidation pond, Aerated lagoons, Anaerobic lagoons, Sludge digesters
	6.8. Compare activated sludge process and trickling filters. List out various methods of sludge disposal and briefly explain them.
	6.9. Explain with sketch the treatment of sewage by septic tank and soak pit.
	6.10. List and explain the various methods of sewage disposal.

7. Rural water supply and sanitation

7.1. Explain the process of disinfection of wells by two pot method.

7.2. Explain the methods of rural sanitation.

7.3. Describe with sketches the construction of sanitary latrines in rural areas.

7.4. State the advantages of biogas plant, factors on which the production of biogas depends, describe the construction and working of K.V.I.C. model and Janata model biogas plant with a neat sketch.

7.5. State vermi composting and explain the procedure of vermi composting and mention its advantages.

8. Air pollution

10.1 Define the term air pollution, state and explain the sources of air pollution.

10.2 Explain the effects of air pollution on human health & vegetation and on atmosphere & materials.

10.3 State methods of control of air pollution.

10.4 State various types of controlling devices and equipment.

PO-CO Mapping:

Course Code : C-502	Course Title: Environmental Engineering Number of Cos: 05				No. Of Periods: 75
PO #	**Mapped with CO #**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3, CO4, CO5	30	40	3	**> 40% Level 3 Highly addressed** **25% to 40% Level 2 Moderately addressed** **5 to 25% Level 1 Low addressed**
PO2	CO1, CO3, CO4, CO5	20	27	2	
PO3	CO2, CO3, CO4, CO5	13	17	1	
PO4	CO5	6	8	1	
PO5	CO1, CO5	6	8	1	
PO6	-	-	-	-	
PO7	-	-	-	-	

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3			2			2	3	2
CO2	3		1					2	3	2
CO3	3	2	1					2	3	2
CO4	3	2	1					2	3	2
CO5	2	1	2	1	2			2	3	2
Average	2.6	2.0	1.25	1.0	2			2	3	2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz

(vii)   Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT

1. Water Supply Scheme &Sources and Conveyance of Water

General importance of water supply –Development of Water supply–Need for protected Water supply-Flow chart of a typical water supply scheme– Total quantity of water for a town, per capita demand and factors affecting demand - Water requirements for domestic purposes, industrial use, firefighting, commercial and institutional needs, public use – Variation in demand peak demand – seasonal, daily and hourly variation– Forecasting population by arithmetical, geometrical and incremental increase methods-problems onabove methods.

Surface source Lakes, streams, rivers and impounded reservoirs – Underground sources-springs, wells, infiltration wells and galleries – Yield from wells by constant pumping and recuperation tests. (No problems required) - Comparison of surface and subsurface sources Types of intakes - Reservoir intake, River intake, Canal intake, Lake Intake - Conveyance of water-open channels, aqueduct pipes - Pipe Materials C.I Pipes, Steel Pipes, concrete pipes, A.C. Pipes, G.I. Pipes Plastic Pipes (PVC &HDPE), merits and demerits of each type - Pipe joints spigot and socket joint, flange joint, expansion joint for C.I. Pipe, joints for concrete and asbestos cement pipes - Pipe Laying and testing, Leak detection, prevention and rectification.

2. Quality and Purification of water.

Impurities of water need for laboratory test – sampling grab and composite sampling– Tests of water physical, chemical and bacteriological tests – P**H** value of water. – Standard quality for domestic use and industrial purposes - Flow diagram of different treatment units. – Aeration methods of aeration- Sedimentation plain sedimentation and sedimentation with coagulation - Filtration Construction and operation of slow sand, rapid sand and pressure filters - Disinfection of water necessity and methods of chlorination, prechlorination, break point chlorination - Colour, taste and odour control. Hardness – Types of Hardness Removal of hardness. NOTE: No design of treatment units.

3. Distribution system and water supply arrangements in a Building.

General requirements– systems of distribution - gravity system, combined system, direct pumping - Methods of supply Intermittent and continuous Storage – underground and overhead service reservoirs - necessity and accessories – Types of layout dead end, grid, radial and ring system their merits and demerits and their suitability– Location and functioning of: Sluice valves, Check valves or reflux valves, Air valves, Drain valves or blow offvalves, Scour valves, Fire Hydrants, Water meters– Water supply arrangements in building – Definition of terms; water main, service pipe, communication pipe, supply pipe, distribution pipe, air gap - General layout of water supply arrangement for single and multi-storeyed buildings as per I.S Code of practice general principles and precautions in laying pipelines within the premises of a building - Connections from water main to building with sketch - Water supply fittings, their description and uses stopcock, ferrule, goose neck etc.

4. Introduction to Sanitary Engineering and Quantity of Sewage

Object of providing sewerage works - Definition of terms : sullage, sewage, sewer and sewerage – classification of sewage - System of sewage disposal water carriage systems – Types of sewerage systems and their suitability – separate, combined and partially separate systems –Quantity of discharge in sewers, dry weather flow, variability of flow Determination of storm water flow

5. Laying of Sewers and Sewer Appurtenances

Different shapes of cross section for sewers – circular and noncircular – merits and demerits of each - Brief description and choice of types of sewers - stone ware, cast iron, cement concrete sewers and A.C Pipes - Laying of sewers setting out alignment of a sewer, excavation, checking the gradient , preparation of bedding, handling, lowering, laying and jointing, testing and back filling - Brief description, location, function and construction of Manholes, Drop manholes, Street inlets, Catch basins, Flushing tanks, Regulators, Inverted siphon - Necessity of pumping sewage location and component parts of a pumping station.

6. Characteristics of Sewage, treatment & disposal

Strength of sewage - sampling of sewage, characteristics of sewage physical, chemical and biological Analysis of sewage – significance of the following tests for (No details of tests) Solids, C.O.D, B.O.D, Ph Value, Chlorides Characteristics of Industrial waste water– principles of treatment– Reduction of volume and strength of wastewater, Equalization, Neutralization and proportioning Preliminary treatment Brief description and functions of following units Screens, Skimming tanks and Grit chambers - Primary treatment - Brief description and functions of Plain sedimentation -   Secondary treatment   Brief description of Trickling filters - Activated sludge process, Oxidation ditch, Oxidation pond, Aerated lagoons, Anaerobic lagoons Sludge digestion – Process and methods of sludge disposal - Miscellaneous treatments septic tank Sewage disposal dilution, disposal on to lands, ground water recharge, reuse etc.

7. Rural Water Supply and Sanitation

Disinfection of wells -Rural sanitation and sanitary latrines, biogas production technology brief description and operational details of biogas plants using animal waste, night soil and agricultural wastes KVIC and JANATA models merits and demerits – maintenance of biogas plant Vermi composting –procedure –advantages.

8. Air Pollution

Definition sources of air pollution – effects of air pollution – methods of Control of air pollution – Knows Air pollution control equipment.

REFERENCE BOOKS:

- Water Supply & Sanitary Engineering – Including Environmental Engineering &Pollution Control Act's, G. S. Birdie, Dhanapati Rai publishing company
- Elements of Environmental engineering, K.N. Duggal, S. Chand Publications
- Textbook of Water Supply and Sanitary Engineering, S.K. Hussain, CBS Publishers anddistributors Pvt Ltd.
- Environmental Engineering, N.N.Basak, Tata Mc Graw-Hill education
- Water Supply Engineering, Santosh Kumar Garg, Khanna Publishers

Model Blue Print

S.No	Chapter Name	Periods allocated	Weight age Of marks	Mark wise Distribution of Weight age				Question wise Distribution of Weight age				Linked with CO
				R	U	Ap	An	R	U	Ap	An	
1.	Water Supply Scheme &Sources and Conveyance of Water	12	13		3	10			1	1		C01
2.	Quality and Purification of Water	16	26	6		20		2		2		C02
3.	Distribution System	8	13	3		10		1		1		C02
4.	Introduction to Sanitary Engg. & Quantity of Sewage	6	13	3		10		1		1		C03
5.	Laying of Sewers& Sewers appurtenances	7	13	3		10		1		1		C03
6.	Characteristics of Sewage, treatment & disposal	14	16	6		10		2		2		C04
7.	Rural Water Supply and Sanitation	8	3	3				1				C05
8.	Air Pollution	4	3	3				1				C05
	Total	75	110	27	3	80		9	1	8		

Table specifying the scope of syllabus to be covered for Unit Test-I & Unit Test-II

Unit Test	Learning Outcomes to be covered
Unit Test – I	From 1.1 to 3.10
Unit Test – II	From 4.1 to 8.4

Time: 90 Minutes   Unit Test –I   Maximum Marks : 40

PART- A   16 Marks

Instructions :
      (i) Answer all questions
      (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) For an average Indian conditions, per capita consumption of water is_____lpcd. (CO1)
    (b) Yield per unit draw down is called_____   (CO1)

    (c) In water treatment plants, commonly used coagulant is_____   (CO2)

    (d) The valve which allows flow in one direction is called_____   (CO2)

2.   What is the difference between environment and ecology?   (CO1)

3.   List various surface and sub surface sources of water.   (CO1)

4.   List out the objects of sedimentation.   (CO2)

5.   What is the function of sluice valve? Draw the sketch.   (CO2)

PART- B   3 x 8 = 24 Marks

Instructions :
      (i) Answer all questions
      (ii) Each question carries EIGHT marks
      (iii)Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) Estimate the future population of the town in 2021 by Arithmetic Increase method and Incremental Increase method.   (CO1)

Year	1931	1941	1951	1961	1971	1981	1991
Population	350000	466000	994000	1560000	1623000	1839000	2430000

(OR)

(B) Describe briefly the construction and working of Infiltration wells with the help of neat sketch.   (CO1)

7. (A) Explain working of a slow sand filter with the aid of neat sketch.   (CO2)

(OR)

(B) What do you understand by "Break point chlorination" and explain with the help of diagram the significance of various stages in it.   (CO2)

8. (A) Explain "Grid iron system" with a sketch and mention the advantages and dis advantages.   (CO2)

(OR)

(B) How do you detect leakages and what are the preventive measures.   (CO2)

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State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fifth Semester : C-502 ENVIRONMENTAL ENGINEERING

<u>Time: 90 Minutes</u>   Unit Test –II   **Maximum Marks : 40**

PART- A   **16 Marks**

Instructions :
     (i) Answer all questions
     (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) Rational formula for calculation of storm water flow is given by Q =_____(CO3)
    (b) The Hydraulic mean depth of a circular sewer running half full is_____ (CO3)
    (c) The bacteria which can survive and grow both in the presence and absence of oxygen are called_____ (CO4)

(d)   The pipe which is used to prevent 416ehaviour action in drainage pipes is called

(CO5)

2. List any three objects of sewerage works.   (CO3)
3. State three advantages of Trickling filter.   (CO4)
4. What is the significance of BOD in sewage treatment?   (CO4)
5. Define Soil pipe, waste pipe, vent pipe.   (CO5)

PART- B   **3 x 8 = 24 Marks**

Instructions :
     (i) Answer all questions
     (ii) Each question carries EIGHT marks
     (iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A) what is meant by water carriage system? List the merits and demerits of it.   (CO3)
              (OR)
  (B) Explain the circular sewer with the help of a sketch and list any two merits and demerits.
              (CO3)
7. (A) Draw the flow diagram of conventional sewage treatment plant and indicate the main functions of each unit.   (CO4)
              (OR)
  (B) What do you mean by Activated sludge process? Draw the flow diagram.   (CO4)

8. (A) Sketch and Explain the working of a Septic tank.   (CO4)
              (OR)
  (B) What is meant by composting? Explain the Bangalore method and Indore method of Composting.   (CO5)
oOo

MODEL QUESTION PAPER FOR BOARD DIPLOMA EXAMINATION, (C–23)
DCE—FIFTH SEMESTER EXAMINATION
ENVIRONMENTAL ENGINEERING(C-502)

Time:3 hours]   **[TotalMarks:80**

PART—A   **3×10=30Marks**

Instructions: (1)Answer all questions.
          (2)Each question carries three marks.
           (3)Answers should be brief and straight to the point and shall not
           exceed five simple sentences.

1.   List any three factors affecting per capita demand.   (CO1)

2.   State the classification of sources of water   (CO2)

3.   Define Sedimentation.   (CO2)

4.   List the methods of distribution.   (CO2)

5.   Define Dry weather flow.   (CO3)

6.   Draw the sketch of drop manhole.   (CO3)

7.   List any three objects of treatment of sewage.   (CO4)

8.   Define the terms COD and BOD.   (CO4)

9.   What are the different methods of testing drains?   (CO5)

10.   What are the sources of air pollution?   (CO5)

PART–B   **5x10=50 marks**

11) Explain the canal intake with a legible sketch   (CO1)

12) Explain the construction and operation of slow sand filter   (CO2)

13) Explain any two systems of water distribution with sketches.   (CO2)

14. Sketch And explain a typical water supply connection to a building   (CO2)

15. Explain types of sewerage systems and their suitability   (CO3)

16. Explain the construction and working of a Man hole   (CO3)

17. Explain construction and working of Trickling filter with a neat sketch.   (CO4)

18. Explain method of sewage disposal on land and water.   (CO4)

QUANTITY SURVEYING

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-503	Quantity Surveying	05	75	20	80

S. No.	Major Topics	No. of Periods	COs Mapped
1	Introduction, Units and Specifications	05	CO1
2	Detailed Estimates of Buildings	28	CO2
3	Analysis of Rates and Abstract Estimates	16	CO2
4	Earthwork Calculations	10	CO3
5	Detailed estimates of Roads and Culverts and Public Health Engineering works	16	CO4
	TOTAL	75	

COURSE OBJECTIVES:

Upon completion of the Course, the student shall be able to		
Course Objectives	(i)	Familiarize with the fundamentals of quantity surveying, cost estimating & specifications
	(ii)	Prepare detailed estimates and abstract estimates for buildings , Detailed Estimates of Roads and Culverts and Public Health Engineering works
	(iii)	Calculate the volumes of earthwork and reservoir capacities

COURSE OUTCOMES:

Course Outcomes	CO1	C-503.1	Explain the basic concepts of Quantity Surveying, Units and Specifications
	CO2	C-503.2	Prepare Lead statement, Data Sheet, Detailed and Abstract estimates for the given Civil Engineering Structure
	CO3	C-503.3	Compute the volumes of earth work and reservoir capacity
	CO4	C-503.4	Prepare detailed estimates of quantities required for construction of Roads and Culverts and public health engineering structures.

