C21_ Curriculum

DIPLOMA IN CIVIL ENGINEERING

OFFERED BY

STATE BOARD OF TECHNICAL EDUCATION & TRAINING,

TELANGANA: HYDERABAD

V SEMESTER

Sl No	Course Code	Course Name	Teaching Scheme				Credits	Examination Scheme						
			Instruction Periods per week			Total Period per 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	CE-501	Construction Management & Entrepreneurship	4	1	0	75	3	20	20	20	40	14	100	35
2	CE-502	Reinforced Concrete Structures	4	1	0	75	3	20	20	20	40	14	100	35
3	CE-503	Water Supply and Sanitary Engineering	4	1	0	75	3	20	20	20	40	14	100	35
4	CE-574	Steel Structures	4	1	0	75	3	20	20	20	40	14	100	35
	CE-584	Green Buildings and Energy Conservation	4	1	0	75	3	20	20	20	40	14	100	35
5	CE-575	Soil Mechanics	4	1	0	75	3	20	20	20	40	14	100	35
	CE-585	Theory of Structures	4	1	0	75	3	20	20	20	40	14	100	35
6	CE-506	Structural Engineering Drawing	1	0	2	45	1.5	20	20	20	40	20	100	50
7	CE-507	Civil Engineering Computer Applications Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
8	CE-508	Environmental Engineering Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
9	CE-509	Field Practices Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
10	CE-510	Project Work	1	0	2	45	1.5	20	20	20	40	20	100	50
11	CE-511	Skill Upgradation	0	0	8	120	2.5	0	0	Rubrics			--	-
	Activities: student performance is to be assessed through Rubrics													

CE-501- CONSTRUCTION MANAGEMENT & ENTREPRENEURSHIP

Course Title:	Construction Management & Entrepreneurship	Course Code	CE-501
Semester:	V Semester	Course Group	Core
Teaching Scheme in Periods(L:T:P):	4:1:0	Credits	3
Methodology	Lecture+ Tutorials	Total Contact Periods	75
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	Discuss 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

<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>Introduction and Organizational Aspects</td><td>12</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>Management Tools</td><td>13</td></tr>
<tr><td>3</td><td>Contracts,Tenders& Arbitration</td><td>12</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>4</td><td>Management of Resources in construction industry</td><td>13</td></tr>
<tr><td>5</td><td>Stores and Financial Management</td><td>12</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>Entrepreneurshipand Professional Ethics</td><td>13</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT-1: Introduction and Organizational Aspects

Duration: 12Periods (L: 10 – T:2)

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:13 Periods (L: 10 – T:3)

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: 12Periods (L: 10– T:2)

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: 13Periods (L:10 – T:3)

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 equipment's(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: 12Periods (L:10 – T:2)

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: 13 Periods (L: 10 – T:3)

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 Niraj Jha, 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 the documents (BOQ, M B, Tender, SR, lead statement) related to the project and prepare report on 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) Irrigation engineering system. c) Transportation engineering system. d) Environment engineering system.
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 report on it.

CO-PO Mapping Matrix

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

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: CE-501 **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: CE-501 **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) 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: CE-501 **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 Entrepreneur

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

CE-502- REINFORCED CONCRETE STRUCTURES

Course Title:	Reinforced Concrete Structures	Course Code	CE-502
Semester:	V Semester	Course Group	Core
Teaching Scheme inPeriods(L:T:P)	4:1:0	Credits	3
Methodology :	Lecture + Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

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	Discuss the procedure and design a slab considering boundary conditions
CO4	Calculate strength of a flanged section as per code
CO5	Determine 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

<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>Introduction to R.C.C and Philosophy of Limit State design</td><td>10</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>Analysis and Design of Rectangular Beams</td><td>15</td></tr>
<tr><td>3</td><td>Design of Slabs</td><td>15</td><td colspan="2">Q2</td><td>Q10(a)</td><td>Q14(a)</td></tr>
<tr><td>4</td><td>Analysis of T-beams</td><td>10</td><td colspan="2">Q2</td><td>Q10(a)</td><td>Q14(a)</td></tr>
<tr><td>5</td><td>Principles of design of Continuous beams and Slabs</td><td>12</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>Design of columns and footings</td><td>13</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
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Course Contents

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

Duration: 10Periods(L: 8– 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) Introduction to IS 456, SP 16
h) Strength and serviceability limit states, characteristic strength of materials and characteristic loads and partial safety factors.
i) Design strength of materials and design loads.
j) Assumptions made in the limit state design.
k) Stress-strain diagram of singly reinforced RCC beam.

UNIT 2: Analysis and design of Rectangular beams

Duration: 15Periods (L: 12 – T:3)

a) Stress-strain diagram of singly reinforced RCC beam.
b) Depth of neutral axis, lever arm.
c) Moment of resistance of singly reinforced rectangular section
d) Critical percentage of steel.
e) 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.
f) Doubly reinforced sections - necessity, use.
g) Calculation of neutral axis and moment of resistance for the given section and grades of concrete and steel.
h) Shear in singly reinforced beams
i) Methods of providing shear reinforcement-vertical stirrups, combination of vertical stirrups and bent up bars.
j) Code provisions for spacing of stirrups and minimum shear reinforcement (no derivation of equations).
k) Development of bond stress in reinforcing bars.
l) Design bond stress - development length – bond and anchorage concepts and their importance.
m) Curtailment of tension reinforcement-codal provisions.
n) Simple problems on development length.
o) 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: 15Periods (L: 12 – T:3)

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: 10Periods (L:.8 – T:2)

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 and Slabs

Duration: 12Periods (L: 10– T: 2)

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.

