C24_CURRICULUM

DIPLOMA IN
CIVIL ENGINEERING

Offered By

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING

TELANGANA : HYDERABAD

III SEMESTER

S.NO	Course		Teaching Scheme					Examination Scheme						
			Instruction Periods per week			Total Periods per semester	Credits	Continuous Internal Evaluation (CIE)			Semester End Examination (SEE)			
	Code	Course Name	L	T	P			Mid Sem 1	Mid Sem 2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including internal
1	SC-301	Applied Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	End Marks shall be ≥35% of Topper Marks and Subject Total Shall be ≥ D-Hybrid Grade Minimum
2	CE-302	Strength of Materials	4	1	0	75	2.5	20	20	20	40	14	100	
3	CE-303	Hydraulics	4	1	0	75	2.5	20	20	20	40	14	100	
4	CE-304	Levelling Surveying	4	1	0	75	2.5	20	20	20	40	14	100	
5	CE-305	Transportation Engineering	4	1	0	75	2.5	20	20	20	40	14	100	
6	CE-306	Construction Practice	4	1	0	75	2.5	20	20	20	40	14	100	
7	CE-307	Building Drawing	1	0	2	45	1.25	20	20	20	40	20	100	End Marks shall be ≥50% of Topper Marks and Subject Total Shall be ≥ D-Hybrid Grade Minimum
8	CE-308	Hydraulics Lab	1	0	2	45	1.25	20	20	20	40	20	100	
9	CE-309	Levelling Surveying Lab	1	0	2	45	1.25	20	20	20	40	20	100	
10	HU-310	Communication Skills & Life Skills Lab	1	0	2	45	1.25	20	20	20	40	20	100	
			28	6	8	630	20	200	200	200	400	164	1000	

SC-301 : APPLIED ENGINEERING MATHEMATICS

Course Title	Applied Engineering Mathematics	Course Code	SC-301
Semester	III	Course Group	Foundation
Teaching Scheme in Periods (L : T : P)	4:1:0	Credits	2.5
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the knowledge of Basic Engineering Mathematics and Engineering Mathematics at Diploma 1st and 2nd Semester level.

Course Outcomes(COs):

At the end of the course, the student will have the ability to:

CO 1	Integrate various continuous functions using substitution method
CO 2	Integrate various continuous functions using different methods of integration
CO 3	Integrate various functions by using Partial fractions and Integration by parts.
CO 4	Evaluate the Definite Integrals using Fundamental Theorem of Integral Calculus and its properties.
CO 5	Solve the problems in Areas of irregular shapes and Volumes of solids of revolution
CO 6	Solve the engineering problems by applying concept of Mean and RMS values of varies functions and Solve numerical problems in the engineering by using Trapezoidal and Simpson's 1/3 rd rule

Course Content:

Unit-I Indefinite Integration – I: Duration: 13Periods (L: 10– T:3)

Integration as an inverse process of Differentiation- Indefinite integral of standard functions- Properties of Indefinite Integral- Integration by Substitution - Integrals using Trigonometric identities of the form: $\int \sin^2 x\, dx, \int \cos^2 x\, dx, \int \sin^3 x\, dx$, $\int \cos^3 x\, dx, \int \sin Ax \cos Bx\ dx, \int \cos Ax \cos Bx\ dx$ and $\int \sin Ax \sin Bx\ dx$, where A and B are constants- Integrals of tan *x*, cot *x*, sec *x* and cosec *x*-Integrals of the form $\int \sin^m x . \cos^n dx$ and $\int \tan^m x . \sec^n dx$, where *m* and *n* are positive integers.

Unit – II Indefinite Integration – II: Duration: 12Periods (L: 10– T:2)

Integrals of some particular functions (Nine standard integrals) of the type: $\int \frac{1}{a^2+x^2} dx$, $\int \frac{1}{a^2-x^2} dx$, $\int \frac{1}{x^2-a^2} dx$, $\int \frac{1}{\sqrt{a^2+x^2}} dx$, $\int \frac{1}{\sqrt{a^2-x^2}} dx$, $\int \frac{1}{\sqrt{x^2-a^2}} dx$, $\int \sqrt{a^2+x^2}\, dx$, $\int \sqrt{a^2-x^2}\, dx$ and $\int \sqrt{x^2-a^2}\, dx$ -Integrals of the type:

$\int \frac{1}{ax^2+bx+c}\,dx, \int \frac{1}{\sqrt{ax^2+bx+c}}\,dx, \int \sqrt{ax^2+bx+c}\,dx, \int \frac{px+q}{ax^2+bx+c}\,dx, \int \frac{px+q}{\sqrt{ax^2+bx+c}}\,dx, \int (px+q)\sqrt{ax^2+bx+c}\,dx, \int \frac{1}{a\pm bsinx}\,dx, \int \frac{1}{a\pm bcosx}\,dx$ and $\int \frac{1}{asinx\pm bcosx\pm c}\,dx$, where *a*, *b*, *c*, *p* and *q* are constants.

Unit-III Indefinite Integration–III: Duration: 12 Periods (L: 10 – T:2)

Integration by using Partial fractions-Integration by parts - Bernoulli's rule for integration by parts - Integrals of the type: $\int e^{ax} \sin bx\,dx, \int e^{ax} \cos bx\,dx$ and $\int e^x[f(x)+f'(x)]dx$, where *a* and *b* are constants.

Unit – IV Definite Integral and its Properties: Duration:13Periods(L:10–T:3)

Definite integral - Fundamental Theorem of Integral Calculus –Evaluation of definite integrals by Substitution Method- Properties of Definite Integrals -Evaluation of Definite integrals by applying their properties.

Unit – V Applications of Definite Integrals: Duration: 13Periods (L: 10 – T:3)

Areas under simple curves -Sign of the Area -The area of the region bounded by a curve and a line - Area between two curves -Volumes of solids of revolution about axes - Volumes of solids of revolution of the area of the region bounded by the curve and a line about axes - Volumes of solids formed by rotating a region bounded by the curves about axes.

Unit – VI Mean, RMS values and Numerical Integration:

Duration: 12Periods (L: 10 – T:2)

Mean Values and Root Mean Square (R.M.S) values of a function in a given interval- Numerical Integration: Trapezoidal rule and Simpson's $\frac{1}{3}$-rule to evaluate an approximate value of a definite integral in a given interval- Problems leading to engineering applications.

Reference Books:

1. Higher Engineering Mathematics, by B.S.Grewal - Khanna publishers.

2. Thomas' Calculus, Pearson Publishers.

3. NCERT Mathematics Text Book for class XII, Part II.

4. Integral Calculus by Shanti Narayan and P. K. Mittal, S. Chand Publishers.

Suggested E-Learning references:

1. https://www.khanacademy.org/
2. https://www.wolframalpha.com/
3. https://onlinecourses.nptel.ac.in/
4. http://tutorial.math.lamar.edu/

Suggested Learning Outcomes:

At the end of the course, the student will have the ability to:

1.0 Apply the properties of Indefinite Integral and Substitution Method to evaluate the

Indefinite Integrals of various functions.

1.1 Explain the concept of Integration asan inverse process of Differentiation with standard notations.

1.2 Classify the Definite and Indefinite Integrals.

1.3. Formulate the standard Integrals using the definition of Integration.

1.4. State the properties of Definite Integrals.

(i.e., $\int (u \pm \mathrm{v})dx$, and $\int ku\ dx$,where *u*, *v* are functions in *x*and *k* is a scalar).

1.5 Use the Indefinite integrals of standard functions and properties of Integralsin solving engineering problems.

1.6 Evaluate Integrals involving simple functions of the following types by the method of Substitution:

i) $\int f(ax+b)dx$,where *f*(*x*)is in standard form,

ii)$\int f\big(g(x)\big)g'(x)dx$,

iii)$\int f(x^n)x^{n-1}dx$,

iv)$\int [f(x)]^n f'(x)dx$,

v)$\int \frac{f'(x)}{\sqrt{f(x)}}dx$

and vi) $\int \frac{f'(x)}{f(x)}dx$

1.7 Find the integrals of tan *x*, cot *x*, sec *x* and cosec*x*.

1.8 Use some trigonometric identities to find the integrals of the type: $\int \sin^2 x\ dx$, $\int \cos^2 x\ dx$,

$\int \sin^3 x\, dx, \int \cos^3 x\, dx, \int \sin Ax \cos Bx\ dx$, $\int \cos Ax \cos Bx\ dx$ and $\int \sin Ax \sin Bx\ dx$, where

A and *B* are constants.

1.9 Evaluate the integrals of the type: $\int \sin^m x . \cos^n dx$, where *m* and *n* are positive integers.

1.10 Evaluate the integrals of type: $\int \tan^m x . \sec^n dx$, where *m* and *n* are positive integers.

2.0 Formulate the Integrals of some particular functions and apply them for integrating many other related standard Integrals.

2.1 Evaluate theintegrals of some particular functions (Nine standard integrals) of the type:

$\int \frac{1}{a^2+x^2} dx$, $\int \frac{1}{a^2-x^2} dx$, $\int \frac{1}{x^2-a^2} dx$, $\int \frac{1}{\sqrt{a^2+x^2}} dx$, $\int \frac{1}{\sqrt{a^2-x^2}} dx$, $\int \frac{1}{\sqrt{x^2-a^2}} dx$, $\int \sqrt{a^2+x^2} dx$,

$\int \sqrt{a^2-x^2} dx$and $\int \sqrt{x^2-a^2} dx$,where *a* is a constant.

2.2 Evaluate the integrals of the type: $\int \frac{1}{ax^2+bx+c} dx$, $\int \frac{1}{\sqrt{ax^2+bx+c}} dx$ and $\int \sqrt{ax^2+bx+c}\, dx$,

where *a*, *b* and *c* are constants.

2.3 Evaluate the integrals of the type: $\int \frac{px+q}{ax^2+bx+c} dx, \int \frac{px+q}{\sqrt{ax^2+bx+c}} dx$ and

$\int (px+q)\sqrt{ax^2+bx+c}\, dx$,where *a, b, c, p* and *q* are constants.

2.4 Evaluate the integrals of the type: $\int \frac{1}{a \pm b\sin x} dx$, $\int \frac{1}{a \pm b\cos x} dx$ and $\int \frac{1}{a\sin x \pm b\cos x \pm c} dx$,

where *a, b* and *c* are constants.

3.0 Integrate various functions by using Partial fractions and Integration by parts.

3.1 Evaluate Indefinite Integrals using Partial fractions.

3.2 Evaluate Indefinite Integrals using Integration by parts.

3.3 Apply the Bernoulli's rule for evaluating the Integrals of the form $\int u.v\, dx$, where *u* and

v are functions in *x*.

3.4 Evaluate the Integrals of the form $\int e^{ax} \sin bx\, dx$ and $\int e^{ax} \cos bx\, dx$,where *a* and *b* are constants.

3.5 Evaluate the Integrals of the form $\int e^x [f(x) + f'(x)]\, dx$.

4.0 Evaluate the Definite Integrals using Fundamental Theorem of Integral Calculus and its properties.

4.1 State the Fundamental Theorem of Integral Calculus.

4.2 Calculate the Definite Integrals over an interval by using the Fundamental Theorem of Integral Calculus.

4.3 Evaluate the Definite Integrals by using Substitution Method.

4.4 Explain various properties of Definite Integration.

4.5 Evaluate the Definite Integrals byusing its properties.

5.0 Compute the Areas of irregular shapes and Volumes of solids of revolution using the concept of Definite Integrals.

5.1 Define Area under simple curves.

5.2 Describe the sign of the Areas of simple curves.

5.3 Calculate the Areas under simple curves.

5.4 Determine the area of the region bounded by a curve and a line.

5.5 Find the area enclosed between two curves using methods of Definite Integration.

5.6 Define the volume of a solid generated by revolving a region bounded by the curves about axes.

5.7 Explain Volumes of solids of revolution.

5.8 Calculate the Volumes of a solid that is obtained by revolving a plane region about axes.

5.9 Compute the Volumes of solids of revolution of the area of the region bounded by the curve and a line about axes.

5.10 Evaluate the Volumes of solids formed by rotating a region bounded by the curves about axes.

6.0 Find the Mean and RMS values of various functions in engineering problems and evaluate

Numerical Integral of functions available only at discrete points.

6.1 Explain Mean Value, Mean Square Value and Root Mean Square (RMS) value of the functions in any given interval.

6.2 Obtain the Mean Value, Mean Square Value and Root Mean Square (RMS) values of the functions in any given interval.

6.3 Explain Trapezoidal rule and Simpson's $\frac{1}{3}$rules.

6.4 Apply the Trapezoidal rule, Simpson's $\frac{1}{3}$ rules for for approximation of definite integrals

6.5 Solve the problems leading to engineering applications by using above methods.

Suggested Student Activities:

1. Student visits Library to refer Standard Books on Mathematics and collect related material.

2.Quiz.

3.Group discussion.

4.Surprise tests.

5. Seminars.

6. Home Assignments.

7. Mathematics for preparing competitive exams and solving old question papers on arithmetical ability.

CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapped POs
CO1	3	2					3	1, 2 ,7
CO2	3	2					3	1, 2 ,7
CO3	3	2					3	1, 2 ,7
CO4	3	2					3	1, 2 ,7
CO5	3	2	2				3	1, 2 ,3,7
CO6	3	2	2				3	1, 2, 3, 7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24), SC-301
SEMESTERIII,MID –I EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

TIME: 1: 00 Hour **Max. Marks: 20**

PART-A

Instructions: 1. Answer **ALL** questions. 04 × 01 = 04
2 Each question carries **ONE** mark.

1. Find: $\int \left(2x - \sqrt{x} + x^3\right) dx$.
2. Find: $\int \frac{dx}{3x+7}$.
3. Find: $\int \frac{dx}{\sqrt{25-x^2}}$.
4. Find: $\int \sqrt{7+x^2}$ dx.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06
2. Each question carries **THREE** marks.

5(a) Evaluate: $\int sin^3 x\, dx$.

OR

5(b) Evaluate: $\int \frac{cos\sqrt{2x}}{\sqrt{2x}} dx$.

6(a)Evaluate: $\int \frac{3x^2}{4+x^6} dx$.

OR

6(b)Evaluate: $\int \sqrt{x^2+2x+5}\, dx$.

PART- C

Instructions: 1. Answer **ALL** questions. 02 × 05 = 10
2. Each question carries **FIVE** marks.

7(a) Evaluate: $\int \frac{dx}{4sin^2 x+9cos^2 x}$.

OR

7(b) Evaluate: $\int sin^7 x.cos^3 d$

8(a)Evaluate: $\int \frac{2x+5}{\sqrt{x^2-2x+2}} dx$.

OR

8(b)Evaluate: $\int \frac{1}{4sinx+3cosx+6} dx$.

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DIPLOMA EXAMINATIONS (C - 24), SC-301
SEMESTERIII,MID –II EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

TIME: 1: 00 Hour **Max. Marks: 20**

PART-A

Instructions: 1. Answer **ALL** questions. 04 × 01 = 04
2 Each question carries **ONE** mark.

1. Find: $\int e^{2x} sin3x\, dx$.
2. Find: $\int e^{x} (\cot x + \log \sin x)\, dx$.
3. Find: $\int_0^1 (x^4 + 1)\, dx$
4. Find: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x\, cos\, x^2\, dx$.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06
2. Each question carries **THREE** marks.

5(a) Evaluate: $\int \sinh 2x\, .\, sin2x\, dx$.

OR

5(b) Evaluate: $\int x^3 sin2x\, dx$ by using Bernoulli's rule.

6(a) Evaluate: $\int_0^{\frac{\pi}{2}} \frac{sin^{2025} x}{sin^{2025} x + cos^{2025} x}\, dx$.

OR

6(b) Evaluate: $\int_0^{2\pi} cos^2\, 7x\, dx$.

PART C

Instructions: 1. Answer **ALL** questions. 02 × 05 = 10
2. Each question carries **FIVE** marks.

7(a) Evaluate: $\int \frac{x^2}{x^2+7x+10}\, dx$.

OR

7(b)Evaluate: $\int \frac{x cos^{-1} x}{\sqrt{1-x^2}}\, dx$.

8(a) Evaluate: $\int_0^{\pi} \frac{x}{25cos^2 x + 16sin^2 x}\, dx$.

OR

8(b) Evaluate: $\int_0^1 \frac{cos^{-1} x}{x}\, dx$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24), SC-301
SEMESTER III, SEMESTER END EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

Time: 2 hours **[Total Marks: 40]**

PART-A

Instructions: 1. Answer **ALL** questions. 08 ×01 = 08
2 Each question carries **ONE** mark.

1. Find $\int(a_0 + a_1x + a_2x^2 + \cdots + a_nx^n))dx$.

2. Find $\int_{-1}^{1} x^2 sin\, x^3\, dx$.

3. Find the area bounded by the curve y = x^2, the x – axis and the ordinates x = 1and x = 3.

4. Find $\int \frac{1}{xcos^2(logx)}\, dx$.

5. Find the mean value of sin x over (0, 2π).

6. Find the volume of the solid generated when the area bounded by the curve y = x^3, the x – axis and the lines x = 0 to x = 1.

7. Find the R.M.S value of $\sqrt{x}$over the range (2, 3).

8. Find the approximate value of $\int_0^6 f(x)\, dx$ from the following table:

x	0	2	4	6
f(x)	3	7	11	9

by Trapezoidal Rule.

PART-B

Instructions: 1. Answer **ALL** questions. 04 × 03 = 12
2. Each question carries **THREE** marks.

9(a) Evaluate: $\int \frac{1}{\sqrt{sin^{-1}x}\sqrt{1-x^2}}\, dx$.

OR

9(b) Find the area bounded by the curve y = cos x in (0, π).

10(a) Evaluate: $\int_0^5 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{5-x}}\, dx$.

OR

10(b) A swimming pool is 100 feet wide and the depth d in meters at a distance x meters from one bank is given by the following table:

x	0	20	40	60	80	100
d	0	7	9	15	8	2

Find the cross-section area of the swimming pool using Simson's $\frac{1}{3}$ -rule.

11(a) Find the area included between the parabola $x^2 = 16y$ and its latus rectum.