LEARNING OUTCOMES:

Learning Outcomes	**1.0 Introduction, Units and Specifications**
	1.1 Define:
	    a) Quantity Surveying
	    b) Estimate
	1.2 State the need for quantity surveying
	1.3 List different types of estimates
	1.4 Explain the need for different estimates
	1.5 Distinguish among element of structure, item of a work & materials of construction
	1.6 List the duties of Quantity Surveyor
	1.7 State the units of measurements, data and payment for different items of work and materials using IS: 1200
	1.8 State two types of taking out measurement.
	1.9 Explain Centre Line Method & Long and Short Wall Method
	1.10 Explain the process of taking measurements for different works and tolerances
	1.11 Define specifications
	1.12 State the need for specifications
	1.13 List different types of specifications
	1.14 State the general specifications for important items of work
	1.15 Prepare approximate estimates for residential and non-residential buildings with given data of size/capacity and rates considering cost of building services and other over heads
	1.16 Explain 'Detailed Estimate' and 'Abstract Estimate'
	1.17 Differentiate between 'Detailed estimate' and 'Abstract estimate'
	    1.18 Write formats of detailed estimate and abstract estimate
	
	2.0 Detailed estimates of buildings
	2.1 State the information required for preparation of detailed estimates of a building
	2.2 Prepare the detailed estimates for various buildings from the given drawings, specifications and site conditions:
	    a) Compound wall and Steps
	    b) Single Room with Verandah (Load bearing structure)
	    c) Single storied Residential building with one / two bed room (1 BHK and 2 BHK) (Load bearing structure)
	2.3 Prepare the estimation for various elements of a steel roof truss for an Industrial building
	2.4 Prepare the estimation of a Septic tank with Soak pit.
	3.0 Analysis of Rates and Abstract estimates
	3.1 Define analysis of rates
	3.2 Explain the purpose of analysis of rates
	3.3 Explain the following in rate analysis:
	    a) Standard data book
	    b) Standard schedule of rates
	    c) Standard data sheet
	3.4 Explain the following terms:
	    a) Blasting charges

b) Seigniorage charges
c) Cess charges
d) Stacking charges
e) Water charges
f) Crushing charges
g) Lead charges
h) Area allowances on labour component
i) Loading and Unloading charges for material
j) Overhead charges

3.5 Explain cost of material at source and site
3.6 Define lead statement, write the format for Lead Statement, Prepare Lead Statement for different materials
3.7 List different types of labour wages as per latest SSR
3.8 Prepare the data sheet for finished items of works using standard data and SSR
3.9 Tabulate the material requirement of mortars and concrete of different proportions
3.10 State different items involved in Abstract estimation of a building

4. Earth work Calculations

4.1 Explain terms:
   a) Embankment
   b) Cutting
   c) Volume of earth work
4.2 Define the terms: a) Lead b) Lift
4.3 State the standard values of 'Lead' and 'Lift'
4.4 Calculate the lead and lift for a given section
4.5 List different methods of computing the areas and volumes
4.6 Explain:
   a) Mean sectional area method
   b) Mid sectional area method
   c) Trapezoidal rule
   d) Prismoidal rule
4.7 State the limitations of Prismoidal rule
4.8 Compute the volumes of an embankment for a given data
4.9 Compute the volumes of a cutting for a given data
4.10 Prepare detailed estimates for earth work for roads, canals and earthen bunds
      Compute gross and effective capacity of a reservoir from the areas of different elevations

5.0 Detailed estimates of roads and culverts and Public Health Engineering works

5.1 Prepare a detailed estimate for different types of roads
5.2 Prepare a detailed estimate for (a) Pipe culvert (b) Slab culvert
5.3 Prepare a detailed estimate for the following items:
   a) Open well
   b) R.C.C. Square/Rectangular overhead tank
   c) Sanitary block
5.4 State the items to be included in the abstract estimates of above structures

PO-CO Mapping:

Course Code: C-503	Course Title: QUANTITY SURVEYING-I No of COs : 4				No. of periods: 75
POs	**Mapped with CO No**	**CO Periods Addressing PO in Col 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3, CO4	20	27	2	>40% Level 3
PO2	CO1, CO2, CO3, CO4	55	73	3	(Highly Addressed)
PO3					25% to 40% Level 2
PO4					(Moderately Addressed)
PO5					5% to 25% Level 1
PO6					(Low Addressed)
PO7					<5% (Not Addressed)

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2						3	3	3
CO2	2	3						3	3	3
CO3	2	3						3	3	3
CO4	2	3						3	3	3
Average	2.25	2.75						3	3	3

Note: The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits ..etc.

COURSE CONTENT:

1. **Introduction, Units and specifications**

   Quantity surveying – Definition of estimate – Need for estimation – Types of estimates – Approximate estimate – Detailed estimate – Abstract estimate – Duties of Quantity Surveyor – Elements of a structure – Item of Work – Materials of construction – Line diagram for preparation of abstract estimate

   Units of measurements for various items of civil engineering works as per IS: 1200 - Degree of accuracy in measurement – Deductions for openings in masonry, R.C.C. and Plastering – Painting coefficients

   Different Methods of taking out quantities – Centre Line Method – Long and Short Wall Method - Specifications – Necessity – Types of specifications – General specifications of: Earth works, Brick/Stone Masonry with C.M, Reinforced Cement Concrete, Plastering with C.M, Floor finishes with ceramic tiles and marbles and White washing/Colour washing

Abstract Estimate - Definitions – Formats for detailed and abstract estimates - Preliminary or Approximate Estimate – Plinth area method – Cubic rate method – Service Unit method - Problems on Preliminary estimates (plinth area method only)

2. **Detailed estimates of buildings**

Compound wall and steps - Single Room with verandah - Single Storied Residential building with one bed room (1 BHK) - Single Storied Residential building with two bed rooms (2 BHK) - Estimation of a steel roof truss - Septic tank with soak pit

3. **Analysis of Rates and Abstract Estimates:**

Cost of materials at source and at site - Standard Schedule of Rates of different materials in buildings works - Types of labour – Wages as per S.S.R - Lead and Lift – Preparation of Lead Statement - Data Sheets – Standard data for materials and labour components for different items of work - Preparation of unit rates for finished items of works using Standard data and S.S.R. - Methods of calculating quantities of ingredients of various proportions of cement concrete.- Provisions for different building services and other overhead charges - Prepare abstract estimate for Single bedroom building (1 BHK), Two bedroom building with verandah (2 BHK).

4. **Earth Work Calculations**

Lead and Lift – Initial and subsequent values - Mid-Ordinate Method – Mean Sectional Area Method – Trapezoidal Rule – Prismoidal Rule for computing volumes in level sections for roads and Canals - Taking out quantities from Longitudinal Section and Cross Section in cutting and embankment of level sections - Capacity of Reservoir from the table of areas and contours

5. **Detailed estimates of roads and culverts, and public health engineering works**

Gravel Road – Water bound macadam road – Surface dressing with bitumen – Cement concrete road – Pipe culvert – R.C.C. slab culvert with i) straight returns – Different items in abstract estimate (Labour charges, Traffic diversion etc.)

Open well with masonry staining – R.C.C. Rectangular/square overhead tank – Sanitary block – Different items to be included in the abstract estimates of the above

REFERENCE BOOKS:

1. Estimating and Costing in Civil Engineering by B.N. Dutta -CBS Publishers and Distributors Pvt Ltd
2. Estimating and Costing by S. C. Rangwala, Charotar Publishing House Pvt Ltd
3. Estimating Construction Costs by Robert L. Peurifoy & Garold D. Oberlender –McGraw-Hill Education

Model Blue Print

S. No.	Major Topics	No. of periods	Weightage of marks	Marks wise Distribution of Weightage				Question wise Distribution of Weightage				COs Mapped
				R	U	Ap	An	R	U	Ap	An	
1.	Introduction, Units and Specifications	05	06	06	--	--	--	2	-	-	--	CO1
2	Detailed Estimates of Buildings	28	26	--	06	20	--	--	2	2	--	CO2
3.	Analysis of Rates and Abstract Estimates	16	26	--	06	20	--	--	2	2	--	CO2
4.	Earthwork Calculations	10	26		06	20	--	--	2	2	--	CO3
5.	Detailed estimates of Roads and Culverts and Public Health Engineering works	16	26	--	06	20	--	--	2	2	--	CO4
	Total	75	110	06	24	80	--	2	8	8	--	

TABLE SPECIFYING THE SCOPE OF SYLLABUS TO BE COVERED FOR UNIT TEST-I & II

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.3
Unit Test-II	From 3.4 to to 5.4

Model Paper for Unit Test-I:

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fifth Semester: C-503 QUANTITY SURVEYING

Time: 90 Minutes   Unit Test –I   Maximum Marks: 40

PART- A   **16 Marks**

Instructions:
    (i) Answer all questions
    (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.(i) The preparation of bills for the payment is not one of the duties of quantity
    surveyor (True/False)   (CO1)
  (ii) The reinforcement in R.C.C. is measured in kN. (True/False)   (CO1)
(iii) Area of ceiling plastering is equal to the following areas
        (a) Area of plastering of internal walls
        (b) Area of flooring
        (c) Area of plastering of parapet wall
        (d) Area of plastering of external wall   (CO2)
  (iv) The order of booking dimensions is
        a) Length, breadth, height
        b) Breadth, length, height
        c) Height, breadth, length
        d) None of the these   (CO2)
2. State any three rules in calculating the plinth area of a building   (CO2)
3. State units of measurements for   (i) Plastering (ii) R.C.C in beams
                                         (iii) R.C.C. Sunshades   (CO1)
4. A room has 6·0 m × 3·5 m internal dimensions with 300 mm wall thickness. The basement has a cross-
   section of 400 mm width and 600 mm height. Calculate (a) plinth area and (b) brick masonry in CM
   (1:8) in basement.   (CO2)
5. The internal dimensions of a room are 6m × 4 m. Find the quantity of sand filling in basement, if the
   height and width of basement are 0.8 m and 0.4 m respectively. The wall thickness of room is 0.30 m.
                                                                            (CO2)

PART- B   **3 x 8 = 24 Marks**

Instructions:
    (i) Answer all questions
    (ii) Each question carries EIGHT marks
    *(iii) Answer should be comprehensive and the criterion for valuation is the content but not
        the length of the answer.*

6. (A) Prepare the detailed estimate for the following items of works from Drawing No.1
                a. Earth work in excavation
                b. R.C.C. (1:1 ½ :3) for roof slab.   (CO2)

Plan

Section of Wall

Reference:
Door D 1000 x 2000 mm
Window W 1000 x 1250 mm
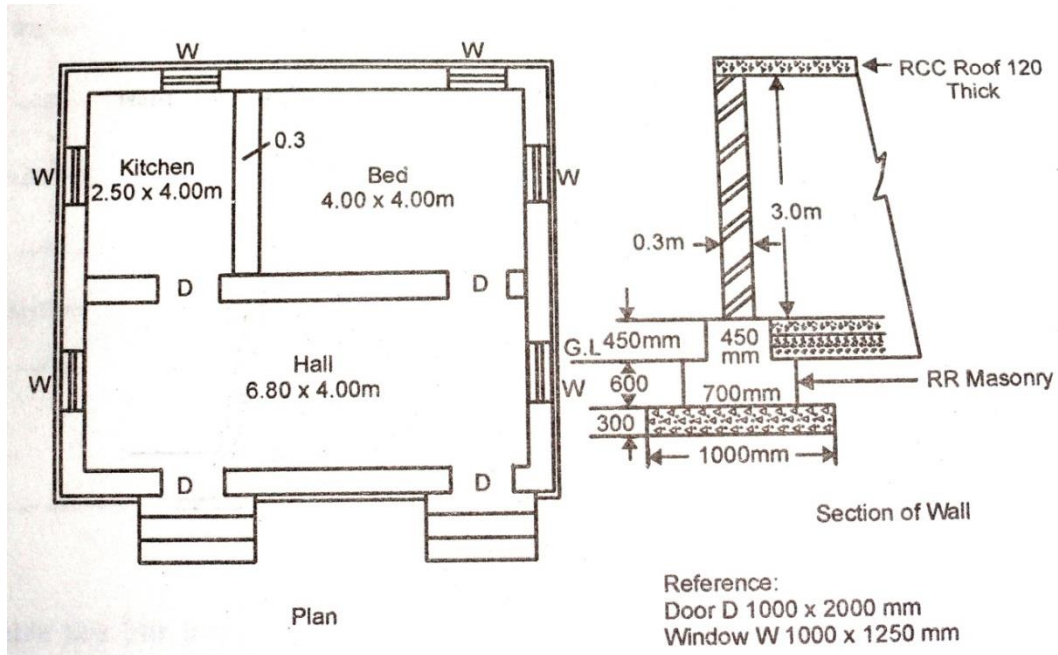
Drawing No.1

(OR)

(B) Prepare the detailed estimate for the following items of works from Drawing No.1
        a. Sand filling in basement
        b. Ceiling plastering   (CO2)

7. (A) Explain briefly the 'long-wall & short-wall method' and 'central line method' mentioning the advantages of each one.   (CO2)

(OR)

(B) Briefly explain any two methods of Approximate Estimate.   (CO2)

8. (A) Find the cost of the following items of work from the lead statement and labour charges given

below:

    a) Cost of 1 cum of C.C. (1:4:8)
    b) Cost of 1 cum of brick masonry in CM (1:6)

C.C (1:4:8):

Unit	1 Cum
40 mm HBG	0.92 cum
Sand	_____
Cement	_____
Masons	0.2 Nos.
Men Mazdoors	1.8 Nos.
Women Mazdoors	1.4 Nos.
Sundries	L.S.

Brick masonry in C.M. (1:6):

Unit	1 Cum
Bricks	512 Nos.
CM(1:6)	0.2 cum
Masons	1.4 Nos.

Men Mazdoors	0.7 Nos.
Women Mazdoors	2.1 Nos
Sundries	L.S.

Lead statement of materials:

S. No.	Material	Cost at source (Rs.)	Lead in km.	Conveyance charges	Seigniorage charges
1.	40 mm. HBG metal	110.00/cum	10	3.00/cum/km	4.50
2.	Sand	45.00/cum	6	2.50/cum/km	3.50
3.	Bricks	1600.00/1000 Nos.	8	5.50/1000 Nos./km	--
4.	Cement	5000.00/1 MT at site			

Labour charges:

I class masons	-	Rs.100.00 per day
II class masons	-	Rs.90.00 per day
Mazdoors	-	Rs.55.00 pr day

Mixing charges of CM- Rs.20.00 per cum.   (CO2)

(OR)

(B) Find the cost of the following items of work from the lead statement and labour charges given below:

     a)   CR masonry in CM (1:6) in superstructure for 1 cum

Unit	1 Cum
Stones	1.25 cum
Mortar	0.42 cum
Masons	1.2 Nos.
Men Mazdoors	0.7 Nos.
Women Mazdoors	2.6 Nos.
Sundries	L.S.

     c)   Plastering with Cement mortar (1:6) for 10 sq. m

Unit	1 Cum
Cement	0.046cum
Sand	0.28 cum
Masons	0.8 Nos.
Men Mazdoors	1.8 Nos.
Sundries	L.S.

Lead statement of materials:

S.No.	Material	Cost at source	Lead in km.	Conveyance charges	Seigniorage charges
1.	40 mm. HBG metal	110.00/cum	10	3.00/cum/km	4.50
2.	Sand	45.00/cum	6	2.50/cum/km	3.50
3.	Bricks	1600.00/1000 Nos.	8	5.50/1000 Nos./km	--
4.	Cement	5000.00/1 MT at site			

Labour charges:

Masons	-	Rs.90.00 per day
Man mazdoors	-	Rs.65.00 per day
Woman mazdoors	-	Rs.60.00 pr day

                                                                (CO2)

Model Paper for Unit Test-II:

State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fourth Semester: C-503 QUANTITY SURVEYING

Time: 90 Minutes   Unit Test –II   Maximum Marks: 40

PART- A   **16 Marks**

Instructions:
   (i) Answer all questions
   (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1 (i) The assumption on which the trapezoidal formula for volumes is based
   a.) The end sections are parallell planes
   b.) The mid area of a pyramid is half the average area of the ends
   c.) The volume of prismoidal is over estimated and hence a prismoidal correction is applied.
   d.) All of the above.

