TEACHING AND EXAMINATION SCHEDULE

V SEMESTER

S.NO	Course Code	Course Name	Teaching Scheme				Credits	Examination Scheme						
			Instruction periods per week			Total periods /semester		Continuous Internal Evaluation			Semester End Examination			
			L	T	P			Mid Sem 1	Mid Sem 2	Internal Evaluation	Max Marks	Min Marks	Total Marks	Min Marks for passing including internal
1	18C-501C	Reinforced Concrete Structures	3	1	-	60	3	20	20	20	40	14	100	35
2	18C-502C	Construction Management & Entrepreneurship	3	1	-	60	3	20	20	20	40	14	100	35
3	18C 503C	Water Supply and Sanitary Engineering	3	1	-	60	3	20	20	20	40	14	100	35
4	18C-504E	**Elective-1** Ground Improvement Techniques Steel structures Integrated Waste Management	3	1	-	60	3	20	20	20	40	14	100	35
5	18C-505E	**Elective-2** Soil Mechanics Theory of Structure Air Pollution Management	3	1	-	60	3	20	20	20	40	14	100	35
6	18C-506P	Structural Engineering Drawing	1	0	2	45	1.5	20	20	20	40	20	100	50
7	18C-507P	Construction Technology Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
8	18C-508P	Civil Engineering Computer Applications Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
9	18C-509P	Programming in C Lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
10	18C-510P	Project Work	-	-	3	45	1.5	-	-	-	-	-	100	50
		Skill Upgradation	0	0	7	105	2.5	0	0	Rubrics		--	-	0
			19	5	18	630	25	200	200	200	400	170	1000	425

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Reinforced Concrete Structures**	Course Code :	**18C-501C**
Semester:	**V Semester**	Course Group :	**Core**
Teaching Scheme in Periods(L:T:P):	**45:15:0**	Credits :	**3**
Methodology :	**Lecture+Assignments**	Total Contact Periods :	**60 Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

This course is common for DAA

Pre requisites

This course requires the knowledge of Building materials and Construction practice, Engineering Mechanics and Strength of Materials

Course Outcomes

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

CO1	Illustrate the basic concepts of RCC design by limit state, identify grades of concrete and steel and calculate the loads acting on the structure
CO2	Analyse and Design a rectangular beam
CO3	Design a slab considering boundary conditions
CO4	Calculate strength of a flanged section as per code
CO5	Calculate the design moments and forces in continuous beams and slabs as per codal provisions and show the reinforcement details as per SP-34
CO6	Design a short column and footing according to codal provisions

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 R.C.C and Philosophy of Limit State design	08	Q4	Q1		Q9(a)	Q13(a)
2	Analysis and Design of Rectangular Beams	12					
3	Design of Slabs	12		Q2		Q10(a)	Q14(a)
4	Analysis of T-beams	8					
5	Principles of design of Continuous beams, Slabs and stairs	8		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Design of columns and footings	12			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	60	8			8	8

Course Contents

UNIT 1: Introduction to R.C.C and Philosophy of Limit State design

Duration: 08Periods(L: 6– T:2).

a) Introduction to R.C.C

b) Codes of practice of R.C.C design

c) Nominal Mix – Design Mix – differences.

d) Loads to be adopted in R.C.C. design.

e) Properties of Concrete

f) Methods of designing R.CElements

g) Strength and serviceability limit states, characteristic strength of materials and characteristic loads and partial safety factors.

h) Design strength of materials and design loads.

i) Assumptions made in the limit state design.

j) Stress-strain diagram of singly reinforced RCC beam.

UNIT 2: Analysis and design of Rectangular beams Duration: 12 Periods(L:9 – T:3)

a) Depth of neutral axis, lever arm.

b) Moment of resistance of singly reinforced rectangular section

c) Critical percentage of steel.

d) Calculation of moment of resistance of the given section and design of singly reinforced rectangular beam for the given load as per IS 456-2000.

e) Doubly reinforced sections - necessity, use.

f) Calculation of neutral axis and moment of resistance for the given section and grades of concrete and steel.

g) Shear in singly reinforced beams

h) Methods of providing shear reinforcement-vertical stirrups, combination of vertical stirrups and bent up bars.

i) Code provisions for spacing of stirrups and minimum shear reinforcement (no derivation of equations).

j) Development of bond stress in reinforcing bars.

k) Design bond stress - development length – bond and anchorage concepts and their importance.

l) Curtailment of tension reinforcement-codal provisions.

m) Simple problems on development length.

n) Design of simply supported singly reinforced rectangular beam for flexure including shear and check for deflection using stiffness criteria - Use of design aids (SP-16).

UNIT 3: Design of slabs **Duration: 12 Periods(L:9.0 – T:3.0)**

a) Slabs as structural and functional members

b) One way and two way slabs

c) Minimum reinforcement and maximum spacing of reinforcement – concrete cover - stiffness criterion- stiffness ratios for simply supported, cantilever and continuous slabs.

d) One way and two way slabs with various end conditions as per I.S:456 code.

e) Design of one-way slab for flexure and shear for the given grades of concrete, steel, span and loading.

f) Check for deflection using simplified approach of stiffness criteria.

g) Design of two-way slabs with different end conditions,

h) Design of torsion reinforcement for the restrained slabs – Deflection check using stiffness criteria - Use of design aids (SP-16).

UNIT 4: Analysis of T-beams **Duration: 08 Periods(L:6.0 – T:2.0)**

a) Conditions needed for design of a beam as T-Section–advantages, Code provisions for effective flange width - three cases of T beams.

b) Neutral axis, lever arm and moment of resistance for under reinforced, balanced sections using the equations given in the code (no derivations).

c) Calculation of the moment of resistance of T- section using the equations given in the code – Use of design aids(SP16).

UNIT 5:Principles of design of Continuous beams, Slabs and stairs

Duration: 08Periods(L:6.0– T:2.0)

a) Behavior of continuous members and advantages of continuous beams and slabs.

b) Determination of B.M and S.F of continuous beams and slabs of minimum three spans using BM & SF coefficients given in the code-Use of design aids(SP-16).

c) Detailing of reinforcement in a continuous beam of three spans.

d) Classify the stairs based on the structural behavior or support condition.

e) Detailing of reinforcement in stairs spanning longitudinally.

UNIT 6: Design of columns and footings **Duration: 12Periods(L:9.0 – T:3.0)**

a) Definition of column – Difference between Column and Pedestal.

b) Types of columns (Long and Short) - effective length for different end conditions.

c) Code provisions for design of columns- square, rectangular and circular columns with lateral ties and helical reinforcement

d) Determination of Load carrying capacity of short column- square, rectangular, circular, helically reinforced column subjected to axial load only.

e) Design of short square, rectangular columns

f) Design of circular columns using helical reinforcement and lateral ties

g) Footings - Need for footings

h) Footings under isolated columns – loads on footings

i) Code provisions for design of footings - size of footings for given bearing capacity

j) Procedure of checking the footing for one-way shear, two-way shear, bearing stress and for development length.

k) Design of an isolated square footing of uniform thickness under a square/rectangular/circular column for flexure only.

Recommended Books

1. I.S:456- 2000
2. I.S:875-1987
3. "Concrete Technology" by A.R.Santhakumar, Oxford university press
4. "Properties of Concrete" by A.M. Neville, Pearson Education
5. "CONCRETE TECHNOLOGY Theory and practice" by M.S Shetty S. Chand & Co. Ltd., New Delhi
6. "Reinforced Concrete Design" by S Unnikrishna Pillai& Devdas Menon Tata McGraw-Hill Publishing Co. Ltd. New Delhi
7. "REINFORCED CONCRETE Mechanics and Design" by James G. MacGregor and James K. Wight, Pearson Prentice hall
8. "Design of Concrete Structures" by Arthur H. Nilson, David Brown and Charles W. Dolan, Tata McGraw-Hill Publishing Co. Ltd. New Delhi
9. "Limit State Design of Reinforced Concrete" by P.C. Varghese Prentice-Hall of India Pvt. Ltd. New Delhi
10. Limit State Design of R.C.C Structures by Ashok K. Jain Nemchand brothers, Roorkee.
11. Structural Engineering(RCC) by Ramamrutham.
12. Structural Engineering (RCC) by Vazirani and Ratwani.
13. Reinforced Concrete Structures by I.C.Syal and A.K.Goyal
14. Structural Design & Drawing by N. Krishna Raju, Universities press

15. Reinforced Concrete Design by S.N. Sinha-Tata McGraw-Hill Publishing Co. Ltd. New Delhi
16. SP:34 - Handbook on concrete reinforcement and detailing

Suggested E-learning references

1. http://nptel.ac.in
2. https://www.youtube.com/watch?v=Grv09rIAPQM
3. https://freevideolectures.com/Course/2686/Design-of-Reinforced-Concrete-Structures

Suggested Learning Outcomes

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

1.1 Differentiate Plain Cement Concrete and Reinforced Cement Concrete.
1.2 State the necessity of reinforcement in plain concrete
1.3 State the advantages and disadvantages of R.C.C.
1.4 Identify the material used in R.C.C. and their function in R.C.C.
1.5 State the different codes used in design of R.C.elements
1.6 List the Loads to be considered in the design of R.C. elements.
1.7 State the different methods of designing R.C. elements.
1.8 State the different grades of concrete
1.9 Differentiate the nominal mix concrete and design mix concrete.
1.10 State the equations of tensile strength and modulus of elasticity of concrete as per IS 456 – 2000.
1.11 Calculate the properties of concrete: Poisson's ratio, creep, shrinkage, workability and unit weight, Compressive Strength/Grade of Concrete, Tensile Strength
1.12 State the different types of steel as per IS 456 – 2000.
1.13 State the modulus of elasticity and unit weight of steel.
1.14 Define Limit State and State different limit states.
1.15 Distinguish 'strength' and 'serviceability' limit states
1.16 State the different IS: 456 – 2000 code provisions for Limit state method of design.
1.17 Define the 'characteristic strength' of materials and 'characteristic loads'
1.18 Explain the role of partial safety factors in limit state design.
1.19 Define 'Design strength of materials' and 'Design loads'
1.20 State the assumptions made in the limit state design.
1.21 Draw the Stress and strain diagrams for a singly reinforced rectangular beam indicating appropriate stress and strain values in compression zone and tension zone of the beam.

1.22 Calculate the depth of rectangular and parabolic stress blocks.

2.1 Calculate the total compressive force and total tensile force resisted by the singly reinforced rectangular beam.

2.2 Calculate the depth of neutral axis from the equilibrium condition

2.3 Define lever arm and write the equation for lever arm for a singly reinforced rectangular beam.

2.4 Define critical or balanced section, under reinforced section and over reinforced section.

2.5 Explain - why the over reinforced sections are not recommended?

2.6 Calculate the maximum depth of neutral axis, limiting value of moment of resistance with respect to concrete and steel and limiting percentage of steel.

2.7 State the general design requirements for beams in limit state design as per IS 456 – 2000(Effective span, limiting stiffness, minimum tension reinforcement, maximum tension reinforcement, maximum compression reinforcement, spacing of main bars, Cover to reinforcement, side face reinforcement.)

2.8 Calculate the depth of neutral axis for a given section and decides the section is balanced or under reinforced or over reinforced and accordingly calculates the moment of resistance for the respective case.

2.9 Calculate the area of steel for a given beam with given cross section and loading.

2.10 Explain the effect of shear on beam.

2.11 Explain the shear stress distribution across a homogeneous section and reinforced concrete section with sketches.

2.12 Calculate the design shear strength and maximum shear stress in different grades of concrete as per IS 456 – 2000.

2.13 State the necessity of shear reinforcement and different forms of shear reinforcement provided in beams

2.14 Show the critical section for shear.

2.15 Calculate the shear strength of concrete, shear resistance of vertical stirrups, shear resistance of bent up bars as per IS 456 – 2000.

2.16 Calculate the minimum shear reinforcement and maximum spacing of shear reinforcement as per IS 456 – 2000.

2.17 Calculate the nominal shear stress, shear resisted by bent up bars and spacing of vertical stirrups.

2.18 Design the shear reinforcement for beams.

2.19 State the situations which require doubly reinforced beams.

2.20 Determine the moment of resistance for a given doubly reinforced section (given d'/d – f_{sc} values)

2.21 Calculate the allowable working load on singly reinforced and doubly reinforced beam for the given span.

2.22 Calculate the development length of bars in compression and tension.

2.23 Sketch the detailing of reinforcement as per SP-34 showing the curtailment position for main tension bars. State the importance of anchorage values of reinforcement.

2.24 Design a singly reinforced simply supported rectangular beam for the given grades of materials, span and loadingfor flexure including shear design with the curtailment of reinforcements and check for the deflection using simplified approach of the code.

3.1 Distinguish oneway slabs and twoway slabs.

3.2 List the types of slabs based on support condition.

3.3 State the general design requirements of slabs as per IS 456 – 2000.

3.4 State the functions of distribution steel in slabs.

3.5 Sketch the general reinforcement details for a a) oneway slab simply supported on two parallel sides b) oneway slab simply supported on four sides c) two way simply supported slab d) one-way continuous slab e) cantilever slab continuous over a support and f) slab cantilevering from the top of a beam.

3.6 Mark the edge strip and middle strip of a twoway slab.

3.7 Sketch the general reinforcement details for a continuous two way slab for its edge strip and middle strip using straight bars and bent up bars.

3.8 Design one-way slab for given grades of materials, loads and span for flexure and including shear check, check for deflection using stiffness criteria.

3.9 Sketchload distribution in two-way slabs. Design two-way slab with different end conditions for flexure including shear using B.M and S.F coefficients. Provide torsional reinforcement in the restrained slabs. Check the deflection using simplified approach of stiffness criteria.

4.1 Distinguish a T- beam and L- beam.

4.2 List the advantages of a T- beam.

4.3 State the formula for effective width of flange of a T- beam and L- beam as per IS 456 – 2000.

4.4 Calculate the effective width of flange of an isolated T- beam as per IS 456 – 2000.

4.5 Describe the three cases of determining neutral axis of T-beams with sketches and notations.

4.6 Calculate the depth of neutral axis and moment of resistance of the given T section using the expressions given in the code.

4.7 Calculate the minimum and maximum reinforcement in T- beams as per 456 – 2000.

5.1 Explain the behavior of continuous slabs and beams subjected to loading.

5.2 List the advantages of continuous beams or slabs.

5.3 Draw the line diagram of a continuous slab or beam and indicate the bending moment and shear force values at salient points as per IS 456 – 2000.

5.4 Show the position of sagging (+ve) and hogging (-ve) bending moments along the continuous beam or slab.

5.5 Sketch the general reinforcement details for a continuous beam or slab.

5.6 Calculates the B.M and S.F of continuous beams and slabs (Minimum of three spans) at critical sections using B.M and S.F coefficients given in the code.

5.7 Classify the stairs based on the structural behavior or support condition.

5.8 Sketch the detailing of reinforcement in stairs spanning longitudinally (Dog legged staircase).

6.1 Define a column/ compression member

6.2 Differentiate column, strut, pedestal, post

6.3 State the necessity of providing reinforcement in column.

6.4 Explain the behavior of column under loading

6.5 Define and calculate the effective length of column for different end conditions as per theory and as per code.

6.6 Classify the columns based on type of reinforcement, loading and slenderness ratio.

6.7 Calculate the slenderness limits for column to avoid buckling of column.

6.8 Calculate minimum eccentricity of column.

6.9 Calculate the load carrying capacity of a short column with lateral ties and with helical reinforcement as per IS 456 – 2000.

6.10 Differentiate between short and long columns and understand their failure behavior.

6.11 State the design requirements of columns as per IS 456 – 2000.

6.12 Designs a Short Square, rectangular, circular column with lateral ties and helical reinforcement (subjected to axial load only).

6.13 Define Footing and States different types of Footings (Square/ Rectangular Isolated footings of Uniform/Tapered sections).

6.14 Calculate the minimum depth of foundation using Rankine’s formula.

6.15 State the code provisions for the design of R.C.C footings.

6.16 Explain the procedure of checking the footing for one-way shear, two-way shear, bearing stress and for development length.

6.17 Design of an isolated square footing of uniform thickness under a rectangular/square/circular column for flexure only.

Note: Students may be encouraged to use design aids SP-16, SP-34 and SP-23 for design of slabs, beams for general practice. I.S.456 – 2000 is allowed in the Examination

Suggested Student Activities

1. Visit to nearby multi-storeyed building/Apartment and collect the structural details.
2. Design the structural elements-Beams, slabs and columns for residential building (One and Two storey building).
3. Prepare a case study of failure of structures due to wrong design, use of poor quality of materials and faulty construction methods.
4. Understand the concept of formwork for different types of buildings and collect information about stripping times for forms for different conditions.
5. Collect the IS codes related to Design of RCC structures, make a report and present it
6. Tech fest/Srujana
7. Paper/Poster presentation
8. Quiz
9. Group discussion
10. Surprise Test

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	1	3	3	2			1			2	1,2,4,7,10
CO2	2	2			2		1		3	3	1,2,5,7,9,10
CO3	1	3			2		1		2	2	1,2,5,7,9,10
CO4		3					1			2	2,7,10
CO5		3		2			1			3	2,4,7,10
CO6	1	3		2	3		1		3	3	1,2,4,5,7,9,10

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
Assignments		5
Seminars		5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

<table>
<tr><td rowspan="2">Unit No</td><td colspan="3">Questions to be set for SEE</td></tr>
<tr><td colspan="2">R</td><td>U</td><td>A</td></tr>
<tr><td>I</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>II</td></tr>
<tr><td>III</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td></tr>
<tr><td>V</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>VI</td><td>Q7,Q8</td><td>Q10(b),
Q12(a), Q12(b)</td><td>Q14(b),
Q16(a), Q16(b)</td></tr>
<tr><td>Total Questions</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
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State Board of Technical Education and Training,Telangana
Model Question paper
DCE V semester Mid Semester-I Examination

Course Code:18C-501C **Duration:1 Hour**
Course Name: Reinforced Concrete Structures **Max.Marks:20 Marks**

PART-A

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

1. Define design strength of material and deign load.
2. Find modulus of elasticity of concrete as per IS 456-2000 for M30 concrete.
3. List various forms of shear reinforcement in beams.
4. Define development length.

PART-B

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

5(a) Explain how the maximum strength of concrete in outermost fibre of compression istaken as $0.446f_{ck.}$

(OR)

5(b) Explain limit state of collapse and serviceability conditions.

6(a)Find the limiting moment of resistance of a singly reinforced beam of size 200 x400mm, use M20 grade concrete and Fe415 steel, effective cover toreinforcement is 25mm.

(OR)

6(b)Calculate the spacing of two legged 8mm stirrups as per min. shear reinforcement for a beam 350mm wide and 500mm overall depth of Fe415 steel.

PART-C

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

7(a) Explain the stress bock diagram for RC beam indicating values.

(OR)

7(b) Draw the stress- strain diagram for concrete,mild steel bars and cold deformed bars.

8(a) A Singly reinforced RC beam simply supported over an effective span of 4m, carries a udl of 10kN/m over entire span. Design the beam using M20 grade concrete and Fe415 steel.

(OR)

8(b)Singly reinforced rectangular beam 300 X 600 mm effective depth carries a uniformly distributed load of 40kN/m including its self-weight over simply supported span of 6 mand is reinforced with 6 bars of 20 mm diameter of which 2 bars are curtailed near thesupport. Design the shear reinforcement. Use M20 grade concrete and Fe415 steel.

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

Course Code:18C-501C **Duration:1 Hour**
Course Name: Reinforced Concrete Structures **Max.Marks:20 Marks**

PART-A

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

1) Distinguish between one way and two way slabs.
2) Write the codal provisions for maximum spacing of bars in slabs.
3) List any two advantages of T beams.
4) State the conditions needed to design a beam as a T-Beam.

PART-B

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

5(a) How do you check for shear and deflection in design of slabs?

(OR)

5(b) Draw the cross section of a cantilever slab (sunshade) and show the reinforcement details.

6(a) What are the advantages of T-beams? Give the equations for the effective flangewidth of isolated T and L beams.

(OR)

6(b)Find effective flange width of a T beam with the following details. Effective span =5.5m, centre to centre distance of adjacent panels = 4m, Breadth of web = 300mm,thickness of slab = 120mm.

PART-C

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

7(a) Design a simply supported RCC slab for a verandah of clear dimensions 3 X 9 m. widthofsupports is 230mm. Superimposed load is 3 kN/Sq.m and weight of finishes is 1.0kN/Sq.m. Use M 25 concrete and HYSD bars of Fe 415 grade.

(OR)

7(b)Design a simply supported RC slab for a room of clear size 4 X 3.5 m. Superimposed load is 2kN/Sq.m and weight of finishes is 1.0 kN/Sq.m. The corners of slab are notheld down. Width of supports is 230mm. Use M25 grade concrete and Fe 415 steel.

8(a) A T beam of effective flange width 750 mm, thickness of slab 120mm, width of rib250mm, and effective depth 450mm is reinforced with 3500 Sq.mm of tension steel. Calculate the moment of resistance of the section. M20 grade concrete are Fe415 bars are used.

(OR)

8(b)A T beam of effective flange width 800 mm, thickness of slab 90 mm, width of rib230mm, and effective depth 400mm is reinforced with 5 numbers of 20mm diameterbars. Calculate the moment of resistance of the section. M20 grade concrete are Fe250bars are used.

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

Course Code: 18C-501C **Duration:2 Hours**
Course Name: Reinforced Concrete Structures **Max.Marks:40 Marks**

PART-A

Answer **all** questions. Each question carries **one** mark. **8 x 1= 8 Marks**

1) Define characteristic compressive strength of concrete.
2) Write the code provisions for maximum spacing of bars in slabs.
3) How do you calculate minimum eccentricity in design of columns?
4) Define development length.
5) State the formula to calculate effective span in case of a continuous beam.
6) State the advantages of a continuous beam.
7) What are the specifications for lateral ties in a column?
8) State the formula for calculating minimum depth of foundation using Rankine's formula

PART – B

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

9(a) Calculate the limiting percentage of tension reinforcement if M20 concrete and Fe 415 steel are used.

(OR)

9(b) Draw the line diagram of a continuous beam and indicate salient points with bending moment equations as per code at those locations.

10(a) Draw the cross section and stress diagrams for three cases of a T beam.

(OR)

10(b) List any six codal provisions for longitudinal reinforcement in design of columns.

11(a) Find effective flange width of a T beam with the following details. Effective span = 5.5m,centre to centre distance of adjacent panels = 4m, Breadth of web = 300mm, thickness ofslab = 120mm.

(OR)

11(b) A continuous RCC rectangular beam of size 250 X 500mm overall is supported on300 X 300mm masonry columns at clear intervals of 3 m. Calculate the effective spans.

12(a) A short axially loaded column of size 300 X 350 mm is reinforced with 8 bars of 20mm diameter Fe 415 grade steel. Concrete is M 30 grade. Calculate the load carrying capacityof column.

(OR)

12(b) List and explain the steps for design of isolated square footing.

PART – C

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

13 (a) A singly reinforced rectangular section of size 230 X 450mm effective is reinforced with4 numbers of 16mm diameter bars in tension. Factored shear force at the section is 120 kN.State whether shear reinforcement is required or not. Concrete is M20 grade.

(OR)

13 (b) Calculate the maximum bending moment at support next to end support for a continuousbeam as per IS 456-2000. Size of beam is 300X500mm overall, effective span = 4m, imposedload (not fixed) = 10kN/m, , imposed load (fixed) = 15kN/m excluding self weight, effective cover = 40mm.

14 (a) A T beam of effective flange width 800 mm, thickness of slab 90 mm, width of rib 230mm andeffective depth 400mm is reinforced with 5 numbers of 20mm diameter bars. Calculate the moment of resistance of the section. M20 grade concrete are Fe250 bars are used.

(OR)

14 (b) Design a short Reinforced Concrete rectangular column with one side as 300mm to carry an axial load of 2000 kN. Use M25 concrete and Fe 415 steel.

15 (a) Draw the detailing of reinforcement for a continuous slab with cranking of main bars.

(OR)

15 (b) Calculate the maximum shear force at end support for a continuous beam as per IS 456-2000.Size of beam is 300X600mm overall, effective span = 4m, imposed load (not fixed) = 10kN/m,imposed load (fixed) = 12kN/m excluding self weight, effective cover = 40mm.