OR

11(b) Find the volume of the solid by rotating one arc of the curve $y = \sin 3x$ about x – axis.

12(a) Find the RMS value of $i = 3 \sin x$ over the half wave.

OR

12(b) Find the Mean value of $x^2 - 5x + 4$ between the values of x,where the expression vanishes.

PART C

Instructions: 1. Answer **ALL** questions 04 × 05 = 20

2. Each question carries **FIVE** marks

13(a) Evaluate: $\int \frac{5x+3}{\sqrt{x^2+4x+10}} dx$.

OR

13(b) Find the area enclosed between the curve $y^2 = 8x$ and the line $2y = x$.

14(a) Evaluate: $\int \frac{1}{x^4-1} dx$.

OR

14(b)The velocity of a train which starts from rest is given by the following table. The time is recorded in minutes from the start and speed in miles per hour.

Minutes	0	2	4	6	8	10	12	14	16	18	20
Miles/hour	0	10	18	25	29	32	20	11	5	2	0

Estimate approximately the total distance run in 20 meters using Simson's $\frac{1}{3}$ - rule.

15(a) Find the area between the two parabolas $y^2 = 4x$ and $x^2 = 12y$.

OR

15(b) Find the volume of the right circular cone of height h and semi vertical angle α.

16(a) Determine the Root Mean Square value of the function $y = x^2 e^{3x}$ in the range between $x = 0$ and $x = 2$.

OR

16(b)Find the Mean value of $\sin^2 \omega t$ in the interval $\left[0, \frac{2\pi}{\omega}\right]$.

CE-302 – STRENGTH OF MATERIALS

Course Title:	**Strength of Materials**	Course Code	**CE-302**
Semester	**III Semester**	Course Group	**Core**
Teaching Scheme in Periods (L:T:P)	**60:15:0**	Credits	**2.5**
Methodology	**Lecture + Tutorials**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

Knowledge of Engineering Mechanics

Course Outcomes

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

CO1	Develop Shear Force and Bending Moment Diagrams for different types of beams
CO2	Apply Euler's formula and Rankine's formula for columns to arrive at critical load over the column
CO3	Discuss geometrical properties of beam to calculate strength parameters like flexural stress in beams for different loading conditions.
CO4	Determine the shear stress distribution in beams of specified sections and capacity of circular shafts in generating Power.
CO5	Calculate the deformation (Slope &deflection) of Beams by Double Integration Method
CO6	Analyse the beams to calculate slope and deflection using Macaulay's method and Moment area method.

Course Content and Blue Print of Marks for SEE

Course Contents

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
I	Shear force and Bending Moment	15	Q4	Q1	Q9(a)	Q13(a)
II	Columns and Struts	10				
III	Theory of simple bending	12		Q2	Q10(a)	Q14(a)
IV	A) Shear stress in beams	07				
	B) Torsion	06				
V	Deflection of beams-I	10		Q3 Q5,Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
VI	Deflection of beams-II	15		Q3 Q7,Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	75	8		8	8

UNIT - 1: Shear Force and Bending Moment

Duration: 15 Periods (L: 12 – T:3)

Concepts of S.F. and B.M.-Sign Convention -Relation between Rate of Loading, S.F. and B.M- S.F. and B.M. diagrams for Cantilevers, Simply Supported beams, Overhanging beams subjected to point loads and uniformly distributed loads - Maximum B.M and maximum S.F in beams for various loads- position and significance of points of contra flexure-

UNIT - 2: Columns and struts

Duration: 10 Periods(L:10 – T:2)

Importance and Calculation of Least Moment of Inertia, radius of gyration and slenderness ratio for Solid circular, Hollow circular, Rectangular, I sections and Built up sections – Compression Members-Types and Classification - Short and Long columns, failures - Different end conditions - Effective length - calculation of safe load on columns with axial load only by Euler's and Rankine's formula - Limitation of Euler's formula

UNIT - 3: Theory of Simple Bending **Duration: 12 Periods(L:10 – T:2)**

Bending stress in beams: Introduction –Simple Bending Stress in beams – Bending Equation (Derivation not required) – Neutral Axis - Section Modulus, Flexural Rigidity, Modulus of Section, Radius of curvature, Moment of Resistance – Calculation of bending stresses in Symmetrical and Unsymmetrical sections-practical applications.

UNIT – 4(A):Shear stress in beams **Duration: 7 Periods (L:5– T:2)**

Shear Stress distribution diagrams for various symmetrical beam sections such as rectangular, solid circular and I & T sections - Calculation of shear stress in different layers of a beam for rectangular and I section (Derivation of formula not required) – Calculation of Maximum shear stress in rectangular, circular and I sections-problems

UNIT- 4(B): Torsion

Duration: 06 Periods (L:4 – T:2)

Introduction – Theory of torsion – Assumptions – Torsion formula (Derivation not required) – Solid and hollow circular shafts subjected to pure torsion – Simple problems– Shear stress distribution in shafts - Power transmitted by circular shafts – Problems

UNIT - 5:Deflection of beams - Introduction

Duration: 10 Periods(L:8– T:2)

Introduction – Deflected profiles of beams with different support conditions – Strength and stiffness of beams – Relation between curvature, slope and deflection

(Derivation not Required)- Slope and deflection for simply supported beams under symmetrical loading – Slope and deflection in cantilever beams under point load and udl- Double integration method – Derivation of standard cases –Problems.

UNIT - 6:Deflection of beams –Macaulay's method & Mohr's theorem

Duration: 15 Periods(L:12 – T:3)

a) Macaulay's method for slope and deflection–Simply supported beams under concentrated and uniformly distributed loads –Problems.

b) Mohr's theorems for slope and deflection – Cantilevers and simply supported beams with symmetrical loading – Problems.

Reference Books

1. Ramamrutham S., *Strength of Materials*, Dhanpat Rai Publishing Company (p) Ltd.
2. Punmia B.C. Dr, Ashok Kumar Jain, Arun Kumar Jain. Dr, *Strength of Materials*, Laxmi Publications
3. Srinivasulu N., *Strength of Materials*, Radiant Publishing House
4. Prakash Rao.D.S., *Introduction to Strength of Materials*, University Press
5. Prakash Rao.D.S., *Strength of Materials -A Practical Approach-Vol-I*, University Press.
6. Bansal.R.K.Dr, *A Text Book on Strength of Materials*, Laxmi Publications
7. Negi.L.S, *Strength of Materials*, McGraw Hill Education
8. Stephen Timoshenko, *Strength of Materials*, CBS Publishers and Distributors Pvt. Ltd.
9. Uday Shanker Dixit, Nelson Muthu, Kamal S.M., *Strength of Materials*, AICTE E-Kumbh Prescribed Book
10. Arunachalam Subramaniam Balu, *Theory of Structures*, AICTE E- Kumbh Prescribed Book

Suggested E-learning references

1. https://nptel.ac.in/courses/105105108.
2. https://nptel.ac.in/courses/105105166

Suggested Learning Outcomes

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

CO1 - Develop Shear Force and Bending Moment Diagrams for different types of beams

1.1 Explain terms: a) Shear Force b) Bending Moment

1.2 Explain the sign conventions used to calculate Shear Force and Bending Moment
1.3 Explain the relationship between the rate of loading, shear force and bending moment
1.4 Determine Shear Force and Bending Moment on Cantilevers, Simply Supported Beams and Overhanging beams for simple cases of loading (Point Load, uniformly distributed load) analytically
1.5 Determine maximum SF and maximum BM for various loading conditions in Cantilevers, Simply Supported Beams and Overhanging beams.
1.6 Describe the procedures for sketching the Shear Force Diagrams (SFD) and Bending Moment Diagrams (BMD)
1.7 Sketch Shear Force Diagrams (SFD) and Bending Moment Diagrams (BMD) for Cantilever, Simply Supported Beams and Overhanging Beams
1.8 Determine point of contra flexure and explain its significance

CO2 - Apply Euler's formula and Rankine's formula for columns to arrive at critical load over the column

2.1 List different types of compression members
2.2 Define :
- i) Buckling/Critical/Crippling Load
- ii) Actual length
- iii) Slenderness ratio
- iv) Least radius of gyration
- v) Safe load
- vi) Factor of safety

2.3 State the classification of columns based on slenderness ratio OR length and lateral dimensions
2.4 Calculate least radius of gyration for solid circular, hollow circular, square, rectangular sections, I-sections and built up sections
2.5 List different end conditions for a column
2.6 Find the effective lengths of columns for different end conditions
2.7 Calculate the slenderness ratio for a given column
2.8 State Euler's formula for crippling load of a column (derivation not required)
2.9 Calculate crippling and safe loads on a column with simple and built up sections using Euler's formula.
2.10 Solve problems on limitations of Euler's formula
2.11 Explain the validity of Rankine's formula for short and long columns using basic Rankine's empirical formula
2.12 Calculate crippling or safe loads on a column with simple and built up section using Rankine' formula
2.13 Calculate the ratio of strengths of hollow and solid circular columns loaded under same conditions
2.14 Design a hollow circular cross section of a column for the given data
2.15 Calculate the ratio of strengths of a section using Euler's and Rankine's formulae under same conditions.

CO3 - Discuss geometrical properties of beam to calculate strength parameters like flexural stress in beams for different loading conditions.

3.1 Explain simple / pure bending

3.2 Define terms a) Neutral layer b) Neutral axis c) Radius of curvature d) Moment of Resistance e) Modulus of section f) Flexural rigidity

3.3 State the assumptions made in the theory of simple bending.

3.4 Sketch and explain bending stress distribution across the depth of the beam for any cross section

3.5 Obtain the formula for section modulus of (solid and hollow sections): a) Square Section b) Rectangular Section c) Circular Section

3.6 Calculate section modulus based on above formulae

3.7 Solve problems on theory of simple bending for symmetrical and unsymmetrical sections to calculate Moment of Resistance, Design of cross section.

CO4 - Determine the shear stress distribution in beams of specified sections and capacity of circular shafts in generating Power.

4.1 State formula for calculation of Shear Stress in any layer of a cross section

4.2 Draw shear distribution diagram across:
i) Rectangular section
ii) Solid circular section
iii) Symmetrical I – section
iv) T – section

4.3 Determine shear stress at any layer and draw shear stress distribution diagram across:
i) Rectangular section
ii) Symmetrical I - section

4.4 Determine the maximum shear stress in circular, rectangular and square and I sections

4.5 State pure Torsion

4.6 State the assumptions made in the pure Torsion

4.7 State and explain the terms in the formula for pure Torsion of a circular shaft

4.8 Solve the problems on Torsion applying Torsion formula

4.9 Explain terms: i) Polar modulus ii) Torsional rigidity

4.10 State and explain the terms in the formula for power transmitted by the circular shaft

4.11 Solve the problems on power transmitted by the solid and hollow circular shafts

4.12 Computes the dimensions of a solid / hollow circular shaft based on strength.

CO5 - Calculate the deformation (Slope &deflection) of Beams by Double Integration Method

5.1 Draw the deflected shapes of different beams

5.2 Define:
i. Elastic curve
ii. Slope
iii. Deflection

5.3 Distinguish between strength and stiffness of a beam.

5.4 State and explain the terms in formula expressing the relation between slope, deflection and radius of curvature

5.5 Derive the equations for maximum slope and deflection by double integration method for:

(i) Cantilever beams with point loads and uniformly distributed loads (standard cases).

(ii) Simply supported beams with central point load, uniformly distributed load throughout and their combination.

(iii)Calculate the maximum slope and deflection in simply supported and cantilever beams using the above formulae.

CO6 - Analyse the beams to calculate slope and deflection using Macaulay's method and Moment area method.

6.1 Explain Macaulay's method (for Simply supported beams) to find the slope and deflections

6.2 Compute the maximum slope and deflection for Simply supported beam carrying point loads and uniformly distributed loads by Macaulay's method

6.3 Define:

i) Mohr's theorem-I

ii) Mohr's theorem-II

6.4 Derive formulae for maximum slope and deflection in standard cases (simply supported and cantilever beams) by moment area method using Mohr's theorems

6.5 Compute the maximum slope and deflections for Cantilever and Simply Supported Beams by Mohr's theorem-I and Mohr's theorem-II (moment area method)

Suggested Student Activities

1. Visit the Institute's Library / internet center and list the books/journals/ e-books and any other resources available on the topics suggested by the teacher.
2. Prepare a simple beam (Cantilever, Simply Supported or Overhanging) using any material like paper, thermocole etc and test it for failure stresses and deflection
3. Prepare references consisting name of the author, title of the book/paper, publication and place of publication, volume No's, page numbers and year of publication on the following topics
   i) Beam column joints.
   ii) Mohr's theorem
   iii)Bending Test on Wood and Mild steel.

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	2					1	1,2,7
CO2	2	2	2				1	1.2.3.7
CO3	2	3	3				2	1,2,3,7
CO4	2	3	3				2	1,2,3,7
CO5	2	2	1				1	1,2,3,7
CO6	2	2	1				1	1,2,3,7

State Board of Technical Education and Training, Telangana
Model Question paper
DCE IV semester
Mid Semester-I Examination

Course Code:CE-302 **Duration:1 hour**
Course Name: STRENGTH OF MATERIALS **Max. Marks:20 Marks**

PART-A

Answer **all** questions, Each Question carries **ONE** mark **4x1 = 4 Marks**

1. Show the SFD and BMD for a cantilever beam of span 'l' with a point load of 'W' at the end indicating Maximum values.
2. Show the SFD and BMD for a simply supported beam of span 'l' with a UDL of 'w kN/m' throughout the span indicating Maximum values.
3. State any three assumptions made in Euler's theory of columns.
4. State different end conditions of columns.

PART-B

Answer **TWO** questions. Each question carries **THREE** marks **2x3 = 6 Marks**

5(a). A simply supported beam of span 6m is carrying a point load of 30kN at a distance of 4m from LHS and a UDL of12kN/m over entire span. Calculate maximum Bending moment and draw BMD.

(OR)

5(b). A cantilever of span 6m carries two point loads of 10kN and 20kN at a distance of 1m and 4m from fixed support. Draw BMD

6(a). A rectangular columnof cross section 200mm x 300mm, 5m long is fixed at one end and hinged at the other. Determine the Euler's critical load on the column if E = 200 kN/mm^2.

(OR)

6(b). A solid circular section of diameter 150mm is used as a column of length 4m. It is fixed on both ends. Determine the Rankine's buckling load. Given fc = 500 N/mm^2 and a = 1/1600

PART-C

Answer **TWO** questions. Each question carries **FIVE** marks **2x5= 10 Marks**

7(a). A cantilever beam of span 6m is subjected to 2 point loads 10kN, 15kN at a distance of 2m, 6m from fixed end. In addition to them it carries a udl of 5kN/m throughout the span. Draw SFD and BMD.

(OR)

7(b). A 7m span beam is simply supported between 5m and is over hanged for a length of 2m on right side. It carries 2 point loads 25kN and 18kN acting at 3m and 7m from LHS. Draw SFD and BMD.

8(a). A solid circular cast iron column whose diameter is 200mm is 4m long. It is fixed at both ends. Calculate the ratio of Euler's and Rankine's critical load. fc = 500N/mm^2 and a = 1/1600

(OR)

8(b) A straight bar 3m long is used as a strut with both ends fixed. When an axial load of 8 kN is applied the bar is found to buckle. What should be the diameter of rod. Take fc = 330 N/mm^2 and a = 1/1750

State Board of Technical Education and Training, Telangana
Model Question paper
DCE IV semester
Mid Semester-II Examination

Course Code:CE-302 **Duration:1 hour**
Course Name: STRENGTH OF MATERIALS **Max. Marks:20 Marks**

PART-A

Answer **ALL** questions, Each Question carries **ONE** mark **4x1 = 4 Marks**

1. Define Neutral axis of the section and state where it lies for any section.
2. Define Section Modulus and state its units.
3. Define pure torsion and write the units for twisting moment.
4. Define torsion and write any three practical examples of application of torsion.

PART-B

Answer **TWO** questions. Each question carries **THREE** marks. **2x3 = 6 Marks**

5(a). A steel rod 100mm diameter is to be bent to a circular shape. Find the minimum radius of curvature to which it should be bent so that stress in the steel may not exceed 120 N/mm^2. Take E = 2 x 10^5 N/mm^2.

(OR)

5(b). A steel flat of size 120mm wide and 25mm thick is bent into a circular arc of radius 5m. Find the maximum stress induced and the bending moment which can produce this stress. Take E = 2 x 10^5 N/mm^2.

6(a). A steel shaft having a modulus of rigidity as 80 kN/mm^2 is twisted by 1 degree 30 minutes in a length of 2m. The shaft is solid circular with diameter 80mm. Determine the Torque required.

(OR)

6(b). A hollow steel shaft has 120mm outer diameter and 15mm thickness. When transmitting power at 150 r.p.m the angle of twist per metre length was one degree. Find the power transmitted by the shaft. Take G = 80 kN/mm^2.

PART-C

Answer **TWO** questions. Each question carries **FIVE** marks **2x5 = 10 Marks**

7(a). A rectangular beam 300mm deep is simply supported over a span of 3m. What "udl" the beam can carry, if the bending stress is not to exceed 120 MPa? Take I = 80 x 10^6 mm^4.

(OR)

7(b). A cast iron beam of symmetrical I-section with top flange 150mm x 10mm, bottom flange 150mm x 10mm and web 280mm x 10mm is simply supported over a span of 6m. If the permissible bending stress is 110 N/mm^2, what uniformly distributed load can be safely applied on the beam?

8(a). A solid steel shaft is to transmit a torque of $1x10^8$ N.mm. If the shearing stress does not exceed 45 N/mm^2, Find the minimum diameter of the shaft.

(OR)

8(b). A hollow circular shaft 120mm external diameter has to transmit 120 kW power at 200 r.p.m. The angle of twist on a length of 3m was observed to be 0.85 degree. Find the thickness of the shaft. Take G = 80 kN/mm^2

State Board of Technical Education and Training, Telangana

Model Question paper

DCE IV semester

IV Semester End Examination

Course Code:CE-302 **Duration:2 hours**

Course Name: STRENGTH OF MATERIALS **Max. Marks: 40 Marks**

PART-A

Answer **all** questions. Each Question carries one mark **8x1 = 8 Marks**

1. What are the sign conventions to calculate Shear Force and Bending Moment in beams.
2. Define Section Modulus and state its units.
3. Write the equations for max. Slope and max. Deflection of a simply supported beam subjected to a total u.d.l of **W** over its whole span.
4. Differentiate between Short column and Long column.
5. Define slope and deflection.
6. Define Elastic curve of a beam and show the deflected shapes of
   (i) Simply supported and
   (ii) Cantilever beams.
7. State the relation between curvature, slope and deflection of a loaded beam and explain the terms.
8. Differentiate between strength and stiffness of a beam.