  (ii) If the formation level of an highway has a uniform gradient for a particular length and the ground level is having a longitudinal slope, the earth work may be calculated by   (CO4)
   (a) Mid-sectional formula
   (b) Trapezoidal formula
   (c) Prismoidal formula
   (d) All the above

 (iii) If 'b' is the bottom width, 'd' is the depth of cutting and '1 in n' is the side slope of a canal, then the top width is given by_____   (CO4)

 (iv) The storage of reservoir between bed level and sluice sill level is called
   (a) Gross storage
   (a) Effective storage
   (b) Dead storage
   (c) Any of the above   (CO4)

2. A cement-concrete pavement 150 mm thick and 6.20 m wide is laid over a base course 100 mm considering a length of 1200 m. Calculate the following quantities: (a) CC requiredfor pavement (b) CC required for base course (CO3)

3.Prepare the detailed estimate of granular shoulders, on either side of the WBM road of 800 m.The width of shoulder is 1.00 m. The compacted thickness is 100 mm and loose thickness is 116 mm.   (CO3)

4. Explain the terms lead and lift for the formation of roads and give the values of initial lead and initial lift.   (CO4)

5. The depths at two ends of an embankment of a road of length 80 m are 2·5 m and 3·4 m. The formation width and side slopes are 12 m and 2:1 respectively. Estimate the quantity of earthwork by mid sectional area method.   (CO4)

Instructions:
(i) Answer all questions
(ii) Each question carries EIGHT marks
(iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

6. (A)A road is to be formed in embankment with the following data

Chainage in m	0	30	60	90	120	150	180
R.L. of ground	98.20	98.40	97.70	97.50	98.10	98.40	98.50

Formation width of road is 12 m. Side slopes of embankment are 1½:1. The formation level may be taken as 100.00 throughout the length of road. The ground in transverse direction is level. Calculate the quantity of earth work by
   i.   Trapezoidal formula
   ii.   Prismoidal formula   (CO4)

(OR)

(B) The ground levels along the ridge of proposed canal area are shown below:

Station	A	B	C	D	E	F	G
Ground Levels	252.00	252.15	251.70	251.75	251.95	251.85	252.00

The bed of the canal is 4.0 m wide and sloped 1 in 100 downwards in longitudinal direction. The side slopes are 2:1 and the bed level of canal at A is 250.00. Determine the volume of the earth work in cutting, if the chainage between the points is 20 m by (a) Trapezoidal Rule   (b) Prismoidal Rule   (CO4)

7. (A) From the particulars of a reservoir given below, calculate the live and surplus capacity of the reservoir   (CO4)

Contour level in m.	Contour areas in m^2	Particulars
110	17000	Bed level of reservoir
120	22000	-
130	29000	Sill of sluice
140	32000	-
150	68000	-
160	122000	F.T.L.
170	131000	M.W.L

(OR)

(B) From the particulars of a reservoir given below, calculate the capacity of reservoir

between the sill level and MWL using Prismoidal and Trapezoidal rule   (CO4)

Contour level in m.	Contour areas in m²	Particulars
40.00	1500	Bed level of reservoir
42.00	2800	-
44.00	4200	Sill of sluice
46.00	6500	-
48.00	9500	-
50.00	12000	F.T.L.
52.00	15000	M.W.L

8.(A) Prepare the detailed estimate for the following items of work for the
R.C.C. overhead tankshown in the following figure   (CO4)
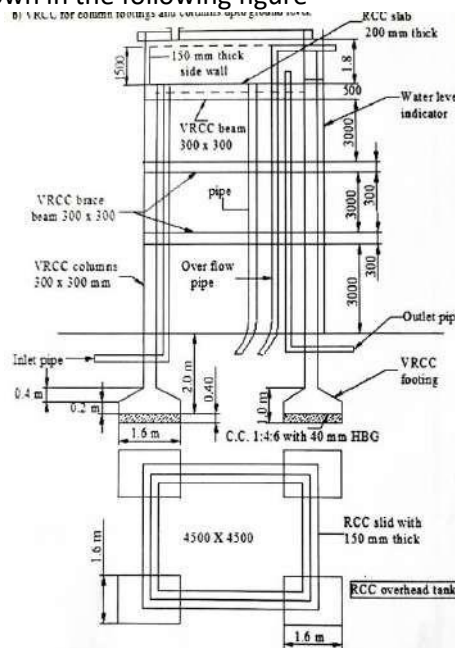
(OR)

(B) Calculate the following quantities of WBM road shown in the fig.5 for a length of

1.50 km:

    i.   Collection of 65 mm HBG for base course.

    ii.   Spreading of 40 mm HBG for wearing course.

Wearing Course : 40mm Size HBG Metal
100mm Thick Compacted to 75mm Thick

0.875m
1.00m
3.75m
1.00m
0.875m

2:1

0.50m

2:1

0.50m

4.00m

7.50

Earthern Formation:

G

9.50m

Granular Shoulders 100mm Thick
Loose Compacted to 75mm thick

Granular Sub Base 225mm Thick
Loose Compacted to 150mm Thick

Fig.5   (CO3)
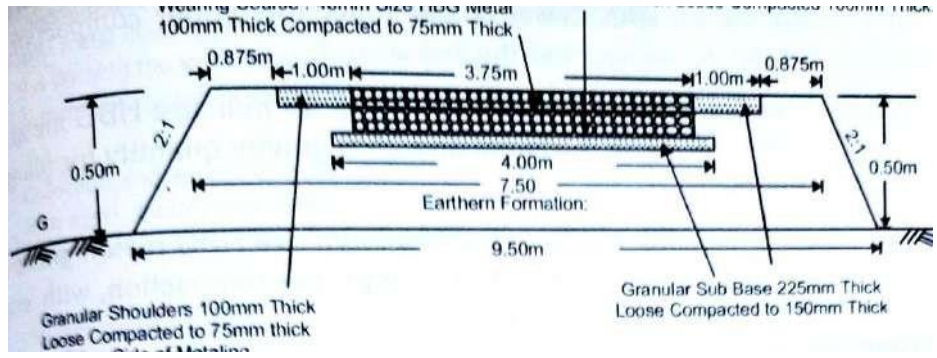
MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C–20)
DCE—FOURTH SEMESTER EXAMINATION
QUANTITY SURVEYING-I (C-403)

Time: 3 hours]   [Total Marks: 80

PART—A   **3×10=30 Marks**

Instructions: **(**1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not
exceed *five* simple sentences.

1. State units of measurements for (i) Plastering
   (ii) R.C.C.
   (iii) Earth work in excavation
   (iv) Flooring.   (CO1)

2. List various types of "Approximate Estimates"   (CO1)

3. A room has 5.4 m x 3.2 m internal measurements with 300 mm thick wall.
   The basement has a cross section of 400 mm wide and 600 mm deep.   (CO2)
   Calculate (a) Brick masonry in CM (1:6) for basement
   (c) Internal area of plastering

4. A room of size 4m x 5m with wall thickness of 230 mm is provided with an R.C.C. roof slab of 150 mm thick. The slab is projected by 300 mm all-round the building. Calculate the quantity R.C.C. in slab.   (CO2)

5. Determine the quantity of cement required for 5 cum of R.C.C. 1: 2: 4 using
   20 mm HBG metal.   (CO2)

6. Write short notes on the following: (a) Seigniorage charges (b) Cess charges   (CO2)

7. Explain the terms lead and lift for the earth work and give the values of
   initial lead and lift.   (CO3)

8. Calculate quantity of earth work for a road, given formation width is 15 m,
   side slopes are 2:1, depth of embankment at ends is 3.1 m and 4.4 m and
   length of the road is 1200 m. by mean sectional area method.   (CO3)

9. A cement concrete pavement 150 mm thick and 6.20 m wide is laid over a base course 100 mm considering a length of 1200 m. Calculate the quantity of C.C. required for pavement   (CO4)

10. The cross section of a circular well is shown in the fig.1, calculate the quantity of masonry in parapet wall.
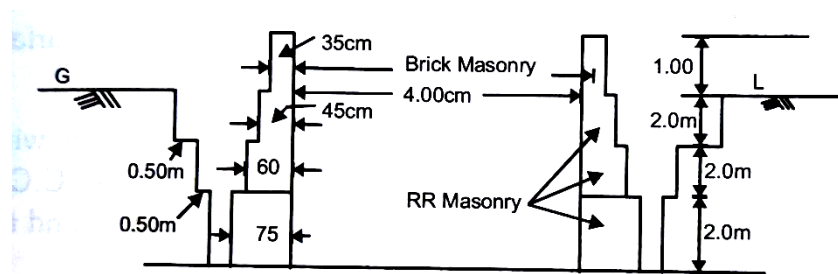
Fig.1   (CO4)

Instructions:

    i)   **Answer any FIVE questions**

    ii)   **Each question carries TEN marks.**

    iii) **Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.**

11.   A) Prepare the detailed estimate for the following items of works from the fig.1 (CO2)

    i. Brick masonry in CM (1:6) in super structure   -- 5 marks

    ii. White washing in two coats for internal walls   -- 5 marks
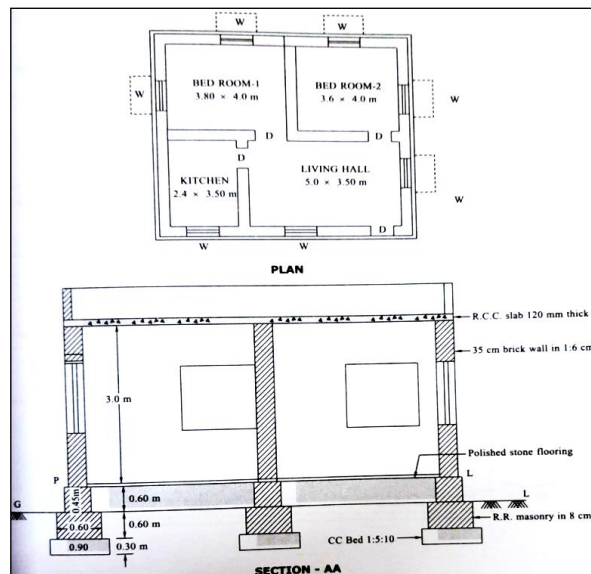
Fig.1   (CO2)

12. Prepare the detailed estimate for the following items of works from the fig.1   (CO2)

    a) Ceiling Plastering with CM (1:5)   -- 5 marks

    b) R.C.C. (1:2:4) in lintels   -- 5 marks

13. Find the cost of the following items of work from the lead statement and labour charges given below:

    CR masonry in CM (1:6) in superstructure for 1 cum   (CO2)

Unit	1 Cum
Stones	1.25 cum
Cement Mortar	0.42 cum
Masons	1.2 Nos
Men mazdoors	0.7 Nos.
Women mazdoors	2.6 Nos.
Sundries	L.S

14.   Find the cost of the following items of work from the lead statement and labour charges given below:

    Plastering with Cement mortar (1:6) for 10 sq.m   (CO2)

Unit	1 Cum
Cement	0.046 cum
Sand	0.28 cum
Masons	0.8 Nos
Men mazdoors	1.8 Nos.
Sundries	L.S

Lead statement of materials:

S. No	Material	Cost at Source (Rs.)	Lead in km	Conveyance charges	Seiniorage charges
1	40 mm. HBG metal	110.00/cum	10	3.00/cum/km	4.50
2	Sand	45.00/cum	6	2.50/cum/km	3.50
3	Bricks	1600.00/1000 Nos.	8	5.50/1000 Nos./km	--
4	Cement	5000.00/1 MT at site	--		

Labour charges:

Masons   -   Rs.90.00 per day

Man mazdoor   -   Rs.65.00 per day

Woman mazdoor   -   Rs.60.00 pr day

15. A road is to be formed in embankment with the following data

Chainage in m	0	30	60	90	120	150	180
R.L. of ground	98.20	98.40	97.70	97.50	98.10	98.40	98.50

Formation width of road is 12 m. Side slopes of embankment are 1½:1. The formation level may be taken as 100.00 throughout the length of road. The ground in transverse direction is level. Calculate the quantity of earth work by

   iii. Trapezoidal formula

   iv. Prismoidal formula   (CO3)

16. From the particulars of a reservoir given below, calculate the live and surplus capacity of the reservoir

Contour level in m.	Contour areas in m^2	Particulars
110	17000	Bed level of reservoir
120	22000	-
130	29000	Sill of sluice
140	32000	-
150	68000	-
160	122000	F.T.L.
170	131000	M.W.L

                                                               (CO3)

17. Prepare the detailed estimate for the cement concrete road of 1 km length with the following components (Fig.4)
    i.   Base course of CC (1:4:8) with 40 mm size HBG metal 150 mm thick
    ii. Wearing coat with CC (1:2:4) with 20 mm size HBG metal 100 mm thick.
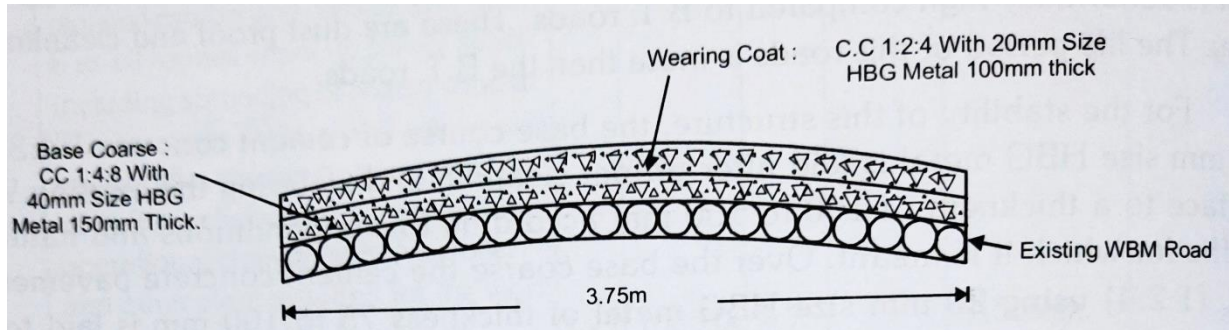
Fig.4   (CO4)

18. Calculate the following quantities of WBM road shown in the fig.5 for a length of 1.50 km:
    i.   Collection of 65 mm HBG for base course.
    ii. Spreading of 40 mm HBG for wearing course.
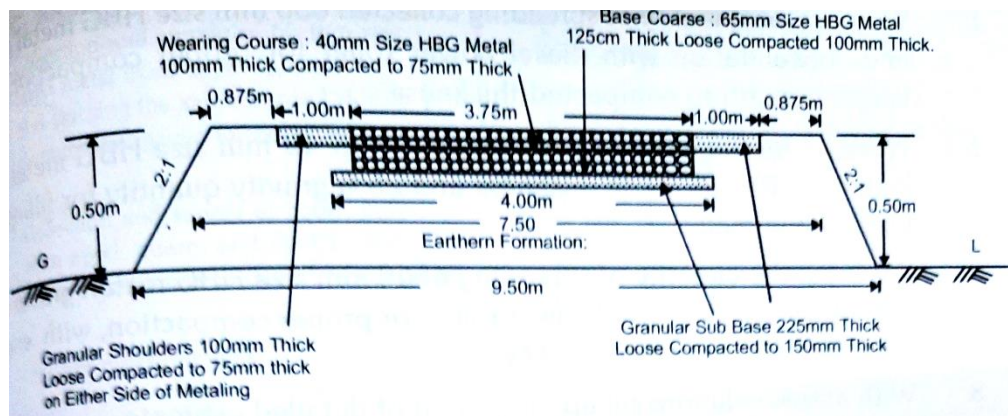
Fig.5   (CO4)

Advanced Civil Engineering Technologies

Course code	Course title	No. Of period/week	Total no. Of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-504	Advanced Civil Engineering Technologies	04	60	20	80