16 (a) Design a circular column of diameter 400 mm with lateral ties. Unsupported length ofcolumnis 3m, and is subjected to a working load if 1200 kN. The column is effectively held inpositionat both ends but not restrained against rotation Use M25 concrete and Fe 415 steel.

(OR)

16 (b) A RC Column of size 300mm X 300mm carries a load of 750 kN. The safe bearing capacity of soil is 200 kN/$m^{2.}$ Design an isolated square column footing of uniform thickness. Use M25 grade concrete and Fe 415 grade steel. Check forshear, development length and bearing pressure are not required.

Department of Technical Education
State Board of Technical Education &Training (TS)

Course Title:	**Construction Management and Enterprenureship**	Course Code :	**18C-502C**
Semester:	**V Semester**	Course Group :	**Core**
Teaching Scheme in Periods(L:T:P):	**45:15:0**	Credits :	**3**
Methodology :	**Lecture+Assignments**	Total Contact Periods :	**60 Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This course requires the knowledge of Building materials and construction practice and Quantity surveying

Course Outcomes

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

CO1	Realize the purpose of Management in construction organization and relate the Organization structure of any engineering department/public sector, duties of different officers
CO2	Adapt scheduling technique for construction project for effective utilisation of resources
CO3	Acquire Knowledge about the Contracts, Tenders and able to select the suitable Contractor from a tender
CO4	Management of Resources in Construction Industry
CO5	Develop insight to discover and create entrepreneurial opportunities and the expertise to successfully launch, manage, and grow their own venture.
CO6	Manage the Human relations, interpersonal relationship for effective work culture and performance in organization,

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 and Organizational Aspects	10	Q4	Q1		Q9(a)	Q13(a)
2	Management Tools	10					
3	Contracts, Tenders& Arbitration	10		Q2		Q10(a)	Q14(a)
4	Management of Resources in construction industry	10					
5	Stores and Financial Management	10		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Entrepreneurship and Professional Ethics	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	60	8			8	8

Course Contents

UNIT-1:Introduction and Organizational Aspects Duration: 10Periods(L: 7.5 – T:2.5)

a) Stages of construction project, Importance of construction and construction industry, Indian construction industry need of construction management, Definition and concept of management.

b) Organizational structure of a state government engineering department. – duties of various officers – Preliminary estimates – detailed estimate – budget provision – administrative approval and technical sanction – powers of sanction.

c) Public sector organizations: Organizational structure of a construction company – Duties of Chief Engineer.

UNIT- 2: Management Tools Duration:10Periods(L: 7.5 – T:2.5)

a) Different Management Tools – Gantt Bar chart, modified Gantt bar chart – Limitations of bar charts – Introduction to CPM and PERT – advantages of CPM and PERT – terms used in CPM – formation of network – Basic rules – Problems on determination of critical path – limitations of CPM – comparison of CPM and PERT.

UNIT- 3:Contracts, Tenders and Arbitration Duration: 10 Periods(L: 7.5 – T:2.5)

a) Contracts – Legality of contracts – contract document – types of contracts – piece work contracts – item rate contracts – Lump sum contracts – percentage contracts – negotiated rates – departmental execution of works – merits and limitations of each contract system – conditions of contract for civil engineering works.

b) Tenders – Necessity of tenders – Sealed tenders – tender notice – tender documents – Earnest Money and Security Deposits – Opening of tenders – comparative statement – acceptance of tenders – work order – contract agreement – Measurement book-rules for recording measurements-pre measurement and check measurement-preparation of bills-modes of payment-hand receipts-recoveries to be made from bills.

c) Arbitration-Need for arbitration

UNIT- 4:Management of Resources in construction industry Duration:10Periods(L: 7.5 – T:2.5)

a) Plant and Equipment – Need for mechanization – Optimum utilization of plant and equipment – Preventive maintenance –Overhauling and replacement

b) Accidents in Construction industry- Causes and effects of accidents- preventive measures- Personal protective equipments(PPE)

c) MIS-Management information system-Design of MIS-Role of MIS-Human Resources accountancy-advantages-Social Audit

UNIT- 5:Stores and Financial Management Duration:10 Periods(L: 7.5 – T:2.5)

a) Stores: Classification of stores-general stock items, consumables and non-consumables-receipts-issues-transfer order entry-MAS account-indent-invoice-stock register-verification of stores-accounting for shortages and surplus-write off

b) Financial Management-Finance as resource-purpose of cost control-stages of cost control-pre contract stage and post contract stage-financial control at head office level and site level

UNIT - 6:Entrepreneurship and Professional Ethics Duration: 10Periods(L: 7.5 – T:2.5)

a) Entrepreneur – concept, definition, role, expectation – characteristics of entrepreneur – risks and rewards of an entrepreneur-government policies introduced to finance entrepreneur

b) Human relations and performance in organization – Understand self and others for effective behaviour – Interpersonal relationship for effective work culture – Need for professional ethics.

Reference Books

1) Management in construction Industry – P.Dharwadker. Oxford & IBH Publishing Co. Pvt., Ltd.,
2) Construction Management And Accounts –V.N.Vazirani &S.P.Chandola. Khanna Publishers.
3) Construction Planning and Management. U.K. Shrivastava Galgotia Publications Pvt. Ltd., New Delhi.
4) Construction Management and Planning - B. Sengupta& H. Guna Tata Mc. Graw Hill Publishing Company Ltd.
5) Construction Management and Accounts. Harpal Singh. Tata Mc. Graw Hill Publishing Company Ltd.
6) Construction project management: Theory and Practice, 2nd edition, 2016, Kumar NirajJha, Pearson Education Publishers.
7) Project management for engineering and Construction, By Garold D Oberlender, 2nd edition McGraw Hill Education (India), Pvt. Ltd.

Suggested E-learning references

1. http://nptel.ac.in

Suggested Learning Outcomes

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

1.1. Describe a Construction Project.

1.2. List the phases of Construction Project.

1.3. State the importance of Construction and Construction Industry

1.4. Define Management.

1.5. State the functions of Management.

1.4 Give the organizational structure of any Engineering department (Government).

1.5 List the duties of different officers of an Engineering department.

1.6 Define preliminary estimate, detailed estimate, administrative approval and technical sanction.

1.7 State the limit of powers of sanction by various officers in an Engineering Department (Government).

1.8 Give the Organizational structure of a public sector construction company.

1.9 List the duties of Chief Engineer in a construction company.

2.1 Define CPM and PERT.

2.2 State the advantages of CPM and PERT.

2.3 Explain the use of bar chart and its limitations

2.4 Define: Network, activity, event, duration, dummy activity, EST, EFT, LST, LFT, total float, free float, critical path.

2.5 Prepare network diagram using basic rules of network formation.

2.6 Calculate time on CPM network identifying critical activities, critical path, free float and total float.

2.7 State the limitations of CPM.

2.8 Distinguish between CPM and PERT.

2.9 List the software tools available in project management

3.1 Define contract

3.2 State the contents of a contract document.

3.3 Explain different contract systems available for construction works.

3.4 List the merits and limitations of each of the contract systems.

3.5 List the general conditions of contract for a civil engineering project.

3.6 Define tender and explain the need for calling of tenders.

3.7 List the steps involved in fixing up agency through tender system.

3.8 Draft a tender notice for a work

3.9 Prepare tender documents.

3.10 Explain the need of earnest money deposit and security deposit.

3.11 Prepare a comparative statement.

3.12 Explain the method of selecting a contractor from the tenders.

3.13 List out the conditions of contract agreements.

3.14 State the importance of measurement book and rules to be followed

3.15 State the need for pre measurement and check measurement

3.16 Identify the types of payments and bills/payments to the contractor

3.17 List the recoveries to be made from the bills

3.18 Arbitration and need for Arbitration

4.1 Explain the scope of materials management

4.2 Explain the need for mechanization.

4.3 Explain the need for optimum utilization of plant and equipment.

4.4 Explain about the preventive maintenance of plant and equipment.

4.5 Explain causes and effects of accidents in construction industry and preventive measures.

4.6 Explain about Management information system(MIS)

4.7 State the factors involved in design of MIS

4.8 Explain the role of MIS

4.9 Explain the importance of Human Resources accountancy and its advantages

4.10 Explain the importance of Social Audit

5.1 Identify the different types of stores materials

5.2 State the classification of items held in general stock

5.3 Explain Transfer entry order

5.4 State the need for materials at site account.

5.5 Explain the terms indent and invoice.

5.6 Explain the importance of periodical inspection of stores.

5.7 Explain the method of accounting for shortages and surplus in stores

5.8 Explain the procedure for write off of equipment

5.9 State the importance of finance as a resource.

5.10 State the purpose of cost control.

5.11 Explain the different stages at which cost control can be achieved.

5.12 Explain the financial control at head office level and site level.

6.1 Define the words entrepreneur and entrepreneurship.

6.2 Outline the concepts of entrepreneurship.

6.3 State the role of entrepreneur in economic development.

6.4 List the characteristics of an entrepreneur.

6.5 Evaluate the risks and rewards of an entrepreneur.

6.6 List Government policies introduced to motivate entrepreneurship or to provide financial help

6.7 State the role of Human relations and performance in organization.

6.8 State the role of Interpersonal relationship for effective work culture.

Suggested Student Activities

1. Visit any construction contracting firm and interact about the present tendering process (e-tendering) and awarding of contract
2. Visit any nearby construction site & interact with the construction team regarding type of structure & its organization structure
3. Collection of tender notices published in newspapers for various items of civil engineering works (at least 5) write salient features of them.
4. Prepare a planning schedule for the nearby ongoing construction activity with the help of available open source project management software.
5. Visit any nearby PWD/ R & B/ Irrigation dept. office or any construction company, collect thedocuments (BOQ, M B, Tender, SR, lead statement) related to the project and prepare reporton it and also organizational setup at divisional office
6. Collect quality management standards pertaining to ISO 9001, ISO 14001 & OHSAS 18001 & prepare a report.
7. Drafting a tender notice for construction of a civil engineering work (W. B. M. Road, residential is building).
8. Preparation of tender document for the building. (detailed estimate prepared for R.C.C. building in estimating and costing shall be used)
9. Collection of various account forms from PWD & Prepare a report on it.
10. Prepare detailed specifications for the following: a) Building construction system. b) Irrigationengineering system. C) Transportation engineering system. D) Environment engineeringsystem.
11. Study the application of CPM & PERT technique in planning software.
12. Prepare a report on women entrepreneurship, rural entrepreneurship, Agri-entrepreneurship.
13. Collect the various entrepreneurship development programs.
14. Collect the details required for getting a contract license from corporation and prepare a reporton it.

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1		2	2		1		2	1	1	2	2,3,5,7,8,9,10
CO2		2	2	2	1			2			2,3,4
CO3		1		2	1		1			1	2,3,4,5,7,10
CO4		2						2			2,8
CO5		3			2		3	3	2	3	1,5,7,8,9,10
CO6					3		3	3	3	3	5,7,8,9,10

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
Assignments		5
Seminars		5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

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

Course Code:18C-502C **Duration:1 hour**
Course Name: Construction Management & Entrepreneurship **Max.Marks:20**

PART-A

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

1) List the phases of construction project
2) Define Management
3) Define (i) Event (ii) Activity
4) State any two limitations of CPM

PART-B

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

5(A) State the need of construction management

(OR)

5(B) Write in brief about Preliminary estimates and detailed estimates

6(A) Write a short note on Bar chart and its limitations

(OR)

6(B)Define i) Critical Path ii) EFT iii) LFT

PART-C

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

7(A) Give the Organizational structure of a public sector construction company

(OR)

7(B) List the duties of Deputy executive engineer

8(A) Distinguish between CPM and PERT

(OR)

8(B) A project has eleven activities , the expected time of each activity is given below

Activity	1-2	2-3	2-4	2-5	3-6	5-6	5-7	4-7	6-8	7-8	8-9
Duration	4	3	5	6	4	7	8	8	5	7	9

Draw the project network and identify the critical path, tabulate the values of EST,LST,EFT,LFT and Float

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

Course Code:18C-502C **Duration:1 hour**
Course Name: Construction Management & Entrepreneurship **Max.Marks:20**

PART-A

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

1) Define Contract

2) What do you mean by sealed tender and when is it preferred

3) What is social audit

4) State the need for mechanization

PART-B

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

5(A) Write short notes on arbitration and need for it

(OR)

5(B) Write briefly about check measurement

6(A) Outline five points stating the need for optimum utilization of plant and equipment

(OR)

6(B) What are the salient features of MIS?

PART-C

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

7(A) Explain the method of selecting a contractor from the tenders

(OR)

7(B) Write any five rules while recording measurements in measurement books

8(A) Explain about preventive maintenance of plant and equipment

(OR)

8(B) Explain the role of MIS in human resource accountancy

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

Course Code:18C-502C **Duration:2 hours**
Course Name: Construction Management & Entrepreneurship **Max.Marks:40**

PART-A

Answer **all** questions. Each question carries **one** mark **8x1 = 08 Marks**

1) Define construction management
2) What do you mean by contract document and arbitration
3) State the necessity of Tender
4) What do you understand by Activity and EST
5) What is bin card and details to be entered in bin cards
6) Define indent and invoice
7) What are Ethics
8) Define Enterpreneur

PART-B

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

9(a) Draw the Organizational structure of any government engineering department

(OR)

9(b) Give the classification of stores

10(a) What is tender, sealed tender and list any three tender documents to be submitted

(OR)

10(b) State the need for professional Ethics

11(a) Write briefly about Transfer order entry in stores

(OR)

11(b) What is the purpose of cost control in financial management

12(a) Brief entrepreneurship and expectations of entrepreneurship

(OR)

12(b) Illustrate the ethical principles to be followed by an organization

PART-C

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

13(a) A project has eleven activities , the expected time of each activity is given below

Activity	1-2	2-3	2-4	2-5	3-6	5-6	5-7	4-7	6-8	7-8	8-9
Duration	4	3	5	6	4	7	8	8	5	7	9

Draw the project network and identify the critical path, tabulate the values of EST,LST,EFT,LFT and Float

(OR)

13(b) Write briefly about verification of stores

14(a)List any four contract systems and explain any two contract systems in brief

(OR)

14(b) Brief the role of entrepreneur in economic development and any five characteristics of entrepreneur

15(a) Explain about financial control at pre-contract and post contract stage

(OR)

15(b) Explain the procedure of write-off

16(a) Discuss any four risks of an entrepreneur

(OR)

16(b) Elaborate the role of financial institutions in entrepreneurial development

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Water Supply and Sanitary Engineering**	Course Code :	**18C-503C**
Semester:	**V Semester**	Course Group :	**Core**
Teaching Scheme in Periods(L:T:P):	**45:15:0**	Credits :	**3**
Methodology:	**Lecture+Assignments**	Total Contact Periods :	**60**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This subject requires the basic knowledge of the course Engineering Chemistry and Environmental Studies is needed.

Course Outcomes

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

CO1	Estimate water requirement for public water supply scheme and Illustrate the different sources and various methods of conveyance of water
CO2	Ascertain the quality of water and study the various stages of purification of water to select the appropriate treatment method.
CO3	Identify the suitable distribution system for a locality and their related appurtenances and plan the arrangement of water supply in a building.
CO4	Categorize the types of sewage, sewerage system, surface drain and estimate the quantity of sewage.
CO5	Summarize the cross section of sewers, sewer appurtenances and categorize the sewage characteristics, methods involved in sewage treatment

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>Water Supply Scheme, Quantity of water. Sources and Conveyance of Water.</td><td>08</td><td rowspan="6">Q4</td><td rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>Quality and Purification of Water</td><td>12</td></tr>
<tr><td>3</td><td>Distribution System and Water supply arrangements in buildings</td><td>12</td><td rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>4</td><td>Introduction to Wastewater Engineering and Quantity of Sewage</td><td>08</td></tr>
<tr><td>5</td><td>Sewers and Sewer appurtenances</td><td>08</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>Sewage Characteristics, and treatment</td><td>12</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>60</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT - 1: Water Supply Scheme, Quantity of Water,Sources and Conveyance of Water

Duration: 08Periods(L: 6.0 – T:2.0)

a) Need for protected water supply – objectives of a protected water supply scheme – Flow chart of a typical water supply scheme.
b) Total quantity of water for a town, per capita demand and factors affecting demand – Variation in demand– seasonal, daily and hourly variation.
c) Forecasting population by arithmetical, geometrical and incremental increase methods – Problems on above methods.
d) Surface sources – Lakes, streams, rivers and impounded reservoirs.
e) Underground sources – Springs, wells, infiltration wells and galleries.
f) Types of intakes – Reservoir, River, Canal and Lake intakes.
g) Pipe Materials available – C.I. Pipes, Concrete Pipes, G.I. Pipes and Plastic Pipes (PVC &HDPE)

UNIT - 2: Quality and Purification of Water **Duration: 12Periods(L: 9.0 – T:3.0)**

a) Impurities of water – need for laboratory tests – sampling.
b) Tests on water – physical, chemical and bacteriological tests.
c) Flow diagram of different treatment units.
d) Objectives – aeration, sedimentation, filtration and disinfection
e) Process of sedimentation with coagulation.
f) Filtration – Construction and operation of rapid sand and pressure filters.
g) Disinfection of water Methods – necessity and methods of chlorination – pre, post, super, double and break point chlorination.

NOTE: No design of treatment units

UNIT - 3: Distribution system and water supply arrangements in a Building

Duration: 12 Periods(L:9.0 – T:3.0)

a) Requirements of Distribution system –Systems of distribution – gravity system, combined system, direct pumping.
b) Methods of supply - Intermittent and continuous.
c) Types of layouts– grid, radial and ring system, their merits &demerits and their suitability.

d) Location and functioning of:
    i. Sluice valves.
    ii. Check valves or reflux valves.
    iii. Air valves.
    iv. Drain valves or blow-off valves.
    v. Scour valves.
    vi. Fire Hydrants
    vii. Water meters

f) Definition of terms: water main, service pipe, communication pipe, supply pipe, distribution pipe, back flow and air gap.

g) General layout of water supply arrangement for single and multi-storeyed buildings as per I.S Code of practice.

UNIT - 4: Introduction to Wastewater Engineering and Quantity of Sewage

Duration: 08Periods(L:6.0 – T:2.0)

a) Define the terms: Sullage, sewage, sewer, sewerage, refuse, garbage ,Strength of sewage

b) Objectives of providing sewerage works.

c) System of sewage collection and disposal –water carriage systems.

d) Types of sewerage systems and their suitability – separate, combined and partially separate systems.

e) Surface drains– requirements, shapes and their merits, demerits &construction.

f) Simple problems on design of sewers (running half full only), using Manning's and Hazen Williams formulae.

UNIT -5: Sewers and Sewer Appurtenances Duration: 08Periods(L:6.0 – T:2.0)

a) Different shapes of cross section for sewers – circular and non-circular – figures, merits and demerits.

b) List Types of sewers based on material – stoneware, cast iron, cement concrete sewers and A.C Pipes

c) Brief description, location, function and construction of
    i) Manholes
    ii) Drop manhole
    iii) Street inlets
    iv) Catch basins
    v) Flushing tanks
    vi) Regulators

vii) Inverted siphon

UNIT -6: Sewage Characteristics and treatment

Duration: 12 Periods(L:9.0 – T:3.0)

a) Strength of sewage, sampling of sewage, characteristics of sewage – physical, chemical and biological.

b) Analysis of sewage – significance of the following tests for (No test details)

(i) Solids (ii) C.O.D (iii) B.O.D

.(iv) P^{H}Value v) Chlorides

c) Preliminary treatment - Functions of following units.

i) Screens (ii) Skimming tanks (iii) Grit chambers

d) Primary treatment - Brief description of Plain sedimentation

e) Secondary treatment - Brief description of

i) Trickling filters ii) Activated sludge process

f) Miscellaneous treatments – septic tank with soak pit.

Reference Books

NOTE: No design of treatment units

1) Environmental Engineering – G.S. Birdie
2) Elements of Public Health engineering – K.N. Duggal
3) Environmental Engineering – Baljeet Kapoor
4) Public Health Engineering – S.K. Hussain
5) Water supply and sanitary Engineering – V.N. Vazirani.
6) Environmental Engineering – N.N. Basak /TMH
7) Water Supply Engineering – S.K. Garg
8) Environmental Engineering – N. Srinivasulu
9) Environmental Engineering – S.R. Laxmi Prasad

Suggested E-learning references

1. http://nptel.ac.in

Suggested Learning Outcomes

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

1.1 State the need of protected water supply.

1.2 List the objectives of a protected water supply scheme.

1.3 Draw the flow chart of a typical water supply scheme of a town.

1.4 List the factors affecting per capita demand of a town / city.

1.5 Explain the variation in demand for water supply.

1.6 Estimate the quantity of water required by a town.

1.7 State the necessity of forecasting population in the design of water supply scheme.

1.8 State different methods of forecasting population

1.9 Work out simple problems on forecasting population by different methods

1.10 State different types of surface and subsurface sources of water.

1.11 Explain with sketches:

a) Infiltration galleries.

b) Infiltration wells.

1.12 Describe with sketches the intakes for collection of water(reservoir, river, canal and lake intakes)

1.13 Lists different types of pipes used for conveyance of water.

2.1 State the different types of impurities present in water.

2.2 State the need for laboratory tests for testing water.

2.3 Explain the method of obtaining samples for testing.

2.4 List the different tests for analyzing quality of water.

2.5 Define: E-coli index, most probable number (MPN).

2.6 State the various water borne diseases in India.

2.7 State the objectives of treatment of water.

2.8 Sketch the overall layout of a water treatment plant indicating the different stages.

2.9 State the objects of aeration, plain sedimentation, sedimentation with coagulation, filtration and disinfection.

2.10 Explain the process of sedimentation with coagulation.

2.11 Describe the construction and operation of rapid sand and pressure filters.

2.12 List various methods of disinfection of water.

2.13 Explain the different forms of Chlorination (Pre, post, super, double and break-point chlorination).

*NOTE: No design of treatment units

3.1 State the requirements of good distribution system.

3.2 Explain with sketches the different systems of distribution.

3.3 Explain different methods of water supply system with their merits and demerits.

3.4 Explain with sketches the different layouts (Grid, radial and ring) in distribution system.

3.5 List the merits and demerits of layouts (Grid, radial and ring) with their suitability for a given locality.

3.6 List various appurtenances used in a distribution system of water supply system to a town.

3.7 Explain with sketches the location and functioning of various appurtenances used in a distribution system of water supply.

3.8 Define terminology used while designing and construction of water supply arrangements in buildings.

3.9 Explain the general layout of water supply connections of buildings with mains

3.10 Layout of water supply arrangement for single and multi-storeyed buildings as per I.S Code.

4.1 Define the terms: Sullage, sewage, sewer, sewerage, refuse, garbage.

4.2 List the objectives of sewerage works.

4.3 State the various methods of sewage collection works and explain about water carriage system

4.4 Explain different sewerage systems and their suitability.

4.5 Compare the three systems of sewerage.

4.6 List the requirements of good surface drains.

4.7 Describe different types of surface drains with their merits and demerits.

4.8 Work out simple problems on design of sewers running half full only.

5.1 State the various shapes of sewers.

5.2 List the circular and noncircular sewers with sketches.

5.3 List any two merits and demerits of each shape.

5.4 Mention the different materials used for sewers.

5.5 List the various sewer appurtenances on a sewer line.

5.6 Explain the construction, function and location of the different sewer appurtenances.

6.1 Define strength of sewage.

6.2 Describe the method of sampling sewage.

6.3 State the physical, chemical and biological characteristics of sewage.

6.4 Define C.O.D and B.O.D.

6.5 State the significance of the following tests to Analyse sewage.

i) Solids ii) C.O.D. iii) B.O.D. iv) P^H -Value v) Chlorides.

6.6 State the objects of sewage treatment.

6.7 Draw the conventional sewage treatment plant of a town and indicate the main function of each unit.

6.8 State the function of screens, skimming tanks and grit chambers.

6.9 Explain briefly the working of screens, grit chambers, skimming tanks.

6.10 Describe with sketch the following treatment works.

a) Trickling filters.

b) Activated sludge process.