UNIT 6: Design of columns and footings

Duration: 13Periods (L: 10 – T:3)

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 longitudinal 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 ShettyS. Chand & Co. Ltd., New Delhi
6. "Reinforced Concrete Design" by S UnnikrishnaPillai&DevdasMenonTata 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. VarghesePrentice-Hall of India Pvt. Ltd. New Delhi
10. Limit State Design of R.C.C Structures by Ashok K. JainNemchand 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 one way slabs and two way 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 two way 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 Sketch load 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.

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

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 V semester Mid Semester-I Examination

Course Code: CE-502 **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 10 kN/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 uniformlydistributed load of 40 kN/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: CE-502 **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: CE-502C **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 themoment 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 for shear, development length and bearing pressure are not required.

CE-503- WATER SUPPLY AND SANITARY ENGINEERING

Course Title	Water Supply and Sanitary Engineering	Course Code	CE-503
Semester	V Semester	Course Group	Core
Teaching Scheme in Periods(L:T:P)	4:1:0	Credits	3
Methodology:	Lecture + Tutorials	Total Contact Periods	75
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 and sewer appurtenances
CO6	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="3">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>10</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>Quality and Purification of Water</td><td>15</td></tr>
<tr><td>3</td><td>Distribution System and Water supply arrangements in buildings</td><td>15</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>4</td><td>Introduction to Wastewater Engineering and Quantity of Sewage</td><td>10</td></tr>
<tr><td>5</td><td>Sewersand Sewer appurtenances</td><td>10</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b), Q11(a), Q11(b)</td><td>Q13(b), Q15(a), Q15(b)</td></tr>
<tr><td>6</td><td>Sewage Characteristics, and treatment</td><td>15</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="3">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: 10 Periods (L: 8 – T:2)

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: 15 Periods (L: 12 – T:3)

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 Building

Duration: 15 Periods (L: 12 – T: 3)

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: 10Periods (L: 8 – T: 2)

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: 10 Periods (L: 8 – T: 2)

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: 15 Periods (L: 12 – T: 3)

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) PH 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.

NOTE: No design of treatment units

Reference Books

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 analysing 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) PH -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

1. Estimate the total quantity of water required for a town/locality/Institute.
2. Visit nearby Intake works of water of your place and collect details.
3. Charts are prepared for BIS and WHO quality standards for drinking water.
4. Visit Water Treatment Plant and collect details of unit operations and processes involved in it.
5. Study the distribution system of water supply of your locality.
6. To visit a newly constructed building for plumbing works.
7. 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
8. Prepare a report on performance of the existing sewage treatment plant at any hospital
9. Visit Sewage Treatment Plant and collect details each unit operations for treatment of Sewage and prepare the charts.
10. Prepare a mini project report for Sewerage System for a locality.
11. To conduct market survey of sanitary ware.
12. Treatment and reuse of automobile service station wastewater for vegetation
13. Impact of industrial solid wastes on soil and sub-surface water
14. Effects due to untreated disposal of municipal sewage
15. Quality study of sewage in your district
16. Soil-industrial effluent interaction and their engineering behaviour
17. Tech fest/Srujana
18. Paper/Poster presentation
19. Quiz
20. Group discussion
21. Surprise Test

CO-PO Mapping Matrix

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

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="4">Questions to be set for SEE</td></tr>
<tr><td colspan="3">R</td><td>U</td><td>A</td></tr>
<tr><td>I</td><td rowspan="8">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),
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>

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

Course Code: CE-503 **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: CE-503 **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: CE-503 **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 PH 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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CE-574- STEEL STRUCTURES

Course Title:	Steel Structures	Course Code	CE-574
Semester:	V Semester	Course Group	Elective
Teaching Scheme inPeriods(L:T:P):	4:1:0	Credits	3
Methodology :	Lecture +Tutorials	Total Contact Periods	75
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	Analyze and design a suitable connection based upon the conditions according to standards
CO4	Discuss and design the tension members considering the various failure patterns as per codal provisions.
CO5	Interpret and 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

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="3">R</th><th>U</th><th>A</th></tr>
<tr><td>1</td><td>Introduction and Fundamentals of Limit State Design of Steel structures</td><td>10</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>Design of Compression members</td><td>15</td></tr>
<tr><td>3</td><td>Design of Bolted and Welded Connections</td><td>12</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>4</td><td>Design of Tension members</td><td>13</td></tr>
<tr><td>5</td><td>Design of Beams</td><td>12</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>Design of Roof trusses</td><td>13</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

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

Duration: 10Periods (L: 8 – 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: 15Periods (L: 12 – 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 Isections 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: 12Periods (L: 10 – T:2)

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 single angle carrying axial loads.

UNIT-4: Design of Tension Members **Duration: 13Periods (L:10 – T:3)**

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) Shear lag effect
g) 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 connection
h) Design procedure of tension members.
i) Problems on design of tension members using plates and single angle with welded connection only

UNIT-5: Design of Steel Beams

Duration: 12Periods (L: 10 – T:2)

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: 13Periods (L:10 – T:3)

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 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 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 and state the functions of different types of stiffeners

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

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="4">Questions to be set for SEE</td></tr>
<tr><td colspan="3">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="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: CE-574 **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: CE-574 **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 gussetplate 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 longerleg is connected to 10 mm thick gusset plate by 6 mm size fillet welds. The lengthof 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: CE-574 **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 girderand 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 =250MPa 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 trusses 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.