S.No.	Major Topics	No. Of periods/week	CO's Mapped
1	IOT Applications in Civil Engineering	12	CO1
2	Prestressed concrete	12	CO2
3	Advanced methods in Earth retaining	10	CO3
4	Pre-fabricated Building Technology	10	CO4
5	Concepts of Green Buildings	10	CO5
6	Solar Energy Utilization in buildings	06	CO5
	Total	60	

COURSE OBJECTIVES:

Upon completion of the course, the student shall be able to	
COURSE OBJECTIVES	(i) Know the smart technologies, understand Prestressed Concrete, Advanced methods in Earth Retaining Structures
	(ii) Understands Prefabricated building technology, the concepts of Green Buildings and Solar utilisation in buildings

	CO1	Knows the IOT applications in CIVIL Engineering
	CO2	Learns about the Prestressed concrete
Course Outcomes	CO3	Knows the Advanced methods in Earth retaining structures
	CO4	Understands Prefabricated building technology
	CO5	Explains the concept of Green buildings and Solar energy utilization in buildings

COURSE OUTCOMES

LEARNING OUTCOMES

Learning Outcomes	1. **IOT Applications in Civil Engineering**
	  1.1 Understand the overview of Internet of Things (IoT)
	    1.1.1 Define the term IoT
	    1.1.2 State the working principle of IoT.
	    1.1.3 List the key features of IoT
	    1.1.4 List the components of IoT (hardware, software, technology and protocols)
	    1.1.5 List the advantages and disadvantages of IoT
	  1.2 Understand the applications of IoT in various fields of Civil engineering
	    1.2.1 Mention the application of IoT in Smart Cities
	    1.2.2 State the application of IoT in Smart Energy and the Smart Grid
	    1.2.3 Mention the application of IoT in Smart Transportation and Mobility
	    1.2.4 State the application of IoT in Smart Home, Smart Buildings and Infrastructure
	    1.2.5 Mention the application of IoT in Smart Factory and Smart Manufacturing
	    1.2.6 Mention the application of IoT in Smart Health
	    1.2.7 Mention the application of IoT in Food and Water Tracking and Security
	    1.2.8 Mention the application of IoT in Social Networks Chain Surveying
	2.0 **Prestressed concrete**

2.1 Understand fundamental principles of prestressed concrete, systems and types of Prestressing, merits and demerits

2.2 State the materials and permissible stresses

2.3 List the losses of prestress

2.4 Explain the methods of 1. Pre stressing and 2. Pretensioning system 3.Posttensioning systems

3.0 Advanced methods in Earth retaining structures

3.1 Understand the concepts of advanced earth retaining structures

3.2 list the advantages of advanced earth retaining structures

3.3 List and explain the methods of advanced earth retaining structures – reinforced anchored earth wall – geogrids – geomats

4.0 Pre-fabricated building technology

4.1 State alternatives for cast in-situ structures

4.2 Understand pre fabrication technology

4.3 State Importance for standardisation and modularisation

4.4 State the pre-fabricated structures – explain their utility

4.5 State advantages of the pre-fabricated structures

4.6 State Materials used in pre-fabricated elements and explain their suitability for various climatic conditions

4.7 Explain types of pre-fabricated systems – large panel systems - frame systems – slab /column systems with walls – mixed systems

5.0 concepts of Green buildings

5.1 State the terms and definitions: (a) Climate (b) weather (c) Global worming (d) Climate change (e) Sustainability (f) Carbon Foot Print (g) Carbon Credit h) Embodied energy i) Green building rating

5.2 Need of Green Buildings in present scenario

5.3 Objectives of Green Buildings

5.4 Importance of Green buildings

5.5 Benefits of Green buildings

5.6 Features of Green buildings

5.7 Merits and Demerits of Green buildings

5.8 Green Building Rating system

5.9 Fundamental Principles of Green buildings

  5.9.1 State the importance of Geographical Location of Buildings

  5.9.2 Understand the concepts of Site Management with respect to Green Buildings

  5.9.3 Explain the Materials/Alternate materials/Transport Foot Print

  5.9.4 State the importance of Water conservation

  5.9.5 Explain various alternative Construction Practices

  5.9.6 Discuss the Post construction energy usage

  5.9.7 Explain Waste management recycling and reuse

  5.9.8 Know the importance of green cover in built environment

6.0 Solar energy utilization in buildings

6.1 Explain the active and passive concepts in heating and cooling

	6.2 List the various solar energy utilities like solar water heaters, solar air heaters, solar cookers, lighting and water pump sets and solar PV panels

Course Code : C-504	Course Title: Advanced Civil Engineering Technologies Number of COs: 05				No. of Periods: 60
POs	**Mapped with CO Nos**	**CO Periods addressing PO in Col. 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3, CO4, CO5	16	27	2	> 40% Level 3
PO2	CO1, CO2, CO3, CO4, CO5	10	16	1	Highly addressed
PO3	CO1, CO2, CO3, CO4, CO5	8	13	1	25% to 40% Level 2
PO4	CO1, CO2, CO3, CO4, CO5	16	27	2	Moderately
PO5	CO1, CO2, CO3, CO4, CO5	9	14	1	addressed
PO6					5 to 25% Level 1
PO7	CO1, CO2	1	3		Low addressed

CO Mapping with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	-	3	2	-	3
CO2	1	1	-	2	2	-	3
CO3	3	2	1	2	1	-	-
CO4	3	1	2	2	1	-	-
CO5	3	2	1	2	1	-	-
Average	2.2	1.6	1.33	2.2	1.4	-	3

TABLE SPECIFYING THE SCOPE OF SYLLABUS TO BE COVERED FOR UNIT TEST-I & II

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 3.3
Unit Test-II	From 4.1 to to 6.2

COURSE CONTENT

1. IOT Applications in Civil Engineering
Overview of IoT - Define IoT, how IoT work, key features of IoT, components of I o T :
Hardware, Software, Technology and Protocols, advantages and disadvantages of IoT - IoT
Applications - Smart Cities, Smart Energy and the Smart Grid, Smart Transportation and
Mobility, Smart Home, Smart Buildings and Infrastructure, Smart Factory and Smart
Manufacturing, Smart Health, Food and Water Tracking and Security, Participatory
Sensing, Social Networks

2. Prestressed Concrete
 Introduction – Basic principles – Systems of prestressing – Types of prestressing
Advantages and Disadvantages - Requirements of steel and concrete for prestressed concrete-
Losses of Prestress - Tensioning devices – Method of Prestressing – Pretensioning system – Post
tensioning systems – Freyssinet, Magnel - Blaton, Gifford Udal and LeeMcal

3.Advanced methods in Earth retaining structures
Concept of advanced earth retaining structures- Advantages of advanced earth retaining
structures- Methods of advanced earth retaining structures –Reinforced anchored earth wall
Geogrids-geomats

4. Pre fabricated building technology
Alternatives for cast in-situ structures- pre fabrication technology- Importance for
standardisation and modularisation - pre fabricated structures – explain their utility - advantages
of the pre-fabricated structures - Materials used in pre fabricate elements and explain their
suitability for various climatic conditions - types of pre-fabricated systems – large panel systems
- frame systems – slab /column systems with walls – mixed systems

5. Concepts of Green Buildings:
Terms and definitions-Climate, weather, Global warming, Climate change, Sustainability, Carbon
Foot Print, Carbon Credit, Embodied energy, Green building rating - Need of Green Buildings in
present scenario - Objectives of Green Buildings - Importance of Green buildings - Benefits of
Green buildings - Features of Green buildings - Merits and Demerits of Green buildings - Green
Building Rating system - Fundamental Principles of Green buildings - State the importance of
Geographical Location of Buildings - Understand the concepts of Site Management with respect
to Green Buildings - Explain the Materials/Alternate materials/Transport Foot Print - State the
importance of Water conservation - Explain various alternative Construction Practices - Discuss
the Post construction energy usage - Explain Waste management recycling and reuse - Know the
importance of green cover in built environment

6. Solar Energy Utilization in Building

Active - Passive concepts of solar Heating and cooling - Solar energy utilities – water heaters, air heaters, cookers, lighting and water pump Sets - Roof top Solar power generation systems

REFERENCE BOOKS:

1. **N.Kishnam Raju, Prestressed Concrete, Mc Graw Hill, New Delhi**
2. **Braja M Das, Fundamentals of Geotechnical Engineering**
3. **CBRI Building Materials and Components, NPTEL Lecture 31**
4. **Prof shiva Kumar Babu, Reinforced Soil Retaining Walls, Designs and construction.**
5. **Dr. R. Sarvanan, Prefabricated Structures, Laxmi Publications**
6. **G. Hari Hara Iyer, Green Building, Kindle Edition**
7. **Dr. R.Suresh Kumar, Fundamentals of Solar Energy, Edu creation publications**

MODEL BLUE PRINT

S.No	Major topics	No of periods	Weightage of Marks	Marks wise distribution of Weightage				Question wise distribution of Weightage				COs Mapped
				R	U	Ap	An	R	U	Ap	An	
1	Smart Technologies	12	16	1	1	1		3	3	10		CO1
2	Pre-stressed concrete	12	26	1	1	2		3	3	20		CO2
3	Advanced methods in Earth retaining structures	10	26	1	1	2		3	3	20		CO3
4	Pre-fabricated Building Technology	10	23	1		2		3		20		CO4
5	Concepts of Green Buildings	10	13	1		1		3		10		CO5
6	Solar Energy Utilization in buildings	06	06	1	1			3	3			CO5
		60	110	6	4	8		18	12	80		

C-504, ADVANCED CIVIL ENGINEERING TECHNOLOGIES
DCE V SEMESTER,
UNIT TEST-I

Time: 1 hour 30 Min   **Max Marks 40**
PART – A
Answer all Questions,   **(4 x 1)+ (4x 3) = 16Marks**

1. (a) Full form of IOT…………….(CO1)
    (b) Freyssinet system is a pretensioning system (True/False) (CO2)
    © Losses are more in post tension system (True/False) (CO2)
    (d) Example for advanced earth retaining system:
       (a) Power Grid (b) Geo Grid (c) Poly Grid (d) None (CO3)
2. List the components of IoT   (CO1)
3. What are different types of losses of Prestress?   (CO2)
4. State the advantages of Advanced earth retaining Structures?   (CO3)
5. Define the term Geo-mat   (CO3)

PART – B
Answer all Questions; each question carries 8 Marks   **3 x 8 = 24**
6.(A) State any eight applications of IoT in smart cities   (CO1)
                                    (OR)
 (B) Mention the application of IOT in Food, water tracking and security. (CO1)

7.(A) Explain the method of Magnel -Blaton system post tensioning (CO2)
                                    (OR)
 (B) Explain the method of Gifford Udal system of post tensioning (CO2)

8.(A) Explain the method of Anchored Earth wall retaining Structure (CO3)
                                    (OR)
(B) Explain the construction of earth retaining structure using Geogrids (CO3)

                            & & &

C-504, ADVANCED CIVIL ENGINEERING TECHNOLOGIES
DCE V SEMESTER,
UNIT TEST-II

Time: 1 hour 30 Min   **Max Marks 40**

PART – A
Answer all Questions,   **(4 x 1)+ (4x 3) = 16**

1.a) Pre-fabricated construction is economical in small scale projects. (true/false) (CO4)
   b) The Pre-fabricated panels form a ………………type of structure. (CO4)
   c) Structures which are built with eco friendly materials is called …………….(CO5)
   d) The concept of air movement is called ……………….(CO5)
2. State the alternatives or cast-in-situ structures   (CO4)
3. State any two advantages and disadvantages of pre-fabricated structures. (CO4)
4. Define the concept of "Green-building".   (CO5)
5. List any three solar energy utilities.   (CO5)

PART – B
Answer all Questions; Each question carries 8 Marks   **3 x 8 = 24**
6. A) Explain the importance of standardization and modularization in
    Prefabrication.   (OR)   (CO 4)
   B) Explain the large systems of Pre-fabrication.   (CO 4)

7. A) Explain the mixed systems of Pre-fabrication.   (CO 4)
                       (OR)
   B) How does green building effect the environment   (CO 5)

8. A) Describe the water conservative methods in case of Green-building (CO 5)
                        (OR)
   B) Explain roof-top solar power generations systems.   (CO 5)

Time : 3 hours]   [*Total Marks* : 80

PART-A   3×10=30

Instructions :(1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the pointand shall not exceed *five* simple sentences.

1. Define the term IoT   (CO1)

2. State any three key features of smart city   (CO1)

3. List three advantages of pre stressed concrete   (CO2)

4. List any six losses of pre-stress.   (CO2)

5. What is retaining wall?   (CO3)

6. State any three types of retaining walls.   (CO3)

7. Define prefabrication   (CO4)

8. Define embodied energy in building materials   (CO5)

9. List the four main types of solar energy   (CO5)

10. What is solar energy?   (CO5)

PART—B   5×10=50

Instructions :(1) Answer *any five* questions.

(2) Each question carries 10 marks.

(3) Answers should be comprehensive and the criteria for valuation are the content but not the length ofthe answer.

11. Explain the applications of IoT in *(a)* smart buildings and *(b)* smart transportation. (CO1)

12. Explain the Gifford-Udal system of post tensioning with necessary legible sketch (CO2)

13. Explain the Freyssinet system of Post-tensioning with a sketch.   (CO2)

14. Explain the process of reinforcing earth with Geogrids.   (CO3)

15. Explain Geomats in advanced earth retaining structures(CO3)

16. Explain the types of prefabricated systems (CO4)

17. Explain prefabricated systems Slab/Column with wall (CO4)

18. Explain environmental, economic and social benefits of Green Building   (CO5)

CONSTRUCTION MANAGEMENT AND ENTREPRENEURSHIP

Course code	Course title	No. Of period/week	Total no. Of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-505	Construction Management and Entrepreneurship	03	45	20	80

S. No	Major Topics	No. Of Periods	Cos Mapped
1.	Introduction	3	CO1
2.	Organizational Aspects	6	CO1
3.	Management Tools	8	CO2
4.	Contracts and Tenders and Arbitration	10	CO3
5.	Management of Resources in Construction	8	CO4
6.	Entrepreneurship	6	CO5
7.	Human Relations and Professional Ethics	4	CO5
	Total	45	

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Familiarize with the Preliminary Planning & Organizational aspects, constructional planning, contracts and tender systems.
	(ii)	Gain adequate knowledge in managing different resources in construction field and human relations and professional ethics.

COURSE OUTCOMES:

Course Outcomes	CO 1	C-505.1	State the importance of project management and Organizational aspects.
	CO 2	C-505.2	Analyse the tools of Management for construction projects in planning.
	CO 3	C-505.3	Discuss different types of contracts, Tendering systems and Arbitration.
	CO 4	C-505.4	Analyse the principles of management of Resources like Men, Material and Machinery.
	CO 5	C-505.5	Discuss the role of Entrepreneur for better outcome in construction industry by inculcating better Human Relations.

LEARNING OUTCOMES:

Learning Outcomes	**1.0** **Introduction** 1.1. Define Management. 1.2. State the functions of Management. 1.3. State the need for scientific Management of projects. 1.4. Describe the fields level management. 1.5. Describe the sequencing of work **2.0** **Organizational Aspects** 2.1. Explain the organizational structure of any Engineering department (Government). 2.2. List the duties of different officers of an Engineering department. 2.3. Define Preliminary estimate, Detailed estimate, Administrative approval and Technical sanction. 2.4. State the limit of powers of sanction by various officers in an Engineering Department (Government). 2.5. Give the Organizational structure of a public sector construction company. 2.6. Compare the Headquarters versus Regional and Project Management. 2.7. List the duties of Chief Engineer in a construction company. 2.8. List the duties of a Resident Engineer. **3.0** **Management Tools** **3.1** Define CPM and PERT. **3.2** State the advantages of CPM and PERT. **3.3** Explain the use of bar chart and its limitations **3.4** Define Network, Activity, Event, Activity duration,Dummyactivity,EST, EFT, LST, LFT, Total float, free float and Critical path. **3.5** Prepare Network diagram using basic rules of network formation. **3.6** Calculate Project duration using CPM network identifying critical activities, critical path, free float and total float. **3.7** State the limitations of CPM. **3.8** Distinguish between CPM and PERT.