6.11 Explain with sketch the treatment of sewage by septic tank and soak pit.

Suggested Student Activities

11. Estimate the total quantity of water required for a town/locality/Institute.
12. Visit nearby Intake works of water of your place and collect details.
13. Charts are prepared for BIS and WHO quality standards for drinking water.
14. Visit Water Treatment Plant and collect details of unit operations and processes involved in it.
15. Study the distribution system of water supply of your locality.
16. To visit a newly constructed building for plumbing works.
17. Estimate total quantities of sewage generated from a locality and design the sewage discharge. Prepare a report on effects due to untreated disposal of municipal sewage
18. Prepare a report on performance of the existing sewage treatment plant at any hospital
19. Visit Sewage Treatment Plant and collect details each unit operations for treatment of sewage and prepare the charts.
20. Prepare a mini project report for Sewerage System for a locality.
21. To conduct market survey of sanitary ware.
22. Treatment and reuse of automobile service station wastewater for vegetation
23. Impact of industrial solid wastes on soil and sub-surface water
24. Effects due to untreated disposal of municipal sewage
25. Quality study of sewage in your district
26. Soil-industrial effluent interaction and their engineering behaviour
27. Tech fest/Srujana
28. Paper/Poster presentation
29. Quiz
30. Group discussion
31. Surprise Test

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	1	3			2	2					1,2,5,6

CO2		2	1		3	2					2,3,5,6
CO3	2	3			2	3		2			1,2,5,6,8
CO4		3			3	3		2			2,5,6,8
CO5		2			3	3				2	2,5,6,10

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
Assignments		5
Seminars		5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

<table>
<tr><td rowspan="2">Unit No</td><td colspan="3">Questions to be set for SEE</td></tr>
<tr><td colspan="2">R</td><td>U</td><td>A</td></tr>
<tr><td>I</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>
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<tr><td>III</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
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<tr><td>V</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b),
Q11(a), Q11(b)</td><td>Q13(b),
Q15a), Q15(b)</td></tr>
<tr><td>VI</td><td>Q7,Q8</td><td>Q10(b),
Q12(a), Q12(b)</td><td>Q14(b),
Q16(a), Q16(b)</td></tr>
<tr><td>Total Questions</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

Model Question paper
DCE V semester
Mid Semester-I Examination

Course Code:18C-503C **Duration:1 hour**
Course Name: Water supply and Sanitary Engineering **Max.Marks:20 Marks**

PART-A

Answer **ALL** questions and each question carries **one** Mark 4 x 1 = 4 Marks

1. State any two needs of protected water supply
2. List out the variations in demand for water supply
3. Write any two objectives of treatment of water
4. Define aeration

PART-B

Answer **two** questions and each question carries **three** Marks **2 x 3 = 6 Marks**

5(a). State different types of surface and sub-surface sources of water.

(OR)

5(b). Draw a flow chart of typical water supply scheme of a town

6(a). What is the process sedimentation with coagulation? Give two examples of coagulants used.

(OR)

6 (b). State the objective of filtration and disinfection in water treatment

PART-C

Answer **two** questions and each question carries **five** Marks 2 x 5 = 10 Marks

7(a). Explain with a neat sketch canal intake.

(OR)

7(b).Estimate the population for the year 2021 from the following census data of a town by arithmetic methods.

year	1981	1991	2001	2011
population	86400	98800	115700	130500

8(a). Draw layout of water treatment plant indicating the different stages.

(OR)

8(b). Write about Pre, Post and Super Chlorination.

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

Corse Code:18C-503C **Duration:1 hour**
Course Name: Water supply and Sanitary Engineering **Max.Marks:20**

PART-A

Answer **ALL** questions and each question carries **one** Mark **4 x 1 = 4 Marks**

1. List any four appurtenances used in water supply distribution system
2. State the function of water main while making water supply arrangements in buildings
3. Mention any two shapes of surface drains.
4. Name the methods of sewage collection and disposal

PART-B

Answer **two** questions and each question carries **three** Marks **2 x 3 = 6 Marks**

5(a). State any four requirements of good distribution system.

(OR)

5(b).Write two merits and two demerits of radial layout of distribution system

6(a). Write four requirements of good surface drains.

(OR)

6(b).Define i) Sewage ii) Sewer iii) Garbage

PART-C

Answer **two** questions and each question carries **five** Marks **2 x 5 = 10 Marks**

7(a). Sketch reflux value and state the function of it.

(OR)

7(b).Draw layout of water supply arrangements for single storey building

8(a).Find the velocity flow in a sewer, which runs half full. Assume the value of coefficient of Rugosity as 0.013 and bed slope of 1 in 100

(OR)

8(b). Write about partially separate sewerage system.

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

Corse Code:18C-503C **Duration:2 hours**
Course Name: Water supply and Sanitary Engineering **Max.Marks:40**

PART-A

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

1) State any two objectives of protected water supply scheme
2) Define Communication pipe
3) What is strength of sewage
4) List any two methods of disinfection of water
5) Mention any two shapes of non-circular sewers
6) State the function of catch basins
7) What do you mean by COD in sewage analysis
8) List any two chemical characteristics of sewage

PART-B

Answer **four** questions and each question carries **three** Marks **4 x 3 = 12 Marks**

9(a) What is disinfection of water and state its necessity in water treatment.

(OR)

9(b)State the different types of materials used for sewers

10(a)Write Manning's formula for velocity and significance of terms used in it

(OR)

10(b)Brief the significance of P^H value in sewage analysis

11(a) What is the function of sewer appurtenances
i) Regulator ii) Flushing tank

(OR)

11(b) State the conditions where Circular sewer and Double egg sewer are commonly used

12(a) Write about BOD and its significance in sewage treatment

(OR)

12(b) What is activated sludge process.

PART C

Answer **four** questions and each question carries **five** Marks **4 x 5 = 20 Marks**

13 (a) Explain the working of rapid sand filter

(OR)

13 (b) Sketch a drop manhole and label the parts

14(a) Distinguish between intermittent and continuous water supply

(OR)

14(b) Write briefly about working and use of trickling filters

15(a) Explain the construction of ordinary manhole

(OR)

15 (b) Write any two merits and demerits of any two sewers based on shape

16(a) Draw a Septic tank with soak pit and label it

(OR)

16(b) Brief about any two physical and chemical characteristics of sewage. Also mention the related tests.

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Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Ground Improvement Techniques**	Course Code :	**18C-504(A)**
Semester:	**V Semester**	Course Group :	**Elective**
Teaching Scheme in Periods(L:T:P):	**45:15:0**	Credits :	**3**
Methodology :	**Lecture+Assignments**	Total Contact Periods :	**60 Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

Basic Knowledge on Soil mechanics

Course Outcomes

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

CO1	Identify difficult ground conditions in engineering practice.
CO2	Identify different ground improvement techniques.
CO3	Recommendation of Site specific method of improvement and its design.
CO4	Propose wider use of techno – economical modification techniques such as modifications by admixtures, Reinforced soil structures, Gabion walls,

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 ground modification	8	Q4	Q1		Q9(a)	Q13(a)
2	Methods of Ground modification	12					
3	Mechanical modification	10		Q2		Q10(a)	Q14(a)
4	Hydraulic modification	10					
5	Cementing and chemical modification	12		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Modification by inclusion and confinement	8			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	60	8			8	8

Course Content

UNIT — I:Introduction to Ground Modification Duration: 08Periods(L:6 – T:2)

Need and objectives of ground improvement, classification of soil types in India- unfavorable ground conditions- favorable ground conditions.

UNIT —II: Methods of Ground Modification Duration: 12Periods(L:9 – T:3)

Methods of Ground Modification: Classification of ground modification techniques -Mechanical, Hydraulic, cementing and chemical methods, Geo synthetics- different types of geo synthetics- applications of geo synthetics- suitability and feasibility.

UNIT — III: Mechanical Modification Duration: 10 Periods(L:7.5 – T:2.5)

Methods of shallow compaction -Tampers, rollers-methods of Deep Compaction Techniques- Blasting, Vibrofloatation, Dynamic compaction and Compaction piles and their suitability.

UNIT — IV: Hydraulic Modification Duration: 10 Periods(L:7.5 – T:2.5)

Methods of dewatering open sumps and ditches, Well point systems, Electro osmosis, Vacuum dewatering wells, drains –Horizontal and vertical drains- uses of drains in ground improvement

UNIT — V:Cementing and Chemical Modification Duration: 12 Periods(L:9.0 – T:3.0)

Modification by admixtures like cement, lime, fly ash, bitumen and calcium chloride- Grouting Technology-grout materials-grout characteristics-grouting techniques- applications

UNIT — VI: Modification by Inclusions and Confinement

Duration: 8 Periods(L:6 – T:2)

Modification by Inclusions and Confinement – Concept of Soil reinforcement, reinforcing materials, applications of soil reinforcement, stone columns, Concept of confinement, Gabion walls

Reference Books

1. Robert M. Koerner “Construction and Geotechnical methods in Foundation Engineering”, Mc.Graw-Hill Pub. Co., New York, 1985.
2. Manfred R. Haussmann, “Engineering principles of ground modification”, Pearson Education Inc. New Delhi, 2008.
3. F. G., Bell, “Engineering Treatment of Soils”, E& FN Spon, New York, 2006.

4. P. PurushothamaRaju, " Ground Improvement Techniques" Laxmi Publications (P) Limited, 2006.
5. Jie Han et. al., "Advances in ground Improvement" Allied Pub., 2009.

Suggested E-learning references

1. https://nptel.ac.in
2. https://swayam .gov .in

Suggested Learning Outcomes

After completion of course, the student shall be able to

1.1 Appreciate the Need and objectives of ground improvement
1.2 Classify different soil types in India
1.3 Identify favorable and unfavorable ground conditions
2.1 Classify different methods of Ground modification
2.2 Explain Mechanical method of Ground modification and it's suitability
2.3 Explain Hydraulic method of Ground modification and it's suitability
2.4 Explain Physico-chemical method of Ground modification and it's suitability
2.5 What is geo synthetics
2.6 Classify different types of geo synthetics
2.7 List the applications of geo synthetics
3.1 Define compaction
3.2 List various methods of compaction
3.3 Explain shallow compaction methods of Tampers and Rollers
3.4 Explain Deep Compaction methods of Blasting, Vibro floatation, Dynamic compaction and Compaction piles
4.1 List various methods Dewatering
4.2 Explain open sumps and ditches method of dewatering
4.3 Explain Well point systems of dewatering
4.4 Explain Electro osmosis and Vacuum method of dewatering
4.5 Explain Electro osmosis and Vacuum method of dewatering
4.6 Explain briefly about Horizontal and vertical drains,
5.1 Define Cementing
5.2 Explain Modification by admixtures like cement, lime,
5.3 Explain Modification by fly ash and bitumen
5.4 Define grouting
5.5 List various grout materials and their suitability

5.6 Explain various grouting techniques

5.7 List applications of grouting

6.1 Define concept of soil reinforcement

6.2 List various reinforcing materials

6.3 Explain ground anchors and rock bolting

6.4 Explain about Concept of confinement

6.5 Explain about Gabion walls

Suggested Student Activities

1. Tech fest/Srujana for incubating the innovative ground improvement techniques.
2. Visit a site and study the nature of soils and it's favorability for construction
3. Visit an unfavorable ground condition for pavement and suggest site specific ground improvement technique
4. Visit an unfavorable ground condition for foundation of a building and suggest site specific ground improvement technique
5. Poster presentation of unfavorable ground condition for pavement before and after ground improvement
6. Poster presentation of unfavorable ground condition foundation of a building before and after ground improvement

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1		3	2	2		2			2	1	2,3,4,6,9,10
CO2		2	2	2	2	2					2,3,4,5,6
CO3		2		2	2	2	2			2	2,4,5,6,7,10
CO4		3			2		2		2		2,5,7,9

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
Assignments		5
Seminars		5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

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

Course Code: 18C-504E (A) **Duration:1 hour**
Course Name: Ground Improvement Techniques **Max.Marks:20 Marks**

PART-A

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

1) Define Ground improvement.
2) List out any two soil types in India.
3) State any two methods of Ground modification.
4) What is Hydraulic modification?

PART-B

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

5(a) State any three objectives of ground improvement.

(OR)

5(b) Write a brief note on Unfavorable ground conditions

6(a) Write about the Classification of ground modification techniques

(OR)

6(b) Write a brief note on Hydraulic modification

PART-C

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

7(a) Explain favorable ground conditions for construction

(OR)

7(b) Explain unfavorable ground conditions for construction

8(a) Explain the factors to be considered while selection of appropriate Ground Improvement technique

(OR)

8(b) Explain geo synthetics and write different types of geo synthetics.

State Board of Technical Education and Training,Telangana

Model Question paper
DCE V semester
Mid Semester-II Examination

Course Code: 18C-504E (A) **Duration:1 hour**
Course Name: Ground Improvement Techniques **Max.Marks:20 Marks**

PART-A

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

1) Define compaction
2) List any two methods of Deep compaction
3) List any two methods of Hydraulic modifications
4) Write any two uses of drains in ground improvement

PART-B

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

5(a) Write about shallow compaction methods of Tampers and Rollers

(OR)

5(b) Write about Vibro floatation method of compaction

6(a) Write open sumps and ditches method of dewatering.

(OR)

6(b) Write a Note on horizontal Drains.

PART-C

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

7(a) Write the suitability criteria of various methods of compaction.

(OR)

7(b) Explain Compaction piles and their suitability.

8 (a) Explain Dewatering by Electro osmosis.

(OR)

8(b) Explain Well point systems of dewatering.

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

Course Code: 18C-504E (A) **Duration:2 hours**
Course Name: Ground Improvement Techniques **Max.Marks:40**
Marks

PART-A

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

1) State any two objectives of ground improvement
2) What are geo synthetics
3) What is pozzolonic reaction of lime with soil
4) Define hydraulic modification
5) Define cementing method of ground improvement
6) Define grouting
7) Define confinement
8) What is gabion wall

PART-B

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

9(a)Write any two types of geo synthetics

(OR)

9(b) Write a short note on Modification of soil with a fly ash

10(a) Write a note on Dynamic compaction.

(OR)

10(b) Write a short note on Soil reinforcement.

11(a) What are the Characteristics of Grout materials

(OR)

11(b) Write a short note on the modification of soil with cement.

12(a)Write a note on the characteristics of soil reinforcement materials.

(OR)

12(b) Write a short note on the uses of Gabion walls

PART-C

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

13(a)Write any five applications of geo synthetics.

(OR)

13(b) Explain modification of soil with bitumen and calcium chloride.

14(a) Explain any two deep compaction methods.

(OR)

14(b) Explain various methods of soil confinement.

15(a) Explain the modification of soil with lime.

(OR)

15(b) Explain various grouting techniques

16(a) Explain Soil reinforcement.

(OR)

16(b) Explain stone column method of soil stabilization

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Steel Structures**	Course Code :	**18C-504E(B)**
Semester:	**V Semester**	Course Group :	**Elective**
Teaching Scheme in Periods (L:T:P):	**45:15:0**	Credits :	**3**
Methodology :	**Lecture+Assignments**	Total Contact Periods :	**60 Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This course requires the knowledge of Engineering Mechanics, Strength of Materials and Strength of Material lab

Course Outcomes

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

CO1	Illustrate the basic concepts of limit state design and suitability of different types of standard rolled steel sections
CO2	Design suitable compression member and a slab base for the given conditions as per code
CO3	Analyse and Design a suitable connection based upon the conditions according to standards
CO4	Design the tension members considering the various failure patterns as per codal provisions.
CO5	Design a suitable laterally restrained beam as per standard code
CO6	Plan a suitable roof truss for the given span as per standards and Calculate the loads acting on the truss using relevant Indian Standards

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 and Fundamentals of Limit State Design of Steel structures	08	Q4	Q1	Q9(a)	Q13(a)
2	Design of Compression members	12				
3	Design of Bolted and Welded Connections	10		Q2	Q10(a)	Q14(a)
4	Design of Tension members	10				
5	Design of Beams	10		Q3 Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Design of Roof trusses	10		Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	60	8		8	8

Course Contents

UNIT-1: Introduction and fundamentals of limit state design of steel structures

Duration: 8 Periods (L: 6 – T: 2)

a) Merits and demerits of steel structures.
b) Loads considered in the design of steel structures as per I.S:875 -1987.
c) Introduction to I.S. 800-2007 - Mechanical properties of structural steel
d) Standard structural sections as per SP-6
e) Classification of cross sections – class 1(plastic) class2(compact) class3(semi compact) and class4(slender), Types of Elements-Internal, outside and Tapered
f) Concept of Limit State Design – limit state of strength – limit state of serviceability – classification of actions – strength – partial safety factors for loads and materials.

UNIT-2: Design of Compression Members

Duration: 12Periods (L: 9 – T: 3)

a) Introduction to compression members - different forms of compression members.
b) Behavior of compression members
c) Effective lengths to be used for different end conditions – table 11 of I.S:800.
d) Buckling class of cross section – imperfection factor and stress reduction factor for different buckling classes
e) Maximum values of effective slenderness ratios as per code – design compressive stress for different column buckling classes.
f) Calculation of design strength of compression members – problems (no built-up sections).
g) Design procedure of compression members – problems on simple I sections only (no built-up sections).
h) Design details - effective sectional area – codal provisions for angle struts – single angle struts.
i) Codal provisions of single / double lacing and battening for built-up columns (no problems).
j) Design of slab base along with a cement concrete pedestal – problems.

UNIT-3: Design of Bolted and Welded Connections **Duration: 10Periods (L: 7.5 – T:2.5)**

a) Different types of joints

b) Different types of Connections
c) Differentiation of bolted joints and welded joints.
d) Advantages and disadvantages of bolted connections,
e) Difference between unfinished bolts and High strength friction grip bolts (HSFG).
f) Behavior of bolted joints, failure of bolted joints,
g) Strength of lap joint only with chain and staggered patterns for bearing type bolts only
h) Efficiency of the joint.
i) Advantages and disadvantages of welding
j) Different forms of welded joints
k) Fillet welded joint – detailed sketch showing the component parts.
l) Stresses in welds as per I.S.800-2007 – Codal requirements of welds and welding.
m) Problems on calculation of strength of a fillet welded joint.
n) Design of fillet welded joint for a plate of given load, thickness of a plate and permissible stress as per code.
o) Design of fillet welded joint for single angle carrying axial loads.

UNIT-4: Design of Tension Members Duration: 10Periods (L:7.5 – T:2.5)

a) Introduction to tension members and different forms of tension members.
b) Behavior of tension members.
c) Different modes of failures – gross section yielding, net Section rupture and block shear failure.
d) Maximum values of effective slenderness ratios as per code.
e) Calculation of net effective sectional area of single angle with welded and bolted connection.
f) Calculation of the design strength due to yielding of gross section, rupture of critical section and block shear – problems on plate and single angle section with welded and bolted connection
g) Design procedure of tension members.
h) Problems on design of tension members using plates and single angle with welded connection only

UNIT-5: Design of Steel Beams

Duration: 10Periods (L:7.5 – T:2.5)

a) Concept of limit state design of beams – shape factor and plastic properties of beams – Problems on Calculation of shape factor for symmetrical sections.
b) Classification of beams based upon lateral restraint of compression flange

c) Design strength of Laterally supported beam(simply supported and cantilever)in bending (flexure) and in shear.

d) Design of laterally supported beam(simply supported under symmetrical point loads and udl throughout the span, cantilever under point load at free end and udl throughout the span) considering all codal requirements and check for flexure, shear and deflection

e) Web Buckling and Web crippling-description only(no problems)

f) Component parts of plate girders with sketches – brief description of different types of stiffeners.

UNIT-6: Design of Roof Trusses **Duration: 10 Periods (L:7.5 – T:2.5)**

a) Types of trusses – plane trusses, space trusses.

b) Sketches of different roof trusses with their suitability for a given span.

c) Cross sections of truss members.

d) Loads on roof trusses as per I.S – 875.

e) Determination of loads at nodal points of a given roof truss due to dead load, live load and wind load, given the coefficients K1, K2, K3,design wind speed, design wind pressure, external and Internal pressure coefficients. – problems.

Reference Books

1. Steel Structures Design& Practice by N.Subramanian, oxford University Press
2. Code of practice: IS 800-2007
3. Limit state Design of Steel Structures by S.K. Duggal/TMH
4. Structural steel design by M.L.Gambhir/TMH
5. Design of Steel Structures by S.S.Bhavikatti
6. Structural Engineering by A.P.ArulManickam
7. Teaching Resource Material :http://www.steel-insdag.org
8. Teaching Resource Material :http://www.nptel.iitm.ac.in

Suggested E-learning references

1. http://nptel.ac.in/courses/105106112/
2. https://www.youtube.com/watch?v=EFBTSKPW5Ek
3. https://www.youtube.com/watch?v=C4Mm3mvN1P0

Suggested Learning Outcomes

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

1.1 List the common types of steel structures.

1.2 State the merits and demerits of Steel Structures.

1.3 List the loads considered in the design of steel structures as perI.S:875-1987.

1.4 State the importance of code of practice I.S. 800-2007

1.5 State the physical and mechanical properties of structural steel. – yield stress (fy), ultimate tensile stress (fu) and maximum percent elongation for standard steel and fusion welding steel (table -1 of IS:800-2007)

1.6 List different types of rolled steel sections as per SP-6.

1.7 Explain the classification of cross sections and types of elements

1.8 Explain the Concept of Limit State Design.

1.9 State the various types of limit states.

1.10 Define the terms: design action and design strength.

1.11 State the partial safety factor values for loads in limit state of strength and serviceability.

1.12 State the partial safety factor values for materials in limit state.

2.1 State the different types of compression members like column, strut, etc.

2.2 Sketch different forms of compression members.

2.3 Explain the behavior of compression members - classification of cross sections.

2.4 Explain the terms: actual length and effective length.

2.5 Define the terms a) least radius of gyration b)slenderness ratio.

2.6 State effective lengths to be used for different end conditions.

2.7 Explain buckling class of cross section – imperfection factor and stress reduction factor.

2.8 State the maximum values of effective slenderness ratios as per code

2.9 Determine the design strength of compression members (No built up sections).

2.10 Explain design procedure of compression members.

2.11 Design columns with I sections.

2.12 Explain design details - effective sectional area – codal provisions for angle struts.

2.13 Design single angle struts.

2.14 Explain codal provisions of single / double lacing and battening for built-up columns.

2.15 Design a slab base along with a cement concrete pedestal

3.1 State the different types of joints

3.2 State the different types of Connections.

3.3 Differentiate between Bolted joints and Welded joints.

3.4 State the advantages and disadvantages of bolted connections.

3.5 Specifications of bolted joints.

3.6 State the difference between bearing type bolts and high strength friction grip bolts

3.7 Explain the behavior of bolted joints and reasons for failure of bolted joints

3.8 Calculate the strength of lap joint only with chain and staggered patterns for bearing type bolts only

3.9 Calculate the efficiency of a bolted joint.

3.10 List the features of a fillet welded joint.

3.11 State different stresses in welds as per I.S.800-2007.

3.12 Specifications of welded joints.

3.13 State the formula for design strength of a fillet welded joint.

3.14 Calculate the design strength of a fillet welded joint.

3.15 Design a fillet welded joint for a given load, thickness of a plate and permissible stress as per code.

3.16 Design a fillet welded joint for a single angle connected to the gusset plate by fillet welds along the sides and at ends carrying axial loads.

4.1 Define the term 'Tie'.

4.2 State the applications of tension members.

4.3 Sketch different forms of tension members.

4.4 Explain the behavior of tension members.

4.5 State the different modes of failures of tension members

4.6 Describe briefly with sketches the different modes of failures of tension members.

4.7 State the maximum values of effective slenderness ratio as per code reversal of stresses

4.8 Determine the net effective area of flat and a single angle connected to gusset plate by bolts and welds.

4.9 Determine the design strength due to yielding of gross section, rupture of critical section and block shear failure of a flat and a single angle connected by bolts and welds.

4.10 Explain design procedure of tension members.

4.11 Design a flat and a single angle tension member connected by welds only.

5.1 Illustrate the concept of limit state design of beams.

5.2 Explain the behavior of steel beams.

5.3 Define the terms: elastic moment of resistance, plastic moment of resistance, elastic section modulus, plastic section modulus, shape factor.

5.4 Determine the shape factor values for Symmetrical sections

5.5 State the classification of cross sections class 1 to 4

5.6 State the classification of beams based on lateral restraint of compression flange.

5.7 Determine the design strength in bending(flexure) and in shear.

5.8 Describe briefly web buckling and web crippling (no problems),

5.9 Design laterally supported simply supported(under symmetrical point loads and udl) and cantilever beam(under point load at free end and udl throughout the span) considering all codal requirements and check for flexure, shear and deflection

5.10 State component parts of plate girders with sketches – describe different types of Stiffeners with their suitability.