PART-B

Answer **FOUR** questions.Each question carries **three** marks. **4 x 3 = 12 Marks**

9(a). A cantilever beam of span 6m is subjected to 2 point loads 20kN and 30kN at a distance of 3m and 6m from fixed end. Draw SFD and BMD for the beam and summarize maximum values.

(OR)

9(b). A cantilever beam of span 5m carries a u.d.l at the rate of w/m. The section of the beam is 100mm x 200mm and the value of E of the beam material is 2×10^4 mm^4. Determine the value of 'w' if the maximum deflection is 8mm.

10(a). A simply supported beam of symmetrical section 300mm deep and $I = 120 \times 10^6$ mm^4 carries a UDL of 15 kN/m throughout the span. Calculate maximum span of the beam if the maximum bending stress is not to exceed 160 N/mm^2

(OR)

10(b). A cantilever beam of span 3m carries a point load of 30kN at its free end. Calculate the slope and deflection at the free ends using Mohr's theorems. Take EI = 4000 $kN-m^2$.

11(a). A simply supported beam is 6m long, 200mm wide and 350mm deep. Calculate the maximum central point load the beam can carry so that the maximum deflection does not exceed 10mm.

(OR)

11(b). A cantilever of span 3m carries a UDL of 10kN/m over a length of 2m from fixed support. Calculate the deflection at the free end.

12(a). A simply supported beam of span 'L' carries a point load of 'W' at the centre of beam. Derive a formula to calculate the maximum slope in the beam. Use Moment Area method.

(OR)

12(b). Write the boundary conditions to attain maximum slope and maximum deflection for the following cases.

a) Simply supported beam with a UDL of 'w' kN/m acting throughout the span 'L'.
b) Cantilever beam of span 'L'with a point load 'W' at the free end.

PART-C

Answer **FOUR** questions. Each Question carries **FIVE** marks **4 x 5 = 20 Marks**

13(a) A simply supported beam of span 5m is carrying a point load of 40kN at a distance of 2m from LHS and a UDL of 10 kN/m over entire span. Calculate maximum Bending moment and draw BMD.

(OR)

13(b) Derive a formula to calculate maximum slope for a simply supported beam with concentrated load at the centre, using Double integration method.

14(a) A symmetrical I-section with flange dimensions 180mm x 10mm and web 12 x 250mm is used as a beam having overall depth 270mm to resist a Shear Force of 60kN. Find the maximum Shear stress developed in the beam.

(OR)

14(b) A RSJ is freely supported over a span of 5m carrying central concentrated load of 20 kN. Find the position and magnitude of maximum deflection. Use Macaulay's method. $E = 200\ kN/mm^2$, $I = 73.3 \times 10^6\ mm^4$.

15(a) Derive a formula to calculate maximum slope for a simply supported beam with a udl of 'w' kN/m throughout the span, using Double integration method.

(OR)

15(b) Derive a formula to calculate maximum slope and maximum deflection for a cantilever beam with a point load 'W' at the free end, using Double integration method.

16(a) A cantilever of span 6m carries a UDL of 10kN/m for a length of 4m from fixed end and a point load of 12 kN at the free end. Determine maximum slope and deflection at the free end by Moment area method. Given E = 200 kN/mm^2, Ixx = 32 x 10^6 mm^4.

(OR)

16(b) A I-section is used as a simply supported beam of span 5m to carry two point loads of 20kN each at a distance of 1.5m from both the supports. Find the position and magnitude of maximum deflection. Take E= 2 x 10^5 N/mm^2, I=73.33 x 106 mm^4. Use Macaulay's method.

CE-303 - HYDRAULICS

Course Title:	**Hydraulics**	Course Code :	**CE-303**
Semester:	**III Semester**	Course Group :	**Core**
Teaching Scheme in Periods(L:T:P):	**60 :15:0**	Credits :	**2.5**
Methodology :	**Lecture+Assignments**	Total Contact Periods :	**75**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This subject requires the basic knowledge of physics

Course Outcomes

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

CO1	Calculate fluid pressure using pressure measuring devices and compute the forces on immersed plane surfaces.
CO2	Apply the general principles of flow of liquids and Bernoulli's theorem and solve problems on discharge and pressure measurements using flow measuring devices.
CO3	Determine the discharge and coefficients of discharge for orifices and mouthpieces, notches and weirs
CO4	Evaluate the major loss and various minor losses of head in flow through pipes.
CO5	Determine the flow parameters and design the most economical channel sections.
CO6	Explain the working principles of pumps, turbines and layout of a typical hydro-electric power station.

Course Content and Blue Print of Marks for SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="2">R</th><th>U</th><th>A</th></tr>
<tr><td>1</td><td>Properties of fluids and measurement of fluid pressure</td><td>12</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>Flow of fluids</td><td>13</td></tr>
<tr><td>3</td><td>Flow through orifices, mouthpieces, notches and weirs</td><td>13</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>4</td><td>Flow through pipes</td><td>12</td></tr>
<tr><td>5</td><td>Open channel flow</td><td>10</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b), Q11(a), Q11(b)</td><td>Q13(b), Q15(a), Q15(b)</td></tr>
<tr><td>6</td><td>Pumps, turbines and hydroelectric power plants</td><td>15</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT 1: Properties of fluids and measurement of fluid pressure

Duration: 12Periods (L:10 – T:2)

a) Scope and importance of hydraulics in civil Engineering
b) Fluids - classification - properties – formulae- units
c) Pressure- types – relationship - pressure measuring instruments –compute the pressure of flowing liquid on a Piezo meter, Manometers- U-tube, inverted U-tube and differential manometer.
d) Total pressure and centre of pressure on plane surface immersed in liquid - Numerical problems

UNIT 2 : Flow of fluids **Duration:13Periods(L:10 – T:3)**

a) Types of flow - Rate of flow or discharge-continuity equation- Numerical problems
b) Total energy of liquid in motion – Bernoulli's theorem (without proof) –its limitations -Numerical problems.
c) Applications of Bernoulli's theorem – Pitot tube and Venturimeter -Numerical problems on Venturimeter only.

UNIT 3: Flow through orifices, mouth pieces, notches and weirs

Duration: 13Periods (L:10 – T:3)

a) Orifice-types of orifices-Numerical problems on small orifice, large rectangular orifice and time of emptying a prismatic tank by an orifice(No derivations)
b) Mouth piece-types of mouth pieces- Numerical problems
c) Notch - types of notches - rectangular, triangular and trapezoidal notches- Numerical problems.
d) Weirs - types of weirs –Numerical problems(No derivations)

UNIT4: Flow thorough pipes **Duration :12Periods(L:10 – T:2)**

a) Frictional loss in pipes - Chezy's formula and Darcy's formula (without proof) – Numerical problems.
b) Types of minor losses
c) Hydraulic gradient and total energy line.
d) Discharge through parallel pipes and compound pipes (series) connected to a reservoir.
e) Reynold's number and critical velocity
f) Laminar and turbulent flow in pipes

UNIT5: Open channel flow **Duration: 10Periods(L:8– T:2)**

a) Open channel flow - discharge through open channel - Chezy's and Manning's formula (derivation not necessary) - Numerical problems

b) Geometric properties of open channel
c) Empirical formulae for value of Chezy's constant(C)
d) Derive conditions for most economical section of a channel- rectangular and trapezoidal sections -Numerical problems.

e) **UNIT 6: Pumps, turbines and hydro-electric power plants**

Duration: 15 Periods (L:12 – T:3)

a) Pumps - types - reciprocating pumps and centrifugal pumps.
b) Classification of turbines-impulse and reaction turbines.
c) Sketch a typical layout of a hydroelectric power plant – components parts– functions of surge tank

Reference Books

1. Hydraulics
2. by Reya&Rao,
3. Hydraulics by Dr. S.R. Laxmi Prasad
4. Hydraulics & Fluid Mechanics by Modi&Seth,
5. Hydraulics & Fluid Mechanics by BansalR.K

Suggested E-learning references

1.http://nptel.ac.in
2.You tube videos on working of pumps and turbines.
3. Profile of a company manufacturing pumps and turbines on internet.
4. Wikipedia search on the different terms used in hydraulics
5.Fluid mechanics for civil engineers- Bruce hunt, university of Canterbury, Newzeland.

Suggested Learning Outcomes

Upon completion of course, the students shall be able to

CO1 - Calculate fluid pressure using pressure measuring devices and compute the forces on immersed plane surfaces.

1.1 Explain the scope and importance of hydraulics in Civil Engineering.
1.2 Define fluid and list types of fluids
1.3 Differentiate between ideal and real fluids.
1.4 Define - mass density, specific weight, specific gravity, adhesion, cohesion, surface tension, capillarity, compressibility, dynamic viscosity, kinematic viscosity and vapour pressure - state the units and formulae-simple numerical problems.
1.5 Define 1. Atmospheric pressure, 2. Gauge pressure and 3. Absolute pressure – State the relationship between them-Numerical problems.

1.6 Describe the following pressure measuring instruments and compute the pressure of a flowing fluid on a
   a) Piezometer,
   b) Simple U-tube manometer, differential and inverted differential U-tube manometers.

1.7 Define total pressure and centre of pressure.

1.8 Calculate total pressure and centre of pressure on the following surfaces immersed in a liquid at rest:
   a) Horizontal plane,
   b) Vertical plane and
   c) Inclined plane

CO2 - Apply the general principles of flow of liquids and Bernoulli's theorem and solve problems on discharge and pressure measurements using flow measuring devices.

2.1 State the different types of flow of liquids

2.2 Define uniform flow, non-uniform flow, steady flow, unsteady flow, laminar flow and turbulent flow.

2.3 State one dimensional continuity equation and energies of liquid in motion-simple numerical problems on continuity equation.

2.4 State the equation for Bernoulli's theorem of total energy of liquids in motion (no proof) and limitations of Bernoulli's theorem

2.5 Compute the pressure and velocity at a section of flowing liquid in a pipe for the given conditions using Bernoulli's equation.

2.6 Describe the working principle and use of pitot tube and venturimeter.

2.7 Compute the actual discharge of flowing liquid through venturimeter.

CO3 - Determine the discharge and coefficients of discharge for orifices and mouthpieces, notches and weirs

3.1 Define orifice and list different types of orifices

3.2 Distinguish between small and large orifices

3.3 Define vena- contracta, C_c, C_v, and C_d (Hydraulic coefficients).

3.4 State the formulae for actual, theoretical discharges through small orifice

3.5 Calculate the discharge, C_c, C_v and C_d for given conditions-Numerical problems

3.6 Calculate discharge through large rectangular orificef or given conditions-Numerical problems.

3.7 State the formula for time of emptying of a prismatic tank by an orifice-Numerical problems

3.8 Define mouth piece –classification of mouth pieces.

3.9 Calculate discharge through a mouth piece for given data- Numerical problems.

3.10 Define a notch and list different types of notches.

3.11 Calculate the discharge over Rectangular, Triangular and Trapezoidal notches.

3.12 Define weir and list the different types of weirs.

3.13 Determine the discharge over sharp crested and broad crested weirs under given conditions - Numerical problems

3.14 Determine the discharge over rectangular weir using Francis and Bazin's empirical formulae

CO4 - Evaluate the major loss and various minor losses of head in flow through pipes.

4.1 List the various losses that occur when water flow through pipes.

4.2 Differentiate major loss and minor losses.

4.3 Compute loss of head due to friction using Chezy's and Darcy's equations

4.4 Compute the various minor losses of head for given data–Numerical problems.

4.5 Define hydraulic gradient line and total energy line.

4.6 Calculate discharge through parallel and compound (series) pipes connected to reservoir for given data- Numerical problems.

4.7 Define critical velocity and Reynold'snumber.

4.8 Explain the classification of flow as laminar or turbulent flow in pipes based on Reynold's number.

CO5 - Determine the flow parameters and design the most economical channel sections.

5.1 Define open channel flow.

5.2 Differentiate open channel flow and pipe flow.

5.3 Define wetted perimeter and hydraulic mean depth/radius.

5.4 State Chezy's formula and Manning's formula for uniform flow through open channels.

5.5 List the values of 'C' for different surfaces

5.6 State the following formulae to evaluate Chezy's constant (C)

a) Kutter's, formula,
b) Manning's formula and
c) Bazin'sformula.

5.7 Calculate velocity and discharge in a channel using Chezy' s and Manning's formulae for given conditions-Numerical problems.

5.8 Define most economical section of a channel.

5.9 Derive the conditions for most economical section for rectangular channel and trapezoidal channel

5.10 Design the most economical rectangular and trapezoidal channel sections for the given conditions – Numerical problems

CO6 - Explain the working principles of pumps, turbines and layout of a typical hydro-electric power station.

6.1 Define pump and list different types of pumps

6.2 Describe the parts of reciprocating pump with a sketch.

6.3 Describe the working principle of single acting and double acting reciprocating pumps.

6.4 List the functions of air vessels for reciprocating pumps.

6.5 Describes the different parts of centrifugal pumps and explain the working principle of centrifugal pump.
6.6 Define priming and explain the necessity of priming.
6.7 Explain the use of foot valve and strainer in a centrifugal pump.
6.8 Define turbine and list types of turbines.
6.9 Differentiate between impulse and reaction turbines.
6.10 Explain the working principle of Pelton wheel turbine.
6.11 Describe the parts of Francis turbine.
6.12 Explain the purpose of draft tube and list types of draft tubes.
6.13 Sketch the typical layout and list different components of hydro-electric power plant installation.
6.14 Define surge tank and list the functions of surge tank

Suggested Student Activities

1. To visit a nearby petrol bunk and bike repairing centre and submit a report on pressure measuring devices
2. To carryout market survey for pipes of different sizes and materials available.
3. To assess conditions of water supply mains of your locality and quantify the pressure drop and measuring the actual discharges through various outlets.
4. To visit & submit a report on nearby hydel power plant to know the setup of various components.
5. Student is encouraged to participate in Tech fest/Srujana fest to evolve any novel method of water supply systems
6. Prepare/Download a dynamic animation to illustrate the working principle of hydraulic pumps.
7. Paper/Poster presentation
8. Quiz
9. Group discussion
10. Surprise Test/Slip test

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	2	1	2	1	1	2	1,2,3,4.5.6,7
CO2	1	3	2	2	3	2	2	1,2,3,4.5.6,7
CO3	2	3	2	2	2	2	2	1,2,3,4.5.6,7
CO4	1	2	3	2	2	2	2	1,2,3,4.5.6,7
CO5	3	2	2	3	2	1	2	1,2,3,4.5.6,7
CO6	1	1	1	1	1	1	2	1,2,3,4.5.6,7

State Board of Technical Education and Training,Telangana

Model Question paper
DCE III semester
Mid Semester-I Examination

Course Code: CE-303 **Duration:1 hour**
Course Name: HYDRAULICS **Max.Marks:20 Marks**

PART-A

Answer **all** questions, Each Question carries **one** mark **4x1 = 4 Marks**

1) Define the term specific weight
2) What is meant by an ideal fluid
3) Define discharge and state the units
4) Write the mathematical form of Bernoulli's theorem

PART-B

Answer **two** Questions. Each question carries **three** marks **2x 3 = 6 Marks**

5(a) Calculate the specific weight of one litre of liquid which weighs 7N

(OR)

5(b) Compare the center of pressure and total pressure.

6(a) What are the different energies of a fluid?

(OR)

6(b) State three limitations of Bernoulli's theorem

PART-C

Answer two questions. Each question carries **five** marks **2x 5 = 10 Marks**

7(a) Convert the following vacuum pressures into absolute pressures

(a) 26cm of mercury

(b) 11.14 kN/m^2

(c) 0.05 N/mm^2

(d) 0.34 Kgf/cm^2

(OR)

7(b) A circular plate in diameter is 3m immersed in water with its least and greatest depth being 1.5m and 3.5m, respectively find, (1) The total pressure on the plate (2) Depth of center of pressure

.

8(a)Water is flowing through a tapered pipe of length 100m having diameter 600mm at the upper end and 300mm at the lower end at the rate of 50lit/s. The pipe has a slope of 1in30. Find the pressure at the lower end if the pressure at higher end is 0.1962 N/mm^2

(OR)

8(b)A 20cm x 10cm venturimeter is mounted in a vertical pipe carrying water the flow being upwards. The throat section is 30cm above the entrance section of venturimeter. For a certain flow through the meter, the differential gauage between the throat and entrance indicates a gauge deflection of 30cm. Assuming the co- efficient of meter is 0.95, find the discharge.

State Board of Technical Education and Training,Telangana
Model Question paper
DCE III semester
Mid Semester-II Examination

Course Code:CE-303 **Duration:1 hour**
Course Name: HYDRAULICS **Max.Marks:20 Marks**

PART-A

Answer **all** questions, Each Question carries **on**e mark **4x1 = 4 Marks**

1) Define vena-contracta
2) List any two types of notches according to the shape of opening.
3) Define Hydraulic gradient line
4) Write the formula to calculate the head loss due to entrance of pipe

PART-B

Answer any **two** questions. Each question carries **three** marks **2x 3 = 6 Marks**

5(a) Distinguish between small orifice and large orifice in any three aspects.

(OR)

5(b)Water flows over a rectangular notch 1.25m wide with a head of 0.10m. The same discharge passes through aright angled V notch. Find the head of water in the v-notch.

6(a) It was observed that the difference of head between the two ends of a pipe 250m long and 300mm diameter is 1.5m. Taking Darcy coefficient as 0.01 and neglecting minor losses, calculate the discharge flowing through the pipe.