4.0   Contract, Tendering systems and Arbitration

4.1 Define contract, State the contents of a contract document, and Explaindifferent contract systems available for construction works.

4.2 List the merits and limitations of each of the contract systems, List the general conditions of contract for a civil engineering construction project.

4.3 Define tender, Explain the need for calling of tenders, List the steps involved in fixing up agency through tender system.

4.4 Draft a tender notice for a work, Prepare tender documents.

4.5 Explain the need of earnest money and security deposits.

4.6 Prepare a comparative statement.

4.7 Explain the method of selecting a contractor from the tenders, List out the conditions of contract agreements.

4.8 Define the terms Dispute and Arbitration, Explain the scope for disputes in a construction industry.

4.9 State the need for arbitration, List the qualifications of an arbitrator, List the advantages of arbitration.

5.0   Management of Resources in construction

5.1 Explain the scope of materials management, Classify the common building materials based on the procurement, Explain different Stages of materials management.

5.2 Explain the points to be observed in the storage of perishable and non-perishable store materials, Explain the terms Indent, Invoice and Bin card, Explain the importance of verification of stores.

5.3 Explain the need for mechanization, Explain the need for optimum utilization of plant and equipment, Explain the financial impact of mechanization.

5.4 Explain about the preventive maintenance of plant and equipment.

5.5 Explain the importance of training of operators.

5.6 Explain the need for overhauling or replacement.

5.7 Explain the requirements of centering, shuttering and scaffolding

5.8 State the importance of finance as a resource.

5.9 Explain the different stages at which cost control can be achieved.

5.10 Explain the financial control at head office level and site level.

6.0   Entrepreneurship

6.1 Define 1. Entrepreneur and 2. Entrepreneurship.

6.2 Outline the concepts of entrepreneurship.

6.3 State the role of entrepreneur in economic development.

6.4 List the characteristics of an entrepreneur.

6.5 Evaluate the risks and rewards of an entrepreneur.

6.6 State the role of financial institutions in entrepreneurial development.

7.0 Human relations and professional ethics

7.1 State role of Human relations and Performance in organization.

7.2 State the role of Interpersonal relationship for effective work culture.

CO-PO Mapping:

Course Code : C-505	Course Title: Construction Management and Entrepreneurship Number of Cos: 05				No. Of Periods: 45
PO #	**Mapped with CO #**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3, CO4, CO5	18	40	3	
PO2	CO2	3	7	1	**> 40% Level 3 Highly addressed**
PO3	CO2	3	7	1	
PO4	CO2	3	7	1	**25% to 40% Level 2 Moderately addressed**
PO5	CO1, CO2, CO3, CO4, CO5	12	26	2	
PO6	CO1, CO2, CO3, CO4, CO5	6	13	1	**5 to 25% Level 1 Low addressed**
PO7					

PO-CO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3				2	2		2	2	3
CO2	2	3	2	1	2	3		2	2	3
CO3	2				2	3		2	2	3
CO4	2				1	2		2	2	3
CO5	2				2	2		2	2	3
Average	2.2	0.6	0.4	0.2	1.8	2.4		2	2	3

Note: The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

 (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
 (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

TABLE SPECIFYING THE SCOPE OF SYLLABUS TO BE COVERED FOR UNIT TEST-I & II

Unit Test	Learning outcomes to be covered
Unit Test-I	From 1.1 to 4.4
Unit Test-II	From 4.5 to to 7.2

COURSE CONTENT:

1.   Introduction
Definition and concept of management – need for scientific management of projects – need for attitudinal change – Scope and characteristics of construction Industry.

2.   Organizational Aspects
Govt. Organizations: Organizational structure of P.W.D. – duties of various officers – Preliminary estimates – detailed estimate – budget provision – administrative approval and technical   sanction – powers of sanction-Public sector organizations: Organizational structure of a construction company – Head quarters versus Regional and Project Management–Duties of Chief Engineer – preparation of bids – duties of Resident Engineer.

3.   Management Tools
Different Management Tools – Gantt Bar chart, modified Gantt bar chart – Limitations of bar charts – Introduction CPM and PERT – advantages of CPM and PERT – terms used in CPM – formation of network – Basic rules – Problems on determination of critical path – limitations of CPM – comparison of CPM and PERT.

4.   Contracts, Tenders and Arbitration
Contracts – Legality of contracts – contract document – types of contracts – piece work contracts – item rate contracts – Lump sum contracts – percentage contracts – negotiated rates – departmental execution of works – merits and limitations of each contract system – conditions of contract for civil engineering works-Tenders – Necessity of tenders – Sealed tenders – tender notice – tender documents – Earnest Money and Security Deposits –Opening of tenders – comparative statement – acceptance of tenders – work order – contract agreement – conditions of contract-Arbitration – Disputes – disputes in construction industry – arbitration – need for arbitration – arbitrator – qualifications of arbitrator – advantages of arbitration.

5.   Management of Resources in Construction Industry
Materials management – Scope – Classification of common building materials based on the

procurement – procedural formalities for acquisition – stages of materials management-
Plant and Equipment – Need for mechanization – Optimum utilization of plant and
equipment – Financial impact of mechanization – Preventive maintenance –Overhauling and
replacement – Cantering, shuttering and scaffolding requirements-Financial Management –
Finance as Resource – Purpose of cost control – stages of cost control – pre contract stage
and post contract stage – Financial control at head office level and site level.

6. Entrepreneurship

Entrepreneur – concept, definition, role, expectation – characteristics of entrepreneur – risk
and rewards of an entrepreneur – role of financial institution in entrepreneurial development.

7. Human Relations and Professional Ethics

Human relations and performance in organization – Understand self and others for effective
behaviour – Interpersonal relationship for effective work culture – Need for professional
ethics.

REFERENCE BOOKS

1. Management in construction Industry ,P.Dharwadker,Oxford& IBH Publishing Co. Pvt., Ltd.
2. Construction Management And Accounts , V.N.Vazirani& S.P. Chandola, Khanna Publishers.
3. Construction Planning and Management ,U.K. Shrivastava,Galgotia Publications Pvt. Ltd.,
   New Delhi.
4. Construction Management and Planning ,B. Sengupta & H. Guna , Tata Mc. Graw Hill
   Publishing Company Ltd   .
5. Construction Management and Accounts ,Harpal Singh,Tata Mc. Graw Hill Publishing
   Company Ltd.

MODEL BLUE PRINT

S. No	MajorTopics	No. Of periods	Weightage ofmarks	Marks wiseDistribution ofWeightage				Question wiseDistribution ofWeightage				CosMapped
				R	U	Ap	An	R	U	Ap	An	
1	Introduction	3	03	03	--	--	--	1	-	-	--	CO1
2	Organizational Aspects	6	13	03	10	--	--	1	1	--	--	CO1
3	Management Tools	8	23	03	20	--	--	1	2	--	--	CO2
4	Contracts and Tenders and Arbitration	10	26	06	20	--	--	2	2	--	--	CO3
5	Management of Resources in Construction	8	26	06	20	--	--	2	2	--	--	CO4
6	Entrepreneurship	6	06	06	--	--	--	2	--	--	--	CO5
7	Human Relationsand Professional Ethics	4	13	03	10	--	--	1	1	--	--	CO5
	Total	45	110	30	80	--	--	10	8	--	--	

Time: 90 Minutes   Maximum Marks : 40

PART- A   **16 Marks**

Instructions:
   (i) **Answer all questions**
   (ii) **First question carries FOUR marks, each question of remaining carries THREE marks.**

1.   (a)   A construction manager will supervise &manage contractors and labour at construction
        sites. - True/False   (CO1)

     (b) The difference between the time available to do a job and the time required to do a job is
        known as Bloat   – True/False   (CO2)

     (c) The sanction of the competent authority to a properly detailed estimate for a work to be
        done is known as ------------------   (CO1)

     (d) The process whereby governments and financial institutions invite bids for large projects
        that must be submitted within finite deadlines   (CO3)

2.   State the need for scientific management of projects   (CO1)

3.   Define the terms CPM and PERT.   (CO2)

4.   What do you mean by (i) Activity (ii) Event   (CO2)

5.   State three contract systems.   (CO3)

PART- B   **3 x 8 = 24 Marks**

Instructions:
   (i)   **Answer all questions**
   (ii) **Each question carries EIGHT mark**
   (ii) **Answer should be comprehensive and the criterion for valuation is the content but not
         the length of the answer.**

 6.   (A) Describe the duties of a Chief Engineer in Government Engineering Department (CO1)
                                          (OR)

     (B) Explain the organization structure of a public sector construction company.   (CO1)

7.   (A) Describe the process of preparation of a net work diagram using basic rules of network
        formation.   (CO2)
                                          (OR)

(B) Draw the following CPM network diagram and find the critical path and its duration. (CO2)

Activity	1-2	1-3	2-5	3-4	3-5	4-5
Duration in days	4	3	3	1	3	5

8. (A) State the merits and limitations of different contract systems. (CO3)

(OR)

(B) State the general conditions of contract for civil engineering construction project   (CO3)

Model Paper for Unit Test-II :
State Board of Technical Education and Training, A.P.
Diploma in Civil Engineering (DCE)
Fifth Semester :: C-505, Construction Management and Entrepreneurship

Time: 90 Minutes   Maximum Marks : 40

PART- A   16 Marks

Instructions *:*
   (i) Answer all questions
   (ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1.   (a) EMD stands for Earliest Money deposit   -- True/False   (CO3)

     (b) Indent refers to the process of taking orders from stores   – True/False   (CO4)

     (c) The method of resolving disputes outside the courts is known as ----------------------(CO3)

     (d) The process whereby governments and financial institutions invite bids for large projects

     that must be submitted within finite deadlines ...   (CO3)

2.   State the qualifications of a contractor that make him eligible for tender .   (CO3)

3.   State the importance of verification of stores.   (CO4)

4.   List different stages of material management.   (CO4)

5.   State the characteristics of an entrepreneur.   (CO5)

PART- B   3 x 8 = 24 Marks

Instructions :
   (i)   Answer all questions
   (ii) Each question carries EIGHT mark
   (iii) Answer should be comprehensive and the criterion for valuation is the content but not
          the length of the answer.

6.   (A) List out the conditions of contract agreements.   (CO3)

                                   (OR)

     (B) State the need for arbitration and list the advantages of arbitration.   (CO3)

7.   (A) Explain the preventive maintenance of plant and equipment .   (CO4)

                                   (OR)

     (B) Explain the importance of training of operators   (CO4)

8.   (A) Explain the role of entrepreneur in economic development.   (CO5)

                                   (OR)
     (B)Explain the role of human relations and performance in organization.   (CO5)

Model paper for End Examination:
MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C–23)
DCE—FIFTH SEMESTER EXAMINATION
CONSTRUCTION MANAGEMENT AND ENTREPRENEURSHIP (C-505)

Time: 3 hours]   **[Total Marks: 80**

PART—A   **3×10=30 Marks**

Instructions: **(1)**   **Answer all questions.**

          (2)   **Each question carries three marks.**

          (3)   **Answers should be brief and straight to the point and shall not exceed five simple sentences.**

1. State any three functions of management (CO1)

2. What is the need for technical sanction (CO1)

3. Define CPM and PERT (CO2)

4. Define the terms EMD and security deposit (CO3)

5. State the qualifications required for a contractor (CO3)

6. State the need for mechanization. (CO4)

7. Define the terms Indent and Invoice (CO4)

8. Define entrepreneurship. (CO5)

9. State the characteristic of good entrepreneur (CO5)

10. Explain briefly about human resource management. (CO5)

PART – B   **5x 10 marks = 50**

Answer any FIVE questions.

11. Draw a flow chart and explain organization of a construction company for an irrigation project. (CO1)

12. State any ten advantages of network analysis. (CO2)

13. Explain the use of bar chart and its limitations (CO2)

14 "All contracts are agreements but all agreements are not contracts." Explain. (CO3)

15. Explain various steps involved in tender system. (CO3)

16. Explain the importance of verification of stores. (CO4)

17. Explain the requirements of centering, shuttering and scaffolding (CO4)

18. State role of Human relations and Performance in organization. (CO5)

STRUCTURAL ENGINEERING DRAWING

Course code	Course title	No. Of period/week	Total no. Of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-506	Structural Engineering Drawing	04	60	40	60

S. No.	Major Topics	No. Of Periods	Cos Mapped
1.	Structural Planning and marking of Frame components	8	CO1
2.	R.C.C. Drawings	44	CO2
3.	Reading and interpretation of Structural Drawings	8	CO3
	Total	60	

COURSE OBJECTIVES:

Upon completion of the course the student shall be able to		
Course Objectives	(i)	Prepare the working drawings for steel reinforcement in different RCC members and able to read and understand the given drawings.
	(ii)	Calculate Steel quantity required from the given drawings.
	(iii)	Gain knowledge on how to draw and read the different structural steel members.

COURSE OUTCOMES:

Course Outcomes	CO1	C506.1	Draw the individual RCC members and the placement of reinforcement in it.
	CO2	C506.2	Draw the working drawings and evaluate the bar bending schedule for the given drawings.
	CO3	C506.3	Read and understand the working drawings.

LEARNING OUTCOMES*:*

Learning Outcomes	**1.0 structural planning and marking of Frame components**
	   1.1 Understand Positioning and Orientation of columns
	   1.2 Understand Positioning of beams
	   1.3 Understand Spanning of slabs
	   1.4 Explain layout of stairs
	   1.5 List types of footings
	   1.6 Prepare member reference scheme of Column reference scheme and Grid reference scheme (Scheme recommended by IS:5525 – recommended for detailing of reinforced concrete works and SP-34)
	
	2.0 Draw the detailed working drawings of R.C.C.
	   2.1 Draw the longitudinal section and cross sections of singly reinforced simply supported beam, Prepare schedule of reinforcement and quantity of steel for singly reinforced simply supported beam
	   2.2 Draw the longitudinal and cross section of lintel cum sunshade, Prepare schedule of reinforcement and quantity of steel for lintel cum sunshade
	   2.3 Draw the plan and longitudinal section of one-way slab showing reinforcement details, Prepare schedule of reinforcement and quantity of steel for one-way slab showing reinforcement details
	   2.4 Draw the details of reinforcement of two-way simply supported slab with corners not held down condition, Draw top and bottom plan and section along short and long spans of two-way simply supported slab with corners not held down condition, Prepare schedule of reinforcement of two-way simply supported slab with corners not held down condition
	   2.5 Draw the details of reinforcement of two-way simply supported slab with corners held down conditions, Draw top and bottom plan and section along short and long spans have to be drawn. (Scheduling of reinforcement is not necessary).
	   2.6 Draw the details of reinforcement of one-way continuous slab along with T-beam with details of slab and T-beam (plan and section of continuous slab and longitudinal section of T-beam have to be drawn). (Scheduling of steel is not necessary)
	   2.7 Draw the details of column and square footing (plan and sectional elevation) prepare schedule of reinforcement of column and footing and quantity of steel required.
	   2.8 Draw the reinforcement details of dog legged stair case (section only) prepare schedule of reinforcement for one flight including landing.
	