6.1 State types of trusses – plane trusses, space trusses.

6.2 Explain the situations where roof trusses are used.

6.3 Sketch different types of roof trusses with their suitability for a given span.

6.4 Sketch a roof truss and name the component parts.

6.5 State configuration of trusses – pitched roof, parallel chord trapezoidal trusses.

6.6 State cross sections of truss members.

6.7 Estimate the type of loads on roof trusses as per I.S – 875.

6.8 Describe briefly how the wind load is calculated on roof trusses.

6.8 Determine loads at nodal points of a given roof truss due to dead load, live load and wind load, given the coefficients K1, K2, K3, design wind speed, design wind pressure, external and internal pressure coefficients.

Suggested Student Activities

1. Visit a nearby construction site and identify the various types of connections used in steel structures and prepare a report.
2. Collect & Prepare a list of Indian Standard codes referred for structural steel design with the purpose of each code.
3. Collect the catalogues of various types of structural steel sections
4. Collect the map showing Basic wind speed throughout the country and analyse those maps.
5. Prepare 2D & 3D models of various structural steel sections using CADD.
6. Prepare the structural detailing of designed sections as per SP 6-1 (1964): ISI Handbook for Structural Engineers -Part- 1
7. Tech fest/Srujana
8. Paper/Poster presentation
9. Quiz
10. Group discussion
11. Surprise Test

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	1	2				1	1		2	2	1,2,6,7,9,10
CO2		2					1		2	2	2,7,9,10
CO3		2		2		1	1	2	2	3	2,4,6,7,8,9,10
CO4		2					1		2	2	2,7,9,10
CO5		3					1		2	2	2,7,9,10
CO6	1	3		2		3	1		2	3	1,2,4,6,7,9,10

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
Assignments		5
Seminars		5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

<table>
<tr><td rowspan="2">Unit No</td><td colspan="3">Questions to be set for SEE</td></tr>
<tr><td colspan="2">R</td><td>U</td><td>A</td></tr>
<tr><td>I</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>II</td></tr>
<tr><td>III</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td></tr>
<tr><td>V</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>VI</td><td>Q7,Q8</td><td>Q10(b),
Q12(a), Q12(b)</td><td>Q14(b),
Q16(a), Q16(b)</td></tr>
<tr><td>Total Questions</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

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

Course Code:18C-504E(B) **Duration:1 Hour**
Course Name: Steel Structures **Max.Marks:20 Marks**

PART – A Marks**: 4 X 1M = 4 M**

*NOTE: 1) Answer **all** questions and each question carries **one** mark.*

1. Define limit state. State various types of limit states to be considered in limit state.
2. State any four physical properties of steel.
3. Define a compression member.
4. Sketch the two different forms of compression members.

PART – B Marks **: 2 X 3M= 6 M**

*Answer **two** questions and each question carries **three** marks*

5(a)State the loads that are to be considered in the design of steel structures.

(OR)

5(b)Explain actions and their classifications.

6(a) Write any six codal provisions for single laced system.

(OR)

6(b)Define slab base. Draw a neat sketch of a slab base showing the components.

PART – C

Answer **two** questions and each question carries **five** marks. **Marks : 2 X 5 M = 10 M**

7(a) Explain with sketches the different types of rolled steel beam Channel and angle sections

(OR)

7(b) Write any five advantages and disadvantages of steel structures.

8(a) Design a steel column using a single rolled I- section to carry an axial load of 800 kN. Both ends of the column are restrained against rotation and translation. The actual length of the column between the intersections is 8m.The yield stress of steel is250MPa.

(OR)

8(b) Determine the design compressive strength of a single-angle discontinuous strut ISA 80 mm × 50 mm × 8 mm of effective length 1·5 m, when connected to gusset plate through longer leg by fillet welds at each end yield stress of steel used is 340 MPa. Modulus of elasticity of steel is 2 $x10^5$ MPa. The gusset fixity may be taken as hinged.

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

Course Code:18C-504E(B) **Duration:1 Hour**
Course Name: Steel Structures **Max.Marks:20 Marks**

PART – A **Marks: 4 X 1 M = 4 M**

*NOTE: 1) Answer **all** questions and each question carries **one** mark.*

1. State any two advantages and two disadvantages of welded joints?
2. Define nominal diameter and gross diameter of bolt.
3. Define a tension member and state the applications of tension member.
4. State three different types of failures of tension members.

PART – B **Marks : 2 X 3 M= 6 M**

*NOTE: 1) Answer **two** questions and each question carries **three** marks*

5 (a)A tie member in a truss is 200 x 10 mm in size it is welded to a 10 mm thick gusset plate fillet weld. The overlap of the member is 300 mm and the weld size is 6 mm. Determine the design strength of the joint if the welding is done on all the three sides

(OR)

5 (b) Calculate the design strength of the welded joint if the size of the weld is 5mm and its length is 212mm.The ultimate shear stress in the weld is 410N/mm^2.Assume the connections are made in the workshop.

6(a) Write the design procedure of tension members.

(OR)

6(b) Sketch the figures of angles connected to i)the same side of gusset plate ii) both sides of the gusset plate showing welds in appropriate places.

PART – C

Answer **two** questions and each question carries **five** marks **Marks: 2 X 5 M= 10 M**

7(a) The longer leg of ISA 150 mm×115 mm×10 mm is connected to a gusset plate of 12mm thick by a lap joint using side welds only, at site. The member carries an axial design tensile force of 500 kN acting through centre of gravity of the angle. Design the joint taking ultimate shear stress in the filled weld as 410 MPa.

(OR)

7(b) The plates of 6 mm thick tank are connected by a single bolted lap joint with 20 mm diameter bolts at 60 mm pitch, calculate the efficiency of the joint. Take fu of plate as 410 MPa and assume 4.6 grade of bolts

8(a) Determine the design tensile strength of single ISA 100 x 65x 10 mm when its longer leg is connected to 10 mm thick gusset plate by 6 mm size fillet welds. The length of weld is 150 mm. Take fy = 250 MPa, fu = 410MPa

(OR)

8(b) Design a single angle tension member to carry a tensile force of 225KN.The angle is to be connected to a gusset plate by one of its leg by fillet welds. f_y=250N/mm^2 and f_u=410N/mm^2.

State Board of Technical Education and Training,Telangana

Model Question paper
DCE V Semester
Semester End Examination

Course Code:18C-504E(B) **Duration:2 Hours**
Course Name: Steel Structures **Max. Marks: 40Marks**

PART – A Marks: 8 X 1 M = 8M

*NOTE : 1)Answer **all** questions and each question carries **one** mark.*

1. State the different types of loads acting on the steel structures?
2. Explain the terms i) Gross area ii) Net area.
3. What is beam? State any one classification.
4. State the differences between unfinished and HSFG bolts
5. Distinguish between laterally restrained beam and unrestrained beam
6. Define Shape factor
7. State the relation between design wind speed and design wind pressure.
8. Define slope and pitch of a roof truss

PART – B

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

9(a)What are the different types of column bases. Explain any one of them.

(OR)

9(b) Draw the cross section of plate girder and label the component parts.

10(a) Write three different types of failures of a tension member?

(OR)

10(b) Draw the line sketches of i)fan truss ii)fink truss iii)pratt truss

11(a) Derive an expression for calculating the shape factor of a circular section of diameter 'd'

(OR)

11(b) Name any three types of web stiffeners in a plate girder and what are their functions?

12(a) Draw a neat sketch of a roof truss and name the component parts.

(OR)

12(b) What is a purlin? Determine the live load on a truss if the angle of slope of roof is 25^0.

PART – C

*Answer **four** questions . Each question carries **five** marks*

4x 5 M = 20 M

13 (a) Design a column 3.5 m long in a building subjected to a factored load of 600 kN. Both the ends of the column are effectively restrained in direction and position. Use steel of grade Fe 410.

(OR)

13 (b) A simply supported beam ISLB 300@370N/m has an effective span of 5 m. Find i) Design bending strength of beam ii) Design shear strength of beam. Assume Fe250 grade steel and assume that the beam is laterally supported.

14 (a) Design a tension member considering a single-angle section to carry a tensile force of 250 kN. Adopt length of welded connection as 150 mm and use Fe 410 steel

(OR)

14 (b)Sketch different types of roof trusses with their suitability for a given span.

15 (a) A simply supported beam ISMB 400 @ 616 N/m is subjected to a BM of 100 kN and SF of 80 kN. Check the safety of the beam is bending and shear if beam is laterally restrained. Consider f_y=250 MPa and f_u=410 MPa

(OR)

15 (b) An ISLB 350@495N/m is used as a simply supported beam over a span of 6 m and carries a udl of 25kN/m including self weight. The compression flange of the beam is adequately restrained. Check for shear and maximum deflection if f_y= 250 N/mm^2 and E=210 kN/mm^2

16(a) A roof truss shed is to be built in Lucknow for an industry. The size of shed is 24 m x 40m. The height of building is 12 m at the eves. Determine the basic wind pressure

(OR)

16 (b) A Pratt truss of span 12 m span with each panel of length 2m and pitch 25^o carries AC sheet roofing. The truss are 3 m apart. The design wind pressure may be assumed as 1200 N/m^2.

Assume

(i) self-weight of AC sheet = 200 N/m^2 of slope area

(ii) weight of purlin = 100 N/m^2 of plan area.

Determine (a) live load and (b) dead load at various nodal points of the truss.

Department of Technical Education
State Board of Technical Education &Training (TS)

Course Title:	**Integrated Waste Management**	Course Code :	**18C-504E(C)**
Semester:	**V Semester**	Course Group :	**Elective**
Teaching Scheme in Periods(L:T:P):	**45:15:0**	Credits :	**3**
Methodology :	**Lecture+Assignments**	Total Contact Periods :	**60**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This subject requires basic knowledge of Sanitary Engineering

Course Outcomes

Upon completion of course, the student shall be able to

CO1	Identify the principles of safe disposal of solid waste
CO2	Explain the quality and recycling of municipal solid waste.
CO3	Analyze the components of integrated MSW handling system
CO4	Explain the laws on Management of biomedical solid waste.
CO5	Evaluate the importance and recycling of C& D waste
CO6	Illustrate the impacts of e-waste.

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 Solid Waste Management-	08	Q4	Q1		Q9(a)	Q13(a)
2	Municipal Solid Waste - Characteristics and Quantities	12					
3	Disposal of Municipal Solid Waste	10		Q2		Q10(a)	Q14(a)
4	Biochemical process and Composting	10					
5	Construction and Demolition (C&D) of Waste Management	10		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Electronic Waste Management	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	60	8			8	8

Course Contents

UNIT 1: Introduction to Solid Waste Management **Duration: 8 Periods(L:6 – T:2)**

a) Definition of Solid waste
b) Classification of solid waste
c) Necessity of Solid waste disposal
d) Safe disposal of solid waste.

UNIT 2:Municipal Solid Waste Characteristics and Quantities

Duration:12Periods(L:9 – T:3)

a) Composition of MSW.
b) Quantity of generated MSW
c) Collection and Transportation of Municipal solid waste.
d) Separation for recycling and reuse of plastics, paper and glass from the MSW.

UNIT 3: Disposal of Municipal Solid Waste Duration: 10 Periods(L:7.5 – T:2.5)

a) Disposal of MSW.
b) Disposal of MSW by Sanitary Land filling method.
c) Land sealants for the control of gas and Leachate movement.
d) Disposal of MSW by Shredding and Pulverisation.
e) Disposal of MSW by Composting.
f) Disposal of MSW by barging it out into Sea.

UNIT 4: Biochemical process and Composting Duration: 10 Periods(L:7.5 – T:2.5)

a) Biomedical wastes and their impacts on Health and Environment.
b) Legislative laws on Management of Biomedical wastes in India.
c) Collection, transportation and treatment of Biomedical wastes.
d) Disposal of Biomedical waste.
e) Human Resources issues on biomedical wastes

UNIT 5: Construction and Demolition (C&D)Waste Management

Duration: 10 Periods(L:7.5 – T:2.5)

a) C&D Definition, applicability and waste generating activities.
b) Estimation of C&D waste generation for India.
c) Initiatives to promote recycling of C & D waste in India
d) Importance of recycling C & D Wastes.
e) C&D Waste processing
f) The rules promote C&D Waste utilization.

UNIT 6: Electronic Waste (E-Waste) Management Duration: 10 Periods(L:7.5 – T:2.5)

a) Definition of E- Waste.
b) Classification of E- Waste.

c) Adverse health and environmental impacts of E-Waste on its improper disposal.

d) Environmental and Occupational Hazards posed by disposal of certain categories of E-Waste.

e) Menace of E- Waste in India

Reference Books

1. Sewage Disposal by S.K. Garg.
2. Municipal Solid waste management by P Jayarami Reddy
3. C&D Waste Management Rules 2016.
4. NPTEL

Suggested E-learning references

1. http://nptel.ac.in

Suggested Learning Outcomes

Upon completion of course, the student shall be able to

1.1 Define Solid Waste Management

1.2 Classify Solid Waste Management

1.3 State the necessity of SWM(Solid Waste Management).

1.4 Explain the importance of safe Disposal.

2.1 Define composition of MSW(Municipal Solid Waste).

2.2 Characteristics of MSW

2.3 Estimate generated quantity of MSW.

2.4 Describe collection and transportation of MSW.

2.5 Explain separation for recycling.

2.6 Explain reuse of Plastics, Paper and Glass from MSW.

3.1 Define disposal of MSW.

3.2 Explain the methods of disposal

b) By Sanitary Land filling method

c) By Shredding and Pulverization.

3.3 Explain land sealants for the control of gas and Leachate movement

3.4 Explain Disposal of MSW by Composting.

3.5 Explain MSW by Barging it out into Sea.

4.1 Define Biomedical Waste

4.2 Explain the Biomedical waste impacts on Health and Environment.

4.3 State the Legislative laws on Management of Biomedical wastes in India

4.4 Explain the procedure to collection and transportation of Biomedical wastes

4.5 Explain the Treatment of Biomedical waste.

4.6 Explain the Disposal of Bio medical waste.

4.7 Human Resources issues on biomedical wastes.

5.1 Define C &D.

5.2 Estimate C & D quantities..

5.3 State the importance of recycling C&D waste.

5.4 Explain effective utilization of C&D waste.

5.5 List the Rules to promote C& D waste utilization.

6.1 Define E- Waste.

6.2 State the Classification of E-Waste

6.3 Explain Adverse Health and Environmental Impacts of E-Waste on its Improper Disposal

6.4 State the Environmental and Occupational Hazards posed by Disposal of certain categories of E- Waste.

6.5 State Menace of E- Waste India

Suggested Student Activities

1) To submit a report to implement a plan to reduce solid waste at your house/ college.
2) To submit a report on the life cycle of a CD/mobile /Calculator etc and prepare a fact sheet on findings in class in the form of Paper/Poster presentation.
3) Field trip to nearest MSW handling facility
4) Visit to any NGO/Public Health Department dealing with the environmental health program
5) Team work for analyzing the need for recycling
6) Prepare an excel sheet on sources of solid waste in a village/ town in teams.
7) Group discussion
8) Surprise Test

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1		2			3	3	2	2			2,5,6,7,8
CO2		2			3	3	2	2	2		2,5,6,7,8,9
CO3		3			3	3	2	2	2		2,5,6,7,8,9

CO4		3					3	2		3	2,7,8,10
CO5		3			3	3	2	2	2		2,5,6,7,8,9
CO6		3			3	2	2	2	1		2,5,6,7,8,9

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
Assignments		5
Seminars		5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

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

Course Code: 18C-504E(C) **Duration:1 hour**
Course Name: INTEGRATED WASTE MANAGEMENT **Max.Marks:20 Marks**

PART-A

Answer **all** questions, Each Question carries **one** mark **4x1 = 04 Marks**

1) Define Solid waste management.
2) Give the classification of Solid waste management
3) State the necessity of Solid waste management
4) Define composition of Municipal Solid Waste

PART-B

Answer **two** questions, Each Question carries **three** marks **2x3 = 06 Marks**

5(a) Explain the Importance of safe Disposal

(OR)

5(b)Write about the transportation of Municipal Solid Waste.

6(a) How do you Estimate generated quantity of Municipal Solid Waste .

(OR)

6(b) List out any four methods of collection of Municipal Solid waste.

PART-C

Answer **two** questions, Each Question carries **five** marks **2x5 = 10 Marks**

7(a)Explain the Importance of safe Disposal.

(OR)

7(b) Explain separation for recycling

8(a)Explain reuse of Plastics, Paper and Glass from MSW

(OR)

8(b) Draw the flow diagram of Collection to transportation of MSW

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

Course Code: 18C-504E(C) **Duration:1 hour**
Course Name: INTEGRATED WASTE MANAGEMENT **Max.Marks:20 Marks**

PART-A

Answer **all** questions, Each Question carries **one** mark. **4x1 = 04 Marks**

1. List the methods of disposal of Municipal Solid waste management.
2. Define biomedical waste.
3. State any two legislative laws on Management of Biomedical wastes in India.
4. What are the land sealants for the control of gas.

PART-B

Answer **two** questions, Each Question carries **three** marks **2x3 = 06 Marks**

5(a) Explain consequent effects of Leachate movement.

(OR)

5(b) Explain the procedure to Collection of Biomedical wastes.

6(a) What the impacts of biomedical waste on environment

(OR)

6(b) Write about any one human resource issue on biomedical waste

PART-C

Answer **two** questions, Each Question carries **five** marks **2x5 = 10 Marks**

7(a)Explain the methods of disposal by Sanitary Land filling method

(OR)

7(b) Explain Disposal of Municipal Solid Waste by barging it out into Sea.

8(a) Explain the treatment of biomedical waste

(OR)

8(b) Explain the procedure of transportation of biomedical waste

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

Course Code: 18C-504E(C) **Duration: 2hours**
Course Name: INTEGRATED WASTE MANAGEMENT **Max.Marks:40 Marks**

PART-A

Answer **all** questions, Each Question carries **one** mark. **8x1 = 08 Marks**

1. Define Composition of Municipal solid waste.
2. List out the characteristics of Municipal solid waste.
3. State the importance of recycling Construction and Demolition waste
4. What are the land sealants for the control of leacheate movement?
5. State the methods of C& D processing.
6. List any two Rules to promote Construction and Demolition waste utilization
7. State the Environmental Hazards posed by Disposal of certain categories of E- Waste.
8. State Menace of E- Waste in India

PART-B

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

9(a). Explain the necessity of safe disposal of solid waste.

(OR)

9(b) Explain the procedure for estimation of Construction and Demolition waste quantities

10(a) How do you Estimate generated quantity of Municipal Solid Waste.

(OR)

10(b) What are the environmental and occupational Hazards posed by Disposal of E- Waste.

11(a).Explain the procedure to collection and transportation of Biomedical wastes**.**

(OR)

11(b) State the importance of recycling C& D waste

12(a).Brief the adverse Health Impacts of E-Waste on its improper Disposal.

(OR)

12(b) State Environmental Impacts of E-Waste on its improper Disposal

PART- C

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

13.(a) Explain the procedure of separation for recycling and reuse of plastics, paper and glass from the Municipal solid waste.

(OR)

13(b) Explain effective utilization of C&D waste.

14(a) Explain the methods of disposal by Shredding and Pulverization

(OR)

14(b) Give the classification of E-Waste

15(a).Explain the procedure to collection and transportation of E-Waste**.**

(OR)

15(b) Explain the processing of C& D waste

16(a). Write the occupational hazards of E-Waste during disposal.

(OR)

16(b) Explain the environmental hazards of E-Waste.

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Soil Mechanics**	Course Code :	**18C-505E(A)**
Semester:	**V Semester**	Course Group :	**Elective**
Teaching Scheme in Periods(L:T:P):	**45:15:0**	Credits :	**3**
Methodology :	**Lecture+Assignments**	Total Contact Periods :	**60 Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

Basic Knowledge of Mathematics and Engineering Mechanics

Course Outcomes

Upon completion of course, the student shall be able to

CO1	Characterise and classify soils.
CO2	Develop volumetric relationships between different soil parameters.
CO3	Explain the significance of the physical and mechanical properties of the soils and the experimental methods to measure them.
CO4	Discuss bearing capacity of soils in foundation design along with presumptive bearing capacity values using IS code equation for computing bearing capacity.
CO5	Analyse the principles of consolidation and compaction.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R			U	A
1	General characteristics of soils	10	Q4	Q1		Q9(a)	Q13(a)
2	Basic definitions and simple tests on soils	10					
3	Classifications of soils	08		Q2		Q10(a)	Q14(a)
4	Hydraulic and Mechanical properties of soils	12					
5	Bearing capacity of soils	10		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Consolidation and Compaction of soils	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	60	8			8	8

Course Contents

UNIT 1: General characteristics of Soils **Duration: 10Periods(L:7.5– T:2.5)**

a) Soil mechanics – Importance of soil mechanics – Origin of soil – Formation of soil - types of soils – Residual soil, Transported soil, sand, silt, clay, peat, loess, muram, caliche, clay, bentonite –Major soil deposits in India
b) Mechanical analysis of soils – Hydrometer and sieve analysis of soil particles – semi logarithmic grain size curve.
c) Physical properties of soils – plasticity, cohesion, consolidation.

UNIT 2: Basic Definitions and Simple Tests on soils Duration: 10Periods(L:7.5– T:2.5)

a) Three phase diagram of soil – Basic definitions: Void ratio, Porosity, Degree of saturation, Percentage air voids, Air content, Bulk density, Dry mass density, Saturation mass density, submerged mass density, Bulk unit weight, Dry unit weight, Saturation unit weight, submerged unit weight, Density index.
b) Water content - Soil moisture content methods – Tests for determination of soil moisture content-oven drying method – specific gravity - Specific gravity methods - Tests for determination of specific gravity of soil by Pycnometer method.
c) Atterberg's Limits - Liquid Limit, Plastic Limit, Shrinkage Limit – tests for determination of Atterberg's Limits – plasticity index.
d) Relationships of volume of voids, moisture content, density of soil mass, dry density , saturated density, submerged density, specific gravity, void ratio, porosity, degree of saturation, percentage of air voids, air content, density index, - simple problems using the above relationships.

UNIT 3: Classifications of Soils **Duration: 8 Periods(L: 6.0– T:2.0)**

Classification of soils –different systems of classification of soils – Textural classification of soils – I.S. classification of soils -Field identification of soil.

UNIT 4: Hydraulic and Mechanical Properties of Soils

Duration: 12 Periods(L: 9.0 – T: 3.0)

a) Permeability of soil –Essentiality of permeability –Darcy's law – Tests on determination of coefficient of permeability – laboratory methods.
b) Compressibility of soils – Shearing resistance of soils- Liquefaction of sand – shear strength experiment with direct shear apparatus (Explanation of testing procedure with the help of figures only).

UNIT 5: Bearing Capacity of Soils: **Duration: 10Periods(L:7.5 – T:2.5)**

Bearing capacity – Basic definitions: Ultimate bearing capacity, Net ultimate bearing capacity, Net safe bearing capacity, Gross safe bearing capacity – Importance of bearing capacity in foundation design – Bearing capacity of shallow footings – presumptive bearing capacity values – IS code equation for computing bearing capacity (No derivation) – Types of shear failures - Field plate load test.

UNIT 6: Consolidation and Compaction of soils Duration: 10Periods(L:7.5 – T:2.5)

a) Consolidation of Soils

Consolidation –Terzaghi's model analogy of compression springs showing the process of consolidation – field implications.

b) Compaction of Soils

Theory of compaction – compaction and its objectives – factors affecting compaction - Laboratory compaction tests – Proctor's compaction test – Modified Proctor's compaction test – Methods of compaction used in field - field measurement of dry density by core cutter method and sand replacement method.