CE-584- GREEN BUILDINGS AND ENERGY CONSERVATION

Course Title	Green Buildings and Energy Conservation	Course Code	CE-584
Semester	V	Course Group	Elective
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	3
Methodology	Lecture+Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites This course requires the knowledge of building materials and construction practice

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

CO1	Acquire the concept of Green Buildings and Energy Efficiency
CO2	Apply the Design features of Green Buildings
CO3	Evaluate Energy Audit and comprehend Environmental Impact Assessment
CO4	Differentiate Renewable and Non Renewable Energy Sources and Apply Energy Conservation Techniques
CO5	Explain the strategies and materials used in Green Building construction
CO6	Discuss different Energy Rating Systems

Course Content and Blue Print of Marks for SEE

Course Contents

Unit No	Unit Name	Periods	Questions to be set for SEE			
			R		U	A
1	Introduction to Green Buildings	10	Q4	Q1	Q9(a)	Q13(a)
2	Design of Green Buildings	15				
3	Energy Audit and Environmental Impact Assessment	10		Q2	Q10(a)	Q14(a)
4	Energy Resources and Energy Conservation	15				
5	Strategies and Materials in Green Buildings	15		Q3 Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Rating System	10		Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
	Total	75	8		8	8

Unit 1: Introduction to Green Building Duration: 10 Periods (L: 8 – T: 2)

a) Definition of Green Building
b) Benefits of Green building
c) Components/features of Green Building
d) Site selection, Energy Efficiency, Water efficiency, Material Efficiency, Indoor Air Quality.

Unit2: Design Features of Green buildings

Duration: 15Periods (L: 12 – T: 3)

a) Site selection strategies
b) Landscaping, building form, orientation, building envelope and fenestration, material and construction techniques, roofs, walls, fenestration and shaded finishes, advanced passive heating and cooling techniques, waste reduction during construction

Unit–3 Energy Audit and Environmental Impact Assessment (EIA)

Duration: 10 Periods (L: 8 – T: 2)

a) Energy Audit:Meaning,Necessity,Procedures,Types,EnergyManagementPrograms
b) Environmental Impact Assessment (EIA): Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA, Environmental clearance for the civil engineering projects.

Unit–4 Energy Resources and Energy conservation

Duration: 15Periods (L: 12 – T: 3)

a) Renewable Energy Resources: Solar Energy, Wind Energy, Ocean Energy, Hydro Energy, Bio-mass Energy
b) Non-renewable Energy Resources: Coal, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Bio fuels.
c) Energy conservation: Introduction, Specific objectives, present scenario, Need of energy conservation, LEED India Rating System and Energy Efficiency.

Unit–5 Strategies and Materials in Green Building

Duration: 15Periods (L:12 – T: 3)

a) Principles: Principles and planning of Green building
b) Environmental design(ED) strategies for building construction.
c) Process: Improvement in environmental quality in civil structure
d) Materials: Green building materials and products- Bamboo, Rice husk ash concrete, plastic bricks, Bagasse particle board, Insulated concrete forms. reuse of waste material-Plastic, rubber, News paper wood, Non toxic paint, Green roofing

Unit - 6 Rating System

Duration: 10 Periods (L:8 – T: 2)

a) Introduction to (LEED) criteria,
b) Indian Green Building council (IGBC) Green rating,
c) Green Rating for Integrated Habitat Assessment(GRIHA)criteria
d) Heating Ventilation Air Conditioning(HVAC) unit in green Building
e) Functions of Government organization working for Energy conservation and Audit (ECA)
f) National Productivity council(NPC)
g) Ministry of New and Renewable Energy (MNRE)
h) Bureau of Energy efficiency(BEE)

Reference Books

1. Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hobouken, New Jersey.
2. Chauhan, DS Sreevasthava, SK., Non-conventional Energy Resources, New Age International Publishers, New Delhi.
3. O.P.Gupta, Energy Technology, Khanna Publishing House, New Delhi
4. Jagadeesh, KS, Reddy Venkatta Rama & Nanjunda Rao,KS.,Alternative Building Materials and Technologies, New Age International Publishers, Delhi.
5. Sam Kubba., Hand book of Green Building Design and Construction, Butterworth-Heinemann.
6. Means RS, Green Building-Project Planning and Cost Estimating, John Wiley & Sons
7. Sharma KV, Venkata seshaiah P., Energy Management and Conservation, IK International.

Suggested E-learning references

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

Suggested Learning Outcomes

On completion of the subject the student shall be able to

1.1. Define Green Building
1.2. List the components of Green Building
1.3. List the Benefits of Green Building
1.4. Explain the main guidelines for Site selection for construction of a green buildings
1.5. Define Energy efficiency
1.6. Define Water efficiency and Material Efficiency in relation to a green building
1.7. Suggest Indoor Air quality improvement methods
2.1. State the importance and explain the procedure for landscaping.
2.2. Gain Knowledge about building envelope and Fenestration