	3.0 Read and interpret the drawings
	   3.1 Understand the details of reinforcement from the given drawings
	   3.2 Fill in the details of reinforcement in a drawing.

PO-CO Mapping:

Course Code: C-506	Course Title: Structural Engineering Drawing No.of Cos : 3				No. Of periods: 60	
Pos	Mapped with CO No	CO Periods Addressing PO in Col 1		Level (1,2,3)	Remarks	
		No	%		>40% Level 3 (Highly Addressed)	
PO1	CO1,CO2,CO3	12	20	1	25% to 40% Level 2 (Moderately Addressed)	
PO2	CO1,CO2,CO3	30	50	3		
PO3	CO1,CO2,CO3	18	30	2	5% to 25% Level 1 (Low Addressed)	
PO4					<5% Not Addressed	
PO5						
PO6						
PO7						

CO-PO Mapping:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2					1	2	2
CO2	2	3	2					1	2	2
CO3	2	3	3					1	2	2
Average	2.3	2.7	2.3					1	2	2

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
 (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz
 (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT

1.0 Structural planning and marking of Frame components
Draw the position of columns, beams, slabs, stairs and footing in a given line diagram of building – Prepare member reference scheme of Column reference scheme as per IS:696 code of practice for general engineering drawing and Grid reference scheme as per IS:5525 – recommended for detailing of reinforced concrete works and SP-34

2.0 R.C.C Drawings
Draw the longitudinal section and cross sections and Prepare schedule of reinforcement and quantity of steel for – Singly reinforced simply supported rectangular beam – Lintel cum sunshade –Simply supported one-way slab – Two-way slab simply supported corners not held down – Two-way slab simply supported corners held down – One-way continuous slab and T-beam (with details of slab and T-beam) – Column with square footing of uniform thickness.- Stair case – stairs spanning longitudinally (Dog legged stair case)

3.0   Reading and interpretation of Structural Drawings
Understand the details of reinforcement from the given drawings - Fill in the details of reinforcement in a drawing.

REFERENCE BOOKS

1. Designing and detailing hand book SP-34

MODEL BLUE PRINT

S. No	Major Topics	No. Of periods	Weightage of marks	Marks wise Distribution of Weightage				Question wise Distribution of Weightage				CO's Mapped
				R	U	Ap	An	R	U	Ap	An	
1.	Structural Planning and marking of Frame components	8	8	--	8	--	--	2		--	--	CO1
2	R.C.C. Drawings	44	44	--	4	40	--	1		2	--	CO2
3.	Reading and interpretation of Structural Drawings	8	8	--	8	--	--	2		--	--	CO3
	Total	60	60		20	40		5	2			

MODEL PAPER – BOARD DIPLOMA EXAMINATION, (C–23)

DCE—FIFTH SEMESTER EXAMINATION

STRUCTURAL ENGINEERING DRAWING- II (C-506)

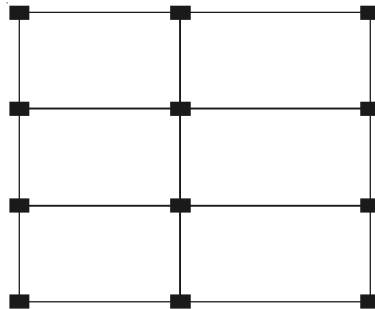<u>**Time: 3 hours]**</u>   **[Total Marks:60**

PART—A   4×5=20

Instructions :   (1) Answer **all** questions.

(2) Each question carries **four** marks.

(3) Any missing data may be assumed suitably.

1.   Redraw the figure given below and mark the columns and beams asper Grid Reference Scheme.

2.   State any two guiding principles each for positioning of columns andbeams in structural planning of buildings.

3.   Draw the cross section of an isolated square column footing with thefollowing specifications :

Column : 230 × 230 mm with 4 nos. of 16 mm dia steel and lateralties of 8 mm @ 150 mm c/c.

Footing : 1200 × 1200 mm with 12 mm bars at 150 mm c/c both waysThickness of

footing : 350 mm

Thickness of base course : 150 mm. Assume covers as 50 mm.

4. Prepare the bar bending schedule and estimate the quantity for the given reinforcement of the simply supported RCC beam with the following data :

Clear span of beam : 5000 mm, Width of beam : 230 mm, Overalldepth of beam : 450 mm, Width of support : 230 mm (full bearing)

Main reinforcement : 20 mm bars 4 nos. (2 bars cranked at 700 mmfrom the face of support)

Hanger bars: 12 mm 2 nos.

Covers : Top and bottom : 25 mm   End cover : 40 mm.

5. Prepare bar bending schedule and calculate the steel quantity for theone way slab with the following data :

Size of room	:	7000 mm × 3000 mm
Wall thickness	:	300 mm
Slab thickness	:	130 mm
Main reinforcement	:	10 mm @125 mm c/c. All the bars are cranked on one side and cranks placed alternatively at a distance of 300 mm fromthe face of support.
Distribution Steel	:	8 mm @150 mm c/cAll covers

are of 20 mm.

Instructions: **(1) Answer all questions.**

             (2) Each question carries twenty marks.

             (3) All parts must be drawn to scale.

             (4) Any missing data may be assumed suitably.

1. An RCC lintel with sunshade has the following specifications :

Clear span of lintel	:	1500 mm
Width of wall	:	230 mm
Size of lintel	:	230 mm × 200 mm
Bearing on walls	:	150 mm
Projection of sunshadefrom face of the wall	:	600 mm
Thickness of sunshade	:	100 mm to 50 mm
Reinforcement of Lintel :		
Main reinforcement	:	3 nos. Of 12 mm dia (all straight bars)
Hanger bars	:	2 nos. Of 10 mm dia
Stirrups	:	6 mm dia. 2-legged at 150 mm c/c
Reinforcement of Sunshade :		
Main bars	:	10 mm dia bars at 140 mm c/c

Distribution steel : 6 mm dia @ 120 mm c/c

Draw to a scale of 1 : 10 :

(a) Longitudinal section of lintel   10+10

(b) Cross-section of lintel with sunshade 10Width of canal bund = 900 mm

2. Draw the reinforcement details of a simply supported RCC two way slab whose corners are free to lift, with the following specifications :

Size of the room—4·0 m × 5·0 m

Edge conditions—simply supported, corners not held down

Overall depth of slab—140 mm

Bearing on walls—230 mm

Materials:

Concrete—M-20 grade , Steel—Fe 415

Reinforcement:

       Along shorter span—# 12 at 200 mm c/c

(alternate bars are cranked at a distance of 400 mm from the face of the support)

       Along longer span—# 10 at 250 mm c/c

(alternate bars are cranked at a distance of 500 mm from the face of the support)

Provide 3#8 hanger bars at each edge to keep top bars in position.

Covers:

       Bottom clear cover 12 mm

       Top clear cover 12 mm

       End covers 20 mm

(i) Bottom plan of the reinforcement   10+5+5

(ii) Top plan of the reinforcement

(iii)Cross-section along the shorter span

FIELD PRACTICES

Course code	Course title	No. Of period/week	Total no. Of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-507	Field Practices	04	60	40	60

S.No.	Chapter/Unit title Name	No. Of periods/week	CO's Mapped
1.	Marking for the earth work of a pillar &for the junction of two walls	08	CO1
2.	Marking for the earth work of a simple one roomed building	04	CO1
3.	Marking for the earth work of a simple two roomed building	08	CO2
4.	Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.	08	CO3
5.	Construction of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.	08	CO3
6.	Supervisory skills of plastering of wall	04	CO4
7.	Supervisory skills for construction of Cement Concrete Flooring and of fixing of floor trap, gully trap and their connections to drain.	04	CO4
8.	Placement of reinforcement in an Isolated Column Footing with proper cover & Positioning of shuttering to the column reinforcement	04	CO5
9.	Placement of reinforcement for sun shade (with specific attention of location).	04	CO5
10.	Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).	04	CO5
11.	Placement of reinforcement for slab (with specific attention of chairs). OR Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).	04	CO5
	Total Periods	60	

COURSE OBJECTIVES*:*

		Upon completion of the syllabus, the student shall be able to
COURSE OBJECTIVES	(i)	Learn the marking for earthwork, footings, basement and walls/columns of simple buildings.
	(ii)	Familiarise with the process of plastering, concreting and fixing of traps
	(iii)	Gain knowledge on the placement of reinforcement for different components of a building.

COURSE OUTCOMES:

COURSE OUTCOMES	CO 1	C-507.1	Mark for earthwork of pillars, junction of two walls, simple buildings.
	CO 2	C-507.2	Mark centre line for simple buildings.
	CO 3	C-507.3	Prepare cement mortar mix by volumetric batching, arrange bricks in different bonds to plumb.
	CO 4	C-507.4	Supervise plastering of walls, C.C.Flooring and fixing of traps.
	CO 5	C-507.5	Position shuttering and reinforcement in various components of building.

LEARNING OUTCOMES:

LEARNING OUTCOMES	**1.0 Marking for the earth work of a pillar & for the earth work of a junction of two walls**
	1.1 Note down the measurements of pillar at superstructure and measurements of earth work excavation.
	1.2 Mark the centre lines of pillar in either direction.
	1.3 Mark the size of pillar with reference to the centre lines.
	1.4 Mark the size by pouring the lime.
	1.5 Read the width of walls at super structure from drawing.
	1.6 Mark the centre line of main walls from the markings on marking pedestals.
	1.7 Mark the centre line of cross wall perpendicular to main wall with the help of wooden set square or by other means.
	1.8 Transfer the same by pouring the lime on the centre line.
	2.0 Marking the centre line of a one roomed building
	2.1 Read the width of walls at super structure and width of earth work excavation from drawing.

2.2   Mark the centre line of main wall from the markings on marking pedestals.

2.3   Mark the centre line of cross wall perpendicular to main wall with the help of wooden set square or by other means.

2.4   Mark the width of walls with reference to centre lines of walls.

2.5   Transfer the same by pouring the lime to proceed for excavation.

2.6   Mark the width of excavation with the help of threads placed parallel to the centre line and at a distance equal to half the width of excavation on either side of centre line.

2.7   Transfer the same by pouring lime to proceed for excavation.

3.0   Marking for the earth work of a simple two roomed building

3.1   Prepare the centre line diagram from a given drawing.

3.2   Note down width of earthwork excavation.

3.3   Mark the centre lines on the ground with the help of plumb bob.

3.4   Check the accuracy by measuring length of two diagonals and their equality.

3.5   Mark the width of excavation with the help of threads placed parallel to the centre line and at a distance equal to half the width of excavation on either side of centre line.

3.6   Transfer the same by pouring lime to proceed for excavation.

4.0   Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning

4.1   Note the mix proportion and take the respective quantities of cement and sand (volume of 1bag of cement = 0.035 cubic meter).

4.2   Place the measured quantity of sand to a suitable stack on an impervious hard surface.

4.3   Spread the cement uniformly over the sand stack.

4.4   Dry mix both sand and cement thoroughly to a uniform colour.

4.5   Sprinkle sufficient quantity of water on the dry mix while thoroughly mixing the dry mortar, which can be used for 30 minutes.

4.6   Continue the mixing to bring the mortar to a stiff paste of working consistency.

5.0   Construction of 230mm thick brick wall in English Bond at the corner of a   wall and check for horizontality and verticality

5.1   Soak the bricks in water and air dry before their use.

5.2   Prepare C.M of specified proportion and keep ready for use

		5.3	Sketch the two threads perpendicular to each other at specified corner in line with the outer edges of wall.
		5.4	Arrange the quoin header in line with the two perpendicular threads
		5.5	Arrange the queen closure adjacent to quoin header.
		5.6	Continue one layer with headers on one face and stretchers on the perpendicular face to the true line.
		5.7	Continue the next layer with stretchers on headers and headers on stretchers.
		5.8	Check the verticality of the wall with the help of plumb bob and horizontality with the help of level tube for every three to four layers.
		5.9	Place the bricks, with frog at the top.
		5.10	Fill the vertical joint in each layer with mortar using trowel.
	6.0	**Supervisory skills of Plastering of a wall**	
		6.1	Prepare the surface by raking the joints and brushing the efflorescence if any by brushing and scraping dust and loose mortar.
		6.2	Remove efflorescence if any by brushing and scraping.
		6.3	Wash the surface thoroughly with water and keep the surface wet before commencement of plastering.
		6.4	Complete the ceiling plaster before commencement of wall plaster
		6.5	Fill all put log holes in advance of the plastering.
		6.6	Start plastering from top and work down towards the floor.
		6.7	Apply 15cm x 15cm plaster of specified thickness first, horizontally and vertically at not more than 2.0m intervals over the entire surface to serve as gauges.
		6.8	Check the surfaces of gauges for truly in plane of the finished plaster surface by using a plumb bob.
		6.9	Apply the mortar on the wall between the gauges with a trowel to a thickness slightly more than the specific thickness.
		6.10	Use a wooden straight edge to bring to the true surface with small upward and sideways movement at a time reaching across the gauges.
		6.11	Use trowel to obtain final finish surface as a smooth OR wooden float for sandy granular texture.
		6.12	Avoid excessive use of trowel or over working the float.
	7.0	**Supervisory skills for construction of Cement Concrete Flooring and for fixing of floor trap, gully trap and their connections to drain.**	
		a. Base Concrete	
		7.1	Use cement concrete of specified mix
		7.2	Provide base concrete with the slopes towards floor trap required for the flooring using tube level.

		7.3	Provide a slope ranging from 1:48 to 1:60 for flooring in varandah, courtyard, kitchen and bath.

7.3   Provide a slope ranging from 1:48 to 1:60 for flooring in varandah, courtyard, kitchen and bath.

7.4   Provide a slope of 1:30 for floors in water closet portion.

7.5   Provide necessary drop of 6mm to 10mm in flooring in bath, water closet and kitchen near floor traps to avoid spread of water.

b. Finishing

7.6   Follow the finishing of the surface immediately after the cessation of beating.

7.7   Allow the surface till moisture disappears from it.

7.8   Use of dry cement or cement mortar to absorb excessive moisture not permitted.

7.9   Spread the thick slurry of fresh cement and water @ 2kg of cement over an area of 1 square metre of flooring, while flooring concrete is still green.

7.10   The cement slurry shall be properly processed and finished smooth.

7.11   Finish the edge of sunk floor rounded with C.M 1:2 and finish with a floating coat of neat cement.

7.12   Cure the surface for a minimum period of 10 days.

7.13   Lay the flooring in lavatories and bath rooms only after fixing of water closets and squatting pans and floor traps.

7.14   Plug the traps while laying and open after curing and cleaning.

c. Fixing of traps and their connections to drain.

7.15   Identify the Floor trap and Gully trap

7.16   Identify the location of fixing the floor trap and gully trap

7.17   Connect the floor trap to the drain pipe.

7.18   Fix the joint using proper filler and adhesive material such that the joint is water tight.

7.19   Fix gully trap on cement concrete foundation 65 mm x 65 mm and not less than 10 mm thick.

7.20   Prepare a mix of concrete 1:5:10 and jointing of gully outlet to the branch drain is done

7.21   Tarred gasket soaked in thick cement slurry shall first be placed round the spigot of the drain

7.22   The remainder of the socket is filled with stiff mixture of cement mortar in the proportion of 1:1.

8.0   Placement of reinforcement for an Isolated Column Footing and positioning of shuttering to the column reinforcement.

8.1   The grill of column footing should be kept ready as per design data.

8.2   Mark the centre lines in both directions on levelling course / bedding concrete with the help of plumb bob from the string stretched over the marking pedestals.