Recommended Books

1. Soil mechanics and foundation Engineering by Dr.B.C.Punmia
2. Modern Geo technical Engineering by Alam Singh.
3. Soil Mechanics (SI Version) by T. W.Lambe and Robert V. Whitman
4. Geo technical Engineering by Dr. C. Venkatramaiah.
5. Soil Mechanics by Lambe and Whiteman.
6. Soil Mechanics in Engineering Practice by Terzaghi, R.B.PeckandG.Mesri
7. Geotechnical Engineering by ManojDatta and S.Gulhat.
8. Fundamentals of Soil Behaviour by Mitchell and Soga.
9. Soil mechanics and foundation Engineering by Dr. K.R Arora
10. Geo technical Engineering by Prof.T.N.Ramamurthy , Prof.T.G.S

Suggested E-learning references

http://nptel.ac.in

Suggested Learning Outcomes

Upon completion of course, the student shall be able to

1.1 State the importance of soil mechanics.

1.2 State the origin of soil

1.3 State the formation of soil

1.4 List the types of soils

1.5 Describe the hydrometer analysis and sieve analysis of soil particles

1.6 Describe the semi-logarithmic grain size curve.

1.7 Define the physical properties of soils like plasticity, cohesion and consolidation.

2.1. Explain the three phase diagram of soil.

2.2. Define the terms: Void ratio, Porosity, Degree of saturation, Percentage air voids, Air content, Bulk density, Dry mass density, Saturation mass density, submerged mass density, Bulk unit weight, Dry unit weight, Saturation unit weight, submerged unit weight, Density index.

2.3. List methods for determination of water content of soil.

2.4. Describe the test procedure for determination of moisture content of soil by oven dry method.

2.5. List the methods for determination of specific gravity of soil

2.6. Describe the test procedure for determination of specific gravity of soil by pycnometer method.

2.7. Define the Atterberg's limits/ Consistency limits.

2.8. Describe the test procedures for determination of liquid limit, plastic limit and shrinkage limit of soil.

2.9. Express relationships between volume of voids, moisture content, density of soil mass, dry density, saturated density, submerged density, specific gravity, void ratio and porosity, degree of saturation, percentage of air voids, air content and density index.

2.10. Work out simple problems using the relationships between various soil parameters.

3.1. Define soil classification

3.2. State different systems of classification of soils.

3.3. Explain the textural classification of soils with a neat sketch.

3.4. Explain I.S. classification of soils.

3.5. Explain methods for field identification of soils.

4.1 Define permeability of soil.

4.2 State the essentiality of permeability in soil engineering.

4.3 Explain Darcy's law.

4.4 State the factors affecting permeability of soil.

4.5 Explain the compressibility of confined layers of soil.

4.6 Explain the shear resistance concept of soils.

4.7 Define the liquefaction of sand.

4.8 Describe the direct shear test experiment.

5.1 Define bearing capacity of soil.

5.2 Define Ultimate bearing capacity, Net ultimate bearing capacity, Net safe bearing capacity, Gross safe bearing capacity of soil.

5.3 Importance of bearing capacity in the design of foundations.

5.4 Justify the importance of 'factor of safety' and 'safe bearing capacity' values in foundation design.

5.5 Methods for determining bearing capacity of soil.

5.6 State the presumptive bearing capacity values and the IS code equation for the calculation of bearing capacity.

5.7 Explain types of shear failures.

5.8 Explain the 'field plate load test' for determining the ultimate bearing capacity of soils.

6.1 Define the principle of 'consolidation'.

6.2 Explain in detail the Terzaghi's model analogy of compression springs, showing the process of consolidation.

6.3 Explain the basic principles of compaction and its objectives.

6.4 State the factors affecting compaction.

6.5 Describe the Proctor's compaction test and Modified proctor's compaction test.

6.6 State the methods of compaction used in field.

6.7 Explain measurement of field density by core cutter method and sand replacement method.

Students activity

1. Visit any construction site and collect soil samples and identify the type of soil by Visual inspection and prepare a report.

2. Prepare a chart of types soils available in different states of India and show them on Indian map with different colour coding.

3. Classify the locally available soil with basic knowledge.

4.Conductthe field tests on soil samples from your college and prepare a report on the tests.

5.Prepare a report on collection of samples of soil.

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

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1		3		2		2				3	2,4,6,10
CO2		2	2					2		3	2,8,10
CO3	2	2	2	2	1	1				3	1,2,3
CO4	2	3		2	1	2	1			3	1,2,4,5,6,7,10
CO5		3	1	1		2				2	2,3,4,6.10

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

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks

	Total Marks	20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
				Total Marks		40 Marks

Unit No	Questions to be set for SEE				
	R			U	A
I	Q4	Q1		Q9(a)	Q13(a)
II					
III		Q2		Q10(a)	Q14(a)
IV					
V		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
VI			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total Questions	8			8	8

State Board of Technical Education and Training, Telangana

Model Question paper

DCE V semester

Mid Semester-I Examination

Course Code: 18C-505E(A) **Duration:1 hour**

Course Name: Soil Mechanics **Max.Marks:20 Marks**

PART-A

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

1) List any two types of soils.

2) Define plasticity of soil.

3) Define Degree of saturation of soil.

4) Define density index.

PART-B

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

5(a) State the formation of soils

(OR)

5(b) State the origin of soil.

6(a) Establish a relationship between porosity and void ratio.

(OR)

6(b) Determine void ratio of soil sample when porosity is 40%

PART-C

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

7(a) Explain the dry sieve analysis of soil

(OR)

7(b) Describe semi- logarithmic grain size curve.

8(a) Describe the three-phase diagram of soil.

(OR)

8(b) Describe the test procedure for determination of moisture content by oven dry method

State Board of Technical Education and Training, Telangana

Model Question paper

DCE V semester

Mid Semester-IIExamination

Course Code: 18C-505E(A) **Duration:1 hour**

Course Name: Soil Mechanics **Max.Marks:20 Marks**

PART-A

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

1) Define soil classification.

2) List any two soil classification systems.

3) Define permeability of soil.

4) Define liquefaction of sand.

PART-B

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

5(a) Explain any one test for field identification of soil.

(OR)

5(b) State how coarse grained soils are classified as per IS classification system.

6(a) Explain Darcy's law.

(OR)

6(b) State any three factors which are affecting the permeability of soil.

PART-C

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

7(a)Explain the textural classification of soils with neat sketch.

(OR)

7(b) Explain IS classification of soils.

8(a) Explain shear resistance concept of soil.

(OR)

8(b) Describe the direct shear test experiment.

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

Course Code: 18C-505E(A) **Duration:2 hours**
Course Name: Soil Mechanics **Max.Marks:40 Marks**

PART-A

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

1) Define the term cohesion
2) Define the term degree of saturation.
3) State any two methods of measurement of field density of soils.
4) Define liquefaction of sand.
5) Define ultimate bearing capacity of soil.
6) List any two methods for determining bearing capacity of soil.
7) Define consolidation of soil.
8) Define compaction of soil.

PART-B

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

9(a) state the formation of soil.

(OR)

9(b) State the importance of bearing capacity in the design of foundation.

10(a) State the essentiality of permeability in soil engineering.

(OR)

10(b) State any three objectives of compaction.

11(a) Distinguish between net safe bearing capacity and net ultimate bearing capacity.

(OR)

11(b) State the importance of factor of safety values in foundation design.

12(a) Distinguish between consolidation and compaction.

(OR)

12(b) State any three factors which are affecting compaction of soil.

PART-C

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

13(a)Describe sieve analysis of soil particles.

(OR)

13(b) Explain local shear failure with neat sketch.

14(a) Explain the compressibility of confined layers of soil.

(OR)

14(b) Explain in detail the Terzaghi's model analogy of compression of springs showing the process of consolidation.

15(a) Explain the field plate load test for determining the ultimate bearing capacity of soils.

(OR)

15(b) State the presumptive bearing capacity values and the IS code equation for calculation of bearing capacity.

16(a) Describe the Proctor's compaction test.

(OR)

16(b) Explain measurement of field density by core cutter method.

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title	**Theory of Structures**	Course Code	**18C-505E(B)**
Semester	**V Semester**	Course Group	**Elective**
Teaching Scheme in periods(L:T:P)	**45:15:0**	Credits	**3**
Methodology	**Lecture+Assignments**	Total Contact periods	**60 Periods**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

Knowledge of Engineering Mechanics and Strength of Materials

Course Outcomes

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

CO1	Calculate the thickness of thin cylinder based on hoop stress and longitudinal stress
CO2	Evaluate various loads acting on the dams and retaining walls.
CO3	Calculate stresses at the base of retaining walls with surcharge.
CO4	Analyse indeterminate structures like Propped cantilevers and Fixed beams.
CO5	Acquire the knowledge of applying Moment Distribution method to continuous beams.
CO6	Calculate axial forces in determinate trusses.

Semester End Examination

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R			U	A
1	Thin Cylinders	8	Q4	Q1		Q9(a)	Q13(a)
2	Dams	12					
3	Retaining Walls	08		Q2		Q10(a)	Q14(a)
4	Statically indeterminate beams-Propped Cantilevers and Fixed beams	12					
5	Statically Indeterminate beams-Continuous beams	10		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Stresses in Frames	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	60	8			8	8

Course Contents

UNIT 1: Thin Cylinders **Duration: 8Periods(L:6.0 – T:2.0)**

Introduction - Thin cylinders - Failures of thin cylinders-Longitudinal and Hoop stresses in thin cylinders (Derivations not required) – Calculation of thickness of thin cylinder under internal pressure – Problems - strains and changes in dimensions (δd, δl, δv) of thin cylinders – Problems.

UNIT 2: Dams **Duration:12Periods(L: 9.0 – T:3.0)**

Introduction – rectangular dams – trapezoidal dams - Calculation of maximum and minimumstresses at the base of a dam - trapezoidal dams having water face vertical and inclined – Conditions for the stability of a dam – Minimum base width of a dam.

UNIT 3: Retaining Walls **Duration:8Periods(L:6.0 – T:2.0)**

Active and passive earth pressure - Angle of internal friction – Angle of surcharge – calculation of active earth pressure by Rankine's formula with and without surcharge - Calculation of Maximum and Minimum stresses at the base of retaining wall having soil face vertical with levelled earth and surcharge. (walls with batter on earth face not included). General conditions of stability of retaining walls – middle third rule – Distribution of pressure on foundation of retaining walls – calculation of minimum base width.

UNIT 4: Statically indeterminate beams-Propped Cantilevers and Fixed beams

Duration:12Periods(L:9.0 – T:3.0)

a) Statically determinate and indeterminate structures –Analysis of propped cantileverswithUDL on whole span andpoint load between fixed and propped ends – Calculation of prop reaction – SFD and BMD.

b) Fixed Beams: Introduction- Determination of Fixed end moments by moment Area method – standard cases – fixed beams subjected to symmetrical concentrated loads – Fixed beams subjected to U.D.L throughout – sketching B.M.D. and S.F.D – problems (without sinking of props) – Max deflection formulae of fixed beams subjected to central point load and U.D.L throughout (No derivation) – problems.

UNIT 5: Statically indeterminate beams-Continuous beams

Duration:10Periods(L:7.5 – T:2.5)

Analysis of beams by Moment Distribution Method (Hardy cross method) – Sign conventions – stiffness factor – carry over factor – distribution factor – Application to continuous beams with same moment of inertia through out the span carrying single point load (central or eccentric) or UDL throughout the individual spanof two span and three span beams(No combination of UDL and point loads)-sketching B.M.D only

UNIT 6: Stresses in frames **Duration:10** **Periods(L:7.5 – T:2.5)**

Frames – Definition – classification based on number of members and number of joints – Determination of forces in members of statically determinate pin jointed frames – method of joints and method of sections – Application to simple frames and trusses (simply supported and cantilever) under loads at joints.

Recommended Books

1. Strength of Materials by R. Subramaniam , Oxford university Press
2. Analysis of Structures by Thandavamoorthy, oxford university Press
3. Strength of Materials by S.S. Rattan Tata Mcgraw hill
4. Strength of Materials by S.Ramamurtham
5. S.M and T.S – by B.C.Punmia
6. Strength of Materials – by R.S. Khurmi
7. Graphical Methods in structural analysis by D S PrakashRao
8. Structural Analysis – A Unified Approach by D S PrakashRao
9. Mechanics of solids by – R.K .Rajput
10. Strength of Materials – by R.K. Bansal

Suggested E-learning references

1. http://nptel.ac.in

Suggested Learning Outcomes

On completion of the subject the student shall be able to

1.1. Define thin cylinder

1.2. Explain failures of thin cylinders

1.3. Explain longitudinal and hoop stresses in the cylinder under internal pressure

1.4. State the formulae for longitudinal and hoop stresses in riveted and welded thin cylinders.

1.5. Calculate the longitudinal and hoop stresses in the cylinder under internal pressure, given the dimensions of the riveted and welded thin cylinders

1.6. Calculate the thickness of a thin cylinder(riveted/welded)

1.7. State the formulae for strains and changes in dimensions of a thin cylinder

1.8. Calculate the changes in dimensions of a thin cylinder under internal pressure

2.1 Define a dam/ retaining wall.

2.2 List the forces acting on a dam / retaining wall.

2.3 Calculate maximum and minimum stress intensities at the base of a Trapezoidal dam with water face vertical and inclined.

2.4 Sketch the stress distribution at the base of a dam for different conditions

2.5 Calculate the stress intensity at base of a Rectangular / Trapezoidal dam with or without free board

2.6 List the conditions for stability of a dam

2.7 Check the safety of dam to avoid tension in the masonry dam at its base, to prevent the over-turning of the dam, the sliding of dam and to prevent the crushing of masonry/concrete at the base of the dam

2.8 Define middle third rule

2.9 Minimum base width of a dam

2.10 Calculate minimum base width of a trapezoidal / rectangular / triangular sections of a dam without free board to avoid tension at the base

2.11 Calculate the minimum base width of a trapezoidal dam with vertical water face and having free board to avoid tension and sliding.

2.12 Solve the problems on checking the stability of a dam with water face vertical

3.1 Define: i) Angle of repose of soil ii) Angle of Surcharge
iii) Active earth pressure iv) Passive earth pressure

3.2 Differentiate between active earth pressure and passive earth pressure

3.3 Compute the lateral earth pressure on a retaining wall having soil face vertical with levelled earth and surcharge.

3.4 Calculate the stresses at the base of a retaining wall for the above cases

3.5 Calculate the minimum base width of a retaining wall with vertical soil face and levelled earth to avoid tension and sliding at base

3.6 Check the stability of a retaining wall with soil face vertical and having levelled / surcharged earth

4.1. Differentiate between a statically determinate and indeterminate structure.

4.2. Define degree of static indeterminacy

4.3. Calculate degree of static indeterminacy for a propped cantilever, fixed and two span continuous beams.

4.4. Calculate prop reaction of propped cantilever subjected to UDL throughout OR a single point load between fixed and propped ends

4.5. Calculate SF and BM values and draw SFD and BMD for a propped cantilever with above type of loading only.

4.6. Calculate the location of point of contra flexure in propped cantilever for above loading.

4.7. State the merits and demerits of fixed beams.

4.8. Sagging and hogging bending moments

4.9. Derive the conditions required for the analysis of fixed beams by moment area method.

4.10. Derive the formulae for the fixed end moments due to central point load or UDL throughout on a fixed beam.

4.11. Draw SFD and BMD for a fixed beam with above type of loading only.

4.12. State the formulae for maximum deflection in a fixed beam due to above loading.

4.13. Calculate the maximum deflection in a fixed beam using above formulae.

5.1 Define stiffness factor, distribution factor and carry over factor.

5.2 Calculate stiffness factor and distribution factor at an intermediate support of a beam or non-hinged joint.

5.3 Calculate span moments and support moments for two span or three span continuous beams with different end conditions, carrying single point load (central or eccentric) or UDL throughout the individual span, using Moment Distribution method

5.4 Draw BMD only for the two span or three span continuous beams with the above type of loading and end conditions, using moment distribution method.(overhangs, beams with varying moment of inertia, supports at different levels not included)

6.1. Define a frame.

6.2. Classify the fames based on number of members and number of joints.

6.3. Show the sign convention for different types of stresses in members of a truss / frame

6.4. Explain the rules for assuming the direction of stresses in the members.

6.5. Explain the method of calculating stresses / forces in the members of a truss / frame by the method of joints.

6.6. Calculate the stresses / forces in the members of a simply supported or cantilever truss / frame subjected to DL & LL at nodal points by the method of joints and prepare force table.

6.7. Explain the method of calculating stresses / forces in the members of a truss / frame by the method of sections.

6.8. Differentiate method of joints and method of sections.

6.9. Calculate the Forces in the members of a simply supported or cantilever truss/frame subjected to DL and LL at nodal points by the method of sections and prepare force table

Suggested Student Activities

1. Prepare a program in M.S.Excel to analyze a beam in Moment Distribution method
2. Prepare a report on the Identifying and analyzing the trusses found in nearby workshop
3. Prepare the list of dams constructed as part of Mission Kakatiya project executed by Government.
4. Submit a detailed report on Kaleswaram Project.

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	1	3			2	1		1		3	1,2,5,6,8,9,10
CO2	2	3	1		2	2		1		3	1,2,3,5,6,8,10
CO3	1	3	1		2					3	1,2,3,5,10
CO4	2	3								3	1,2,10
CO5	1	3		2	2				2	3	1,2,4,5,9,10
CO6	1	3		2						3	1,2,4,10

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
Assignments		5
Seminars		5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

<table>
<tr><td rowspan="2">Unit No</td><td colspan="3">Questions to be set for SEE</td></tr>
<tr><td colspan="2">R</td><td>U</td><td>A</td></tr>
<tr><td>I</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>II</td></tr>
<tr><td>III</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td></tr>
<tr><td>V</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>VI</td><td>Q7,Q8</td><td>Q10(b),
Q12(a), Q12(b)</td><td>Q14(b),
Q16(a), Q16(b)</td></tr>
<tr><td>Total Questions</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

State Board of Technical Education and Training,Telangana
Model Question Paper
DCE VSemester Mid Semester-I Examination

Course Code:18C-505E(B) **Duration:1 hour**
Course Name: THEORY OF STRUCTURES **Max.Marks:20 Marks**

PART-A

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

1. What is hoop stress?
2. Write the formula to calculate hoop stress and longitudinal stress.
3. State the forces acting on the dam.
4. What is middle third rule?

PART-B

Answer **TWO** questions. Each question carries **THREE** marks **2x 3 = 6 Marks**

5(a). A cylindrical shell of diameter 2.5m and 18mm thickness is subjected to an internal pressure of 5 N/mm^2. Find circumferential and longitudinal stresses developed in the material of the cylinder.

(OR)

5(b). A boiler shell is to be made of 12mm thick plate having limiting tensile stress of 120 N/mm^2. If the efficiency of joint is 70%. Find the diameter for an internal pressure of 2.5 N/mm^2.

6(a). If the magnitude of horizontal water pressure on the vertical back of a dam and the weight of the dam are 320kN and 920kN respectively. Determine the resultant thrust acting on the dam.

(OR)

6(b). Briefly explain about the factor of safety against

a) Over turning
b) Sliding

PART-C

Answer **TWO** questions. Each question carries **FIVE** marks **2x 5 = 10 Marks**

7(a). A cylindrical shell 2.5m long has 1.2m internal diameter and 10mm thickness. Calculate circumferential and longitudinal stresses and changes in dimensions of the shell, if it is subjected to an internal pressure of 2.5 N/mm^2. Take E = 2 x 10^5 N/mm^2 and 1/m = 0.3

(OR)

7(b). Calculate the minimum wall thickness required for a thin cylinder 1.2m diameter, if it is to withstand an internal pressure of 3 N/mm^2 and
(i) Longitudinal stress is not to exceed 30 N/mm^2
(ii) Hoop stress is not to exceed 40 N/mm^2

8(a). A trapezoidal masonry dam 5m high, 1m wide at its top and 3m wide at its bottom retains water on its vertical face. What are the maximum and minimum stresses at the base when the reservoir is empty? Take ω_m= 22kN/m^3 and ω_w= 9.81kN/m^3.

(OR)

8(b) A trapezoidal masonry dam 6m high, 1.5m wide at its top and 3.5m wide at its bottom retains water on its vertical face. What are the maximum and minimum stresses at the base when the reservoir is full? Take ω_m= 22kN/m^3 and ω_w= 9.81kN/m^3.

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

Course Code:18C-505E(B) **Duration:1 hour**
Course Name:THEORY OF STRUCTURES **Max.Marks:20 Marks**

PART-A

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

1. List any two failures of a retaining wall.
2. What is active earth pressure.
3. Define Prop.
4. Define point of contraflexure.

PART-B

Answer **TWO** questions. Each question carries **THREE** marks **2x 3 = 6 Marks**

5(a). A trapezoidal retaining wall 10m high, 3m top width retains earth on vertical face and has a slope of 1:2.5 on the other side. Calculate the distance of its centre of gravity from the toe of the wall.

(OR)

5(b). A trapezoidal masonry retaining wall 2m wide at top and 5m wide at bottom is 7m high. The vertical face retains earth having an angle of repose of 30^0 at a surcharge of 20^0 with the horizontal. Calculate the earth pressure.

6(a). A propped cantilever beam of span 4m carries a Point load of 22 kN at the mid span. Find the prop reaction.

(OR)

6(b). A fixed beam of span 5m carries a UDL of 10kN/m over entire span. Calculate net positive bending moment.

PART-C

Answer **TWO** questions. Each question carries **FIVE** marks **2x 5 = 10 Marks**

7(a). A trapezoidal masonry retaining wall is 12m high and 2m wide at top and 5m wide at bottom with a vertical face retained earth up to its top. Specific weight of masonry and earth are $22kN/m^3$ and $18kN/m^3$ respectively. Angle of repose of soil = 32^0. Calculate the stresses at the base.

(OR)

7(b). A trapezoidal masonry retaining wall is 10m high and 2.5m wide at top and 6m wide at bottom with a vertical face retained earth up to its top. Check the stability of the wall if the allowable pressure on soil is $300kN/m^2$, co-efficient of friction between masonry and the earth is 0.6. The earth pressure on the wall is 960 kN and self weight of wall is 1400 kN.

8(a). A cantilever beam of span 3m propped at its free end is subjected to a u.d.l of 10kN/m over its entire span. Determine the prop reaction and draw the SFD and BMD showing the values at salient points.

(OR)

8(b). A cantilever of 5m span subjected to a point load of 10kN at a distance of 3m from fixed end. If it is propped at its free end, determine the prop reaction and draw the SF and BM diagrams.

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

Course Code: 18C-505E(B) **Duration:2 hours**
Course Name: THORY OF STRUCTURES **Max. Marks: 40 Marks**

PART-A

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

1. Write any two stability conditions of a dam.
2. What is the difference between a dam and a retaining wall.
3. Define a truss and draw a simple truss.
4. What is meant by statically indeterminate beam
5. Define 'Distribution Factor' in Moment Distribution Method?
6. Draw the deflected shapes of a two span continuous beam.
7. State the difference between perfect frame and imperfect frame.
8. Mention any two assumptions made in the analysis of frames.

PART-B

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

9(a). A boiler shell is made of 10mm thick plate having limiting tensile stress of 120 N/mm^2. The efficiencies of longitudinal and circumferential joints are 70% and 40% respectively. Find the maximum permissible diameter of the shell to withstand a pressure of 1.5 N/mm^2.

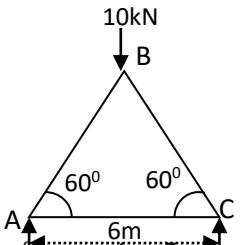
(OR)

9(b). A two span continuous beam ABC of spans 4m and 5m is fixed at A and C. Calculate the distribution factors.

10(a). A fixed beam of span 4.5m carries a point load of 50kN at the centre. Calculate net positive bending moment.

(OR)

10(b). Determine the forces in all the members of the truss shown in figure by method of joints.



11(a). A three span continuous beam ABCD of spans 4m, 5m and 4m is fixed at A and D. Calculate the distribution factors at the joint B.

(OR)

11(b). Explain "Distribution factors" and "Carry over factors".

12(a). Distinguish between a deficient frame and redundant frame with the help of an example.

(OR)

12(b). Briefly explain the method of sections of determining the forces in the members of a frame.

PART-C

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

13(a) The inside diameter of the shell is 0.8m and its length is 1.8m. The thickness of the shell is 15mm. Find the changes in diameter, length and volume when a fluid is introduced in it at a pressure of 1.5 N/mm^2. Take E=200 kN/mm^2 and 1/m = 0.35

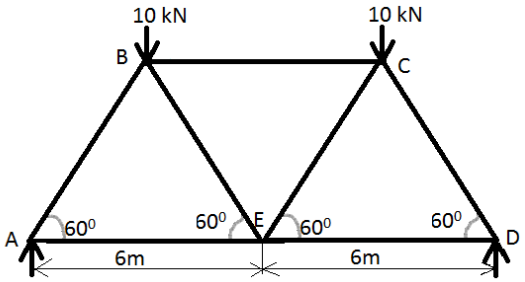
(OR)

13(b) A two span continuous beam ABC is fixed at A and C. Span AB = 5m and span BC = 4m. A central point load of 20kN acts in span AB and a UDL of 8 kN/m acts over span BC. Calculate fixed end moments using Moment Distribution method and draw bending moment diagram.