2.3. Gain Knowledge about material and construction techniques used in green buildings
2.4. Explain the means of waste reduction during construction of green buildings
2.5. Suggest advanced passive heating and cooling techniques used in green buildings.
3.1. Define Energy Audit.
3.2. State the necessity of Energy Audit and explain the process of Energy Auditing in a green building.
3.3. Gain knowledge about Environmental Impact Assessment
3.4. Give information related to EIA regulations, Benefits and Limitations
3.5. State the procedures for environmental clearance for civil engineering projects.
4.1 Define Renewable sources of energy and their advantages and disadvantages.
4.2 List different renewable energy Resources.
4.3 List different Non Renewable energy Resources.
4.4 State the advantages and disadvantages of different non-renewable sources of energy.
4.5 Explain the need of energy conservation and the present scenario
4.6 Give the objectives of Energy conservation and the present scenario
4.7 Define energy efficiency and LEED rating system
5.1 Explain the Principles involved in planning and construction of Green Buildings
5.2 Suggest the environmental design strategies for construction of green building
5.3 List different Green materials
5.4 State the advantages of different green materials, their strength and life cycle
6.1 Define Energy rating system
6.2 Give information related to different green rating organizations, their functions and importance of green rating
6.3 State the importance principles in HVAC design of green buildings
6.4 State the criteria used for getting a green rating using GRIHA
6.5 List the various government organizations working for energy conservation and audit
6.6 State the functions and use of various organizations such as MNRE,BEE,NPC in green buildings
6.7 List the functions of ECA
6.8 Explain working of ECA of government organization

Suggested Student Activities

1. Collect the information of Green building concepts from internet
2. Collect the information related to construction practices of Green Buildings.
3. Collect the details of innovated materials used in construction of Green Buildings.
4. Compare cost and life of Green buildings with respect to conventional buildings
5. Prepare a list of various Green building materials along with price.
6. Prepare collection of photographs showing various types Green buildings
7. Do a case study regarding efficiency of Green Buildings
8. Collect information regarding various IGBC certified Buildings.

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

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>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: CE-584 **Duration:1 Hour**
Course Name: Green Buildings and Energy Conservation **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 Green Building.
2. Define Energy Audit.
3. Define Environmental Impact Assessment.
4. Define Environmental Clearance.

PART – B Marks**: 2 X 3M= 6M**

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

5(a).Write any Three components of Green Buildings.

(OR)

5(b).Write any Three Benefits of EIA.

6(a) Write any three features of site selection for Green Buildings.

(OR)

6(b) Write any three types of Energy Management Programs.

PART – C

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

7(a) Explain Limitations of Environmental Impact Assessment.

(OR)

7(b) Write steps in Environmental Impact Assessment process.

8(a) Write about orientation, Building envelope and Fenestration of Green Buildings.

(OR)

8(b) Define energy efficiency, water efficiency, material efficiency and Indoor Air quality.

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

Course Code: CE-584 **Duration:1 Hour**
Course Name: Green Buildings and Energy Conservation **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 Renewable sources of Energy.
2. State any two Non Renewable sources of Energy.
3. State any two sources of Energy
4. Define Environmental Impact Assessment.

PART – B **Marks : 2 X 3 M= 6 M**

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

5(a) What are Renewable and Non Renewable Sources of Energy.

(OR)

5 (b) Write any three specific objectives of Energy conservation.

6(a) What is the need for Energy conservation.

(OR)

6(b) What do you mean by LEED India Rating System.

PART – C

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

7(a) Differentiate between Renewable and Non Renewable sources of Energy.

(OR)

7(b) Write the Procedures for Energy Audit Systems.

8(a) Explain the present scenario of Energy conservation.

(OR)

8(b) Explain the types of Energy Management programs

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

Course Code: CE-584 **Duration:2 Hours**
Course Name: Green Buildings and Energy Conservation **Max. Marks: 40Marks**

PART – A Marks: 8 X 1 M = 8M

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

1. Define Green Building
2. What does EIA stand for?
3.What is Energy Efficiency?
4. List four Renewable sources of Energy
5. List four Green building materials.
6. Give the principle of Green building
7. What does LEED mean?
8.What is Green Rating?

PART – B

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

9(a) Write any three site selection strategies of Green Buildings.

(OR)

9(b) What are Green building materials?.

10(a) Write any three Limitations of EIA?

(OR)

10(b) What is HVAC system in Building and What is Green HVAC

11(a) What is Green roofing?

(or)

11(b) What is insulated concrete forms

12(a) Write any three points about GRIHA.

(OR)

12(b) Write about MNRE.

PART – C

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

4x 5 M = 20 M

13 (a) What are the components of Green Buildings.

(OR)

13 (b) How can we reduce the impact of construction on Environment

14 (a) List any five benefits of EIA.

(OR)

14 (b) What are the benefits of LEED certification.

15 (a) Write about any five Design strategies of Green buildings

(OR)

15 (b) Write the fundamental principles of Green Buildings

16(a) Write about IGBC.

(OR)

16(b) What are the functions of Government organization working for Energy conservation and Audit.

CE-575- SOIL MECHANICS

Course Title:	Soil Mechanics	Course Code	CE-575
Semester:	V Semester	Course Group	Elective
Teaching Scheme in Periods(L:T:P):	4:1:0	Credits	3
Methodology	Lecture+Tutorials	Total Contact Periods	75
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	Characterize and classify soils.
CO2	Develop volumetric relationships between different soil parameters and Explain the experimental methods to measure the physical and mechanical properties of the soils.
CO3	Classify the soils based on different parameters.
CO4	Explain permeability and shear strength parameters of soils
CO5	Discuss bearing capacity of soils in foundation design along with presumptive bearing capacity values and use IS code equation for computing bearing capacity of soils
CO6	Analyze the principles of consolidation and compaction of soils.