	8.3	Mark centre of the outer reinforcing rods of footing in either direction.
	8.4	Carefully place the grill such that centre line markings of outermost reinforcing rods are exactly above the centre lines marked on the bedding concrete.
	8.5	Place the chairs/cover blocks of specified thickness below the bottom layer of reinforcing rods.
	8.6	Exercise care for rectangular column footing while placing reinforcing mat such that bars in longer direction are at bottom.
	8.7	Place the column reinforcement with chairs or cover blocks over the foundation mat.
	8.8	Prepare the reinforcement as per the drawing.
	8.9	Check for the verticality of column reinforcement with plumb bob
	8.10	Provide lateral support for the column reinforcement to keep them in position.
	8.11	Prepare the shuttering and apply waste oil inside surface of the shuttering box and fastenings
	8.12	Place the shuttering box around the column and fix the fastenings.
	8.13	Check for the verticality of shuttering with plumb bob
	9.0	**Placement of reinforcement for sun shade (with specific attention of location)**
	9.1	Prepare the reinforcement as per design
	9.2	Prepare the centering for sun shade
	9.3	Place the grill for sun shade such that the main reinforcement is in the top zone leaving the cover
	9.4	Place the cement mortar cover blocks or chairs of specified height below the main reinforcement to have prescribed cover above the reinforcement
	9.5	Observe for sufficient length of anchorage of main reinforcement into the lintel or the beam etc.
	10.0	**Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs)**
	10.1	Read the reinforcement details from the bar bending schedule
	10.2	Prepare the shuttering for the stairs as per the design.
	10.3	Bend the reinforcing bars to the shape and length confirming to the bar bending schedule.
	10.4	Place the bars at the specified spacing maintaining the cover with the help of chairs or cover blocks.
	10.5	Exercise care in the placement of reinforcement at the junction of waist and loading slab.
	10.6	Tie the distributors parallel to raisers at the specified spacing

	11.0	**Placement of reinforcement for slab (with specific attention of chairs) and placement of reinforcement for a beam column junction (with specific attention to Earth Quake resistance design)**
	11.1	Prepare the reinforcement as per design
	11.2	Rest the reinforcement in slabs on bar chairs
	11.3	Securely fix the bar to chairs so that it won't move when concrete is placed around it.
	11.4	Locate reinforcing bars and mesh so that there is enough room between the bars to place and compact the concrete.
	11.5	Anchor the reinforcement to improve the transfer of tensile forces to the steel by bending or hooking or lapping the bars.
	11.6	Read the reinforcement details from the bar bending schedule
	11.7	Note down proper cover-clear cover, nominal cover or effective cover to reinforcement.
	11.8	Decide detailed location of opening/hole and supply adequate details for reinforcements around the openings..
	11.9	Show enlarged details at corners, intersection of beams and column junction
	11.10	Avoid congestion of bars at points where members intersect and make certain that all reinforcement is properly placed.
	11.11	In the case of bundled bars, Make lapped splice of bundled bars by splicing one bar at a time
	11.12	Stagger such individual splices within the bundle. Make sure that hooked and bent up bars can be placed and have adequate concrete protection.

PO-CO MAPPING STRENGTH:

Course Code : C-507	Course Title: Field Practices Number of Cos: 05				No. Of Periods: 60	
Pos	**Mapped with CO Nos.**	**CO periods addressing PO in Col.1**		**Level (1,2,3)**	**Remarks**	
		No.	**%**			
1	CO1,CO2.CO3,C04,C05	15	14	1	>40%	Level.3
2	CO1,CO2.CO3,C04,C05	32	30	2		(Highly addressed)
3	CO1,CO2.CO3,C04,C05	32	30	2	25% - 40% Level.2	
4	CO1,CO2.CO3,C04,C05	21	20	1		(Moderately addressed
5					5% - 25% Level.1	
6						(Low addressed)
7	CO1,CO2.CO3,C04,C05	5	6	1	<5%	Not addressed

CO-PO MAPPING:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	2	2	3			2	2	3
CO2	2	3	2	3	3			2	2	3
CO3	3	2	3	3	2			2	2	3
CO4	2	2	2	2	2			2	2	3
CO5	2	2	2	2	2			2	2	3
Average	2.2	2.4	2.2	2.4	2.4			2	2	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
(i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions   (vi) Quiz
(vii)   Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

Key competencies to be achieved by the student

S.No	Experiment title	Key competency
1	Marking for the earth work of a pillar. Marking for the earth work for the junction of two walls	Mark the size of pillar with reference to the centre lines. Mark the centre line of main walls from the markings on marking pedastals
2	Marking the centre line of a one roomed building	Mark the centre line of cross wall perpendicular to main wall
3	Marking for the earth work of a simple two roomed building	Check the accuracy by measuring length of two diagonals and their equality.
4	Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.	Dry mix both sand and cement thoroughly to a uniform colour
5	Construction of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.	Arrange the quoin header in line with the two perpendicular threads
6	Supervisory skills of Plastering of a wall.	Complete the ceiling plaster before commencement of wall plaster
7	Supervisory skills for construction of Cement Concrete Flooring. Supervisory skills of fixing of floor trap, gully trap and their connections to drain.	The cement slurry shall be properly processed and finished smooth. Fix the joint using proper filler and adhesive material such that the joint is water tight.
8	Placement of reinforcement in an Isolated Column Footing with proper cover. Positioning of shuttering to the column reinforcement	Mark centre of the outer reinforcing rods of footing in either direction. Place the shuttering box around the column and fix the fastenings
9	Placement of reinforcement for sun shade (with	Place the grill for sun shade such that the main

	specific attention of location)	reinforcement is in the top zone leaving the cover
10	Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).	Exercise care in the placement of reinforcement of at the junction of waist and loading slab.
11	Placement of reinforcement for slab (with specific attention of chairs). Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).	Locate reinforcing bars and mesh so that there is enough room between the bars to place and compact the concrete. Decide detailed location of opening/hole and supply adequate details for reinforcements around the openings..

COURSE CONTENT

1. Marking for the earth work of a pillar. Marking for the earth work for the junction of two walls.
2. Marking the centre line of a one roomed building
3. Marking for the earth work of a simple two roomed building.
4. Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.
5. Construction of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.
6. Supervisory skills of Plastering of a wall.
7. Supervisory skills for construction of Cement Concrete Flooring. Supervisory skills of fixing of floor trap, gully trap and their connections to drain.
8. Placement of reinforcement in an Isolated Column Footing with proper cover. Positioning of shuttering to the column reinforcement.
9. Placement of reinforcement for sun shade (with specific attention of location).
10. Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).
11. Placement of reinforcement for slab (with specific attention of chairs). Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).

REFERENCE:

1. CPWD SPECIFIATIONS , Govt of India Vol I&II, 2009
2. Practical Civil engineering hand book, Kale and Shaw
3. Building Construction, S.P.Bindra & S.P.Arora, Dhanpat Rai publications
4. National Building Code, BIS publication

Course Title : Life Skills	Course code : C23- C-508
	{ Common to all Branches}
Year/ Semester : V/ VI Semester	Total periods : 45
Type of Course : Practical	Max Marks : 100
	{ Sessional 40 + External 60 }

Course Objectives: The students shall

- understand the relevance of life skills in both personal and professional lives

- practise life skills complementarily in life-management to lead a happy and successful life

Course Outcomes: The students shall

CO1: exhibit right attitude and be adaptable in adverse and diverse situations.

CO2: set appropriate goals and achieve them through proper planning, time management and self-motivation

CO3: solve diverse real-life and professional problems with critical thinking and creativity for a stress-free life.

CO4: be an ideal team player and manifest as a leader.

Course Delivery:

Text book: **"Life Skills"** – by State Board of Technical Education and Training, AP

Sl no	Unit	Teaching Hours
1	Attitude	4
2	Adaptability	4
3	Goal Setting	4
4	Motivation	4
5	Time Management	4
6	Critical thinking	4
7	Creativity	4
8	Problem Solving	5
9	Team work	4
10	Leadership	4
11	Stress Management	4
	Total	45

Course Content:

UNIT I: Attitude *matters!*
Preparatory activity-Role play; Generating word bank; Types of attitude. Read the passage and answer the related questions, read the story and discuss issues raised; Express opinions on the given topic and fill the grid with relevant words.

UNIT 2: **Adaptability…   ** *makes life easy!*
Pair work-Study the given pictures and understand adaptability -read the anecdote and discuss, read the story and answer the questions, role play

UNIT 3: Goal Setting… *life without a goal is a rudderless boat!*
Short term goals and long term goals-SMART features, observe the pictures and answer questions- matching- read the passage and answer questions-filling the grid.

**UNIT 4:   Motivation…   ** *triggers success!*
Types of motivation-difference between motivation and inspiration- matching different personalities with traits - dialogue followed by questions - writing a paragraph based on the passage.

UNIT 5: Time Management … *the need of the hour!*
Effective Time Management- Time quadrant - Group task on management of time- Time wasters-fill in the grid, read the story and answer the questions- prioritising tasks.
**UNIT 6: Critical Thinking…   ** *Logic is the key!*

Preparatory activity-read the passage and answer the questions- differentiate between facts and assumptions- components of critical thinking- complete the sets of analogies- choose the odd one out- true or false statements- decide which of the conclusions are logical.

UNIT 7: Creativity….   The essential YOU!!
Definition- Pre-activity-read the anecdote and answer the questions- matching celebrities with their fields of specialisation- think of creative uses of objects- think creatively in the given situations.

UNIT 8: Problem Solving… *there is always a way out!*

Preparatory activity-read the story and answer the questions- discuss the given problem and come out with three alternative solutions- group activity to select the best solution among available alternatives- discuss the problem and plan to analyse it.

UNIT 9: Team Work… *Together we are better!*

Advantages of team work- Characteristics of a team player- Activity-Observe the pictures and classify them into two groups- team game - read the story and answer the questions- fill in the grid.

UNIT 10 : Leadership… the *making of a leader!*

Characteristics of effective leadership- styles of leadership- Activity-read the dialogue and answer the questions- identify the people in the picture and describe them- discuss leadership qualities of the given leaders- filling the grid- read the quotes and write the name of the leader.

UNIT 11: Stress Management … *live life to the full !!*

Types of stress- Strategies for Stress Management- Activity-read the passage and answer the questions, read the situation and write a paragraph about how to manage stress.

Mapping Course Outcomes with Program Outcomes

P O	1	2	3	4	5	6	7
C O	POs 1 to 5 are applications of Engineering Principles, can't directly be mapped to Life Skills					1,2,3,4	1,2,3,4

Cos- POs Mapping :

CO	Course Outcome	CO Unit Mapped	PO mapped	Cognitive levels as per Bloom's Taxonomy R/U/Ap/An/Ev/Cr (Remembering / Understanding/ Applying/Analysing/ Evaluating/ Creating)
CO 1	To exhibit right attitude and be adaptable to adverse and diverse situations	All Lessons (1 to 11)	6,7	U/Ap/ An
CO2	To set appropriate goals and achieve them through proper planning, time management and self-motivation	3,4,5	6,7	U/Ap/An
CO3	To solve diverse real-life and professional problems with critical thinking and creativity for a stress-free life	6,7,8,11	6,7	U/Ap/An/ Ev/ Cr.
CO4	To be an ideal team player and manifest as a leader	9,10	6,7	U/Ap/An/ Ev

ASSESSMENT

C23-Common-508: Life Skills

- The assessment for C23-Common 508 is on par with all other practical subjects comprising 40 marks for Internal Assessment and 60 marks for External examination attaining the final total of 100 Marks.
- The Internal Assessment can be conducted in the form of Assignments in all the 11 Units together, taking the average for 40 marks as suggested below.
- The Assessment sheet provided after each lesson in the workbook can be evaluated as an assignment (A) for 10 marks. In addition to that, another assignment (B) can be conducted for 10 marks in each Unit, awarding total average of 10 marks for each Lesson. Finally the grand total can be averaged for 40 marks as Internal marks.
- The students can present these assignments (B) to the teacher orally and they should also write down their assignments (B) in a separate note book for practice as they are going to speak/present in the external examination and submit the same to the teacher.
- The questions for Assignment styles vary from Lesson to Lesson as different skills are assessed in each Lesson with specific parameters. We can also consider the questions of assignments given after each lesson in the workbook.
- The assignment questions can also be given based on case studies, personal experiences, observations, making inferences/ analysis/ forming opinions, solving puzzles, questions on logical thinking, reasoning, evaluating and writing reviews..etc.

Calculating Internal marks through Assignments				
Name of the student: \quad **PIN:** \quad **Branch:** \quad **Academic Year:**				
S. No.	**Title of the Unit / Lesson**	**Assignment A: 10Marks (assessment sheets after each lesson)**	**Assignment B: 10 Marks**	**Total Marks in each Unit/ Lesson (Average for 10 Marks)**
1	Attitude			
2	Adaptability			
3	Goal setting			
4	Motivation			
5	Time Management			
6	Critical Thinking			
7	Creativity			
8	Problem Solving			
9	Team work			
10	Leadership			
11	Stress Management			
	Marks scored	:	Example:	90
	Total Number of Assignments			11
	Internal Assessment: Average for 40 Marks	Example: (90/11) X4=32.7		33

End Exam Model paper: C23-Common-508 : Life Skills Lab

---**Guidelines to prepare the question paper of the Lab End exam for 60 marks:**

I. Define any three of the following terms of Life skills: (Oral) – 10 Marks
                              (From Lessons 1 to 11)

II. Recollect and narrate an incident either from your personal experience or observation where you have exhibited/ learned about any one of the following life skills. (oral) – 15 Marks.
         (From Lessons 1 to 4: Attitude/ Adaptability/Motivation/Goal setting/

III.   Recollect and narrate an incident either from your personal experience or observation where you have exhibited/ learned about any one of the following life skills. (oral) – 15Marks.
  (From Lessons 5, 9,10,11 : Time Management, Team Work, Leadership, Stress Management)

IV. A question on problem solving skill, using creativity and critical thinking.
    (A case study/a problematic situation should be provided by the examiner and the students should answer it in writing.)

Ex: Analyse the following problematic situation and write down the possible solutions and choose the best among them using your creativity and critical thinking / How do you solve the following problem?– (written) 20 Marks
      (From Lessons 6,7,8: Creativity/ Critical Thinking/ Problem Solving)

Note: The questions I to III can be evaluated through Viva Voce and Q.No. IV should be answered by the students in writing. The examiner can adapt the blended mode of evaluation (oral& written) in view of the more number of students and time constraint.