14(a) A cantilever beam of span 3m propped at its free end is subjected to a u.d.l of 10kN/m over its entire span. Determine the prop reaction and draw the SFD and BMD.

(OR)

14(b) Determine the forces in the members AB, AE, and BC of the truss shown in figure by method of joints.

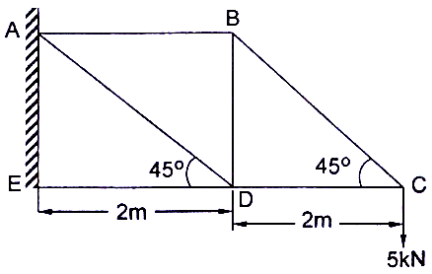


15(a) A two span continuous beam ABC is fixed at A and C. Span AB = 5m and span BC = 6m. A central point load of 20kN acts in span AB and a central point load of 40kN acts over span BC. Calculate fixed end moments using Moment Distribution method and draw bending moment diagram.

(OR)

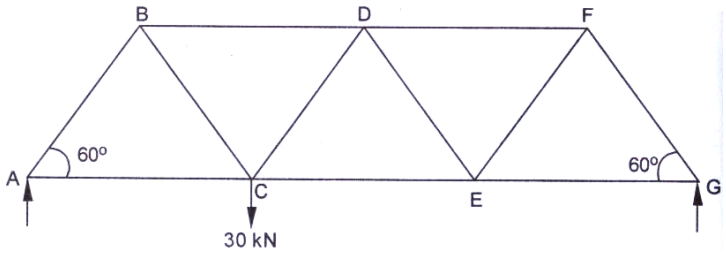
15(b) A two span continuous beam ABC is simply supported at A, B and C. Span AB = 6m and span BC = 4.5m. A central point load of 20kN acts in span AB and a UDL of 8kN/m acts over span BC. Calculate fixed end moments using Moment Distribution method and draw bending moment diagram.

16(a) Determine the forces in the members BC, DC and BD of the truss shown in figure by method of sections.



(OR)

16(b) Determine by method of sections the magnitude and nature of forces induced in the members BD, CA and CE of the girder shown in the figure. Span AC=CE=EG=3m,


B
D
F
60°
60°
A
C
E
G
30 kN

Department of Technical Education
State Board of Technical Education &Training (TS)

Course Title:	**Air Pollution Management**	Course Code :	**18C-505E(C)**
Semester:	**V Semester**	Course Group :	**Elective**
Teaching Scheme in Periods(L:T:P):	**45:15:0**	Credits :	**3**
Methodology :	**Lecture+Assignments**	Total Contact Periods :	**60 Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

Knowledge of Engineering Chemistry and Environmental studies

Course Outcomes

Upon completion of course, the student shall be able to

CO1	Explain the nature and characteristics of air pollutantsand basic concepts of air quality management
CO2	Identify, formulate and solve air and noise pollution problems
CO3	Design stacks and particulate air pollution control devices to meet applicable standards
CO4	Identify and Explain the mechanism involved in various pollution control equipment

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
			R			U	A
1	Sources of Air pollutants	08	Q4	Q1		Q9(a)	Q13(a)
2	Effects of Air pollutants	12					
3	Dispersion of Pollutants	9		Q2		Q10(a)	Q14(a)
4	Air Pollution Control	11					
5	Air Quality Management	12		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Noise Pollution	8			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	60	8			8	8

Course Contents

UNIT I: SOURCES OF AIR POLLUTANTS Duration: 8Periods (L: 6.0 – T: 2.0)

Classification of Air Pollutants – Particulate and Gaseous Pollutants – Secondary air pollutants – pollution caused by Nuclear Energy program– Sources of Air Pollution – Types of gases causing air pollution– Source Inventory

UNIT II: EFFECTS OF AIR POLLUTANTS Duration: 12Periods (L: 9.0 – T: 3.0)

Effects of Air Pollution on Human Beings, Materials, Vegetation, Animals – Atmospheric stability – Global Warming–Green house gases – Ozone Layer Depletion – Sampling and Analysis – Basic Principles of Sampling – Objective of sampling –Iso-kinetic sampling – Source and Ambient Sampling – Stack sampling – Equipment used – Economical aspects of air pollution controlling equipments – Methods of Analysis of Pollutants – Principles

UNIT III: DISPERSION OF POLLUTANTS Duration: 9Periods (L: 7 – T: 2)

Elements of Atmosphere – Meteorological parameters – Wind role in air pollution– Wind Roses – Lapse Rate – Atmospheric Stability and Turbulence – Plume Rise–Types of Plume behaviour –Plume rise formula suggested by Indian standards – Dispersion of Pollutants – Factors affecting Dispersion of Pollutants – Dispersion Models – Merits and Demerits– Applications –Types of Inversion – Particulate emission rate of the power plant

UNIT IV : AIR POLLUTION CONTROL Duration:11Periods(L:8–T:3)

Concepts of Control – Principles And Design Of Control Measures – Particulates Control By Gravitational, Centrifugal, Filtration, Scrubbing, Electrostatic Precipitation – Selection Criteria For Equipment – Objective – Gaseous Pollutant Control By Adsorption, Absorption, Condensation, Combustion– Scrubbing– Types– Collection mechanism– Cyclone separator– Working principle– Types of Electro static Precipitators (ESP) – Working principle– Factors influencing the performances–Bag house filter – Working– Operational problems – Efficiency in gravitational settling chamber – Constitution of Pollution control board– Functions of state and central pollution control boards– Pollution Control For Specific Major Industries-Green building concept.

UNIT V : AIR QUALITY MANAGEMENT Duration: 12Periods (L: 9.0 – T:3.0)

Air Quality Standards of EPA and Indian Standards– Emission standards – Air Quality Monitoring – Air quality index – Purpose –Different stages of work involved– Air act– Industries specified in Air Act 1981 – Legal provisions in India against Air pollution – Ambient air quality standards – Objective– Preventive Measures – Air Pollution Control Efforts – Zoning – Types of Industrial Zone – Town Planning Regulation of New Industries – Legislation and Enforcement – Environmental Impact Assessment and Air Quality

UNIT VI: NOISE POLLUTION Duration: 8Periods (L: 6.0 – T: 2.0)

Noise –Types of Noise Pollution –Sources of Noise Pollution–Causes of Noise Pollution – Ill Effects of Noise Pollution– Noise indicator – Assessment – Standards– Ambient Noise level for Residential

and Industrial Zones –L_N and L_{equi} concept in noise rating – Control Methods – Prevention– Threshold shift

Reference Books

1. Anjaneyulu, D., "Air Pollution And Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N., And Rao H. V. N., Air Pollution Control, Tata McGraw Hill, New Delhi, 1996.
4. Heumann. W.L., "Industrial Air Pollution Control Systems", McGraw Hill, New Yark, 1997.
5. Mahajan S.P., "Pollution Control In Process Industries", Tata McGraw Hill Publishing Company, New Delhi, 1991.
6. Peavy S.W., Rowe D.R. And Tchobanoglous G. "Environmental Engineering", McGraw Hill, New Delhi, 1985.
7. Garg, S.K., "Environmental Engineering Vol. II", Khanna Publishers, New Delhi, 1998
8. Mahajan, S.P., "Pollution Control In Process Industries", Tata McGraw Hill, New Delhi, 1991.
9. Thod Godesh, "Air Quality, Lewis India Edition, 2013.

Suggested E-learning references

1. http://nptel.ac.in
2. E- Lessons prepared by sbtet,TS
3. http://www.youtube.com/user/nptelhrd/search?query=air+pollution

Suggested Learning Outcomes

Upon completion of course, the student shall be able to

1.1 List the sources of air pollution

1.2 Explain about the classification of various air pollutants

1.3 State the secondary air pollutants with examples

1.4 List out the various air pollution caused by nuclear energy program

1.5 Give the detailed account on sources and classification of air pollutants

1.6 Differentiate between particulate and gaseous pollutants

1.7 Discuss about the various types of gases causing air pollution

2.1 Describe in detail the effects of air pollution on human beings, materials, vegetation and animals

2.2 Define atmospheric stability

2.3 Define sampling, what is basic objective of air sampling

2.4 Define iso-kinetic sampling

2.5 State are the basic principles of ambient air sampling and stack sampling, mention the equipment used for the same

2.6 Explain global warming, green house gases, state the contribution of GHG to this

2.7 Explain the economical damage caused by air pollution to a country,

2.8 Discuss in detail about Economical aspects of various air pollution controlling equipments

2.9 Explain methods for analysis of air pollutant at source

2.10 Explain the causes, effects and control of ozone layer depletion

3.1 Discuss about the various metrological parameters that are influencing air pollution

3.2 List the dispersion models

3.3 Describe various Dispersion models in Air pollution control

3.4 write its merits and demerits of various Dispersion models in Air pollution control

3.5 Explain the factors affecting dispersion of air pollutants

3.6 Define plume.

3.7 Describe various types of plume behaviour with neat sketches

3.8 Write the plume rise computing formula suggested by Indian standard (IS:8829)

3.9 Explain the role played by wind in air pollution

3.10 Define lapse rate

3.11 Explain plume behaviour from a stack with respect to the different prevailing lapse rate. with neat sketches.

3.12 Define wind rose

3.13 Write the purpose of wind rose diagram.

3.14 List the types of inversion

3.15 Determine the particulate emission rate of the power plant with given details

4.1 List the factors to be considered while selecting the air pollution control equipment

4.2 Explain the objective of using air pollution control equipment

4.3 Write brief notes on Constitution of pollution control boards, functions of state and central pollution control boards

4.4 State the list of Industries specified in the scheduled Under Air Act 1981

4.5 State the functions of the central board to control air pollution

4.6 Define a cyclone separator

4.7 Explain working principle of cyclone separator

4.8 Explain with the help of neat sketch the working principle of various types of Electro static precipitators (ESP).

4.9 State the factors influencing its performances

4.10 Define bag house filter.

4.11 Explain the working principle of a bag house filter

4.12 List the operational problems involved in bag house filter

4.13 Discuss the collection mechanism and controlling methods of gaseous pollutants from industries.

4.14 Define adsorption.

4.15 Explain the use of adsorption principle for air pollution control

4.16 Explain the control of Gaseous pollutants by adsorption technique

4.17 Suggest a method for control of air pollutants in cement industry and Justify.

4.18 List pollution control equipments

4.19 Explain the principle behind "Combustion" in air pollution control.

4.20 Explain pollution control by combustion.

4.21 Define scrubbing.

4.22 List the types of Scrubbing

4.23 State the collection mechanism of scrubbers

4.24 State the equipment to control particulate matter

4.25 Write the formula to calculate the efficiency in gravitational settling chamber

4.26 Explain the concept and principles used in designing of green building

5.1 Define Emission standards.

5.2 Explain various air quality standards of EPA and Indian Standards , emission standards

5.3 Explain air quality monitoring of a city,

5.4 Explain the different stages of work involved in quality monitoring of a city.

5.5 State guidelines for town planning regulation of new industries in general

5.6 Discuss the role of town planning and zoning in air pollution control.

5.7 Define Air act

5.8 Explain the legal provisions in India against air pollution

5.9 Define air quality index

5.10 State the purpose of air quality index

5.11 State ambient air quality standards

5.12 State objectives of Air quality standards

5.13 Define Environmental Impact Assessment.

5.14 Discuss the role of Environmental Impact Assessment in control of air pollution

5.15 Explain types of industrial zone

5.16 List the measures to be taken to prevent air pollution

6.1 Define noise

6.2 Define sound pressure level

6.3 Explain various types of Noise Pollution

6.4 Explain various sources of noise pollution

6.5 Explain various causes of noise pollution

6.6 Explain the ill-effects of noise pollution on human being

6.7 Define Noise indicator

6.8 Explain the steps in assessment of noise pollution

6.9 State the ambient Noise level for Residential Zone

6.10 State the ambient Noise level for Industrial Zone

6.11 Explain L_N and L_{equi} concept in noise rating

6.12 Explain the importance of design to control the noise at the source

6.13 Explain the methods to control noise pollution in an industrial area

6.14 Explain the principles of achieving noise control in the transmission path

6.15 Explain preventive measures of noise pollution

6.16 Explain the controlling strategies of noise pollution

6.17 Define threshold shift

Suggested Student Activities

1. Prepare a chart on causes of air pollution and diseases caused due to that pollutant
2. Know the level of pollution in your city.
3. Visit a nearby industry and observe the equipments they use to control air pollution & noise pollution
4. Know IS codal provisions on maximum permissible limits of air pollution and noise pollution that an industry can be allowed
5. Give presentation on working principles of ESP and latest advancements
6. Tech fest/Srujana
7. Paper/Poster presentation
8. Quiz
9. Group discussion
10. Surprise Test

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1		2		2	2					3	2,4,5,10
CO2		2		2	2	2	1				2,5,6,7
CO3		2		2	3		2	2			2,4,5,7,8
CO4		3	2	3	2			2		3	2,3,4,5,8,10

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
Assignments		5
Seminars		5
	Total	60

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	4	1	Nil	4 Marks
02	Part-B	Understanding(U)	4	3	2	6 Marks
03	Part-C	Application(A)	4	5	2	10 Marks
Total Marks						20 Marks

MID SEM-I EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-I	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-II	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

MID SEM-II EXAM

S.No	Unit No	R	U	A	Remarks
1	Unit-III	1,2	5(a)	7(a)	
			5(b)	7(b)	
2	Unit-IV	3,4	6(a)	8(a)	
			6(b)	8(b)	
Total Questions		4	4	4	

The length of answer for each question framed in respect of Part-A, B&C shall not exceed ¼ of a page,1 page and 2 pages respectively

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R)	8	1	Nil	8 Marks
02	Part-B	Understanding(U)	8	3	4	12 Marks
03	Part-C	Application(A)	8	5	4	20 Marks
Total Marks						40 Marks

<table>
<tr><td rowspan="2">Unit No</td><td colspan="3">Questions to be set for SEE</td></tr>
<tr><td colspan="2">R</td><td>U</td><td>A</td></tr>
<tr><td>I</td><td rowspan="7">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>II</td></tr>
<tr><td>III</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td></tr>
<tr><td>V</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>VI</td><td>Q7,Q8</td><td>Q10(b),
Q12(a), Q12(b)</td><td>Q14(b),
Q16(a), Q16(b)</td></tr>
<tr><td>Total Questions</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
</table>

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

DCE VSemester
Mid Semester-I Examination

Course Code: 18C-505E(C) **Duration: 1 Hour**
Course Name: Air Pollution Management **Max.Marks: 20 Marks**

PART-A

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

5) List any two sources of Air pollution.
6) What are the secondary air pollutants
7) Define sampling
8) Define Atmospheric stability

PART-B

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

5(a)Classify various sources of Air pollution

(OR)

5(b) List various air pollutants in nuclear energy program.

6(a) Explain the basic objective of air sampling

(OR)

6(b) Explain the control of ozone layer depletion

PART-C

Answer **two** questions. Each question carries **five** marks **2x5 = 10Marks**

7(a) Differentiate between particulate and gaseous pollutants

(OR)

7(b) Discuss about the various types of gases causing air pollution

8(a) Describe in detail the effects of air pollution on human beings, vegetation and animals

(OR)

8(b) Identify the methods for analysis of air pollutant at source and Explain any two methods.

DCE VSemester
Mid Semester-IIExamination

Course Code:18C-505E(C) **Duration:1 Hour**
Course Name: Air Pollution Management **Max.Marks:20 Marks**

PART-A

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

1) What is lapse rate?
2) List any two factors affecting dispersion of air pollutants
3) What is scrubbing?
4) List any two equipments to control particulate matter

PART-B

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

5(a) Write the merits of dispersion models in Air pollution control

(OR)

5(b) Write the types of Inversion

6(a) Write brief notes on Constitution of pollution control boards

(OR)

6(b)Explain how Gaseous pollutants can be controlled by adsorption technique?

PART-C

Answer **two** questions. Each question carries **five** marks **2x5 = 10Marks**

7(a) Discuss about the various metrological parameters that are influencing air pollution

(OR)

7(b) What is Wind rose and mention the purpose of wind rose diagrams?

8(a) Justify -Which method will you suggest for control of air pollutants in cement industry.

(OR)

8(b) Examine the factors influencing performance of Electrostatic Precipitator and with help of a neat sketch explain the working principle of a ESP.

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

Course Code: 18C-505E(C) **Duration: 2 Hours**
Course Name: Air Pollution Management **Maximum .Marks: 40 Marks**

PART-A

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

9) List any two pollutants from nuclear energy program
10) What is plume?
11) What is Air Act?
12) What is iso-kinetic sampling?
13) Define Emission standards.
14) Define air quality index.
15) Define noise.
16) List any two preventive measures to control noise pollution

PART-B

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

9(a) Classify various sources of air pollution.

(OR)

9(b) Explain types of industrial zone?

10(a) How do wind play its role in air pollution, explain?

(OR)

10(b) Classify various types of Noise pollution

11(a) Give the guidelines for town planning regulation of new industries in general

(OR)

11(b) What are ambient air quality standards?

12(a) Explain the steps in assessment of noise pollution

(OR)

12(b) What is noise indicator?

PART-C

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

13(a) Discuss in detail about Economical aspects of various air pollution controlling equipments

(OR)

13(b) Define Environmental Impact Assessment, discuss how it helps in control of air pollution

14(a) Explain plume behaviour form a stack with respect to the different prevailing lapse rate use neat sketches.

(OR)

14(b) How could noise control be achieved at the source by design, Explain?

15(a) List and explain the measures to be taken to prevent air pollution

(OR)

15(b)How do town planning and zoning could bring air pollution control?

16(a) Explain the principles of achieving noise control in the transmission path

(OR)

16(b) Explain briefly the various sources and causes of noise pollution and the ill-effects of noise pollution on human being.

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Structural Engineering Drawing**	Course Code :	**18C-506P**
Semester:	**V Semester**	Course Group :	**Practical**
Teaching Scheme in Periods(L:T:P):	**15:0:30**	Credits :	**1.5**
Methodology :	**Lecture+ Practical**	Total Contact Periods :	**45Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

Basic knowledge of Engineering Drawing and Design principles of RCC , ability to visualize 2D and 3D.

Course Outcomes

CO1	Explain structural planning of building and marking of frame components
CO2	Prepare detailed structural drawings of Beams and Lintels
CO3	Prepare detailed structural drawings of R.C.C Slabs
CO4	Prepare detailed structural drawings of footings, stair cases and earthquake resisting structures

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE		
			R	U	A
1	Structural Planning And marking of Frame Components	15	1		1
	R.C.C Drawings- Beams and Lintels			1	
2	R.C.C Drawings – Slabs	15			
3	R.C.C Drawings - Columns with footing, Stair cases and Earthquake resistant structures	15		1	1
	Reading and interpretation of drawings			1	
	Total	45	1	3	2

Course Contents

UNIT 1: Structural planning of a building and marking of Frame components and R.C.C Drawings- Beams and Lintels

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

a) Draws the position of columns, beams, slabs, stairs and footing in a given line diagram of building-guidelines and space standards for barrier free built environment

b) Prepare member reference scheme of given building following Column reference scheme & Grid reference scheme as per IS: 5525 – (recommendations for detailing of reinforced concrete works). & SP:34

c) Singly reinforced simply supported rectangular beam

d) Lintel cum sunshade

UNIT 2: R.C.C Drawings- Slabs **Duration: 15 Periods.(L:5-P:10)**

a) Simply supported one-way slab.

b) Two-way slab simply supported corners not held down.

c) Two-way slab simply supported corners held down.

d) One-way continuous slab and T-beam (with details of slab and T-beam)

UNIT 3: R.C.C Drawings -Columns with footing, Stair cases and Earthquake resistant structures and Read and interpret the drawings

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

a)Column with square footing of uniform thickness.

b) Stair case – stairs spanning longitudinally (Dog legged stair case)

c) Frame showing the details of reinforcement for earth quake resistant structures

d) Take the details of reinforcement from the given drawings

e) Preparation of Schedule of reinforcement for a given structural drawing.

Recommended Books

1. Hand book on Concrete reinforcement and detailing (IS CODE – SP 34)
2. IS 5525: Recommendations for detailing of reinforcement in reinforced concrete works by Bureau of Indian Standards

Suggested E-learning references

1. http://nptel.ac.in

Suggested Learning Outcomes

Upon completion of the subject the student shall be able to

1.1 Understand Positioning and Orientation of beams and column base upon the guidelines and space standards for barrier free built environment.

1.2 Understand Spanning of slabs , layout of stairs

1.3 List types of footings

1.4 Prepare member reference scheme of given building following

a) Column reference scheme and

b) Grid reference scheme (Scheme recommended by IS:5525 –recommended for detailing of reinforced concrete works and SP-34)

1.5 Draw the longitudinal section and cross sections of singly reinforced simply supported rectangular beam.

1.6 Prepare schedule of reinforcement and quantity of steel for singly reinforced simply supported rectangular beam

1.7 Draw the longitudinal and cross section of lintel cum sunshade

1.8 Prepare schedule of reinforcement and quantity of steel for lintel cum sunshade

2.1 Draw the plan and longitudinal section of one-way slab showing reinforcement details.

2.2 Prepare schedule of reinforcement and quantity of steel for one-way slab showing reinforcement details

2.3 Draw the details of reinforcement of two-way simply supported slab with corners not held down condition.

2.4 Draw top and bottom plan and section along short and long spans of two way simply supported slab with corners not held down condition

2.5 Prepare schedule of reinforcement of two-way simply supported slab with corners not held down condition

2.6 Draw the details of reinforcement of two-way simply supported slab with corners held down conditions.

2.7 Draw top and bottom plan and section along short and long spans have to be drawn (Scheduling of reinforcement is not necessary).

2.8 Draw the details of reinforcement of one-way continuous slab along with T- beam with details of slab and T-beam (plan and section of continuous slab and longitudinal section of T-beam have to be drawn). (Scheduling of steel is not necessary)

3.1 Draw the details of column and square footing (plan and sectional elevation) prepare schedule of reinforcement of column and footing and quantity of steel required.

3.2 Draw the reinforcement details of dog legged stair case (section only) prepare schedule of reinforcement for one flight including landing.

3.3 Understand the details of reinforcement from the given drawings

3.4 Fill in the details of reinforcement in a drawing.

Suggested Student Activities

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

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	3	2		1		2	2		2	1,2,3,5,7,8,10

CO2		3	2	3				2	2	2	2,3,4,8,9,10
CO3		3	2	3				2	2	2	2,3,4,8,9,10
CO4		3	3	3				2	2	3	2,3,4,8,9,10

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R) and Understanding(U)	2	4	Nil	8 Marks
02	Part-B	Application(A)	2	12	1	12 Marks
				Total Marks		20 Marks

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

Sl.No	Description	Level	No of Questions	Marks for each question	Choice	Total Marks
01	Part-A	Remembering(R) and Understanding(U)	4	4	Nil	16 Marks
02	Part-B	Application(A)	2	24	1	24 Marks
				Total Marks		40 Marks

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

Course Code: 18C-506P **Duration: 1 Hour**
Course Name: Structural Engineering Drawing **Max.Marks: 20 Marks**

PART-A

Answer all questions. Each question carries **four** marks
2x4=8Marks

Instructions : (1) To be drawn not to scale.
(2) Assume suitable data, if necessary.

1. State any two guiding principles for positioning in a structural planning of a building for the following. a) Columns b) Beams.