(OR)

6(b) A pipe of diameter 90mm is suddenly enlarged to a diameter of 150mm. Find the loss of head due to the enlargement when the quantity of water flowing is $0.072m^3$/sec

PART-C

Answer any **two** questions. Each question carries **five** marks **2x 5 = 10 Marks**

7(a)A jet of water issues from an orifice $1250mm^2$ in area under a constant head of 1.125m. It falls vertically 1m before striking the ground at a distance of 2m measured horizontally from vena-contracta. Calculate hydraulic coefficients (C_c, C_d&C_v), if the jet is discharging 3.65 lit/sec.

(OR)

7(b) A weir 2.5 m long has 60cm head of water over the crest of the weir. Using Francis formula find the discharge over the weir. If the channel approaching the weir is 6m wide and 1.2 m deep, also determine the new discharge considering the velocity of approach.

8(a)A compound piping system consists of three pipes of lengths 1500 m, 1200m and 1000m and of diameters 0.5m, 0.4m and 0.3m respectively are connected in series. Convert the

system to (i) An equivalent length of 0.4m diameter pipe and (ii) An equivalent size pipe 3700 m long.

(OR)

8(b) A 2 km long water main has to carry a discharge of 0.54 m^3/sec. If the maximum allowable loss of head due to friction is 26m, find the diameter of the pipe required. Assume f=0.008. Use Darcy's equation neglecting minor losses.

State Board of Technical Education and Training,Telangana
Model Question paper
DCE III semester
Semester End Examination

Course Code: CE-303 **Duration:2 hours**
Course Name: HYDRAULICS **Max.Marks:40 Marks**

PART-A

Answer **all** questions. Each question carries **one** mark. **8x1 = 8 Marks**

1) Define surface tension
2) List the classification of orifice based on size
3)Name the parts of a reciprocating pump
4) State equation of continuity of flow
5) Define steady flow in open channels
6) Define the term hydraulic mean depth
7) What is meant by priming of a pump
8) What is draft tube

PART-B

Answer**four** questions. Each Question carries **three** marks **4 x 3 = 12 Marks**

9(a)A rectangular plate 3m long and 1.5m wide is immersed vertically in water in such a way that it's 3m side is parallel to water surface and its top edge is 2.5m below the free surface. Find the total pressure.

(OR)

9(b) Find the velocity of flow of water through an open channel of 6 m wide and 3m deep, When it is running full. The Channel is having bed slope as 1 in 2000. Take Chezy's constant C = 55

10(a)A rectangular channel of 1.5m width is used to carry 0.2 m^3 of water. The rate of flow is measured by placing a 90^0 V- notch weir.If the maximum depth of water is not to exceed 1.2m. Find the position of the apex of the notch from the bed of the channel.

(OR)

10(b) List the components of a reciprocating pump.

11(a) Find the discharge through a rectangular channel 4 m wide, having depth of water 3 m and bed slope 1 in 1500 Take N=0.03 in Kutter's formula.

(OR)

11(b) A trapezoidal channel 5m wide at the bottom and 1.5m deep discharges 1500 l/sec.The side slopes are 2H : 1V. Given N for the channel surface as 0.03, find thelongitudinal slope.

12(a) State any three functions of air vessel fitted to a reciprocating pump.

(OR)

12(b) Write short notes on scroll casing in Francis turbine

PART-C

Answer**four** questions. Each Question carries **five** marks **4 x 5 = 20 Marks**

13(a) A circular plane of 2m diameter is immersed in water so that its plane makes an angle of $30^0$and the highest point of plane is 1.6 m below the surface. Find the total pressure and centre of pressure.

(OR)

13(b) Water flows at a uniform depth of 2m in a trapezoidal channel having a bottom width 6m, side slopes 2 horizontal to 1 vertical. If the bed slope is 1 in 200 then calculate the discharge. Take Manning's coefficient N is 0.0025

14(a) Two reservoirs are connected by pipeline 22m long consisting of two pipes one of 15cm diameter and length 6m and the other of diameter 22.5cm and 16m length if the difference of water levels in two reservoirs is 6m, calculate the discharge considering the Darcy's formula and considering all the losses.Take f = 0.04.

(OR)

14(b) Explain the working of centrifugal pump with the help of neat sketch.

15(a) A rectangular channel having the most economical section is 6m wide find the discharge, if the bed slope is 1 in 1200 assume C as 50.

(OR)

15(b) What do you mean by most economical section.Derive the conditions for trapezoidal section

16(a) Write any five differences between Impulse and reaction turbines

(OR)

16(b) Draw the neat sketch of Hydroelectric power plant and label the parts and write their functions.

CE-304 LEVELLING SURVEYING

Course Title:	**Levelling Surveying**	Course Code :	**CE-304**
Semester:	**III Semester**	Course Group :	**Core**
Teaching Scheme in Periods(L:T:P):	**60:15:0**	Credits :	**2.5**
Type of Course :	**Lecture+Assignments**	Total Contact Periods :	**75Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This course requires the basic knowledge of Surveying.

Course Outcomes

Upon completion of the course the student shall be able to

CO1 :	Demonstrate the principle of levelling and use of levelling instruments to calculate reduced levels through various methods
CO2 :	Explain the different methods, classification and description of levelling
CO3 :	Compute errors in levelling, familiarize with precaution and correctives measures involved in levelling procedures.
CO4 :	Differentiate between contouring methods and their practical application in civil engineering projects
CO5 :	Explain the fundamentals of Theodolite operations including setting up, measurement of horizontal and vertical angles and recording procedures.
CO6 :	Compute Traverse data, omitted measurements and associated errors.

Course Content and Blue Print of Marks for SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="3">R</th><th>U</th><th>A</th></tr>
<tr><td>C01</td><td>Introduction to levelling, Concept and calculation of Reduced levels</td><td>15</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>C02</td><td>Different methods of levelling</td><td>10</td></tr>
<tr><td>C03</td><td>Errors, precautions and corrections in levelling</td><td>10</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>C04</td><td>Contours and their applications</td><td>15</td></tr>
<tr><td>C05</td><td>Principles and Basics of Theodolite Survey and applications and Errors.</td><td>15</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b), Q11(a), Q11(b)</td><td>Q13(b), Q15(a), Q15(b)</td></tr>
<tr><td>C06</td><td>Traverse computations</td><td>10</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT 1: Introduction to Levelling, Concept and Calculation of Reduced Levels

Duration: 15Periods(L: 12 – T: 3)

a). Levelling - Types of levelling instruments - component parts of a dumpy level and their functions - Definitions of important terms used in Levelling - Temporary adjustments of a dumpy level

b). Types of Levelling Staves

c). Bench marks - different types of bench marks

d). Booking of readings in field book

e). Determination of Reduced levels by height of instrument and Rise and Fall methods - Comparison of methods - Problems

UNIT 2: Different methods of levelling

Duration: 10 Periods ((L: 8 – T: 2)

a) Classification of Levelling–Different methods of Levelling-Simple Levelling-Deferential Levelling-Fly Levelling-Profile Levelling-Reciprocal Levelling.

b) Balancing of sights.

c) Description of profile levelling and Reciprocal levelling - Problems on Reciprocal levelling

UNIT 3: Errors, precautions and Corrections in Levelling.

Duration: 10Periods (L: 8 – T: 2)

a) Errors in levelling -Personal, natural and instrumental errors

b) Precautions to be taken to avoid errors.

c) Errors due to curvature and refraction and combined correction – problems

d) Different axes of Levelling instrument and their Relationship

e) Permanent adjustments of a dumpy level (Two peg method)

UNIT4: Contours and their applications **Duration: 15 Periods ((L: 12 – T: 3)**

a) Contouring – Uses

b) Characteristics of contours

c) Methods of contouring: Direct-Indirect methods

d) Interpolation of contours-tracing contour gradient.

e) Capacity of Reservoir

UNIT 5: Basics of Theodolite applications and errors

Duration: 15Periods ((L: 12 – T:3)

a) Theodolite - Types of theodolites-Parts and functions and principle
b) Technical terms – uses and applications
c) Setting up theodolite and reading angles
d) Measurement of Horizontal angles and vertical angles and Recording
e) Fundamental lines and their relationship
f) Errors and adjustments

UNIT 6: Traverse computations

Duration: 10 Periods (L: 10 – T: 2)

a) Traverse types and methods

b) Balancing of Traverse - methods

c) Omitted measurements-problems

d) Consecutive and Independent Coordinates

e) Calculation of Area

Recommended Books

1. Surveying - N.N.Basak - Tata McGraw Hill
2. Surveying Vol-I - S.K.Duggal -McGraw Hill Edn (India) Pvt Ltd
3. Surveying and LevellingVol -1 -Kulkarni and Kanetkar
4. Surveying and Levelling Vol. - 1 - B.C. Punmia
5. Surveying and Levelling -Vol -1 -R.Agor- Khanna Publishers

Suggested E-Learning references

1.www.elearning.com/survey
2. http://nptel.ac.in

Suggested Learning Outcomes

Upon completion of the course the student shall be able to

CO1 - Demonstrate the principle of levelling and use of levelling instruments to calculate reduced levels through various methods

1.1 Define levelling and list the types of levelling instrumentsandequipment

1.2 Define the important terms in levellinglevel surface, level line, Horizontal line Horizontal surface, vertical line, axis of telescope, line of collimation, back sight, fore sight, intermediate sight, and changepoint,. Datum, Mean sea level ,

1.3 Define Bench mark and types

1.4 List the component parts of a dumpy level and their functions with figure

1.5 Explain the steps involved in Temporary adjustments of a dumpy level.

1.6 List various types of levelling staves

1.7 Write the principle of levelling and Tabulate the levelling field data

1.8 Compute reduced levels by height of instrument and Rise and fall methods, and apply Checks

1.9. Compare height of instrument and Rise and fall methods.

1.10 Problems on HI method and Rise and fall method

1.11 Write the precautions while entering the readings in the field book.

CO2 - Explain the different methods, classification and description of levelling

2.1 Explain the methods of Levelling-Simple Levelling with change point, Differential Levelling, Fly Levelling, profile levelling, reciprocal levelling, and check Levelling (double check BM)

2.2 Explain in detail profile levelling-Longitudinal and cross sectioning of Roads and Canals for earthwork calculations

2.3. Explain in detail about reciprocal levelling and its suitability

2.4 List the errors eliminated y reciprocal levelling

2.5 Calculate true difference in elevation and collimation error in reciprocal levelling

2.6 Problems on Reciprocal leveling

CO3 - Compute errors in levelling, familiarize with precaution and correctives measures involved in levelling procedures.

3.1 List the Errors in levelling and the precautions to avoid the errors

3.2 State the formulas for curvature and refraction and combined errors

3.2 State the effect of Errors due to curvature and refraction

3.3 Compute the Error due to curvature, refraction and combined error and the correction to be applied

3.4 Different axes of Levelling instrument and their Relationship.

3.5 What is permanent adjustment? Explain how to set permanent adjustments of a dumpy level(Two peg method)

CO4 - Differentiate between contouring methods and their practical application in civil engineering projects

4.1 Define contour ,contour map and how contour is designated

4.2 Define 1. Contour, 2. Contour interval and 3. Horizontal equivalent

4.3 List the uses of contours

4.4 List the Characteristics of contours with relevant sketches

4.5 List the methods of contouring, Direct and Indirect methods.

4.6 Describe Block contouring and radial contouring and cross sectioning

4.7 Explain the interpolation of contours and methods

4.8 Explain the method of tracing contour gradient / alignment of hill road

4.9 Compute the capacity of reservoir by Trapezoidal and Prismoidal methods

CO5 - Use the general principles for installing motors and its control equipment.

5.1 What is Theodolite and state its uses and principle

5.2 List the types of theodolites

5.3 Differentiate between transit and non-transit theodolites.

5.4 List the parts of a transit theodolite and explain the functions of parts of a transit Theodolite.

5.5 Define various technical terms in theodolite traversing

5.6 Explain the method of temporary adjustments of a transit theodolite for taking observations and recording in thefield book.

5.7 Read the reading of varnier and least count

5.8 Explain the method of measuring the horizontal angle by repetition method

5.9 What are the errors eliminated by repetition method

5.10 Explain the method of measuring of horizontal angle by reiteration method

5.11 Explain the method of measurement of 1. Direct angles and 2. Deflection angles

5.12 Explain the Steps involved in setting out angles and magnetic bearing using a theodolite.

5.13 Explain the methods of prolonging a given survey line

5.14 List the types of errors in theodolite surveying and adjustments

CO6 - Explain the fundamentals of Theodolite operations including setting up, measurement of horizontal and vertical angles and recording procedures.

6.1 Explain the method of conducting traverse survey by 1. Included angles method, 2.Deflection angles method and 3. Magnetic bearing method

6.2 Check the angular measurements and apply corrections in a closed traverse

6.3 Define 1. Latitude and 2. Departure of a line

6.4 Compute the latitudes and departures of survey lines of a closed traverse

6.5 Calculate the error of closure of a closed traverse

6.6 Omitted measurements-Calculate the omitted measurements when Length and bearing of one side only is omitted.

6.7 Balance the closing error by 1. Bowditch rule and 2. Transit rule

6.8 Enumerate the difference between consecutive and independent coordinates

6.9 Calculate the area of a closed Traverse by independent co-ordinate method

Suggested Student Activities

1. Tech fest/Srujana
2. Paper/Poster presentation
3. Seminar
4. Group discussion
5. Surprise test

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	1	-	2	1	-	2	1,2,4,5,7
CO2	3	3	1	2	1	1	2	1,2,3,4,5,6,7
CO3	3	3	1	2	1	1	2	1,2,3,4,5,6,7
CO4	3	2	2	1	1	1	2	1,2,3,4,5,6,7
CO5	2	2	2	1	1	1	2	1,2,3,4,5,7
CO6	3	3	2	-	1	2	2	1,2,3,5,6,7

Internal evaluation

Test	Units	Marks
Mid Sem 1	1 and 2	20
Mid Sem 2	3 and 4	20
Slip Test 1	1 and 2	5
Slip Test 2	3 and 4	5
Assignment	1	5
Seminars	1	5
	Total	60

State Board of Technical Education and Training,Telangana
Model Question paper
DCE II semester Mid Semester-I Examination

Course Code:24C-304 **Duration:1 hour**
Course Name: Levelling Surveying **Max.Marks:20 Marks**

PART - A **4x1 = 4M**

Note: *Answer **ALL** the questions. Each question carries onemark.*

1. State any two objects of Leveling.
2. Define Bench mark
3. What is balancing of sights,
4. Find the level difference between points A and B if BS and FS readings taken on them respectively are 2.105 m and 3.220 m.

PART- B **2 x 3 = 6M**

Note: *Answer **two** questions. Each question carries **three** marks.*

5(a) Briefly Explain Temporary adjustments of a Dumpy Level.

OR

5(b) Briefly Explain different types of Bench Marks.

6(a) Compare collimation method with Rise and Fall method.

OR

6(b) what are the points to be remembered while entering readings in the level Field Book.

PART - C **2x5 = 10M**

Note: *Answer **two** questions. Each question carries **five** marks*

7(a) Draw a neat sketch of a Dumpy Level and label the parts.

OR

7(b) Explain in detail the temporary adjustments of a dumpy level.

8(a) The following staff reading were observed successively with a level the instrument was shifted after the second and fifth readings.
0.675, 1.230, 0.750, 2.565, 2.225, 1.935, 1.835, 3.220 mt.
The first staff reading was taken with the staff held on a Bench Mark of reduced level 125.325 m. Enter the readings in a level Book form and find the reduced levels of all points and apply the check.

OR

8(b) Describe in detail the procedure of conducting profile levelling

State Board of Technical Education and Training,Telangana
Model Question paper
DCE II semester Mid Semester-II Examination

Course Code:24C-304 **Duration:1 hour**
Course Name: Levelling Surveying **Max.Marks:20 Marks**

PART - A **4x1 = 4M**

Note: *Answer **ALL** the questions. Each question carries **one** mark.*

1. What is collimation error

2. State any two natural errors in levelling.

3. Define contour interval

4. What is Horizontal equivalent

PART- B **2 x 3 = 6M**

Note: *Answer **two** questions. Each question carries **three** marks.*

5(a) If a levelling staff is placed at a distance of 980m from the instrument,
Find i) Correction for curvature ii) Correction for refraction.
OR
5(b) State the effect of Curvature and Refraction errors.

6(a) Write any 3 uses of contours.
OR
6(b) Write in brief the Direct method of Contouring.

PART - C **2x5 = 10M**

Note: *Answer **two** following questions. Each question carries **five** marks*

7(a) The line of sight from two stations A and B just touches the sea level. If the height of A and B above the sea level are 85 and 110m respectively, find the distance AB.
OR
7(b) State the precautions to be taken to prevent the errors in levelling.

8(a) write the characteristics of Contours
OR
8(b) The area within the contour lines at the site of a reservoir and the face of a proposed dam are as follows:

Contour(m)	300	302	304	306	308	310	312	314	316
Area $(m)^2$	620	8,400	60,240	90,510	1,00,200	3,01,500	3,75,000	4,50,500	5,27,280

Taking 300m as the bottom level of the reservoir and 314m as the water level, find the volume of water in the reservoir by

(i) Trapezoidal formula ii) Prismoidal formula.

State Board of Technical Education and Training,Telangana
Model Question paper
DCE II semester EndExamination

Course Code:18C-205C **Duration:2 hours**
Course Name: Levelling Surveying **Max.Marks:40 Marks**

PART – A **8 x 01 =8 Marks**

Instructions : (1) Answer all questions
(2) Each question carries one mark.

1) Define Back sight and Fore sight.
2) What is meant by balancing fore sight and back sight?
3) State the equation for combined correction for curvature and refraction.
4) Define contour interval,
5) What is face left and face right observations in a Theodolite
6) Which part of Theodolite is used for centering
7) What is Latitude and Departure
8) How error of closure is adjusted in Theodolite Traversing

PART – B **4 x 3 =12 Marks**

Instructions :(1) Answer any Four questions.
(2) Each question carries Three marks.

9(a) What is meant by reduction of levels? What are the methods used for the same?

OR

9(b) Write any three use off a Theodolite

10(a) what is reciprocal leveling? When it is used?

OR

10(b) Mention any six applications of Theodolite.

11(a) state the steps involved in setting up theodolite.