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>General characteristics of soils</td><td>12</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>Basic definitions and simple tests on soils</td><td>13</td></tr>
<tr><td>3</td><td>Classifications of soils</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>Hydraulic and Mechanical properties of soils</td><td>13</td></tr>
<tr><td>5</td><td>Bearing capacity of soils</td><td>12</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>Consolidation and Compaction of soils</td><td>13</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT 1: General characteristics of Soils **Duration: 12 Periods (L:10– T:2)**

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: 13Periods (L:10– T:3)

a) Three phase diagram of soil – Volumetric Relationships- Void ratio, Porosity, Degree of saturation, Percentage air voids, Air content, Volume- Mass Relationships, Bulk Mass density, Dry mass density, Saturated mass density, submerged mass density, Mass Density of Solids, Volume-Weight Relationships: -Bulk unit weight, Dry unit weight, Saturated unit weight, submerged unit weight, Unit weight of Solids , Density index.
b) Water content – Tests for determination of soil moisture content-oven drying method-Pycnometer method. Specific gravity of solids – Mass Specific Gravity-Absolute Specific gravity- 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: 12Periods (L:10– T: 2)**

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: 13 Periods (L:10 – T:3)

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– shear strength experiment with direct shear apparatus (Explanation of testing procedure with the help of figures only).

UNIT 5: Bearing Capacity of Soils: **Duration: 12periods (L: 10 – T:2)**

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: 13Periods (L:10 – T:3)

a) Consolidation of Soils

Consolidation –Initial, Primary and Secondary 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 Manoj Datta 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

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 and pycnometer 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 falling head and constant head permeability tests
4.6 Explain the compressibility of confined layers of soil.
4.7 Explain the shear resistance concept of soils.
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 Initial Primary and secondary consolidation

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

6.4 Explain the basic principles of compaction and its objectives.

6.5 State the factors affecting compaction.

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

6.7 State the methods of compaction used in field.

6.8 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. Conduct the 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 and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Practices for Society, Sustainability and	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2			2	2	1	3	1,4,5,6,7
CO2	2	2	2				2	1,2.3.7
CO3	2			1	2		2	1,4,5,7
CO4	2	2	1		1		2	1,2,3,5,7
CO5	2				1		2	1,5,7
CO6	2				1		2	1,5,7

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="4">Questions to be set for SEE</td></tr>
<tr><td colspan="3">R</td><td>U</td><td>A</td></tr>
<tr><td>I</td><td rowspan="8">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>

tate Board of Technical Education and Training, Telangana

Model Question paper

DCE V semester

Mid Semester-I Examination

Course Code: CE-575 **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-II Examination

Course Code: CE-575 **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) List any two factors which contribute shear strength of soils

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: CE-575 **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) List any two factors which contribute shear strength of soils
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.

CE-585- THEORY OF STRUCTURES

Course Title	Theory of Structures	Course Code	CE-585
Semester	V Semester	Course Group	Elective
Teaching Scheme in periods(L:T:P)	4:1:0	Credits	3
Methodology	Lecture+Tutorials	Total Contact periods	75
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	Determine stresses at the base of retaining walls with surcharge.
CO4	Analyze indeterminate structures like Propped cantilevers and Fixed beams.
CO5	Apply Moment Distribution method to continuous beams.
CO6	Calculate axial forces in determinate trusses.

Semester End Examination

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="3">R</th><th>U</th><th>A</th></tr>
<tr><td>1</td><td>Thin cylinders</td><td>10</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>Dams</td><td>15</td></tr>
<tr><td>3</td><td>Retaining walls</td><td>12</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>4</td><td>Statically indeterminate beams-Propped Cantilevers and Fixed beams</td><td>13</td></tr>
<tr><td>5</td><td>Statically Indeterminate beams-Continuous beams</td><td>12</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>Stresses in Frames</td><td>13</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT 1: Thin Cylinders

Duration:10 Periods (L:8 – T:2)

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:15 Periods (L:13 – T:2)

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

UNIT 3: Retaining Walls

Duration:12 Periods(L:10 – T:2)

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:13 Periods(L:10 – T:3)

a) Statically determinate and indeterminate structures –Analysis of propped cantilevers with UDL on whole span and cantilevers with point load between fixed and propped ends – Calculation of prop reactions – 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 –B.M.D. and S.F.D – problems (without sinking of props) – Maximum deflection formulae of fixed beams subjected to central point load and beams subjected to U.D.L throughout (No derivation) – problems.

UNIT 5: Statically indeterminate beams-Continuous beams

Duration:12 Periods(L:10 – T:2)

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(combination of UDL and point loads not included)-sketching B.M.D only

UNIT 6: Stresses in frames **Duration:13 Periods(L:7.8 – T:5.2)**

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

Recommended Books

1. Strength of Materials by R. Subramanian , Oxford university Press
2. Analysis of Structures by Thandava moorthy, Oxford university Press
3. Theory of structures by S.Ramamrutham and R.Narayan, Dhanpath Rai publications
4. Strength of materials by B.C.Punmia, Laxmi publications
5. Theory of structures by B.C.Punmia and A.K.Jain, Laxmi publications
6. Structural Analysis –A Unified Approach by D S Prakash Rao, Universities press publications
7. Strength of materials by R.K .Rajput, S.Chand publications
8. Strength of Materials by R.K. Bansal, Laxmi publications

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 thin cylinders.
1.5. Calculate the longitudinal and hoop stresses in the cylinder under internal pressure, given the dimensions of thin cylinders
1.6. Calculate the thickness of a thin cylinder
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 over-turning of the dam, 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 water face vertical 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 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 truss.