2. Mark the position of columns in the given diagram and name them as per 'Grid Reference Scheme'

ROOM 4000 X 3600 MM	ROOM 2000 X 3600 MM

PART-B

Answer any one questions. Each question carries twelve marks1 x 12=12 Marks

Instructions :
(1) Draw all questions to scale.
(2) Any missing data may be assumed suitably

3. A singly reinforced rectangular beam of width 230mm and gross depth 400mm is simply supported over a clear span of 3000 mm. Bearing on each side is 200 mm.It is reinforced with 4 nos 16mm dia bars with a clear cover of 40 mm and 2 anchor bars of 12 mm dia are provided.
Middle bars of tension reinforcement are cranked through 45^0at a distance of 0.1 times the clear span from the face of the support. To resist shear two legged stirrups of 8 mm dia at 225 mm c/c are provided. The end covers are 40mm.The materials used were M20 grade concrete and deformed bars of grade Fe415.
Draw the longitudinal section for the above specifications to a scale of 1:15

4. A RCC lintel with sunshade has the following specifications :

Clear span of Lintel—1·50 m
Width of wall—230 mm
Size of Lintel—230 mm × 200 mm
Bearing on walls—150 mm
Reinforcement of Lintel
Main reinforcement—4 Nos. of 12 mm dia (middle two bars cranked at 45° at 220 mm fromface of the support)
Hanger bars—2 Nos. of 10 mm dia
Stirrups—6 mm dia 2 legged at 180 mm c/c throughout
Projection of sunshade from face of the wall—600 mm
Thickness of sunshade—80 mm at fixed end. 60 mm at free end
Reinforcement of sunshade :
Main bars—10 mm dia bars at 150 mm c/c
Distribution steel—8 mm dia @ 180 mm c/c
Covers:
Bottom clear cover in lintel:30 mm
Top clear cover in sunshade:20 mm
All the remaining covers :25 mm

Draw to a scale of 1 : 5thecross-section of Lintel with sunshade at mid span.

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

Course Code: 18C-506P **Duration: 1 Hour**
Course Name: Structural Engineering Drawing **Max.Marks: 20 Marks**

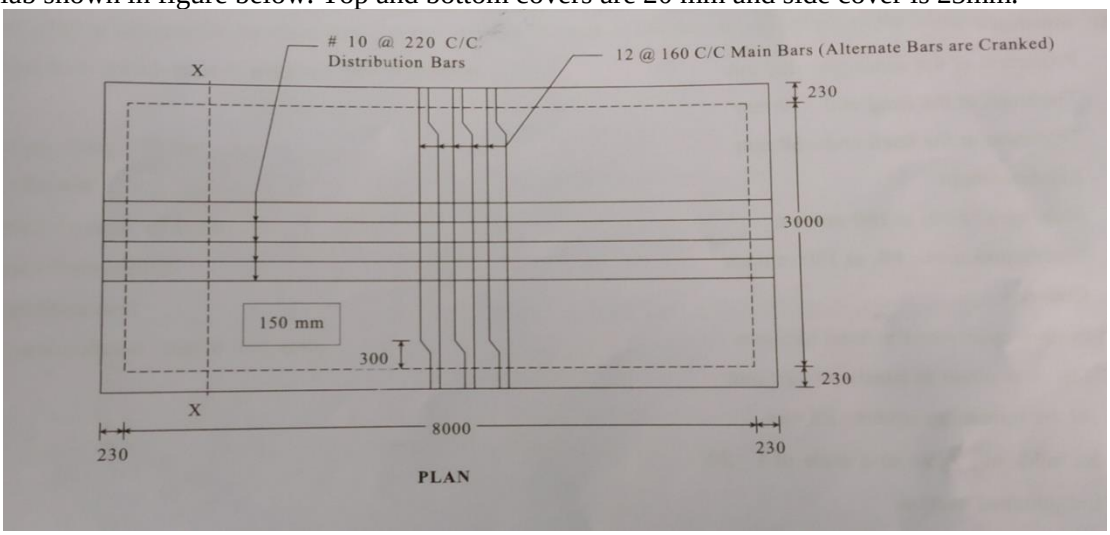
PART-A

Answer all questions. Each question carries four marks
2x4=8Marks

Instructions : (1) To be drawn not to scale.
(2) Assume suitable data, if necessary.

1. Draw the cross section showing reinforcement details of simply supported one way slab along shorter span with the following specifications
   I. Clear span [shorter] = 2.8m
   II. Clear span [longer] = 6.0m
   III. Bearing on all the sides = 230mm
   IV. Overall depth of the slab = 130mm
   V. **Steel**
   Main steel = # 10 at 170mm c/c, all main bars are cranked on one side alternatively at a distance of 280mm from the face of the support.
   Distribution steel = # 8 @ 200mmc/c
   Hanger bars = 3 # 8 on each side (to support cranked bars)
   VI. **Covers**
   Bottom clear cover=20mm
   Top clear cover = 20mm
   Side covers = 25mm
   VII. **Materials**
   Concrete = M 20 grade concrete
   Steel = Fe415

2. Prepare the bar bending schedule and find the total quantity of steel required for one way slab shown in figure below. Top and bottom covers are 20 mm and side cover is 25mm.



PART-B

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

Instructions :

(1) Draw all questions to scale.

(2) Any missing data may be assumed suitably

3. Draw to scale of 1:20 the bottom plan of reinforcement of a simply supported Two way slab with the following specifications:

   Size of the room : 4.2 m x 5.0 m
   Edge conditions : simply supported, corners not held down
   Overall depth of the slab:140mm
   Bearing on walls :230mm

   Reinforcement:

   Steel for shorter span = #12 at 220mm c/c (alternate bars are cranked at a distance of 400mm from face of support)

   Steel for longer span = # 10 at 250mm c/c (alternate bars are cranked at a distance of 500mm from the face of the support)

   Covers:

   Bottom clear cover = 20mm
   Top clear cover = 20mm
   Side covers = 25mm

   Materials:

   Concrete : M20 grade
   Steel : Fe415

4. Draw the reinforcement details of a simply supported two way slab whose corners are held down with the following specifications.

   Specifications:

   Size of the room = 4.8 m x6.2 m
   Edge conditions = simply supported, corners held down
   Overall depth of the slab =160mm
   Bearing on walls = 300mm

   Reinforcement Along **shorter span:**

   In middle strip = 12m dia. at 180mm c/c
   In edge strip = 12mm dia. at 300mm c/c
   (Alternate bars are cranked at a distance of 480 mm from the face of the support)

   Reinforcement Along longer span

   In middle strip=12mm dia at 220 mm C/C
   In edge strip=12mm dia at 300 mm C/C
   (Alternate bars are cranked at a distance of 620mm from the face of the support)

   Torsion reinforcement

   In the form of mesh 990 mm x990 mm in four layers with 8mm dia. bars 10 nos in each layer at all four corners

   Covers:

   Bottom clear cover = 20mm
   Top clear cover =20mm
   Side covers =25mm

   Materials;

Concrete: M20 grade concrete
Steel : Fe415 steel

Draw to a scale of 1:25 bottom plan of the reinforcement

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

Course Code: 18C-506P **Duration: 2 Hour**
Course Name: Structural Engineering Drawing **Max.Marks: 40 Marks**

PART-A

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

Instructions : (1) To be drawn not to scale.
(2) Assume suitable data, if necessary

1. State any five guiding principles for positioning of columns in a structural planning of a building.
2. A singly reinforced rectangular beam of width 230mm and gross depth 400mm is simply supported over a clear span of 3000 mm. Bearing on each side is 200 mm.It is reinforced with 4 nos 16mm dia bars with a clear cover of 40 mm and 2 anchor bars of 12 mm dia are provided.

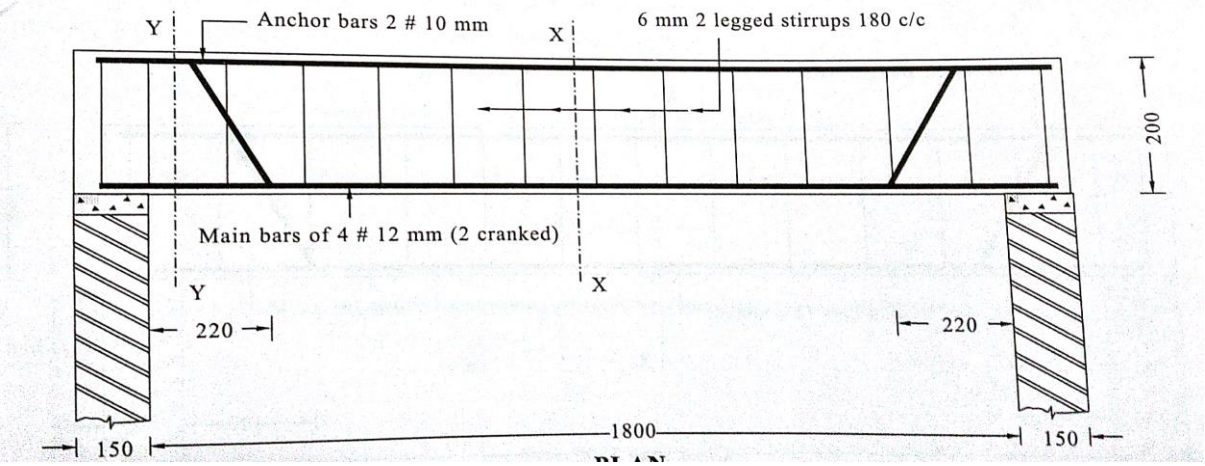
   Middle bars of tension reinforcement are cranked through 45^0at a distance of 0.1 times the clear span from the face of the support.To resist shear two legged stirrups of 8 mm dia at 225 mm c/c are provided. The end covers are 40mm.The materials used were M20 grade concrete and deformed bars of grade Fe415.

   Draw the cross section of the beam at middle span for the above specifications

3. Draw the longitudinal section of an isolated square footing for a column with the following specifications.

   Size of the column = 400x400mm
   Size of the footing=2100x2100mm
   Thickness of the footing=450mm
   Base course thickness: 150mm with P.C.C, 1:2:4
   Reinforcement for footing :
   12mm dia at 160 mm c/c in both the directions at bottom with a clear cover of 50mm. The horizontal lap length of the column reinforcing bar is 500mm each.
   Reinforcement for the column:
   Main bars: 16mm dia bars 4nos
   Lateral ties: 8mm dia ties at 220mm c/c ,
   All covers 50mm
   Materials Used:
   M20 Grade Concrete and Fe415 Steel

4. Prepare the bar bending schedule and find the quantity of steel required for the main reinforcement for lintel shown in the figure below. Top and bottom covers are 25mm and all the remaining covers are 40mm



PART-B

Answer **any one** question. Each question carries **Twenty four** marks **1 x 24= 24 Marks**

Instructions :

(1) Draw all questions to scale.

(2) Any missing data may be assumed suitably

5. Draw the reinforcement details of a simply supported singly reinforced RCC beam with the following specifications:

Specifcations;

Clear span of the beam : 3800mm
Bearing on either side : 200mm
Width of the beam : 300mm
Overall depth of the beam :500mm

Materials:

Concrete :M20 grade
Steel : Fe 415 steel

Reinforcement :

Bars in tension : 4 # 16,out of which 2 middle bars are cranked at a distance of 400mm from the face of the support at 45 °
Hanger bars :2#12
Stirrups: #8,two legged stirrups at 200mm c/c throughout .

Covers:

Top and bottom clear cover :25mm
Side clear cover:40mm

Draw the following views to a scale of 1:20

I. Longitudinal section of beam
II. Cross section at the mid span

6. Draw the reinforcement details of a longitudinally spanned doglegged stair case with the following specifications to a scale of 1:20.

Specifications:
Size of the stair case room: 2500x4000mm
Height of the floor : 3600mm
Tread(T) : 270mm
Rise(R) : 150mm
Thickness of the waist slab : 200mm
Bearing in the wall: 200mm
Thickness of the wall: 300mm
Projection into the basement :300x300mm
Width of the staircase:1200mm

Reinforcement:
Main bars:12mm dia bars at 160mm c/c (Alternate bars are cranked at L/7 from the bottom end)
Distribution bars: 8mm dia bars at170mm c/c
Additional bars of 12mm dia at 140mm c/c at the junction of landing slab with the waist slab. Project this bars through a distance of 1000mm from the junction point downwards parallel to the waist slab.

Covers:
Bottom clear cover= 20mm
All the remaining covers= 25mm

Materials used:
Concrete: M20 grade
Steel: Fe 415

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Construction Technology Lab**	Course Code :	**18C-507P**
Semester:	**V Semester**	Course Group :	**Practical**
Teaching Scheme in Periods(L:T:P):	**15:0:30**	Credits :	**1.5**
Methodology :	**Lecture+ Practical**	Total Contact Periods :	**45Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

This course requires the knowledge of Construction Materials , Strength of materials, Reinforced Cement Concrete and Soil mechanics

Course Outcomes

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

CO1	Use standard equipment like UTM, Hardness testing machine etc for conducting different tests and determine different properties of metals
CO2	Check the suitability of aggregates and soils for use in different works as per standards
CO3	Test for workability of fresh concrete for use in a particular RCC work as per standards
CO4	Prepare Concrete cubes and cylinders as per standards to determine the compressive strength and tensile strength of concrete

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods
1	Tests on Metals	15
2	Tests on Aggregates and soils	15
3	Tests on Concrete	15
	Total	45

Course Contents

UNIT 1: Tests on Metals **Duration: 15 Periods (L:5 – P:10)**

a) Tension test on mild steel rod

b) Torsion test on mild steel rod

c) Hardness Test on different metals(Brinell's/Rockwell's)

d) Izod/Charpy's Impact test on metals

e) Deflection test on beam

UNIT2: Tests on Aggregates and Soils **Duration: 15 Periods(L:5 – P:10)**

a) Specific Gravity of fine and coarse aggregate

b) Flakiness and Elongation Index of Coarse Aggregate

c) Field density of soil (sand replacement method)

d) Liquid Limit, Plastic Limit and Shrinkage Limit(Atterberg's Limits)

e) Proctor Compaction Test

UNIT 3: Tests on Concrete **Duration: 15 Periods(L:5-P:10)**

a) Workability by slump cone test.

b) Workability by compaction factor test

c) Casting and Testing of Cement concrete cubes for compression

d) Split tensile strength of concrete.

e) Non destructive and Destructive tests on hardened concrete theory only

KEY Competencies to be achieved by the student

S. No	Experiment Title	Key Competency
1	Tension test on mild steel rod	1.Marking of gauge length on the MS Rod
		2.Fixing the specimen correctly in between jaws
		3.Application of load at required rate carefully
		4..Measuring the load at failure accurately
2	Torsion test on mild steel rod	1.Measurment of length and diameter of the specimen accurately
		2.Application of load accurately
		3.Measuring the angle of rotation accurately
3	Brinell/Rockwell Hardness test	1.Placing of specimen at exact position
		2.Application and release of load at required rate
4	Izod/Charpy test on mild steel/brass	1.Preparation of standard specimen and fixing the specimen in the right position of anvil
		2.Recording down the reading by observing the appropriate scale
5	Deflection test on beams(central point load)	1.Measuring the dimensions of specimen accurately
		2.Application of load at exact point of application
		3.Measurement of deflection accurately
6	Specific Gravity of fine and Coarse aggregate	1.Take weights accurately, record the observations and calculate accurately
7	Flakiness and Elongation Index of	1.Correct arrangement of sieves used for the sieve analysis of fine or coarse aggregate

	coarse aggregate	2.Weighing of aggregate passing through thickness /length gauge correctly
8	Field density of soil (Sand Replacement Method)	1.Calibrate the apparatus correctly
		2. Weigh the samples accurately
		3.Calculate the density accurately
9	Attenberg's Limits	1. Collecting required sample of soil and determining its water content
10	Proctor's Compaction Test	1.Weigh the soil accurately
		2.determine the water content accurately
		3. Apply required number of blows of compaction accurately
		4. Record the observations correctly and draw the graph
11	Workability by Slump Cone Test	1. Weigh the material accurately
		2.Apply required number of tampings for each layer of concrete
		3. Measure the subsidence accurately
12	Compaction Factor test on Concrete	1. Weigh the material accurately
		2.Weigh the mould and concrete accurately
		3. Calculate the compaction factor correctly
13	Casting of Cement Concrete Cubes	1.Weigh the material accurately
		2.Vibrate the concrete filled in moulds to the required time correctly
		3. Cure the demoulded cubes to the required period
13a	Testing of cement concrete cubes for compression	1.Apply the load at required rate correctly
		2. Record the load at failure correctly
		3. Calculate the compressive strength accurately
14	Split Tensile Strength of Concrete	1.Apply the load at required rate correctly
		2. Record the load at failure correctly
		3. Calculate the Split Tensile Strength accurately
15	Non Destructive test	Calculate compressive strength of concrete by using rebound hammer.

Recommended Books

1. Laboratory manual on Testing of Engineering Materials by Hemant Sood,New Age International Publishers,New Delhi
2. Building and Construction materials Testing and Quality Control by M.L.Gambhir and Neha Jamwal,McgrawHill,India
3. Material Testing Laboratory manual by C.B.Kukreja, Kishore.K and Ravi Chawla,Standard Publishers Distributors

Suggested E-learning references

1. http://nptel.ac.in
2. https://docslide.us/documents/som-bmt-lab-manual-final.html
3. http://www.nitttrchd.ac.in/sitenew1/nctel/civil.php

Suggested Learning Outcomes

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

1.1 State the properties of mild steel used as reinforcement in concrete

1.2 State various tests conducted on mild steel by using UTM

1.3 Explain the tension test on Mild steel specimen

1.4 Conduct tension test on mild steel using UTM

1.5 Interpret the behaviour of the steel with increasing load

1.6 Draw inferences from tests on different grades of steel

1.8 Explain the Torsion test on mild steel specimen

1.9 Find the rigidity modulus by conducting the Torsion test on mild steel specimen

1.10 State the significance of hardness of metals

1.11 Explain the hardness test by Brinell/ Rockwell testing machine

1.12 Calculate BHN and Rockwell's hardness on given steel samples

1.14 State of effect of impact loading over structures made of different metals

1.15 Explain method of Izod/Charpy impact test on Mild steel specimen

1.16 Calculate Impact load on Mild steel specimens by sing Izod/Charpy Testing machine

1.17 Use apparatus required for conducting deflection tests on beams under central point load

1.18 Find the Young's modulus by conducting deflection test on steel and wooden beams at different positions of loading

2.1 State the importance of specific gravity of fine and coarse aggregate

2.2 State the range of specific gravity values for various naturally available fine and coarse aggregate

2.3 Use the apparatus required for conducting specific gravity test on both fine and coarse aggregate

2.4 Calculate the specific gravity of fine and coarse aggregates

2.5 State the significance of flakiness index of aggregate on strength and workability properties of concrete

2.6 State the standards of flakiness index of aggregates

2.7 Explain the procedure and calculate the flakiness index for given sample of coarse aggregate

2.8 State the significance of elongation index of aggregate on strength and workability properties of concrete

2.9 State the standards of elongation index of aggregate

2.10 Explain the procedure and calculate the elongation index of given sample of coarse aggregate

2.11 Study the significance of field density of soil

2.12 Use the apparatus required for conducting field density of soil

2.13 Explain the procedure for conducting field density test on soil by sand replacement method

2.14 Calculate the field density of given sample of soil by sand replacement method

2.15 Study the significance of Atterberg's limits of soil in Civil Engineering activities

2.16 Use apparatus required for conducting tests to determine Atterberg limits of soil

2.17 Explain the procedure for finding Atterberg's limits of soil

2.18 Perform tests to determine liquid limit, Plastic limit and Shrinkage limit of a given soil sample

2.19 Calculate the values of Atterberg limits of given soil sample from the observation of tests

2.20 Study the significance of proctor compaction test

2.21 Use the apparatus required for conducting proctor compaction test

2.22 Explain the procedure for conducting proctor compaction test

2.23 Conduct proctor compaction test over given sample of soil

2.24 Compare the observations of tests conducted on different types of soils

2.25 Draw the graph for proctor's compaction test

2.26 Calculate the values OMC and MDD of given soil sample from the observations of test

3.1 State the importance of workability on strength properties of concrete

3.2 State various types of tests used for measuring the workability of fresh concrete

3.3 State standards of workability of concrete used for different places of construction work

3.4 Explain and perform slump test of workability on fresh concrete for given ingredients

3.5 Draw inference from test results on slump test on workability of concrete made with Coarse aggregate having different elongation index

3.6 Draw inference from test results on slump test on workability of concrete made with Coarse aggregate having different flakiness index

3.7 Compare the slumps of concrete made with gap graded coarse aggregate and well graded coarse aggregate

3.8 State the purpose of compaction of concrete

3.9 Explain and Perform compaction factor test of workability on fresh concrete for given ingredients

3.10 Draw inference from test results on compaction factor test of workability of concrete made with coarse aggregate having different elongation index values

3.11 Draw inference from test results on compaction factor test of workability of concrete made with coarse aggregate having different flakiness index values

3.12 Compare the compaction factors of concrete made with gap graded coarse aggregate and that made with well graded coarse aggregate

3.13 Study the purpose of casting of concrete cubes

3.14 Use equipment required for casting of cement concrete cubes

3.15 Explain the procedure for casting concrete cubes

3.16 Cast the concrete cubes with given ingredients

3.17 State the importance of testing concrete cubes

3.18 Use equipment required for conducting compression test concrete cubes

3.19 State the precautions to be taken for testing of concrete cubes

3.20 Explain the procedure for conducting compression test on concrete cubes

3.21 Draw inference from test results on compressive strength of concrete cubes Made with coarse aggregate having different elongation index values

3.22 Draw inference from test results on compressive strength of concrete cubes Made with coarse aggregate having different flakiness index values

3.23 Compare the compressive strengths of concrete cubes of concrete made with gap graded coarse aggregate and that made with well graded coarse aggregate

3.24 Compare the compressive strengths of concrete cubes of concrete made with Potable water and concrete cubes made and cured with non-potable water

3.25 State the importance of split tensile strength of concrete

3.26 Cast the concrete cylinders with given ingredients

3.27 Find the split tensile strength test on concrete cylinder

3.28 Calculate compressive strength of concrete by using rebound hammer.

Suggested Student Activities

1. Take the students for industrial visit for a nearby industry Select any two materials used for various mechanical engineering applications. Compare their mechanical properties
2. Collecting and study of various IS codes regarding testing of materials
3. Presentation on Strain gauges, strain indicators, extensometer.
4. Report on working principles of equipment
5. Tools and equipment used with pictorial presentation chart
6. Collecting Specifications of various materials and correlate with standards.
7. Study the methods of enhancing workability of concrete without using any admixtures
8. Collect different soils and test for their properties in the lab
9. Collection of minimum compression strength values and water cement ratio of concrete used for different structural components from IS codes
10. Tech fest/Srujana
11. Paper/Poster presentation
12. Group discussion

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1		2		2				1		2	2,4,8,10
CO2		2	3	2			1	2	2	2	2,3,4,7,8,9,10
CO3		3	2	2			1	3	2	2	2,3.4,7,8,9,10
CO4		2		3			2	3	2	2	2,.4,7,8,9,10

State Board of Technical Education and Training,Telangana
Mid Sem-I Model Question paper
DCE V semester

Course Code:18C-507P **Duration:1 hour**
Course Name: Construction Technology Lab **Max.Marks:20 Marks**

Instructions to the Candidate:
(i)Answer any One of the following Questions..Each question carries 20 marks
(ii) Check the suitability of the given construction material by drawing suitable inference

1) Determine the various parameters of stress strain curve for the given mild steel specimen.
2) Determine the modulus of rigidity for the given sample by conducting torsion test
3) Determine the Brinell's harness number for the given metal sample
4) Determine the Rockwell's hardness number for the given metal sample
5) Find the Izod impact value for the given metal specimen
6) Find the Charpy impact value for the given metal specimen
7) Determine the Young's modulus of the given material by conducting deflection test under central point load

State Board of Technical Education and Training,Telangana
Mid Sem-IIModel Question paper
DCE V semester

Course Code:18C-507P **Duration:1 hour**
Course Name: Construction Technology Lab **Max.Marks:20 Marks**

Instructions to the Candidate:
(i)Answer any One of the following Questions.Each question carries 20 marks
(ii) Check the suitability of the given construction material by drawing suitable inference

1) Calculate the specific gravity of the given aggregate
2) Calculate the flakiness index of given sample of aggregate
3) Calculate the elongation index of given sample of aggregate
4) Calculate the field density of soil using sand replacement method
5) Determine the liquid limit of the given soil sample
6) Determine the plastic limit of the given soil sample
7) Calculate the optimum moisture content and maximum dry density for the given sample using Proctor's compaction test

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

Course Code:18C-507P **Duration:2 hours**
Course Name: Construction Technology Lab **Max.Marks:40 Marks**

Instructions to the Candidate:
(i)Answer any One of the following Questions.Each question carries 40 marks
(ii) Check the suitability of the given construction material by drawing suitable inference

1) Determine the various parameters of stress strain curve for the given mild steel specimen.
2) Determine the modulus of rigidity for the given sample by conducting torsion test
3) Determine the Brinell's harness number for the given metal sample
4) Determine the Rockwell's hardness number for the given metal sample
5) Find the Izod impact value for the given metal specimen
6) Find the Charpy impact value for the given metal specimen
7) Determine the Young's modulus of the given material by conducting deflection test under central point load
8) Calculate the flakiness index of given sample of aggregate
9) Calculate the elongation index of given sample of aggregate
10) Calculate the field density of soil using sand replacement method
11) Determine the liquid limit of the given soil sample
12) Determine the plastic limit of the given soil sample
13) Calculate the optimum moisture content and maximum dry density for the given sample using Proctor's compaction test
14) Determine workability of the fresh concrete prepared with the given mix proportion and water cement ratio using slump test
15) Determine the compaction factor of the fresh concrete prepared with the given mix proportion and water cement ratio using compaction factor test.
16) Prepare three sample concrete cubes with the given mix proportion and water cement ratio
17) Calculate the compressive strength of the given cement concrete cubes
18) Calculate the split tensile strength of the given concrete cylinders

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Civil Engineering Computer Applications Lab**	Course Code :	**18C-508P**
Semester:	**V Semester**	Course Group :	**Practical**
Teaching Scheme in Periods(L:T:P):	**15:0:30**	Credits :	**1.5**
Methodology :	**Lecture+ Practical**	Total Contact Periods :	**45Periods**
CIE :	**60 Marks**	SEE :	**40 Marks**

Pre requisites

Basic core knowledge of designing, Project management and Building services

Course Outcomes

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

CO1	Create a model of the structure, apply properties, apply loads, give supports
CO2	Analyse and Design the Structure and summarize results
CO3	Prepare Schedules for resource allocation and networks for execution of projects
CO4	Calculate Duration and Critical Path of the Project
CO5	Prepare layout of various building services designs for multi-storeyed structures

Course Content

Unit No	Unit Name	Periods
1	**Structural analysis and design using latest version of STAAD PRO**	15
2	**Practice on Project Management software.** .	15
3	**Practice on Software for Building Services**	15
	Total	45

Course Contents

UNIT 1: Structural analysis and Design using latest version of STAAD PRO

Duration: 15Periods(L: 5 – P: 10)

Model Generation – Navigating the STAAD.Pro Graphical User Interface, Creating Structure Geometry, Editing Structure Geometry, Viewing Structure Geometry

Property Assignment – Creating groups to quickly select groups of elements, Assigning materials, sections and beta angles to structural members, Assigning specifications to nodes and members, Assigning supports to nodes

Model Loading and Analysis – Defining primary load cases in STAAD.Pro and load the structure, Generating load combinations, Defining load envelopes and reference loads, Analyzing a model

Concrete Design and Post-Processing – Specifying the appropriate Concrete design code and associated design parameters, Issuing the Concrete design commands and perform a code check, Using the Post-Processor to review and verify analysis and design results,

Steel Design and Post-Processing, Specifying the appropriate steel design code and associated design parameters, Issuing the steel design commands and perform a code check, Using the Post-Processor to review and verify analysis and design results

UNIT 2: Practice on Project Management software. Duration: 15Periods(L: 5 – P: 10)

Various Menus available in MS-Project, Identify various activities for a given project, Input data required for the given project, Prepare schedules using MS-Project for resources like men, material, machinery, money, Calculate duration of project and Critical Path, Generate various reports for the supervision of the project.