Computer Applications in Civil Engineering

Course code	Course title	No. of period/week	Total no. of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-509	Computer Applications in Civil Engineering	04	60	40	60

S. No.	Major Topics	No. of Periods	COs Mapped
1.	MS EXCEL APPLICATIONS IN BUILDING ESTIMATES	20	CO1
2.	ANALYSIS of RCC STRUCTURES USING SOFTWARE	20	CO2
3.	CONSTRUCTION PROJECT MANAGEMENT USING SOFTWARE	20	CO3

COURSE OBJECTIVES:

	Upon completion of the Course, the student shall be able to
Course Objectives	1. Prepare the estimates for quantities of building components using MS Excel.
	2. Analyze RCC structures using softwares
	3. Understand Project Management in construction using software

COURSE OUTCOMES:

Course Outcomes	CO 1	C-509.1	Estimate the different quantities of building components using MS Excel.
	CO 2	C-509.2	Analysis of RCC Structures using softwares
	CO 3	C-509.3	Understand the use of project management softwares in construction industry

LEARNING OUTCOMES:

Learning Outcomes	**1 MS Excel applications in Building Estimates** 1.1 Prepare the detailed estimates for various buildings from the given drawings, 1.2 specifications and site conditions and report usingMS-word for: Compound wall and Steps 1.3 Single Room with Verandah (Load bearing structure) 1.4 Single storied Residential building with one bed room (1 BHK) (Load bearing structure) 1.5 Single storied Residential building with two bed rooms (2 BHK)(Load bearing structure) 1.6 Two storied residential building (Framed structure) **2. ANALYSIS of RCC STRUCTURES USING SOFTWARE** 2.1 Carry out the analysis and design of simple RCC structures using any one of the available packages like STAADPRO, ETAB, CADS 3D or any other suitable packages. **3. CONSTRUCTION PROJECT MANAGEMENT USING SOFTWARE** **3.1** Develop the CPM / PERT Network for the proposed simple building project using anyone of the available packages or any other suitable packages

PO-CO MAPPING:

Course Code : C-509	Course Title: Computer Applications in Civil Engineering Number of COs: 03				No. of Periods: 60
POs	**Mapped with CO No.**	**CO Periods addressing PO in Column 1**		**Level (1,2,3)**	**Remarks**
		No	**%**		
PO1	CO1, CO2, CO3	15	26	2	> 40% Level 3 Highly addressed
PO2	CO1, CO2, CO3	6	11	1	
PO3	CO1, CO2, CO3	6	11	1	
PO4	CO1, CO2, CO3	25	40	3	25% to 40% Level 2 Moderately addressed
PO5	CO1, CO2, CO3	4	7	1	
PO6					
PO7	CO1, CO2, CO3	4	5	1	5 to 25% Level 1 Low addressed

CO-PO MAPPING:

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	3	2	3		2	2	2	3
CO2	2	3	2	3	3		2	2	2	3
CO3	3	2	2	3	2		2	2	2	3
Average	2.3	2.6	2.3	2.6	2.6		2	2	2	3

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:

 (i) Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions (vi) Quiz

 (vii) Industrial visits (viii) Tech fests (ix) Mini project works (x) Library visits etc

COURSE CONTENT

1. MS Excel applications in Building Estimates

Prepare the detailed estimates for various buildings from the given drawings, specifications and site conditions:

   a)   Compound wall and Steps
   b)   Single Room with Verandah (Load bearing structure)
   c)   Single storied Residential building with one bed room (1 BHK) (Load bearing structure)
   d)   Single storied Residential building with two bed rooms (2 BHK) (Load bearing structure)
   e)   Two storied residential building (Framed structure)
   f)   Reporting using MS-Word.

2. ANALYSIS of RCC STRUCTURES USING SOFTWARE

   a)   Carry out the analysis and design of simple RCC structures using any one of the able packages like STAADPRO, ETAB, CADS 3D or any other suitable packages.

3. CONSTRUCTION PROJECT MANAGEMENT USING SOFTWARE

   a.   Develop the CPM / PERT Network for the proposed simple building project using anyone of the available packages mentioned below or any other suitable packages.

Commercial Software	Similar Open source	Download Link
Microsoft Project	GANTT PROJECT	http://www.ganttproj ect.biz/

PROJECT WORK

Course code	Course title	No. Of period/week	Total no. Of periods	Marks for Formative Assessment	Marks for Summative Assessment
C-510	Project Work	03	45	40	60

	Upon completion of the course the student shall be able to	
Course Objectives	(i)	Provide with the opportunity to synthesise knowledge from various areas of learning and critically and creatively apply it to real life situations.
	(ii)	Enable to acquire skills like collaboration, communication and independent learning to prepare them for lifelong learning and the challenges ahead.

Course Outcomes	CO1	Acquires collaborative skills through working in a team to achieve common goals.
	CO2	Reviews and evaluates the available literature on the chosen problem and formulates the methodology to solve the identified problem.
	CO3	Acquires the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
	CO4	Acquires the skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms.
	CO5	Learns on own, reflects on their learning and takes appropriate actions to improve it and prepares and presents project report

Learning Outcomes	**PROJECT WORK**
	1.1 Identifies different works to be carried out in the Project.
	1.2 Collects data relevant to the project.
	1.3 Carries out Site Surveys.
	1.4 Selects the most efficient method from the available choices based on preliminary investigation.
	1.5 Designs the required elements of the project as per standard practices.
	1.6 Prepares working drawings for the project.
	1.7 Estimates the cost of project, men, materials and equipment required.
	1.8 Prepares schedule of time and sequence of operations.
	1.9 Prepares project report.
	1.10 Prepares C.P.M. Chart.
	1.11 Collects the requirements to start a Small Enterprise/Industry under Self Employment Scheme.
	1.12. Collects the necessary information to procure necessary finance, site and equipment.
	1.13 Prepares the chart or model for each project.

Course Code: **C-510**	**Course Title: Project work**		No of COs : **5**			No. Of periods: **45**
POs	Mapped with CO		CO Periods Addressing PO in Col 1		Level (1,2,3)	Remarks
		No	%			>40% Level 3 (Highly Addressed)
PO1	CO1,CO2,CO3,CO4,CO5	15	33.3		2	25% to 40% Level 2 (Moderately Addressed)
PO2	CO1,CO2,CO3,CO4,CO5	15	33.3		2	5% to 25% Level 1 (Low Addressed)
PO3						<5% Not Addressed
PO4						
PO5						
PO6	CO1,CO2,CO3,CO4,CO5,CO6,CO7	15	33.3		2	
PO7						

CO Mapping with POs

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3				3	
CO2	3	3				3	
CO3	3	3				3	
CO4	3	3				3	
CO5	3	3				3	
Average	3	3				3	

COURSE CONTENT

Project work is intended to provide training in the solution of field engineering problems involving Surveying, Planning, drawing plans, designing, estimating and marking out of a building/highway/irrigation/public health project. Project work will also include the preparation of the feasibility report for any one type of enterprise under self – employment schemes.

Students shall be divided into groups of five each and shall be assigned a problem that calls for application of the knowledge he/she acquired in the course and also which involves some extra study of reference materials.

Problems
a) Planning of a Campus.

b) Building project.

c) Industrial complex

d) Irrigation project.

e) Rural Water Supply Scheme.

f) Sanitary Engineering Scheme.

g) Bridge project.

h) Low Cost Housing Scheme.

i) Design of framed structure type building by using a software package.

j) Set up of a small enterprise under self-employment scheme.

Every student should prepare a project report and submit the same for assessment. Every student puts his share to the work in all the operations of the project. The end examination in Project work shall consist of power point presentation and Viva-voce test to be assessed by a panel of examiners comprising of an External examiner, the Head of Section, and member of staff who guided the project as Internal examiner.

Scheme of assessment (External)

1	Seminar	30 Marks
2	Internal assessment	20 Marks
3	Viva-Voce	10 Marks
Total		60 Marks

SIXTH SEMESTER

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND MODEL BLUE PRINT FOR EVALUATION
CURRICULUM-2023
SIXTH SEMESTER
INDUSTRIALTRAINING

Course Code	Course Title	Duration	Marks for Formative Assessment	Marks for Summative Assessment
C-601	Industrial Training	24 weeks	240	60

Time schedule

S.No	Code	TOPICS	Duration
1	C-601	• Practical training in Industry • Training Report Preparation Report Preparation: Title Page, Certificate, Acknowledgements, Abstract, Contents(introduction of Industry/Organization, Organization structure, Duties of different officers in the organization, List of works undertaken by organization, Procedures adopted, M-book recording at various stages of construction, Procurement of Material, Labour & Equipment, Skills Acquired, Conclusions, Charts, Diagrams, Plans etc., pertaining to organization, Literature.	Six Months

COURSE OBJECTIVES:

	Upon completion of the course the student shall be able to
Course Objectives	1. Expose to real time working environment 2. Enhance knowledge and skills already learnt in the institution. 3. Acquire new skills of measuring, supervising and recording civil engineering works. 4. Develop qualities like team & work culture, integrity, responsibility and self confidence.

COURSE OUTCOMES:

COURSE OUT COMES	CO1	C601.1	Apply theory to practical work situations
	CO2	C601.2	Cultivate sense of responsibility and good work habits
	CO3	C601.3	Exhibit the strength, teamwork spirit and self-confidence
	CO4	C601.4	Write report in technical projects

PO-CO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2				2		1	3		2
CO2						3		3		2
CO3						3		3		2
CO4						3		3		2

3: High, 2: Moderate,1: Low

Note : The gaps in CO-PO mapping will be met by one or more appropriate activities from the following:
 (i)   Assignments (ii) Tutorials (iii) Seminars (iv) Guest lectures (v) Group discussions
 (vi)   Quiz   (vii) Industrial visits (viii) Techfests (ix) Mini project works (x) Library visits etc

LEARNING OUTCOMES:

The student shall be able to display the following skill sets

1) Planning & scheduling of works, material & man-power

2) Preparing the designs & drawings of structures and structural components with respect to loads, strengths etc.,.

3) Preparing& reading estimates for civil engineering works.

4) Drafting Skills (Like proposal for new works, repairs for existing works, justification for proposals, Inspection /investigation reports, request for man power /equipment / Budget)

5) Developing Inter-personal relationship skills such as working as a team for a common cause.(Communication – Verbal, Non verbal ,written)

6) Supervising civil engineering works.(With respect to quality, progress rate, material & processes)

7) Identifying raw materials/tools/equipment appropriate for the nature of work and appreciate their importance, their source, mode of Transport to site etc.,(NOT For Final evaluation)

8) Recognizing and Practicing safety Measures in Construction Industry.

9) Preparing Reports pertaining to ongoing works.

Scheme of Formative Assessment and Summative Assessment for Industrial Training

Assessment no	Upon completion of	By	Based on	Max Marks
1	12 weeks	1. The faculty concerned and 2. Training Mentor of the industry	Skill sets as given in the scheme of assessment	120
2	20-22 weeks			120
3. Final summative Evaluation	23-24 weeks	1. The faculty member concerned, 2. HoD concerned and 3. An external examiner	1. Demonstration of any one of the skills listed in the Scheme of assessment	30
			2. Training Report	20
			3. Viva Voce	10
			TOTAL	300

Weightage of marks for Assessment of skills
During first and second assessment of INDUSTRAL Training

Skill set No	Skill set	Max Marks Allotted For each skill set
1	Planning & Scheduling of works, material & man power.	15
2	Reading Drawings & Preparing Designs of various structural components.	30
3	Given drawing, Preparing Estimates	25
4	Supervising Civil Engg works with respect to Quality, Progress rate, Material, Processes	20
5	Developing interpersonal relation (Spoken & written communication)	15
6	Drafting skills	15
	Total	**120**

Note : During assessment, the performance of the students shall be assessed in those skills in which the student has been trained and be awarded the marks as per the Weightage assigned as above. In case the student has undergone training in few skill sets only, then the total marks obtained shall be raised to 120 marks for the given assessment i.e. either assessment 1 or 2. However the performance of the student shall be assessed at the most skill sets listed above but not less than three skill sets.

Illustration: If the student has undergone training in only 4 skill sets (namely S.No. 1,2,4,5) and marks awarded during assessment is 50 out of 80 marks, then the marks of 50 shall be enhanced to 120 proportionately as (50x120/80=75)

GUIDELINES FOR INDUSTRIAL TRAINING OF DIPLOMA IN CIVIL ENGINEERING PROGRAMME:

1. Duration of the training: 6 months (24 Weeks).
2. Eligibility: As per SBTET norms
3. Training Area: Students may be trained in planning, Designing, Estimating, Drafting, Scheduling and executing of Civil Engineering works.
4. The candidate shall put a minimum of 90% attendance during Industrial training.
5. If the student fails to secure 90% attendance during industrial training, the student shall reappear for 6 months industrial training.
6. Formative assessment at industry shall be carried out by the Mentor from the industry, where the student is undergoing training and the in faculty in-charge (Guide) from the concerned section in the institution.
7. The Industrial training shall carry a Weightage of 300 marks and pass mark is 50% in assessments at industry (first and second assessment) and final summative assessment at institution put together i.e. 150 marks out of 300 marks.
8. If the student fails to secure 50% marks in final summative assessment at institution level, the student should reappear for final summative assessment in the subsequent board examination.
9. Final summative assessment at institution level is done by a committee including1. Head of the section (of concerned discipline ONLY), 2.External examiner from an industry and 3. Faculty member who assessed the student during Industrial Training as members

Roles and responsibilities of the faculty members who are assessing the students performance during industrial Training:

1. The faculty member shall guide the students in all aspects regarding training.
2. Shall create awareness regarding safety measures to be followed in the industry during the training period, and shall check it is followed scrupulously.
3. Shall check the logbook of the students during the time of their visit for the assessment.
4. Shall monitor progress at regular intervals and make appropriate suggestions for improvement
5. Shall visit the industry and make first and second assessments as per stipulated schedule.
6. Shall assess the skill sets acquired by the students during their assessment.
7. Shall award the marks for each skill set as per the marks allotted for that skill set during final assessment at institution.
8. Shall voluntarily supplement students learning through appropriate materials like photographs, articles, videos etc.
9. Shall act as co-examiner along with external examiner.
10. Shall act as liaison between the student and mentor.
11. Shall maintain a diary indicating his observation with respect to the progress of students learning in all three domains (Cognitive, Psychomotor and Affective)

Guidelines to the training mentor in the industry:

1) Shall train the students in all the skill sets as far as possible.
2) Shall assess and award the marks in both the assessments along with the faculty member.
3) Shall check and approve the log books of the students.
4) Shall approve the attendance of each student at the end of the training period.
5) Shall report to the guide about student's progress, personality development or any mis behaviour as the case may be.
6) Every Teacher (including HoD if not holding any FAC) shall be assigned a batch of students of 10 to 15 for industrial training irrespective of student's placements for training.

Department of Technical Education
Name of the institution
Industrial training assessment

PIN: Name of the student:

Skill Set Sl.No	SKILL SET	Max Marks Allotted For each parameter	Precisely completes the task	Completes the task, mistakes are absent, but not Precise	Completes the task, Mistakes are a few	Makes attempt, Mistakes are many
1	*Planning & Scheduling of works, material & man power (15)* *(i)Planning of the work*	5	5	3	2	1
	(ii) Scheduling of the work	5	5	3	2	1
	(iii) preparing weekly/monthly Material and Manpower requirement, recording the actuals	5	5	3	2	1
2	*Reading Drawings & Preparing Designs of various structural components (30)* *(i) Reading Drawings, preparing working drawing*	15	15	10	9	6
	(ii) Preparing Designs for small elements	15	15	10	9	6
3	*Given drawing, Preparing Estimates(25)* *(i) Preparing Data*	10	10	7	6	3
	(ii) Preparing Detailed cum Abstract Estimates	15	15	10	9	6
4	*Supervising Civil Engg works with respect to Quality, Progress rate, Material, Processes(20)* *(i) Supervising Quality in work, material etc*	10	10	7	6	3
	(ii) Supervising Progress of work, precautions etc	10	10	7	6	3

5	Developing interpersonal relation (Spoken & written communication)(15) (i) Teamwork and collaboration. (ii)Communication skills	10 5	10 5	7 3	6 2	3 1
6	Drafting skills (15) (i) Presentation skills. (ii) Reporting skills	10 5	10 5	7 3	6 2	3 1

❖ Mistakes are with reference to Technique, Procedure & precautions, while precision refers to technique, procedure, precautions, time & result

(Marks awarded in words: ....)

Signature of the Training In-charge (Mentor)
Name
Designation

Signature of the faculty incharge (Guide)
NameDesignation