6.2. Classify the trusses 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

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 by the method of joints.

6.6. Calculate the stresses / forces in the members of a simply supported or cantilever trusses subjected to loads 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 by the method of sections.

6.8. Differentiate between method of joints and method of sections.

6.9. Calculate the Forces in the members of a simply supported or cantilever truss subjected to loads 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 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 and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	3	3	3	3	3	3	1,2,3,7
CO2	2	2	2	2	2	2	1	1.2.3.7
CO3	2	2	2	2	2	2	2	1,2,3,7
CO4	2	2	3	1	3	1	3	1,2,3,7
CO5	2	2	3	2	3	2	3	1,2,3,7
CO6	2	2	2	2	2	2	2	1,2,3,7

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="4">Questions to be set for SEE</td></tr>
<tr><td colspan="3">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: CE-585 **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:CE-585 **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 contra flexure.

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: CE-585 **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.

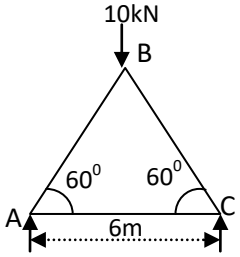
(OR)

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

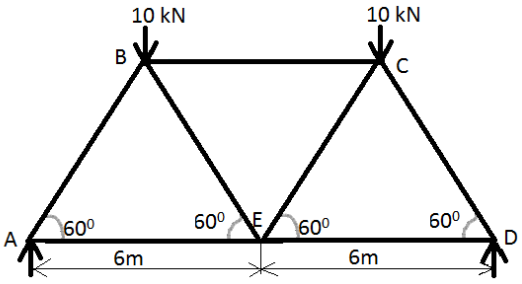
(OR)

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.

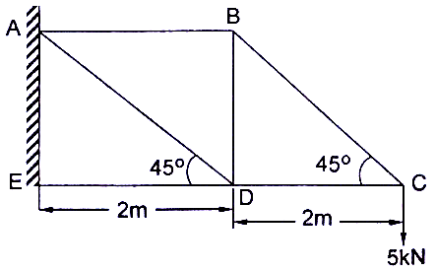


15(a) A two span continuous beam ABC is fixed at A and C. Span AB = 5m and span BC = 6m. A central point load of 20kN acts in span AB and a central point load of 40kN acts over span BC. Calculate fixed end moments using Moment Distribution method and draw bending moment diagram.

(OR)

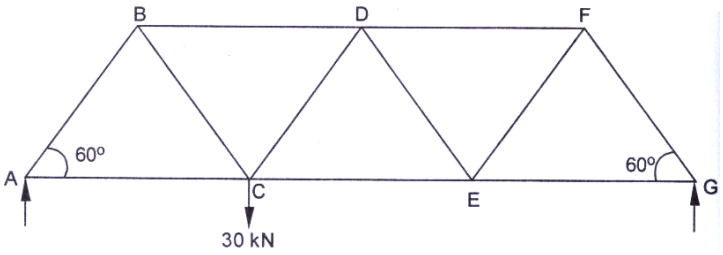
15(b) A two span continuous beam ABC is simply supported at A, B and C. Span AB = 6m and span BC = 4.5m. A central point load of 20kN acts in span AB and a UDL of 8kN/m acts over span BC. Calculate fixed end moments using Moment Distribution method and draw bending moment diagram.

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,



CE-506- STRUCTURAL ENGINEERING DRAWING

Course Title:	Structural Engineering Drawing	Course Code	CE-506
Semester:	V Semester	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture+ Practical	Total Contact Periods	45
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 one way and two way R.C.C Slabs
CO4	Prepare detailed structural drawings of one way continuous R.C.C Slabs and T-beam
CO5	Prepare detailed structural drawings of Column with square footing
CO6	Prepare detailed structural drawings of stair cases

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

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: CE-506 **Duration: 1 Hour**
Course Name: Structural Engineering Drawing **Max. Marks: 20 Marks**

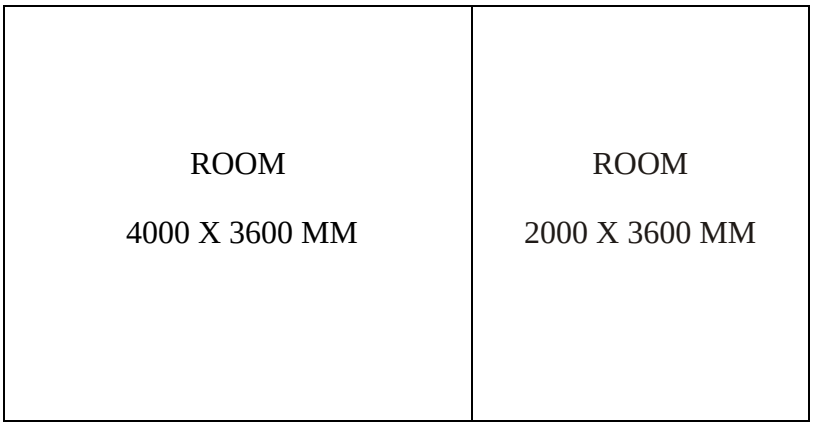
PART-A

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'



PART-B

Answer any one questions. 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. 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 from face 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 1:5 the cross-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: CE-506 **Duration: 1 Hour**
Course Name: Structural Engineering Drawing **Max.Marks: 20 Marks**