UNIT 3:Practice on Software for Building Services Duration: 15 Periods(L: 5 – P: 10)

Components of Building information Model (BIM) like 4M software.

For Heat, Ventilation and Air conditioning design, For Water supply and sewage design, For Electrical design, For Design of lifts, For design of Firefighting System, For Gas supply pipes design

Preparing Layout of HVAC design for a given multistoried building plan, Layout of water supply and sewerage design for a given multistoried building plan, Layout of Electrical design for a given multistoried building plan, Layout of Lift design for a given multistoried building plan, layout of firefighting design for a given multi-storeyed building plan

Key Competencies to be achieved by the student

S.No	Experiment Title	Key competency
1	Structural Analysis and Design using latest version of STAAD PRO	• Analyze R.C.C members(building) for a particular loading • Designs a R.C.C member(building) for a particular loading • Analyze Steel member(Truss) for a particular loading • Design a Steel member(Truss) for a particular loading
2	Practice on Project Management software	• Learns the applications of Project management software. • Learns various menus available in MS-Project • Learns inputting data • Learns various commands to execute the given input data • Prepares schedules for resource allocation • Prepares networks for execution of projects
3	Practice on Software for Building Services	• Learns the applications of Building services soft ware • Learns various menus available in 4M-IDEA-BIM software. • Prepares Layout of HVAC design for a given multistoried building plan using 4M-IDEA software. • Prepares Layout of water supply and sewerage design for a given multi storied building using 4M-IDEA software. • Prepares Layout of Electrical design for a given multistoried building plan using 4M-IDEA software. • Prepares Layout of Lift design for a given multistoried building plan using 4M-IDEA software • Prepares Layout of fire fighting design for a given multistoried building plan using 4M-IDEA software

Reference Books

1. Online manuals and tutorials-Staad Pro
2. Online manuals and tutorials-MS Project
3. Online manuals and tutorials -4M software

Suggested E-learning references

1. http://nptel.ac.in
2. http://www.comp-engineering.com/ETABManE.htm

Suggested Learning Outcomes

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

1.1 Navigate through the STAAD Pro Graphical User Interface

1.2 Create, Edit and view Structure Geometry

1.3 Create groups of elements, Assign the materials, sections and beta angles to structural members

1.4 Assign specifications to nodes and members

1.5 Assign supports to nodes

1.6 Define primary load cases, load the structure, generate load combinations

1.7 Define load envelopes and reference loads, analyze a model

1.8 Specify the appropriate Concrete and steel design code and associated design parameters, issue the Concrete design commands and perform a code check.

1.9 Make use of the Post-Processor to review and verify analysis and design results.

2.1 Identify and Make use of various menus available in MS-Project.

2.2 List and enter the input data required for the Project

2.3 Identify various activities in the project

2.4 Identify and make use of various commands to execute the given input data.

2.5 Prepares schedules for resource allocation.

2.6 Prepares networks for execution of projects

2.7 Calculate duration of project and Critical Path

2.8 Show and summarize various reports for the supervision of the project

3.1 Identify and Make use various menus available in 4M-IDEA-BIM software.

3.2 Prepare Layout of HVAC design for a given multistoried building plan using 4M-IDEA software.

3.3 Develop Layout of water supply and sewerage design for a given multi storied building using 4M-IDEA software.

3.4 Prepare Layout of Electrical design for a given multistoried building plan using 4M-IDEA software.

3.5 Develop Layout of Lift design for a given multistoried building plan using 4M-IDEA software.

3.6 Prepare Layout of firefighting design for a given multistoried building plan using 4M-IDEA software.

Suggested Student Activities

7. Collect information regarding various software available on computer applications in civil engineering and give a presentation on them.
8. Visit an Engineering consultancy which deals with building design and drafting and prepare a report based on the observations made regarding use of computer applications in civil engineering
9. Collect videos showing Staad –Pro models of various buildings.
10. Visit a construction site of a building observe the execution of services work and model them using BIM software
11. Tech fest/Srujana
12. Paper/Poster presentation
13. Quiz
14. Group discussion
15. Surprise Test

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	1	3	2	3				1		2	1,2,3,4,8,10
CO2		3	2	3						2	2,3,4,10
CO3		3	2	3					1	2	2,3,4,9,10
CO4		3	3	3				1		2	2,3,4,8,10
CO5	1	3	3	3					1	2	1,2,3,4,9,10

State Board of Technical Education and Training, Telangana

MID SEM-I Examination

Model Question paper

DCE V Semester practical

Course Code:18C-508P **Duration:1Hour**

Course Name: Civil Engineering Computer Applications Lab **Max.Marks:20 Marks**

Instructions to the Candidate:

(i)Pick and Answer any One of the following Questions from given list. **1x20=20M**

1. Create, Edit and view Structure Geometry, Assign the materials, sections and beta angles to structural members, Assign specifications to nodes and members, Assign supports to nodes as per the given details
2. Define primary load cases, load the structure, generate load combinations, Define load envelopes and reference loads, analyze a model for the given model
3. Specify the appropriate Concrete and steel design code and associated design parameters, issue the Concrete design commands and perform a code check. Make use of the Post-Processor to review and verify analysis and design results for the given model

State Board of Technical Education and Training, Telangana

MID SEM-II Examination

Model Question paper

DCE VSemester practical

Course Code:18C-508P **Duration:1 Hour**

Course Name: Civil Engineering Computer Applications Lab **Max.Marks:20 Marks**

Instructions to the Candidate:

(i)Pick and Answer any One of the following Questions from given list. **1x20=20M**

1. List and enter the input data required for the Project, execute the given input data for the given project
2. Prepares schedules for resource allocation, Prepares networks for execution of projects for the given project
3. Calculate duration of project and Critical Path, Show and summarize various reports for the supervision of the project for the given project

State Board of Technical Education and Training, Telangana

Semester End Examination

Model Question paper

DCE V Semester

Course Code:18C-508P **Duration: 2Hours**

Course Name: Civil Engineering Computer Applications Lab **Max.Marks:40 Marks**

Instructions to the Candidate:

(i)Pick and Answer any One of the following Questions from given lot. **1x40=40M**

1. Create, Edit and view Structure Geometry, Assign the materials, sections and beta angles to structural members, Assign specifications to nodes and members, Assign supports to nodes as per the given details
2. Define primary load cases, load the structure, generate load combinations, Define load envelopes and reference loads, analyze a model for the given model
3. Specify the appropriate Concrete and steel design code and associated design parameters, issue the Concrete design commands and perform a code check. Make use of the Post-Processor to review and verify analysis and design results for the given model
4. List and enter the input data required for the Project, execute the given input data for the given project
5. Prepares schedules for resource allocation, Prepares networks for execution of projects for the given project
6. Calculate duration of project and Critical Path, Show and summarize various reports for the supervision of the project for the given project
7. Prepare Layout of HVAC design for a given multistoried building plan using 4M-IDEA software.
8. Develop Layout of water supply and sewerage design for a given multi storied building using 4M-IDEA software.
9. Prepare Layout of Electrical design for a given multistoried building plan using 4M-IDEA software.
10. Prepare Layout of firefighting design for a given multistoried building plan using 4M-IDEA software.

PROGRAMMING IN C LAB PRACTICE

Course Title :	**Programming in C lab practice**	Course Code	**18C-509P**
Semester	**V**	Course Group	**Practical**
Teaching Scheme in Periods(L:T:P)	**15:0:30**	Credits	**1.5**
Methodology	**Lecture + Practical**	Total Contact Hours :	**45Periods**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

Basic knowledge of Computer Operation.

Course outcomes

Course Outcome	
CO1	Write programs using input/output statements, variables and operators
CO2	Work on Constants, Variables, Data Types, Operators and Expressions in C
CO3	Construct programs on Decision making and Looping statements.
CO4	Develop programs using arrays, Strings and structures

Course Content

1. Programming Methodology and Introduction to C Language Duration: 5 Periods

Program - Define High level language and low level language-history of C language - importance of C language – Define & Differentiate Compiler, Assembler - structure of C language - programming style of C language - steps involved in executing the C program

2. Understand Constants, Variables and Data Types in C and Understand Operators and Expressions in C Duration: 15 Periods

Character set - C Tokens - Keywords and Identifiers- Constants and Variables - data types and classification - declaration of a variable - Assigning values to variables - Define an operator - Define an expression -Classify operators - List and explain various arithmetic operators with examples -Illustrate the concept of relational operators - List logical operators - various assignment operators - Increment and decrement operators - Conditional operator - List bitwise operators -List various special operators- Arithmetic expressions- precedence and associativity of operators- Evaluation of expressions - formatted input and output.

3. Decision making and Looping statements **Duration: 10 Periods**

Simple if statement with sample program – if else statement – else if statement – switch statement -Classification of various loop statements- while statement – do-while statement - for loop statement - break and continue statements.

4. Arrays and Structures **Duration: 15 Periods**

Arrays -declaration and initialization of One Dimensional - Accessing elements in the Array - Declaration and initialization of two Dimensional Arrays - sample programs on matrix addition and matrix multiplication–Strings – String handling functions - Declaration of a Structure – Structure members – Array of structures.

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Write programs using input/output statements, variables and operators	**R, U, A**	**1,2,3,4,8,9,10**	**5**
CO2	Work on Constants, Variables, Data Types, Operators and Expressions in C	**R, U, A**	**1,2,3,4,8,9,10**	**15**
CO3	Construct programs on Decision making and Looping statements.	**R,U, A**	**1,2,3,4,8,9,10**	**10**
CO4	Develop programs using arrays, Strings and structures	**U, A**	**1,2,3,4,8,9,10**	**15**
			Total Sessions	**45**

REFERENCE BOOKS

1. Let Us C -- YeshwanthKanetkar BPB Publications
2. Programming in ANSI C -- E. Balaguruswamy Tata McGrawHill
3. Programming with C -- Gottfried Schaum'outline
4. C The complete Reference -- Schildt Tata McGraw Hill

List of Experiments

1. Exercise on structure of C program
2. Exercise on Keywords and identifiers
3. Exercise on constants and variables
4. Execution of simple C program
5. Exercise on operators and expressions
6. Exercise on special operators
7. Exercise on input and output of characters

8. Exercise on formatted input and output
9. Exercise on simple if statement
10. Exercise on ifelse statement
11. Exercise on elseif ladder statement
12. Exercise on switch statement
13. Exercise on conditional operator
14. Exercise on while statement
15. Exercise on for statement
16. Exercise on do...while statement
17. Exercise on one dimensional arrays
18. Exercise on two dimensional arrays
19. Exercise on string handling functions.
20. Exercise on structure
21. Exercise on array of structures

Department of Technical Education

State Board of Technical Education &Training (TS)

Course Title:	**Project Work**	Course Code :	**18C-510P**
Semester:	**V Semester**	Course Group :	**Practical**
Teaching Scheme in Periods(L:T:P):	**0:0:45**	Credits :	**1.5**
Methodology :	**Practical**	Total Contact Periods :	**45**
CIE :	**60**	SEE :	**40**

Pre requisites

Knowledge of Civil engineering Programme &Inter disciplinary courses.

Course outcomes

Upon completion of Project Work, the student shall be able to

CO1	Reflect upon and explore problems in depth, to develop technical decisions to tackle them, with skills of curiosity, initiative, independence, reflection and knowledge transfer
CO2	Demonstrate ability to pursue new knowledge necessary to share their expertise in Civil engineering arena.
CO3	Appreciate the values of social, legal and ethical responsibility principles, through the analysis and discussion of problem and real time projects .
CO4	Prepare documents in team and enhance written and oral communication presentations

Course Content and Blue Print of Marks for CIE and SEE

Sl. No	**Subject**	**Items**	**Max Marks**
1	Project	**CIE**	
		1. Mid - I:Abstract submission– (Marks awarded by the Guide)	20
		2. Mid – II: Content development/ literature survey, data collection/prototype etc. - (Marks awarded by the Guide)	20
		3.Internal evaluation - (Marks awarded by the Guide)	20
		SEE	
		4.a) Final report Submission b) Seminar /Viva Voce	20 20

		(Marks awarded by the External Examiner, Head of Section (i.e. Internal Examiner)and Guide.	
Total			**100**

Note:

The Project work carries 100 marks and pass marks are 50% and minimum of 50% in SEE. Internal assessment is done by guide and external assessment is conducted by guide, Head of section and external examiner.

A candidate failing to secure the minimum marks has to reappear for the project.

Course Contents

Project work is intended to provide training in the solution of field engineering problems involving Surveying, Planning, drawing plans, designing, estimating and marking out of a building/highway/irrigation/public health project. Project work will also include the preparation of the feasibility report for any one type of enterprise under self – employment schemes.

Students shall be divided into groups of five each and shall be assigned a problem that calls for application of the knowledge he/she acquired in the course and also which involves some extra study of reference materials.

Projects:

a) Planning and designing of a Residential Colony.
b) Multi storied Building project.
c) Industrial complex
d) Irrigation project.
e) Rural Water Supply Scheme.
f) Sanitary Engineering Scheme.
g) Bridge project.
h) Low Cost Housing Scheme.
i) Set up of a small enterprise under self-employment scheme.

Every student should prepare a project report and submit the same for assessment. Every student puts his share to the work in all the operations of the project. The end examination in Project work shall consist of power point presentation and Viva-voce test to be assessed by a panel of examiners comprising of an External examiner, the Head of Section, and member of staff who guided the project as internal examiner.

Suggested Learning Outcomes

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

1.1 Identify different works to be carried out in the Project.

1.2 Collect data relevant to the project.

1.3 Carry out Site Surveys.

1.4 Select the most efficient method from the available choices based on preliminary investigation.

1.5 Design the required elements of the project as per standard Practice.

1.6 Prepare working drawings for the project.

1.7 Estimate the cost of project, men, materials and equipment required.

1.8 Prepare schedule of time and sequence of operations.

1.9 Prepare project report.

1.10 Prepare C.P.M. Chart.

1.11 Collect the requirements to start a Small Enterprise/Industry under Self Employment Scheme.

1.12. Collect the necessary information to procure necessary finance, site and equipment.

1.13 Prepare the chart or model for each project.

The aim of the Project work is to develop capabilities among the students, for a comprehensive analysis of implementation of Good Hygienic Practices in conducting investigation and report writing in a systematic way and to expand students understanding on the subject.

Suggested Student Activities

1. Plan and work out an action plan in a team for completion of a civil engineering problem
2. Take up a task with skills of curiosity, initiative, independence, reflection and knowledge

transfer which will allow them to manage new knowledge in their professional careers.

3. Assign students with quantitative and qualitative tools to identify, analyze and develop opportunities as well as to solve Civil Engineering problems.
4. Develop students' ability to think strategically, and to lead, motivate and manage with teams.
5. Develop students' written and oral communication competencies to enhance Technical effectiveness.
6. Enhance students' appreciation of the values of social responsibility, legal and ethical principles, through the analysis and discussion of relevant articles and real time projects.
7. Tech fest/Srujana
8. Paper/Poster presentation
9. Group discussion

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	1	3	3	3	2	2	3	3	3	3	1,2,3,4,5,6,7,8,9,10
CO2	1	3	3	3	2	2	3	3	3	3	1,2,3,4,5,6,7,8,9,10
CO3	1	3	3	3	2	2	3	3	3	3	1,2,3,4,5,6,7,8,9,10
CO4	1	3	3	3	2	2	3	3	3	3	1,2,3,4,5,6,7,8,9,10

Project Work - I spell

RUBRICS 1:

	GOOD	AVERAGE	ACCEPTABLE	UNACCEPTABLE
Identification of problem	Good explanation of the purpose and need of the project	average explanation of the purpose and need of the project	Moderate explanation of the purpose and need of the project	Minimal explanation of the purpose and need of the project
Study the existing systems	Collects a great deal of information and good study of the existing systems	Collects some basic information	Limited information	Incomplete information
Objectives and methodology	Good justification to the objectives	Incomplete justification to the objectives	Only some objectives of the proposed	Objectives of the proposed work are either not identified or not well

Project Work- II spell
RUBRICS2:

	GOOD	AVERAGE	ACCEPTABLE	UNACCEPTABLE
Incorporation of suggestions	Changes are made as per modification	All major changes are made as per modification	Few changes are made	Suggestions are not incorporated
Project demonstration	All defined objectives are achieved	All modules are achieved	Some of the defined objectives are achieved	Defined objectives are not achieved
Demonstration and presentation	Objectives achieved as per time frame	Objectives achieved as per time frame	Objectives achieved as per time frame	No Objectives achieved as per time frame

Course Title:	**Skill Upgradation**	Course Code :	
Semester:	**V Semester**	Course Group :	**Practical**
Teaching Scheme in Periods(L:T:P):	**0:0:105**	Credits :	**2.5**
Type of Course :	**Practicals**	Total Contact Periods :	**105 Periods**

SKILL UPGRADATION ACTIVITIES

1. Visit any Public Works Department, Collect and study the following documents and prepare a report on their utility and significance in any construction project.
   - Bill of Quantities(BOQ)
   - Measurement Book (MB)
   - Tender Document
   - Schedule of Rates (SSR) and
   - Lead Statement.
2. Prepare a detailed report on various activities with CPM and PERT analysis to be carried out in any construction project.
3. Visit the nearby construction site, collect the soil samples and Perform field and lab tests to determine the shear strength, compressive strength and bearing capacity of soil and prepare a report.
4. Draw your dream house plan in CAD and carry out design and detailing of each and every structural member of the building as per latest IS codes.
5. Visit nearby multistoried building and collect the structural detailing of various elements in all the floors and prepare a detailed report.
6. Prepare a report on water supply arrangement in your city and different methods to optimize water usage.
7. Collect the soil investigation report for any nearby construction project and analyze the results for the suitability of soil and present a report on it
8. Visit nearby site and interact with Geo-Technical Engineer to know how the soil investigation is conducted and submit a detailed report.

9. Organize a Field trip to the nearest Municipal Solid Waste handling facility to know the various methods of disposing and recycling the solid waste
10. Visit any NGO/Public Health Department dealing with the environmental health program, collect detailed information of their programs and submit a report.
11. Collect and study different photographs of various prefabricated structures constructed by major Civil Engineering firms and prepare an analysis report.
12. Submit a detailed Case study report on Handling and Transporting of concrete for construction of Multi-storied buildings.
13. Visit and Submit a Case study report on various heavy equipment used at the site during construction of high-rise Buildings.
14. Visit a site with unfavorable ground conditions and suggest suitable and specific ground improvement techniques to restore the ground for construction of buildings.
15. Carry out the building age calculation for the given complex of buildings and assess the condition of the building and suggest suitable remedies to enhance the life of the building

Note:

1. **The above activities are indicative. The teacher may assign any other activity relevant to the course based on resources available.**
2. **Rubrics for student activities can be generated by subject teacher**
3. **The above student activities will be assessed using rubrics. A sample rubrics template is given below. The subject teacher can assess students using rubrics with atleast four relevant aspects.**

RUBRICS MODEL (For assessing Presentation skills)

Aspects	Needs improvement	Satisfactory	Good	Exemplary
Collection of data	Collects very limited information	Collect much Information with very limited relevance to the topic	Collects some basic information with little bit of irrelevance	Collects a great deal of information with relevance
Presentation of data	Clumsy presentation of data	Presents data well; but presentation needs to be more meaningful	Presents data well but need to improve clarity	Presents data in an understandable yet concise manner
Fulfill team's roles & duties	Performs very little duties but Unreliable.	Performs very little duties and is inactive	Performs nearly all duties	Performs all duties of assigned team roles
Shares work equally	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded
Interaction with other team mates	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening to others	Listens, but sometimes talks too much	Listens and speaks a fair amount
Audibility and clarity in speech	Hardly audible and unclear	Very little audibility and clarity	Audible most of the time with clarity	Audible and clear
Understanding content	Lacks content understanding and is clearly a work in progress	Little depth of content understanding	Some depth of content understanding is evident but needs improvement	Insight and depth of content understanding are evident
Content Presentation	Content is inaccurate and information is not presented in a logical order making it difficult to follow	Content is accurate and information is not presented in a logical order making it difficult to follow	Content is accurate but some information is not presented in a logical order but is still generally easy to follow	Content is accurate and information is presented in a logical order

Suggested additional aspects for assessing Leadership Qualities:

1. Carrying self
2. Punctuality
3. Team work abilities
4. Moral values

5. Communication skills
6. Ensures the work is done in time

Suggested additional aspects for assessing “Participation in social task”

1 Interested to know the current situation of society.
2 Shows interest to participate in given social task.
3 Reliable
4 Helping nature
5 Inter personal skills
6 Ensures task is completed

Suggested additional aspects for assessing “Participation in Technical task”

1. Updated to new technologies
2. Identifies problems in society that can be solved using technology
3. Interested to participate in finding possible technical solutions to identified project
4. Reliable
5. Interpersonal skills

Suggested additional aspects for Carrying Self:

1 Stand or sit straight.
2 Keep your head level.
3 Relax your shoulders.
4 Spread your weight evenly on both legs.
5 If sitting, keep your elbows on the arms of your chair, rather than tightly against your sides.
6 Make appropriate eye contact while communicating.
7 Lower the pitch of your voice.
8 Speak more clearly.