OR

11(b) Define the terms: face left and face right observations

12(a) Write briefly. About the conduct of traverse by Theodolite

OR

12(b)Enumerate the difference between consecutive and independent coordinates

.

PART – C **4x5=20 Marks**

Instructions: (1) Answer any Four questions
(2) Each question carries Five marks.

13(a) The following were the staff readings 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 the first point was 120.650m.

i) Enter the readings properly into the leveling field book proforma in Rise and Fall method
ii) Reduce the levels.
iii) Apply the arithmetical check

OR

13(b) Explain the Steps involved in setting out angles and magnetic bearing using a theodolite.

14(a) The following details refer to reciprocal levels taken with a dumpy level.

Instrument near to station	Staff readings on (m)		Remarks
	A	B	
A	1.505	2.875	Distance between A & B = 1150m
B	0.750	1.895	R.L of B = 100.00m

Find :

(i) The R.L of A
(ii) The combined error for curvature and refraction.

OR

14(b) Balance the closing error by 1. Bowditch rule and 2. Transit rule

15(a) Explain the method of measuring the horizontal angle by repetition method

Or

15(b) Ex plain the procedure of Reiteration method

16(a)An abstract from a traverse sheet for a closed traverse is given below. Balance the traverse by the Bowditch method and transit method.

Line	Length	WCB
AB	89.31	45°10′
BC	219.76	72°05′
CD	151.18	161°52′
DE	159.10	228°43′
EA	232.26	300°42′

OR

16(b)Calculate the length and bearing of the same traverse leg is omitted.

Line	Length	Bearing
AB	89.31	45º10′
BC	?	?
CD	151.18	161º52′
DE	159.1	228º43′
EA	232.26	300º42′

CE-305 – TRANSPORTATION ENGINEERING

Course Title	Transportation Engineering	Course Code	CE-305
Semester	III	Course Group	Core
Teaching Scheme in Periods(L:T:P)	4:1:0	Credits	2.5
Methodology	Lecture +Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre-requisites

This course requires the knowledge of Surveying and Construction materials.

Course outcomes

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

CO1	Classify roads as per Indian Road Congress and describe the principles of highway alignment.
CO2	Identify the highway geometric elements.
CO3	Realize the significance of road safety by incorporating the concepts of traffic engineering.
CO4	Describe the procedures of Highway construction and maintenance
CO5	Differentiate between types of pavements, their construction and design principles.
CO6	Examine the functions of components of permanent way of Railways.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R			U	A
1	Introduction to Transportation Engineering, Highway Alignment and Surveys	12	Q4	Q1		Q9(a)	Q13(a)
2	Highway Geometrics	13					
3	Traffic Engineering	12		Q2		Q10(a)	Q14(a)
4	Principles of Pavement Design	13					
5	Highway Construction and Maintenance	12		Q3	Q5, Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)
6	Introduction to Permanent Wayin Railways	13			Q7, Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	75	8			8	8

Course Contents

UNIT 1: Introduction to Transportation Engineering, Highway Alignment and Surveys:
Duration 12 Periods(L: 10– T:2)

a) Importance of transportation engineering –Different modes of transportation – Characteristics of Road Transport.

b) Highway development in India: Jayakar committee Recommendations – Functions of I.R.C. – Classification of roads as per I.R.C - Twenty year Road plans, their targets and achievements.

c) Alignment – Factors influencing alignment of road in plain and hilly areas – Highway surveys – Reconnaissance, preliminary and final location surveys.

UNIT 2: Highway Geometrics Duration 13 Periods (L:10 – T:3)

a) Highway cross-section in embankment and cutting - Width of pavement, shoulder, formation width, right of way, road boundaries – road widths for different classification of roads, traffic lane widths-camber – recommended I.R.C values of camber for different roads.

b) Gradients – Ruling gradient, limiting and exceptional gradients – Recommended I.R.C values of gradients.

c) Super elevation – Necessity – Curves – necessity of curves in roads – transitioncurves – details of alignment for horizontal and vertical curves.

d) Sight distance – Stopping sight distance –Overtaking sight distance – formula forcalculation of Stopping sight distance - simple problems.

UNIT 3: Traffic Engineering **Duration 12 Periods (L: 10 – T:2)**

a) Traffic studies and its importance.

b) Road intersections – grade intersections-Types–Traffic islands –Channelizing islands – Roundabout – Interchange – Fly over – Diamond Intersections – Clover Leaf junction.

c) Pavement marking and kerb markings.

d) Traffic signs – Informatory signs – Mandatory signs – Cautionary signs

UNIT 4: Principles of Pavement Design:

Duration 13 Periods (L: 10 – T:3)

a) Pavement – Types of pavements –Functions of different components of pavements -White topping roads and its Merits.
b) IRC –Codes for design of various types of pavements
c) Methods for design of flexible and rigid pavements – CBR test
d) Design principles of flexible pavement by CBR method.

UNIT 5: Highway Construction and Maintenance

Duration 12 Periods (L: 10 – T:2)

a) Typical cross section of highway in cutting and embankment.
b) Conventional and non-conventional road materials
c) Non-conventional road materials like reclaimed asphalt pavement and reclaimedconcrete aggregate– sources of non-conventional road materials
d) List the tests on road materials (aggregates and bitumen)- and their significance
e) Water bound macadam roads – Materials used – Machinery used in the construction – Construction procedure – Maintenance of W.B.M road.
f) Bitumen roads-Different types – Surface dressing –interface treatments-seal coat, tack coat, prime coat, premix – Full grout and semi-grout – methods – Construction procedure.
g) Cement concrete roads-Longitudinal joints–Transverse joints –Construction joints – Construction of cement concrete roads – Machinery used for construction.

UNIT 6: Introduction to Permanent Way in Railways

Duration 13 Periods (L:10-T:3)

a) Importance of Railways – Gauge – Types of gauges.
b) Structure of permanent way-Different types of rails- requirements of a good rail.
c) Rail joints – Types of joints – Requirements of good rail joint – Fixtures and fasteningsof rails – coning of wheels.
d) Sleepers – Functions –-Types of sleepers–characteristics of a good sleeper – Spacing ofsleepers – Sleeper density.
e) Ballast – Definition – Function – Characteristics of good ballast.
f) General description and sketches for turnout – General layout of a simple left hand andright hand turnout and different crossings.

Reference Books

1. Highway Engineering – S.K. Khanna & C.E.G. Justo
2. Principles of Transportation Engineering – Chakraborty
3. Principles & Practices of Highway Engineering – L. R. Kadiyali
4. Introduction to Transportation Engineering – J. H. Banks
5. Text book of Highway & Traffic Engineering – Subhash C Saxena
6. Railway Engineering - Satish Chandra and M.M Agarwal

Suggested E-learning references

1. http://nptel.ac.in

Suggested Learning Outcomes

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

CO1 - Classify roads as per Indian Road Congress and describe the principles of highway alignment.

1.1 State the importance and characteristics of transportation engineering.

1.2 List the different modes of transportation.

1.3 State the Jayakar committee Recommendation for Road development in India.

1.4 State the importance and functions of I.R.C

1.5 State the classification of roads as per I.R.C

1.6 State the highlights of first, second and third twenty-year Road development plans.

1.7 Define the term alignment of road.

1.8 State the factors influencing selection of alignment for a road in plain and hilly areas.

1.9 Explain various engineering surveys conducted to fix the alignment of a road.

CO2 - Identify the highway geometric elements.

2.1 Sketch the Highway cross-section in embankment and cutting and label its elements.

2.2 Define the terms: width of pavement, shoulder, formation width, right of way, camber, gradient, super elevation, sight distance, stopping sight distance and over taking sight distance.

2.3 Calculate the Stopping sight distance (calculation of sight distances at slopes not required)

2.4 State the different types of gradients and their recommended values.

2.5 State the necessity of providing super elevation and write the formula.

2.6 Solve simple problems on super elevation.

2.7 State the necessity of curves in highways.

2.8 State the different types of horizontal and vertical curves adopted in road

CO3 - Realize the significance of road safety by incorporating the concepts of traffic engineering.

3.1 List the various traffic surveys.

3.2 State the importance of each traffic survey.

3.3 Explain with neat sketches traffic islands and Interchanges.

3.4 State the functions and types of pavement markings with sketches.

3.5 State the types of traffic signs and their purpose and give sketches.

CO4 - Describe the procedures of Highway construction and maintenance

4.1 State the types of pavements.

4.2 Distinguish between flexible pavement and rigid pavement.

4.3 State the advantages of White topping roads over Black toping roads (Bituminous roads).

4.4 Sketch the Cross section of a flexible and rigid pavement.

4.5 State the functions of components of a pavement.

4.6 State the factors affecting pavement design.

4.7 List the methods for design of flexible pavements and rigid pavements.

4.8 Explain the California Bearing Ratio (CBR) test.

4.9 Explain the design principle of flexible pavement by California Bearing Ratio (CBR)method.

CO5 - Differentiate between types of pavements, their construction and design principles.

5.1 State the necessity of road drainage.

5.2 Explain the methods of providing surface and sub-surface drainage.

5.3 State the materials used in construction of different types of roads

5.4 Define conventional and non-conventional road materials

5.5 List different non-conventional road materials (waste materials) like reclaimed asphalt pavement and reclaimed concrete aggregate which are in use

5.6 State the source of non-conventional road materials

5.7 Specify the significance of the different tests on road aggregates like crushing strength test, Impact test, Elongation and flakiness Index test (shape test), water absorption test and tests on bitumen like penetration test, ductility test, softening point test, viscosity test, flash and fire test and float test (Test procedure for aggregates and bitumen not required)

5.8 State the equipment/machinery used in construction of different roads.

5.9 Explain the methods of construction of different types of roads.

5.10 Explain the maintenance of WBM roads.

5.11 Explain the different types of joints used in C.C roads with sketches.

5.12 State the need for joints in C.C roads.

CO6 - Examine the functions of components of permanent way of Railways.

6.1 State the advantages of Railways.

6.2 Define gauge and state the classification of gauges.

6.3 State the component parts of a permanent way and functions of each component.

6.4 State the requirements of good rail, rail joint, sleeper and ballast.

6.5 State the different types of rails, joints, rail fittings, sleepers, ballast, used in Indian Railways with sketches.

6.6 Describe the coning of wheels.

6.7 Describe different types of turnouts and crossings with sketches.

Suggested Student Activities

1. Prepare a comparative chart showing various types of roads such as WBM Bituminousroads, Concrete roads.
2. Visit a highway construction site, identify various types of soils, the test procedures asper relevant IS codes and inference based on the test results.
3. Draw the cross-sectional details of Village roads, MDR, SH, NH using AUTO CAD andprepare a chart.
4. Collect the parameters of road intersection in the locality and prepare a model.
5. Prepare a model showing the cross-sectional details of various types of roads suchas bituminous and concrete roads.
6. Prepare a chart showing the various road signs used by collecting the informationfrom nearby RTO and prepare a report.
7. Collect information regarding various types of railway gauges used in India and othercountries, prepare a chart and present it.
8. Collect videos showing the various forces acting on a railway track and present in theclass.
9. Collect photographs and videos of crossings and prepare a presentation on it.
10. Collect videos related to track laying procedure and give seminar in the class.
11. Give a presentation on production of railway sleepers.
12. Collect different IRC codes pertaining to highway geometric design and prepare a chart.
13. Prepare a model of a typical railway track.
14. Collect the information regarding various railway divisions in India and their functions.

NOTE

Students should select any one of the above or other topics relevant to the subject approved by theconcerned faculty, individually or in a group.

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Developmen tof Solutions	Engineering Tools, Experimentation andTesting	Engineering Practices for Society, Sustainability	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	1	1	1	1	1	2	1,2,3,4,5,6,7
CO2	2	1	1	2	1	2	2	1,2,3,4,5,6,7
CO3	2	1	1	3	2	1	2	1,2,3,4,5,6,7
CO4	2	1	1	2	3	3	2	1,2,3,4,5,6,7
CO5	1	1	1	1	1	1	2	1,2,3,4,5,6,7
CO6	1	1	1	1	1	1	2	1,2,3,4,5,6,7

State Board of Technical Education and Training, Telangana
Model Question paper

DCE III Semester Mid Semester-I Examination

Course Code: CE-305 **Duration :1 hour**

Course Name: Transportation Engineering **Max.Marks:20 Marks**

PART-A

Answer **all** questions. Each question carries **one** mark **4x1= 4 Marks**

1) List different modes of transportation.

2) Define the term alignment of a road.

3) Define the term gradient.

4) Define the term over taking sight distance.

PART-B

Answer **two** questions. Each question carries **three** marks. **2x 3 = 6 Marks**

5(a) Compare targets and achievements of the road development plans in India.

OR

5(b) State the classification of roads as per I.R.C

6(a) State the necessity of curves in highways.

OR

6(b) Calculate the value of stopping sight distance for a highway with a design speed of 65kmph. Assume suitably all the data required.

PART-C

Answer **two** questions. Each question carries **five** marks **2x 5 = 10 Marks**

7(a) Explain briefly engineering surveys conducted to fix the alignment of highway.

OR

7(b) List any five factors that are influencing selection of alignment of road in hilly areas.

8(a) State the necessity of providing transition curve in highways.

OR

8(b) The radius of horizontal circular curve is 100m. The design speed is 50 kmph and the design coefficient of lateral friction is 0.15.

i) Calculate the super elevation required if full friction is assumed to develop.

ii) Calculate the coefficient of friction needed if no super elevation is provided.

State Board of Technical Education and Training,
TelanganaModel Question paper
DCE III Semester Mid Semester-II Examination

Course Code: CE-305 **Duration: 1 hour**
Course Name: Transportation Engineering **Max.Marks:20 Marks**

PART-A

Answer **all** questions. Each question carries **one** mark **4x1= 4 Marks**

1) Define traffic islands.
2) List any two types of grade separated intersections.

3) State the components of a pavement.

4) List any two methods for design of flexible pavements.

PART-B

Answer **two** questions. Each question carries **three** marks **2x 3 = 6 Marks**

5(a) State the importance of any three traffic surveys.

OR

5(b) State any three purposes of traffic signs. 6(a) State any three advantages of white toppingroads over black topping roads.

OR

6(b) State any three factors affecting pavement design.

PART-C

Answer **two** questions. Each question carries **five** marks **2x 5 = 10 Marks**

7(a) Write about the functions and types of pavement markings with sketches.

OR

7(b) Explain clover leaf junction with a neat sketch.

8(a) Compare flexible pavements and rigid pavements in any five aspects.

OR

8(b) Explain the California Bearing Ratio (CBR) test.

State Board of Technical Education and Training, Telangana

Model Question paper

DCE III Semester End Examination

Course Code: CE-305 **Duration: 2 hours**

Course Name: Transportation Engineering Max.Marks:40 Marks

PART-A

Answer **all** questions. Each question carries **one** mark. **8x1= 8 Marks**

1. Define the term camber.
2. 2.State any four pavement markings.
3. Define sleeper.
4. Define the term gradient.
5. State the materials required for cement concrete roads.6.List any two tests on aggregates.
7. Define permanent way.
8. Define the term gauge in railways.

PART-B

Answer **four** questions. Each question carries **three** marks 4 **x 3 = 12 Marks**

9 (a) State the importance of transportation engineering.

OR

9 (b) State any six tests on bitumen.

10(a) State the importance of any three traffic surveys.

OR

10 (b)State any three characteristics of good ballast.

11(a) List various non-conventional road materials.

OR

11(b) State the machinery used in the construction of WBM roads.

12(a) Sketch the cross section of a permanent way and label the components.

OR

12(b) Write short notes on coning of wheels.

PART-C

Answer **four** questions. Each question carries **five** marks 4 **x 5 = 20 Marks**

13(a) State any five factors influencing selection of alignment for a road in plain areas.

OR

13(b) Explain the method of construction of W.B.M roads.

14(a) Explain the design principle of flexible pavement by CBR method.

OR

14(b) State various requirements of a good sleeper.

15(a) Explain the methods of providing surface and sub-surface drainage.

OR

15(b) Explain different types of joints used in Cement Concrete roads.

16(a) Explain different types of rail joints with sketches.

OR

16(b) Describe right hand turnout with the help of a neat sketch.

CE-306 – CONSTRUCTION PRACTICE

Course Title:	**Construction Practice**	Course Code :	**CE-306**
Semester:	**III Semester**	Course Group :	**Core**
Teaching Scheme in Periods(L:T:P):	**60:15:0**	Credits :	**2.5**
Methodology :	**Lecture+ Tutorials**	Total Contact Periods :	**75**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre-requisites

This subject requires the basic knowledge of basic sciences

Course Outcomes

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

CO1	Classify Buildings as per NBC, select suitable type of foundation and method of constructing masonry as per standards
CO2	Propose a suitable Door, window, lintel and sunshade for a particular opening
CO3	Select a suitable roof and flooring, explain their method of construction
CO4	Identify suitable scaffolding and formwork for doing a particular work and select a suitable staircase
CO5	Provide suitable protective and decorative finishes, method of termite proofing.
CO6	Identify the structural and non structural failures
CO7	Suggest suitable remedial measures for structural and non structural failures

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R			U	A
1	Classification of buildings, foundations and Masonry	15	Q4	Q1		Q9(a)	Q13(a)
2	Doors, Windows, Lintels and Sunshades	10					
3	Roofs and Floorings	12		Q2		Q10(a)	Q14(a)
4	Scaffolding, Formwork and staircases	12					
5	Protective, Decorative finishes and Termite proofing	14		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Construction Failures and Maintenance	12			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	75	8			8	8

Course Contents

UNIT-1: Classification of Buildings, foundations and types of masonry

Duration:15Periods(L: 12 – T:3)

a) Component parts of a building –Their functions.
b) Classification of buildings according to National building code.

c) Spread footing for columns and walls
d) Raft foundation.
e) Pile foundation and uses.
f) Different loads to be considered for the design of foundation as per IS 875 – 1987.
g) Spread foundation – Depth of foundation by Rankine's formula– width of foundation – Thickness of concrete bed.
h) Construction of foundation – spread footing only.
i) Causes, effects and prevention of dampness at basement level.
j) Classification of stone masonry –Random rubble and Coursed Rubble Masonry – general principles to be observed while constructing stone masonry
k) Brick Masonry – Bonds in brick masonry – (English bond only) for one brick thick wall – General principles to be observed in construction of brick masonry.