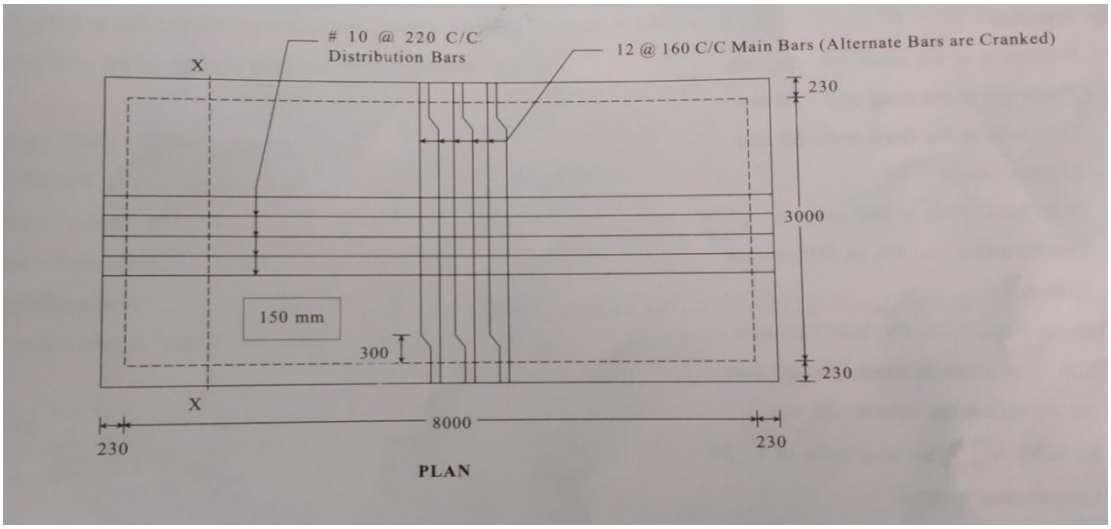
PART-A

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: CE-506 **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.

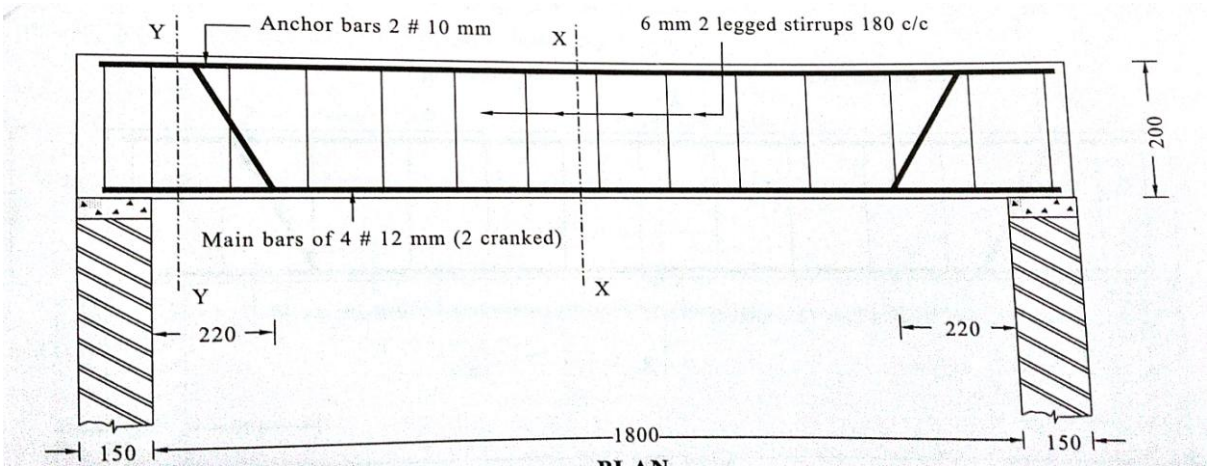
   Draw the cross section of the beam at middle span for the above specifications

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

4. 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

CE-507- CIVIL ENGINEERING COMPUTER APPLICATIONS LAB

Course Title	Civil Engineering Computer Applications Lab	Course Code	CE-507
Semester:	V Semester	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture+ Practical	Total Contact Periods	45
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	Practice software on Building information Model (BIM)
CO6	Prepare layout of various building services designs for multistoried 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 multistoried 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 firefighting 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
1.1 Identify and Make use various menus available in 4M-IDEA-BIM software.
1.2 Prepare Layout of HVAC design for a given multistoried building plan using 4M-IDEA software.
1.3 Develop Layout of water supply and sewerage design for a given multi storied building using 4M-IDEA software.
1.4 Prepare Layout of Electrical design for a given multistoried building plan using 4M-IDEA software.
1.5 Develop Layout of Lift design for a given multistoried building plan using 4M-IDEA software.
1.6 Prepare Layout of firefighting design for a given multistoried building plan using 4M-IDEA software.