UNIT-2: Doors, Windows, Lintels and Sunshades

Duration: 10 Periods (L:8 – T:2)

a) Doors and windows – parts of door, window – positioning of doors and windows.
b) Common types of doors-panelled, Glazed and Flush doors.
c) 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.
d) Windows – Panelled and Glazed.
e) Ventilators – fixed, swinging type and louvered.
f) Fittings and fastenings for doors and windows.
g) Lintels – Functions – Types of lintels – R.C.C., wood, stone and steel.
h) Sunshade, canopy and sun breakers – lintel cum sunshade.

UNIT 3: Roofs and Floorings

Duration:12Periods(L:10 – T:2)

a) Roof – functions of roofs.
b) Classification of roofs – flat roofs – pitched roofs.
c) Different types of trusses – classification based on material and shape- king post truss, queen post truss, fan roof truss, north light roof truss.

d) Weather proof course on R.C.C. roof.
e) Decorative ceilings for auditoriums – method of fixing Plaster of Paris –Fibre glass.
f) Definition of flooring – Requirements of a good floor.
g) Methods of construction of flooring – cement concrete flooring, stone slab (Kadapa slab, Shahabad stone) floorings, cement plaster flooring, Tiled flooring, mosaic flooring.

UNIT 4: Scaffolding, Formwork and Staircases

Duration:12 Periods(L: 10 – T:2)

a) Scaffolding – Purpose and types – tubular scaffolding only.
b) Form work – Objectives of form work- Form work arrangements for slab and beam, columns, walls, water tanks .
c) Location of stairs.
d) Types of different stairs – straight, Quarter turn, half turn, Dog legged, open well, bifurcated, spiral/helical stair case .

UNIT 5: Protective, decorative finishes and Termite proofing

Duration: 14Periods(L:12 – T:2)

a) 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.
b) Pointing – purpose –Types of pointing
c) Painting – objects – method of painting new and old wall surfaces, wood surface and metal surfaces – powder coating and spray painting on metal surfaces.
d) White washing – colour washing – Distempering – internal and external walls.
e) Definition and method ofTermiteproofing .

UNIT 6: Construction Failures and Maintenance

Duration:12 Periods(L:10 – T:2)

a) Introduction – Error and Failure – Different types of failures – Structural and non structural failures.
b) Structural failures: Failures in foundations and in RCC building frames – Remedial measures.
c) Non Structural failures: Failures in plastering and floorings, cracks in walls at different locations – reasons and remedial measures, failures due to ignorance and negligence – Remedial measures.

Reference Books

1. Building Material & Construction by S.P. Arora& S. P. Bindra
2. Construction Technology by Sarkar Oxford University Press
3. Building materials & components by C B R I
4. National Building code by BIS Publication
5. Building Construction by Sushil Kumar
6. Building Construction by S.C.Rangawala
7. SP20 Explanatory handbook on Masonry code
8. SP 62 Handbook on Building Construction Practices
9. Design of foundation structures principles and practice by N.P.Kurian

Suggested E-learning references

1. http://nptel.ac.in
2. https://www.youtube.com/watch?v=nMIl3krK-GI
3. https://www.youtube.com/watch?v=6OAHO9zgeXM
4. https://www.youtube.com/watch?v=j1bL_1NBvIc
5. https://www.youtube.com/watch?v=cQGDP8kWEMM
6. https://www.youtube.com/watch?v=rh1Z-i14-h0
7. https://www.youtube.com/watch?v=veF4uSUtrEY
8. https://www.youtube.com/watch?v=USat6LdENzU
9. https://www.nicee.org/EQTips.php

Suggested Learning Outcomes

After completion of the course, the student shall be able to

CO1 - Classify Buildings as per NBC, select suitable type of foundation and method of constructing masonry as per standards

1.1 State the components of a building and their functions.

1.2 State the classification of buildings according to National Building Code (NBC) with examples.

1.3 Describe with sketches – spread footings, raft and pile foundation.

1.4 State the loads to be considered in design of foundation.

1.5 State the rules for minimum depth, width of foundation and thickness of concrete bed for spread footing.

1.6 Explain the method of constructing spread footing

1.7 List the causes and effects of dampness at basement level and state the measures for prevention of dampness at basement level.

1.8 List different types of stone masonry.

1.9 Explain different types of stone masonry.

1.10 State the general principles to be observed in stone masonry construction

1.11 Explain the terms Bond, Course, Header and Stretcher related to brick masonry.

1.12 State the general principles to be observed in brick masonry construction.

1.13 Explain with sketches English bond of brick masonry forone brick thick wall.

CO2 - Propose a suitable Door, window, lintel and sunshade for a particular opening

2.1 State the principles of locating doors, windows and ventilators in buildings.

2.2 Explain with sketches common and special types of doors, windows and ventilators.

2.3 List the uses of different types of doors, windows and ventilators.

2.4 Explain the fittings and fastenings of doors, windows and ventilators.

2.5 Explain the functions and types of lintels.

2.6 Explain about thin lintel developed by CBRI with simple sketches.

2.7 Explain the functions of sunshades, canopy, sun-breakers and porticos.

CO3 - Select a suitable roof and flooring, explain their method of construction

3.1 State the functions of roofs.

3.2 State the classification of roofs.

3.3 State the classification of trusses based on material and shape.

3.4 Explain with sketches king post truss, queen post truss, fan roof truss, north light roof trusses.

3.5 State the common and decorative ceilings used in construction work.

3.6 Explain the method of fixing Plaster of Paris and fibre glass ceilings.

3.7 State the functions of flooring.

3.8 List the requirements of good floor.

3.9 Explain method of construction of C.C flooring, stone slab flooring, tiled flooring, mosaic flooring, Ceramic flooring, and Marble flooring.

CO4 - Identify suitable scaffolding and formwork for doing a particular work and select a suitable staircase

4.1 State the purpose of scaffolding.

4.2 Define scaffolding and mention the types of scaffolding.

4.3 List the component parts of tubular scaffolding.

4.4 Sketch and explain about tubular scaffolding.

4.5 State the advantages of tubular scaffolding.

4.6 State the objectives of formwork.

4.7 State the requirement of formwork.

4.8 Draw the formwork arrangement for slab & Beam system and Column formwork.

4.9 State the advantages of Steel formwork over Timber formwork.

4.10 State the principles of locating stairs.

4.11 Explain terms: rise, tread, landing, flight, going, hand rail, newal post, baluster and balustrade.

4.12 Draw the line diagrams of different stairs.

CO5 - Provide suitable protective and decorative finishes, method of termite proofing.

5.1 State the objects of plastering.

5.2 State the methods of plastering.

5.3 State the steps in providing cement plastering on masonry walls.

5.4 State the use of wall putty as a decorative finish on masonry walls.

5.5 State the objects of pointing and types of pointing.

5.6 State the objects of painting.

5.7 Explain the method of painting new and old wall surfaces.

5.8 State the paints suitable for painting wood work and steel work – powder coating, spray painting.

5.9 Explain briefly the method of white washing, colour washing, distempering the brick masonry wall.

5.10 Definition and Method of termite proofing.

CO6 Identify the structural and non structural failures

CO7 Suggest suitable remedial measures for structural and non structural failures

6.1 Understand the concepts of error and failures.

6.2 State the different causes of failures.

6.3 State the different types of structural failures in foundations, machinery and RCC frames and state the remedies.

6.4 State the different types of non structural failures in plastering and floorings and cracks in buildings.

6.5 State the causes of leakages of roof and joints and state the remedial measures.

6.6 List the various types of failures due to ignorance and negligence and state the remedies.

6.7 State various annual and special maintenance works in buildings.

Suggested Student Activities

1. Collect and study different photographs of various foundations and prepare a report.
2. Collect and study different photographs of stairs.
3. Collect and study the different types of Damp Proofing materials and prepare a report.
4. Prepare models of various types of foundations.
5. Prepare models of different types of roof trusses.
6. Prepare a report on various types of floorings.
7. Prepare a report on various types of scaffoldings and formwork.
8. Prepare a report on structural failures with case study.
9. Tech fest/Srujana
10. Paper/Poster presentation
11. Quiz
12. Group discussion
13. Surprise Test

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	1	1	1	-	1		2	1,2,3,5,7
CO2	1	1	1	-	1		2	1,2,3,5,7
CO3	1	1	1	-	1		2	1,2,3,5,7
CO4	2	1	1	-	1		2	1,2,3,5,7
CO5	1	1	1	1	1		2	1,2,3,4,5,7
CO6	2	1	1	1	1		2	1,2,3,4,5,7
CO7	1	2	3	2	3	-	2	1,2,3,4,5,7

State Board of Technical Education and Training,Telangana

Model Question paper
DCE III semester Mid Semester-I Examination

Course Code:CE-306 **Duration:1 hour**
Course Name: Construction Practice **Max.Marks:20 Marks**

PART-A

Answer **all** questions, Each Question carries **one** mark **4x1 = 4 Marks**

1) State the classification Educational buildings with examples.
2) List different types of stone masonry.
3) List the types of foundations.
4) List the types of doors

PART-B

Answer **two** questions. Each question carries **three** marks **2x 3 = 6 Marks**

5(a) State any three components of buildings with their functions.

(or)

5(b) Define Course and Header.

6(a) State the principles of locating doors.

(or)

6(b) State the functions of lintels..

PART-C

Answer **two** questions. Each question carries **five** marks **2x 5 = 10 Marks**

7(a) Sketch the cross section of a building and lable its parts.

(or)

7(b) State the general principles of stone masonry.

8(a) Explain with sketches any two types of doors and their uses.

(or)

8(b) Explain the method of construction of spread foundation.

State Board of Technical Education and Training,Telangana
Model Question paper
DCE III semester Mid Semester-II Examination

Course Code:CE-306 **Duration:1 hour**
Course Name: Construction Practice **Max.Marks:20 Marks**

PART-A

Answer **all** questions, Each Question carries **one** mark **4x1= 4 Marks**

1. List the common types of roofs.
2. List any two requirements of good floorings.
3. State the purpose of scaffolding.
4. Define Flight.

PART-B

Answer **two** questions. Each question carries **three** marks **2x 3 = 6 Marks**

5(a) Mention any three functions of Roofs.

(or)

5(b) State the functions offlooring.

6(a) State the objectives of scaffolding,

(or)

6(b)State the objectives of formwork.

PART-C

Answer **two** questions. Each question carries **five** marks **2x 5 = 10 Marks**

7(a) Draw the sketch of king post truss and label the parts.

(or)

7(b) Explain the method of construction of C.C flooring.

8(a) State the advantages of tubular scaffolding.

(or)

8(b) State the advantages of steel formwork over timber formwork.

State Board of Technical Education and Training,Telangana
Model Question paper
DCE III Semester
Semester End Examination

Course Code:CE-306 **Duration:2 hours**
Course Name: Construction Practice **Max.Marks:40 Marks**

PART-A

Answer **all** questions 8**x1 =8 Marks**

1) List any two loads to be considered in design of foundations.
2) State the functions of formwork.
3) State the types of pointing
4) Define queen closure.
5) Define termite proofing
6) State the uses of wall putty.
7) List any two Non structural failures.
8) List the types of cracks in buildings

PART-B

Answer **four** questions. Each question carries **three** marks. **4x3 = 12 Marks**

9(a) State components of building

(or)

9(b) State three objects of plastering a wall

10(a)State any threefunctions of roofs.

(or)

10(b)State different causes of failures

11(a) Explain the terms:
i)Rise ii) tread iii) landing

(or)

11(b) State the principles of locating Stairs in buildings

12(a) Sate the types of structural failures.

(or)

12(b) State any three remedial measures of leakages of roofs.

PART-C

Answer **four** questions. Each question carries **five** marks4 **x 5 = 20 Marks**

13(a) State the general principles to be observed in brick masonry construction.

(or)

13(b) Explain briefly the method of construction of cement concrete floor

14(a) Draw a neat sketch of King post truss and the label parts.

(or)

14(b) Explain the causes of leakages in roof and state their remedial measures.

15(a)Describe the method of application of oil bound distemper on a masonry wall.

(or)

15(b) Explain the method of painting a new wall.

16(a) List the various failures due to ignorance.

(or)

16(b) Explain various types of annual maintenance.

CE-307 – BUILDING DRAWING

Course Title :	**Building Drawing**	Course Code :	**CE-307**
Semester :	**III Semester**	Course Group :	**Practical**
Teaching Scheme in Periods(L:T:P) :	**15:0:30**	Credits :	**1.25**
Methodology :	**Lecture+ Practical**	Total Contact Periods :	**45 Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This course requires the basic knowledge of Engineering drawing

Course Outcomes

On completion of the course, the student should be able to;

CO1	Sketch the conventional signs and component parts related to building plotting as per IS 962.
CO2	Draw plan, cross section and elevation of Residential buildings of load bearing walls
CO3	Develop plan, cross section and elevation of Residential buildings of framed structures
CO4	Draw line diagrams of School buildings.
CO5	Plan and Interpret line diagrams of Hostel buildings.
CO6	Analyse line diagrams of Hospital buildings.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE		
			R	U	A
1	Introduction to building drawing	15	1	3	
2	Residential Buildings	15			1
3	Public Buildings	15			1
Total		45	1	3	2

CourseContents

UNIT 1: Introductionto building drawing

Duration: 15 Periods(L: 5-P: 10)

a) Sketch the Conventional signs for materials like bricks, stone, concrete, wood, glass, earth, steel - water supply and sanitary fixtures like tap, wash basin, sink, W.C pan (Indian and European type), shower, flush tank.-Electrical installations like one way switch, Two way switch, Distribution Board, Socket-5A, 15A, Ceiling fan, LCD bulb, Fluorescent Lamp, Bell.
b) Cross section of a load bearing wall showing all the componentsbelow and above the ground level.
c) Plan and cross section of a column along with footing.
d) Elevation of a fully panelled door and label the parts
e) Elevation of fully panelled window and glazed window and label the parts
f) Elevation of King post truss and label the parts with the given data.(details of the joints not required)
g) Plan and elevation of Dog legged stair case

UNIT 2: Residential Buildings

Duration: 15 Periods (L: 5-P:10)

a) Plan,section and elevation of single storied load bearing type residential building from the given line diagram and set of specifications or by measurement of existing building.
   (i) 1BHK(ii) 2BHK
b) Plan, section and elevation of single storied (framed structure) residential building
c) Plan, section and elevation of Two-storied residential building (framed structure type)
d) Plan of any two apartments at first floor level (contains minimum 4 flats of any BHK).
e) Draw the Site Plan, and proposed construction plan, Section passing through the Stair or WC and Bath and elevation for 3BHK house as per basic principles of building, i.e. Town planning authority in your vicinity.

UNIT 3: Public buildings

Duration: 15 Periods (L: 5-P: 10)

a) Plan of a Sanitary block of a large building showing internal water supply and sanitary fittings
b) Line diagram of Primary school building for 250 studentsshowing the functional requirements.

c) Line diagram of Hostel building for 100 studentsshowing the functional requirements
d) Line diagram of rural hospital buildingfor 10 beds capacityshowing the functional requirements.
e) Line diagram of the Bank, showing the functional requirements.
f) Line diagram of Restaurant, showing the functional requirements in ground floor and first floor only.

Recommended Books

1. Civil Engineering Drawing-I by Chakraborthy
2. Civil Engineering Drawing-I by N.Srinivasulu.
3. S.C.Rangwala ,"Civil Engineering Drawing
4. Shah. M.G. Kale, CM, Patki, S.Y., Building Drawing, Mcgraw Hill Publishing
5. Malik and Mayo, Civil Engineering Drawing, Computech Publication Ltd
6. M. G. Shah and C. M. Kale, Principles of Perspective Drawing, Mcgraw Hill
7. Swamy, Kumara; Rao, N, Kameshwara, A ., Building Planning and Drawing, Charotar Publication, Anand.
8. Bhavikatti, S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.
9. Mantri, Sandip, A to Z Building Construction, SatyaPrakashan, New Delhi.
10. Sane, Y.S., Planning and design of Building, Allied Publishers, New Delhi.

Suggested E-learning references

1. http://nptel.ac.in
2. https://www.youtube.com/c/Circlelineartschool/videos

Suggested Learning Outcomes

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

CO1 - Sketch the conventional signs and component parts related to building plotting as per IS 962.

1.1 Sketch the conventional signs of various Civil Engineering materials, plumbing and electrical elements.
1.2 Draw the cross section of load bearing wall and name all components below and above ground level.
1.3 Draw the plan and cross section of column and footing below and above ground level
1.4 Draw the elevation of fully panelled door and label the parts

1.5 Draw the elevation of fully panelled window and glazed window and label the parts

1.6 Draw elevation of King post truss and label the parts with the given data.

1.7 Draw plan and section of a dog legged staircase with given specifications.

CO2 - Draw plan, cross section and elevation of Residential buildings of load bearing walls

CO3 - Develop plan, cross section and elevation of Residential buildings of framed structures

2.1 Draw the plan, section and elevation of single storied load bearing type residential building from the given line diagram and set of specifications.

i. 1BHK

ii. 2BHK

2.2 Draw the plan, section and elevation of single storied residential building (framed structure) from the given line diagram and set of specifications.

2.3 Draw the plan, section and elevation of two storied residential building (framed structure)from the given line diagram and set of specifications.

2.4 Draw the plan of any two apartments at first floor level.

2.5 Draw the Site Plan, and proposed construction plan, Section and elevation for 3BHK house as per Town planning authority in your vicinity.

CO4 - Draw line diagrams of School buildings.

CO5 - Plan and Interpret line diagrams of Hostel buildings.

CO6 - Analyse line diagrams of Hospital buildings.

3.1 Draw the plan and cross section of sanitary block showing internal water supply and sanitary fittings.

3.2 Draw the line diagram of Primary school building for 250 students .

3.3 Draw the line diagram of a Hostel building for 100 students.

3.4 Draw the line diagram of a Rural hospital building for 10 beds capacity

3.5 Draw the line diagram of a Bank.

3.6 Draw the line diagram of a Restaurant.

Suggested Student Activities

1. Tech fest/Srujana
2. Surprise Test
3. Group discussion
4. Prepare a case study of nearby small public buildings verify and draw the various views and judge the prevailing bye-laws.
5. Prepare a plan, elevation and section of your college main block.

6. Prepare a plan of temporary construction shed and draw various views.
7. Prepare a plan of vehicle parking shed and draw various views.
8. Study the difference between framed structure and a load bearing structure and present it.
9. Incorporate the concepts of Green building technology in your institute building.
10. Draw the plan elevation and sectional views of a pitched roof residential building.
11. Visit the Town planning office in your vicinity and see the master plan of your city and discuss with your authorities
12. Discuss with Municipal or Panchayat authorities regarding stamp duty, Authorized layouts and unauthorized layouts.

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	1	2				1	1,2,3,7
CO2	2	2	2	2	2		3	1,2,3,4,5,7
CO3	2	2	2	2	2		3	1,2,3,4,5,7
CO4	2	2	2	2	2		3	1,2,3,4,5,7
CO5	2	2	2	2	2		3	1,2,3,4,5,7
C06	2	2	2	2	2		3	1,2,3,4,5,7

State Board of Technical Education and Training,Telangana

Mid Sem-I Model Question paper

DCE III semester

Course Code:CE-307 **Duration:1 hour**

Course Name: Building Drawing **Max.Marks:20**

PART-A

Answer **all** questions. Each question carries **four** marks **2 x 4= 8 Marks**

1. Sketch the conventional signs for the following .
    a) Bricks
    b) Wood cross section
    c) Stone Masonry
    d) W.C pan (Indian type)
2. Sketch the plans of odd course and even course of one Brick wall of English Bond meeting at corner and name the components.

PART-B

Answer any one question. Each question carries twelve marks **1 x 12 = 12 Marks**

3. Draw the cross section of load bearing wall and Name any 8 components below and above the ground level.(assume suitable dimensions)
4. Draw the elevation of fully panelled door of size 1200mm X 2100mm (not to scale) and labels the parts.

State Board of Technical Education and Training,Telangana
Mid Sem-II Model Question paper
DCE III semester Examination

Course Code:CE-307 **Duration:1 hour**
Course Name: Building Drawing **Max.Marks:20**

PART-A

Answer **all** questions. Each question carries **four** marks **2 x 4= 8 Marks**

1. Draw the plan of a single room of size 4 m x 3 m. Take wall thickness as 300mm

2. Draw the cross section of load bearing wall with foundation. Wall thickness is 300 mm. Assume suitable dimensions

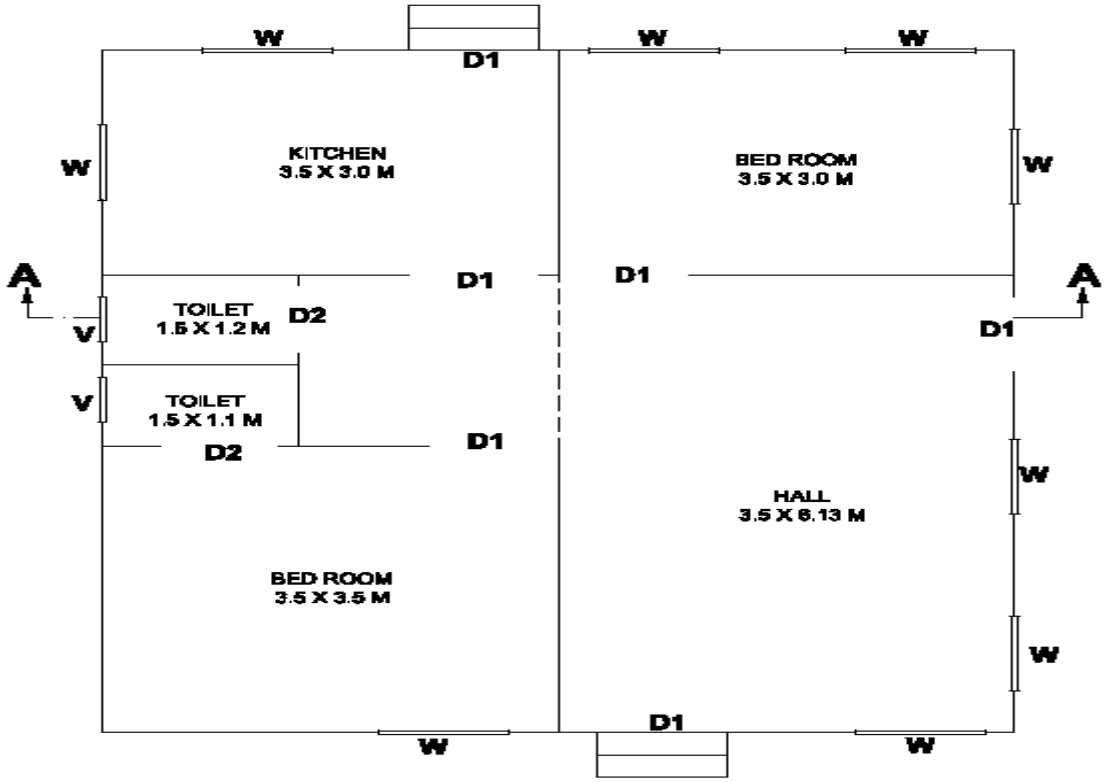
PART-B

Answer any onequestion. Each question carries twelve marks 1x12 = 12 Marks

1. The line sketch of a small residential building is shown in Fig. Draw to scale of 1:100 the following views :
   i. Dimensioned Plan 10 marks

   Specifications:-

   a) All the dimensions in line sketch are internal measurements.
   b) Foundation : 1200mm below the ground level and 1000mm wide
   c) C.C Bed : 1000mm wide and 300mm deep
   d) Footings : 2 Nos. With suitable offsets using RR Masonry in CM (1:6)
   e) Basement : 450mm height with suitable width of Stone masonry in CM (1:6)
   f) Super structure : walls 300mm thick Height from top of the floor to bottom of the roof slab is 3000mm. All walls are of BW in CM(1:6)
   g) RCC roof slab 120mm thick.
   h) Doors , Windows, Ventilators and Lintels may be suitably provided.
   i) Parapet : 150mm thick, Height 750mm.
   j) Sunshades for all external doors and windows are to be suitably provided.



2. The line sketch given below shows the plan of a residential building. The dimensions given in the sketch are internal dimensions of the rooms. Draw the Cross section along ABCD of the given line sketch to a scale of 1:100

Specifications

i. Foundations :- The depth of foundation shall be 1000mm below ground level. Plain cement concrete (1:4:8) bed in the foundation will be 800mm wide and 200mm deep. Width of first and second footings will be 500mm and 400mm respectively. Whereas the depth of both the footings will be 400mm each using stone masonry in C.M (1:8).

ii. Basement:- The height of the basement is 600mm. Damp proof course of walls in the basement is 150mm thick.

iii. Super structure: - All the walls except the partition wall between the toilets are 200mm thick. The partition wall is 100mm thick.

iv. A square brick pillar 200mm X 200mm is provided at left corner in front veranda.

v. Lintels and Sunshades :- Lintels with RCC (1:2:4) are provided on all openings and depth of 150mm with a bearing of 150mm on either side.

Sunshades 100mm thick at the wall face and 75mm thick at the free end are provided projecting 600mm from lintels over all exterior openings. A continuous sunshade is provided both sides of front veranda.

vi. Veranda: In front veranda RCC beam 200mm X 250mm is laid over the brick pillar, the bottom of the beam being at 2100mm from the floor level.

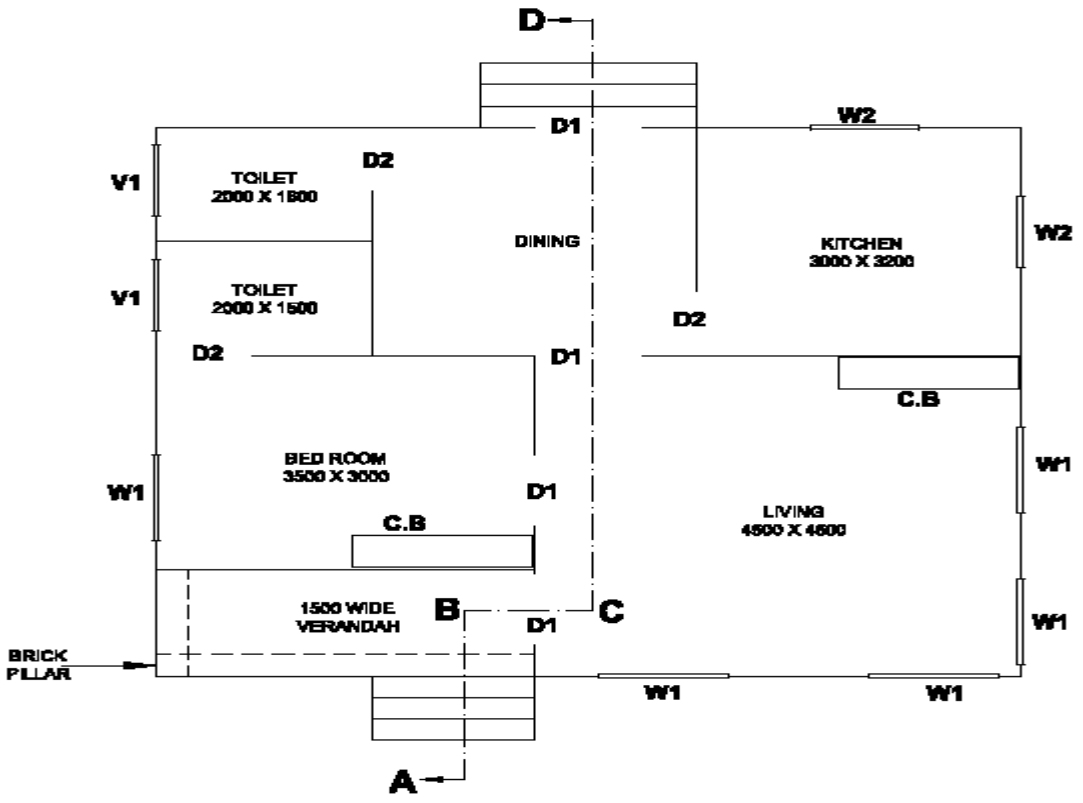
vii. Height of super structure : The walls in the super structure are taken to a height of 3300mm.

viii. Roofing : Roofing consists of RCC (1:2:4) slab 110mm thick and weather proof course 50mm thick.

ix. Flooring : Flooring shall be of Shahabad stone 25mm thick over 80mm thick CC bed of (1:3:6) over a sand filling in the basement.

x. Parapet : Parapet is 100mm thick and 700mm height.

xi. Assume suitable sizes for steps, doors, windows and ventilators.



State Board of Technical Education and Training,Telangana
Semester End Examination Model Question paper
DCE III semester

Course Code:CE-307 **Duration:2 hours**
Course Name: Building Drawing **Max.Marks:40**

PART-A

Answer **all** questions each question carries **four**marks **.** **4x4=16 Marks**

1. Sketch the conventional signs for the following materials,

a).Stone masonry
b) Wood longitudinal section
c) Wash basin
d) Glass
e) Concrete

2. Draw the cross section of load bearing wall and Name any 6 components below and above the ground level.
3. Draw the elevation of king post truss and labels the parts
4. Draw the elevation of fully panelled window of size 1000mm x 1400 mm (not to scale) and label the parts

PART- B

Answer any **one** question. Each question carries **twenty four** marks **1x24=24 Marks**

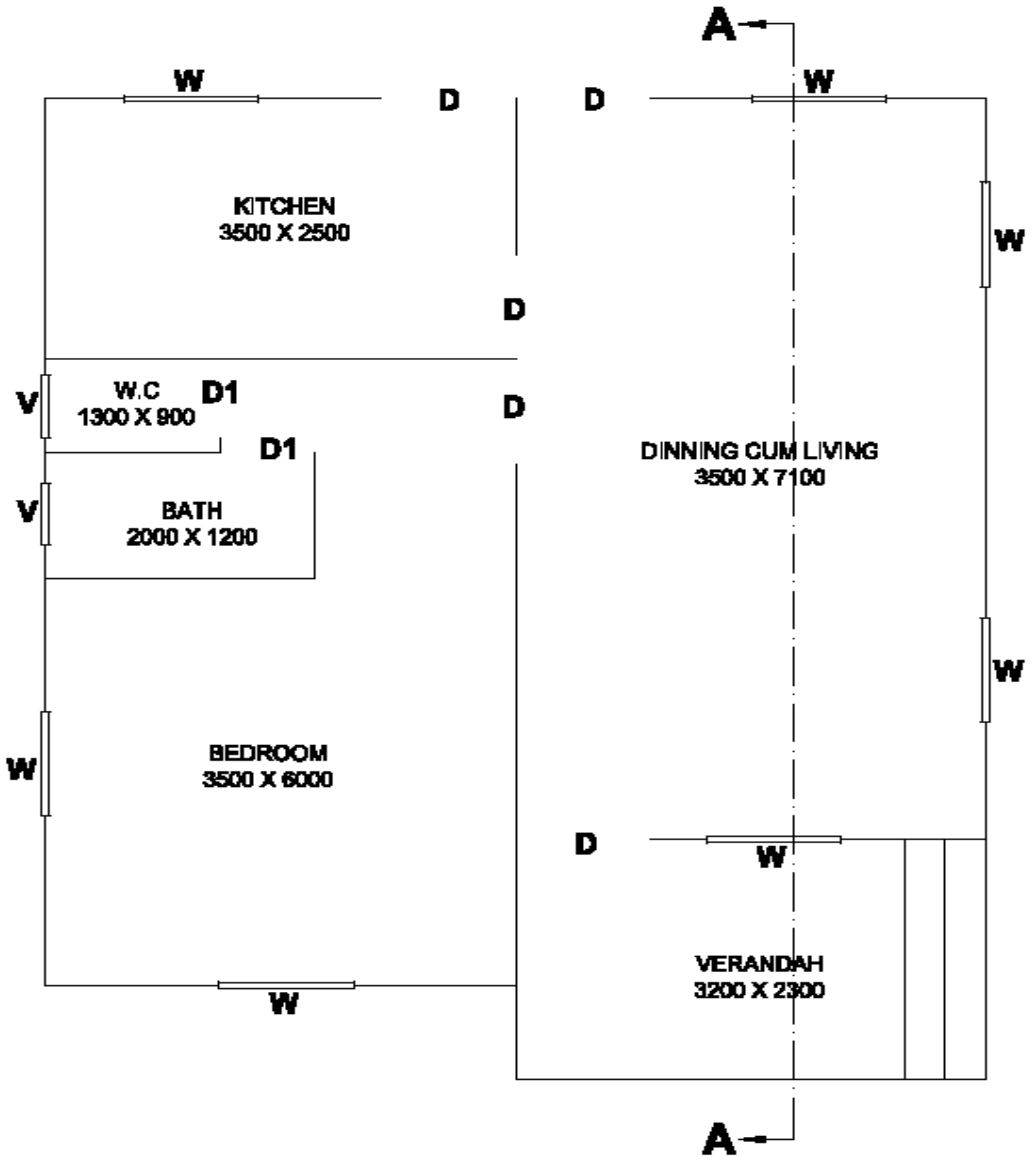
5. The line sketch given below shows the plan of a Single storied two bedroom load bearing residential building. The dimensions given in the sketch are internal dimensions of the rooms. Draw to a scale of 1:100

a) Plan

Specifications:

i. Foundation :- 1.0m wide and 1.0m deep
ii. Levelling course :- 1.0m wide and 0.2m height in CC 1:4:8
iii. First footing :- 0.75m wide and 0.4m height in stone masonry in C.M (1:8)
iv. second footing :- 0.60m wide and 0.4m height in stone masonry in C.M (1:8)
v. Basement :- 0.45m wide and 0.6m height in stone masonry in C.M (1:8)
vi. Flooring :- 20mm thick Marble flooring set in 20mm thick C.M (1:4) over a bed of C.C (1:5:10) and 150mm thick sand cushion.
vii. Super structure :- 300mm thick brick masonry in C.M (1:6), Height 3000mm
viii. Parapet wall :- 150mm thick and 0.75m height in brick masonry in C.M (1:6)

ix. Lintels :- 150mm thick in R.C.C (1:2:4)
x. Sunshades :- 75mm thick flat, projecting 0.60m from face of wall.
xi. Roofing :- R.C.C slab 120mm thick all over with full bearing.
xii. Doors :- MD= D=1.0m X 2.0m; D1=0.9m X 2.0m
xiii. Windows :- W= 1.0m X 1.22m;
xiv. Ventilators :- V 0.45m X 0.75m



6.a) Draw a line diagram for a proposed Rural hospital of 10 beds capacity. (to a suitable scale) showing the functional requirements 20

CE-308 – HYDRAULICS LAB

Course Title	Hydraulics Lab	Course Code	CE-308
Semester	III	Course Group	Practical
Teaching Scheme in Periods (L:T:P)	1:0:2	Credits	1.25
Methodology	Lecture+ Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

Basic Knowledge of Hydraulics

Course Outcomes

Upon completion of the course the learner shall be able to

CO1	Assess the flow parameters like discharge, velocity of flow measuring devices
CO2	Determine flow rates, pressure variations, various losses for flow through pipes
CO3	Verify Bernoulli's theorem and calculate the coefficient of discharge flow measuring devices
CO4	Calculate the constants in open channel flow
CO5	Identify and analyze the component parts of Pumps
CO6	Recognize and identify the component parts of Turbines

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods
1	Orifices, Mouthpieces and Notches	15
2	Verification of Bernoulli's theorem and study of Pipe flow parameters	15
3	Open channel flow and Study of Fluid machines	15
Total		45

Course Contents

List of experiments:

Unit 1: Orifices, Mouthpieces, Notches and weirs

Duration: 15 Periods (L:5 – P:10)

1. Determination of coefficient of discharge of a small orifice by constant head method
2. Determination of C_c of an orifice by finding C_v and C_d.
3. Determination of coefficient of discharge of a mouthpiece by constant head method
4. Determination of coefficient of discharge of a Rectangular and triangular notch.
5. Determination of coefficient of discharge of a trapezoidal notch

Unit 2:Verification of Bernoulli's theorem and study of Pipe flow parameters

Duration: 15 Periods(L:5 – P:10)

1. Verification of Bernoulli's theorem.
2. Determination of coefficient of a discharge of a venture meter.
3. Determination of friction factor in pipe flow.

Unit 3:Open channel flow and Study of Fluid machines

Duration: 15 Periods(L:5 – P:10)

1. Determination of Chezy's constant in open channel flow**.**
2. Study of reciprocating pump
3. Study of centrifugal pump.
4. Study of turbines – Pelton Wheel
5. Study of turbines – Francis Turbine
6. Study of turbines – Kaplan Turbine

KEY Competencies to be achieved by the student

S.No	Experiment Title	Key Competency
1	Coefficient of discharge of small Orifice by constant head.	Regulate the flow Operate stop clock accurately Draw graph between Q vs$H^{1/2}$
3	Hydraulic coefficients of an orifice.	Regulate flow. Note co-ordinate values and measure volume Operate stop clock accurately. State the relation.
4	Coefficient of discharge of mouth piece by constant head.	Regulate the flow. Operate stop clock accurately graph between Q Vs $H^{1/2}$
5	Coefficient of discharge of rectangular notch.	Note readings of head Operate stop clock accurately Draw graph between Q vs$H^{3/2}$
6	Coefficient of discharge of triangular Notch	Note readings of head Operate stop clock accurately. Draw graph between Q vs$H^{5/2}$
7	Coefficient of discharge of trapezoidal notch	Note readings of head Operate stop clock accurately. Compare the results of rectangular and triangular notch.
8	Verify Bernoulli's theorem	Note readings of head at various locations Plot hydraulic gradient line and total energy line
9	Coefficient of discharge of Venturimeter.	Note readings of head Operate stop clock accurately. Draw graph between Q vs.$H^{1/2}$
10	Friction factor in pipe flow.	Note readings of head Observe the significance of friction factor of pipe flow.
11	Chezy's constant	Note readings of head. Observe the significance in design of section of open channel

Recommended Books

1. Hydraulics Lab Manual by S.K.Likhi, NewAge International PvtLtd
2. Laboratory Manual of Hydraulic and Hydraulic Machines by R.V.Raiker, Prentice Hall India learning Pvt Ltd

Suggested E-learning references

1.http://nptel.ac.in

Specific Learning Outcomes

Upon completion of the course the learner shall be able to

CO1 - Assess the flow parameters like discharge, velocity of flow measuring devices

CO2 - Determine flow rates, pressure variations, various losses for flow through pipes

1.1 State the principle / law / apparatus / equipment required for testing for determination of C_d of Orifices by constant head method

1.2 Perform test and record observations.

1.3 Draw inferences on the relationship between parameters.

1.4 Draw a graph between Q vs$H^{1/2}$.

1.5 State the principle / law / apparatus / equipment required for testing for determination of C_d of Mouth pie**ces**

1.6 Perform test and record observations.

1.7 Draw inferences on the relationship between parameters.

1.8 Draw a graph between Q vs$H^{1/2}$

1.9 State the principle / law / apparatus / equipment required for testing for determination of C_d of Rectangular Notches

1.10 Perform test and record observations.

1.11 Draw inferences on the relationship between parameters.

1.12 Draw a graph between Q vs$H^{3/2}$.

1.13 State the principle / law / apparatus / equipment required for testing for determination of C_d of Triangular Notches.

1.14 Perform test and record observations.

1.15 Draw inferences on the relationship between parameters.

1.16 Draw a graph between Q vs$H^{5/2}$.

1.17 State the principle / law / apparatus / equipment required for testing for determination of C_d of Trapezoidal Notches

1.18 Perform test and record observations

1.19 Draw inferences comparing the results with rectangular notch and triangular notch on the relationship between parameters.

CO3 - Verify Bernoulli's theorem and calculate the coefficient of discharge flowmeasuring devices

CO4 - Calculate the constants in open channel flow

2.1 States the principle/law /apparatus/equipment required for verification of Bernoulli's Theorem

2.2 Perform test and record observations.

2.3 State Inference and application.

2.4 Plot Hydraulic gradient line and Total energy line.

2.5 State the Aim /apparatus/equipment required to determine the Cd for flow through Venturimeter

2.6 Perform test and record observations.

2.7 State Practical application.

2.8 Draw a graph between Q vs.$H^{1/2}$

2.9 State the Aim /apparatus/equipment required to determine the friction factor in pipe flow.

2.10 Perform test and record observations.

2.11 State Importance of friction factor in pipe design.

CO5 - Identify and analyze the component parts of Pumps

CO6 - Recognize and identify the component parts of Turbines

3.1 State the Aim / apparatus / equipment required to determine the chezy's coefficient in Open channel flow.

3.2 Perform test and record observations.

3.3 State Importance in design of section of open channel.

3.4 Identify the component parts of a Reciprocating pump

3.5 State the functions of each component of Reciprocating pump

3.6 State field applications for Reciprocating pump

3.7 Identify the component parts of a centrifugal pump

3.8 State the functions of each component of centrifugal pump

3.9 State field applications for centrifugal pump

3.10 State field applications and compare with Reciprocating pump.

3.11 Identify the component parts of Pelton wheel, Francis or Kaplanturbines.

3.12 State function of each component

3.13 State field applications of Turbines

Suggested Student Activities

1. To carryout market survey for pipes of different sizes and materials available.
2. To visit & submit a report on nearby canal/irrigation structures/dam site to know the usage of notches andweirs.
3. To visit & submit a report on nearby hydel power plant to know the type of turbine installed and itssetup.
4. Student is encouraged to attend the Techfest/Srujana
5. Paper/Posterpresentation
6. Quiz
7. Groupdiscussion
8. SurpriseTest

CO-PO Mapping Matrix

	Basic and Discipline SpecificKnowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	1	2	1	2	1	2	1	1,2,3,4,5,6,7
CO2	1	2	1	2	2	2	1	1,2,3,4,5,6,7
CO3	1	2	1	2	1	2	1	1,2,3,4,5,6,7
CO4	1	1	1	1	2	1	1	1,2,3,4,5,6,7
CO5	1	2	1	2	1	2	1	1,2,3,4,5,6,7
CO6	1	1	1	1	2	1	1	1,2,3,4,5,6,7

State Board of Technical Education and Training, Telangana

Model Question paper
DCE III semester
Mid Semester-I Examination

CourseCode:CE-308 **Duration:1 hour**
Course Name:Hydraulics Lab **Max.Marks:20 Marks**

Pick any one experiment from thegivenlist 1x20=20Marks

1. Determination of coefficient of discharge of a small orifice by constant headmethod
2. Determination of C_c of an orifice by finding C_v andC_d.
3. Determination of coefficient of discharge of a mouthpiece by constant headmethod
4. Determination of coefficient of discharge of a rectangularnotch.
5. Determination of coefficient of discharge of a triangularnotch
6. Determination of coefficient of discharge of a trapezoidalnotch

State Board of Technical Education and Training, Telangana
Model Question paper
DCE III semester
Mid Semester-II Examination

CourseCode:CE-308 **Duration:1 hour**
Course Name:Hydraulics Lab **Max.Marks:20 Marks**

Pick any one experiment from thegivenlist 1x20=20Marks

1. Verification of Bernoulli'stheorem.
2. Determination of coefficient of a discharge of a venturemeter.
3. Determination of friction factor in pipeflow.

State Board of Technical Education and Training,Telangana Model Question paper
DCE III semester Semester EndExamination

CourseCode:CE-308 **Duration:2 hours**
Course Name:Hydraulics Lab **Max.Marks:40 Marks**

Pick any one experiment from the given lot1x40=40Marks

1. Determination of coefficient of discharge of a small orifice by constant headmethod
2. Determination of Cc of an orifice by finding Cv andCd.
3. Determination of coefficient of discharge of a mouthpiece by constant head method
4. Determination of coefficient of discharge of a Rectangular notch.
5. Determination of coefficient of discharge of a triangularnotch
6. Determination of coefficient of discharge of a trapezoidalnotch
7. Verification of Bernoulli'stheorem.
8. Determination of coefficient of a discharge of a venturimeter.
9. Determination of friction factor in pipeflow.
10. Determination of Chezy's constant in open channelflow**.**

CE-309 – LEVELLING SURVEYING LAB

Course Title	:	**Levelling Surveying Lab**	Course Code	:	**CE-309**
Semester	:	**III Semester**	Course Group	:	**Practical**
Teaching Scheme in Periods(L:T:P)	:	**15:0:30**	Credits	:	**1.25**
Methodology	:	**Lecture+Practical**	Total Contact Periods	:	**45Periods**
CIE	:	**60 Marks**	SEE	:	**40 Marks**

Pre-requisites

This course requires the basic knowledge of Surveying,Basics of chain surveying, compass surveying and levelling

Course Outcomes

CO1 :	Apply standard practices to perform different operations of Levelling in the field
CO2 :	Calculate the Reduced levels by Differential Levelling and Fly levelling
CO3 :	Conduct Profile Levelling for the given alignment and Reciprocal Levelling in the field to find true difference in elevation
CO4 :	Perform contouring by method of squares and plot the drawings
CO5	Use and operate Theodolite in the field

Course Content

Unit No	Unit Name	Hours/Periods
1a	Study of Levelling Instruments	06
1b	Differential and Fly Levelling	09
2a	Profile and Reciprocal Levelling	09
2b	Contouring	06
3a	Study of Transit Theodolite & Measurement of Angles	06
3b	Measurement of Horizontal Angles and Inaccessible Distance	09
	Total	**45**

Course Contents

UNIT 1:

a) Study of Levelling Instruments **Duration :6 Periods (L:2-P:4)**

Study of different types of Levelling Instruments, levelling staves- performing Temporary adjustments of level-Taking staff readings of various stations - booking of readings in level field book- Methods of deducing the levels (Height of collimation and Rise & Fall method)

b) Differential and Fly Levelling **Duration :9 Periods (L:3-P:6)**

Determine Reduced Level by Height of Instrument Method and Rise & Fall method - Perform Fly Levelling to check levelling work by Double Check Bench Mark.

UNIT 2

a) Profile and Reciprocal LevellingDuration :9 Periods(L:3-P:6)

Longitudinal and cross-sectioning for a given road / canal length with cross-section and at required interval. Reciprocal levelling - True difference in elevation and collimation error.

b) **Contouring** **Duration :6 Periods(L:2-P:4)**

Prepare Contour Plan/map using Block Contouring for the given area to draw its contour plan

UNIT 3

a) Study of Transit Theodolite & Measurement of Angles

Duration:6 Periods(L:2-P:4)

Study of transit Theodolite- Temporary adjustments of Theodolite Measurement of vertical angles-Measurement of Bearings.

b) Measurement of Horizontal Angles and Inaccessible Distance

Duration:9 Periods (L:3-P:6)

Measurement of Horizontal Angles by reiteration and repetition method-Determination of inaccessible horizontal distance involving two Instrument stations.

Recommended Books

1. Surveying - N.N.Basak - Tata McGraw Hill
2. Surveying Vol-I - S.K.Duggal -McGraw Hill Edn (India) Pvt Ltd
3. Surveying and Levelling Vol -1 -Kulkarni and Kanetkar
4. Surveying and Levelling Vol. - 1 - B.C. Punmia
5. Surveying and Levelling -Vol -1 -R.Agor- Khanna Publishers

Suggested E-learning references

1. http://nptel.ac.in
2. http://www.nitttrchd.ac.in/sitenew1/nctel/civil.php

KEY Competencies to be achieved by the student

S.No	Experiment Title	Key Competency
1a	**Study of Levelling Instruments**	✓ Study of different types of Levelling Instruments ✓ levelling staves ✓ Temporary adjustments of level ✓ Taking staff readings of various stations ✓ Deducing the Reduced Levels by Height of Instrument method and Rise and Fall method
1b	**Differential and Fly Levelling**	✓ Fly Levelling by DCBM ✓ Simple and Differential Levelling
2a	**Profile and Reciprocal Levelling**	✓ Longitudinal sectioning ✓ Cross sectioning of given road or canal lanes ✓ Reciprocal Levelling across the pond or water body
2b	**Contouring**	✓ Contouring by squares ✓ Contouring by cross-sections ✓ Prepare Contour Plan/map using Block Contouring
3a	**Study of Transit Theodolite & Measurement of Angles**	✓ Identifying parts and their functions ✓ Conducting operations like swinging and transiting Operating vertical circle clamp and its tangent screw ✓ Spreading the tripod on ground properly for easy levelling and stability ✓ Centering the instrument exactly over station using plumb bob and by moving legs ✓ Operating foot screws to level ✓ Eyepiece adjustment ✓ Focusing the object glass ✓ Recording the observations at their appropriate positions on page of theodolite field book
3b	**Measurement of Horizontal Angles and Inaccessible Distance**	✓ Measuring the horizontal angles accurately by Repetition and Reiteration method and calculating the Inaccessible distance

Suggested Learning Outcomes

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

CO1 - Apply standard practices to perform different operations of Levelling in the field

CO2 - Calculate the Reduced levels by Differential Levelling and Fly levelling

1.1 Identify the component parts of a dumpy level

1.2 Study different types of levelling staves

1.3 Perform temporary adjustments of a dumpy level for taking observations

1.4 Practice taking staff readings and recording them in level field book.

1.5 Take staff readings for differential levelling and compute the difference in elevation between two stations (take invert levels also)

1.6 Conduct fly levelling and determine RLs of required stations

CO3 - Conduct Profile Levelling for the given alignment and Reciprocal Levelling in the field to find true difference in elevation

CO4 - Perform contouring by method of squares and plot the drawings

2.1 Conduct profile levelling along a route and compute the RLs at various stations

2.2 Conduct profile levelling by taking Cross sections across a route and compute the RLs at various stations

2.3 Plot the LS and CS along a route from the data

2.4 Determine the true difference in elevation between two far off stations by conducting reciprocal levelling

2.5 Contouring by squares

2.6 Contour map or plan by block contouring

CO5 - Use and operate Theodolite in the field

3.1.Know the parts of Theodolite

3.2.Perform temporary adjustment.

3.3.Measurement of horizontal and vertical angles

3.4.Record the observations in the field book.

3.5.Computation of included angles, latitudes and departures from field notes

Suggested Student Activities

1. Prepare a spread sheet (Excel) by Rise and Fall method showing the calculation by using formula bar and present it.
2. Prepare a spread sheet (Excel) by Height of Instrument method showing the calculation by using formula bar and present it
3. Conduct a survey camp involving levelling and drawing contour map
4. Tech fest/Srujana
5. Paper/Poster presentation
6. Quiz
7. Group discussion
8. Surprise Test
9. Collect the contour maps of different terrains available with various authorities & prepare a report on its interpretation.
10. Determine the RLs of the components of existing structures like Plinth, lintels, chajja, slab, and beam etc

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for society, sustainability and Environment	Project Management	Lifelong learning	Linked PO
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	
CO1	3	2	1	3	3	3	3	1,2,3,4,5,6,7
CO2	2	2	1	3	3	3	3	1,2,3,4,5,6,7
CO3	3	2	1	3	3	3	3	1,2,3,4,5,6,7
CO4	3	1	2	3	3	3	3	1,2,3,4,5,6,7
CO5		2		2	1	2	2	2,4,5,6,7

State Board of Technical Education and Training,Telangana
Semester End Examination
Mid Sem-I Model Question paper
DCE II semester Examination

Course Code: CE-309P **Duration:1 hours**
Course Name: Levelling Surveying Lab **Max.Marks:20 Marks**

Instructions to the Candidate:

(i)Answer any One of the following Questions.

(ii) Plot the details of field work for illustration and conclude your observation of the experiment

1) Record the readings taken with the level and a 4 m levelling staff on continuously sloping ground at a common interval of 1m in the field book. Take a bench mark of 100.000m. Calculate the R.L of given points by height of collimation method
2) Note the observed readings taken with the level and a 4 m levelling staff on the given ground in the field book. Take a bench mark of 95.000m. Calculate the R.L of given points by Rise and fall method
3) Find out the true difference in elevation between the two given points 50 m apart.

State Board of Technical Education and Training,Telangana

Semester End Examination

Mid Sem-II Model Question paper

DCE II semester practical Examination

Course Code:CE-309P **Duration:1 hours**

Course Name: Levelling Surveying Lab **Max.Marks:20 Marks**

Instructions to the Candidate:

(i)Answer any One of the following Questions.

(ii) Plot the details of field work for illustration and conclude your observation of the experiment

1) Conduct Profile levelling for the given length of the road and plot the details
2) Conduct Cross sectioning for the given section of road and plot the details
3) Prepare the contour map for the given area with a contour interval of 2 m by method of squares
4) Prepare the contour map for the given area with a contour interval of 1 m by direct method of contouring
5) Prepare the contour map from the given reduced levels with a contour interval of 1 m by interpolation

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Semester End Examination

Model Question paper

DCE II semester practical Examination

Course Code:CE-309P **Duration:2 hours**

Course Name: Levelling Surveying Lab Practice **Max.Marks:40 Marks**

Instructions to the Candidate:

(i)Answer any One of the following Questions.

(ii) Plot the details of field work for illustration and conclude your observation of the experiment

1) Record the readings taken with the level and a 4 m levelling staff on continuously sloping ground at a common interval of 1m in the field book. Take a bench mark of 100.000m. Calculate the R.L of given points by height of collimation method
2) Note the observed readings taken with the level and a 4 m levelling staff on the given ground in the field book. Take a bench mark of 95.000m. Calculate the R.L of given points by Rise and fall method
3) Find out the true difference in elevation between the two given points 50 m apart.
4) Conduct Longitudinal Profile levelling for the given length of the road and plot the details
5) Conduct Cross sectioning for the given section of road and plot the details
6) Prepare the contour map for the given area with a contour interval of 2 m by method of squares
7) Prepare the contour map for the given area with a contour interval of 1 m by direct method of contouring
8) Prepare the contour map from the given reduced levels with a contour interval of 1 m by interpolation.
9) Measurement of horizontal angle by Reiteration method
10) Measurement of horizontal angle by repetition method
11) Measure vertical angle by using theodolite.
12) Perform the temporary adjustments of a theodolite in field.