Suggested Student Activities

1. Collect information regarding various software available on computer applications in civil engineering and give a presentation on them.
2. 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
3. Collect videos showing Staad –Pro models of various buildings.
4. Visit a construction site of a building observe the execution of services work and model them using BIM software

5. Tech fest/Srujana
6. Paper/Poster presentation
7. Quiz
8. Group discussion
9. Surprise Test

CO-PO Mapping Matrix

	Basic knowledge and Discipline Knowledge	Problem analysis	Design/development of solutions	Engineering tools, experimentation & testing	Engineering practices for society,	Project management	Life long learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	1	1	1	2	-	-	1	1,2,3,4,7
CO2	1	2	3	2	2	-	1	1,2,3,4,5,7
CO3	-	-	2	3	1	1	2	3,4,5,6,7
CO4	1	-	-	-	1	1	1	1,4,5,6,7
CO5	1	-	2	3	3	-	1	1,3,4,5,7
CO6	1	-	2	3	3	-	1	1,3,4,5,7

State Board of Technical Education and Training, Telangana

MID SEM-I Examination

Model Question paper

DCE V Semester practical

Course Code: CE-507 **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. 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 V Semester practical

Course Code: CE-507 **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: CE-507 **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.

CE-508- ENVIRONMENTAL ENGINEERING LAB

Course Title:	Environmental Engineering Lab	Course Code	CE-508
Semester:	V Semester	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture+ Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

Basic knowledge of Engineering Chemistry and Environmental Studies

Course Outcomes

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

CO1	Collect water sample from different places/points to determine various parameters of water
CO2	Test various physical characteristics of water and determine its suitability
CO3	Test and Calculate solids, alkalinity, and hardness present in water
CO4	Check the given water sample for different chemicals
CO5	Determine the optimum dose of coagulant and chlorine required for treatment of water
CO6	Determine the amount of D.O and B.O.D to check the suitability of particular treatment

Course Content

Unit No	Unit Name	Periods
1	Sampling and Physical Characteristics of water	15
2	Chemical Characteristics of water	15
3	Parameters for treatment of water	15
	Total	45

Course Contents

UNIT 1: Sampling and Physical Characteristics Duration: 15 Periods (L: 5 – P: 10)

1. Collection of Water Samples-Surface, Running and Ground water samples
2. Determination of Conductivity of water
3. Determination of Turbidity of water
4. Determination of pH

UNIT 2: Chemical Characteristics of water. Duration: 15 Periods (L: 5 – P: 10)

1. Determination of Total solids,Suspended solids and dissolved solids of water
2. Determination of alkalinity in water
3. Determination of hardness in water
4. Determination of Chlorides in water

UNIT 3: Parameters for Treatment of water Duration: 15 Periods (L: 5 – P: 10)

1. Determination of optimum dose of Coagulant(Alum) in water
2. Determination of Dissolved oxygen in water
3. Determination of Biological oxygen demand in water
4. Determination of Break point chlorine demand in water

Key Competencies to be achieved by the student

S.No	Experiment Title	Key competency
1.	Collection of water samples - Surface, running and ground water samples	1. Selection of suitable container as per IS:3025 (Part-I)
		2. Taking necessary precautions
2.	Determination of Conductivity of water	1. Calibration of Conductivity meter as per IS:3025(Part 14) using standard 0.1 N potassium chloride solution
		2. Measuring Conductivity of sample
3.	Determination of Turbidity of water	1. Calibration of Turbidity meter as per IS:3025(Part 10) using standard solutions
		2. Measuring Turbidity of sample
4	Determination of pH	1. Calibration of pH meter as per IS:3025(Part 11) using three buffersolutions
		2. Measuring pH of sample
5	Determination of Total Solids, Suspended solids and dissolved solids in water	1. Use of Filter paper as specified in IS:3025(Part 15,16 and 17)
		2. Taking weights before and after placing samples in oven
		3. Use of Oven
6	Determination of alkalinity in water	1. Collection of required sample using pipette as given in IS:3025(Part 23)
		2. Titration with sulphuric acid with the correct indicators
		3. Noting down the correct reading in burette
7	Determination of hardness in water	1. Collection of required sample using pipette as given in IS:3025(Part 21)
		2. Titration with EDTA solution with the correct indicators
		3. Noting down the correct reading in burette
8	Determination of chlorides in water	1. Collection of required sample using pipette as given in IS:3025(Part 32)
		2. Titration with Silver nitrate solution with the correct indicators
		3. Noting down the correct reading in burette
9	Determination of optimum dose of coagulant in water	1. Addition of different dosages of Alum in different Jars
		2. Rotation of Magnetic stirrer in all jars
		3. Observation of nature of floc formed in different jars
10	Determination of dissolved oxygen in water	1. Preparation of required sample with reagents taking precautions as given in IS:3025(Part 28)
		2. Titration with Sodium thiosulphate solution with the correct indicators
		3. Noting down the correct reading in burette

11	Determination of Biological oxygen demand in water	1. Preparation of required sample with reagents taking precautions as given in IS:3025(Part 44)
		2. Use of BOD incubator for storing samples for five days
		3. Titration with Sodium thiosulphate solution with the correct indicators
		4. Noting down the correct reading in burette to measure dissolved oxygen
12	Determination of Break point of Chlorine in water	1. Preparation of sample solutions of water by addition of suitable amount of chlorine as per IS:3025(Part 25)
		2. Storage of sample solutions for the required contact period
		3. Preparation of required sample by mixing with suitable reagents as per IS:3025(Part 26)
		4. Titration with Sodium thiosulphate solution with the correct indicators
		5. Noting down the correct reading in burette to measure residual chlorine

Reference Books

1. SharmaS.C,EnvironmentalEngineering,KhannaPublishingHouse,NewDelhi
2. Garg,S.K.,EnvironmentalEngineeringVol.IandVol.II,KhannaPublishers
3. Birdie,G.S.and Birdie,J.S. Water Supply and Sanitary Engineering, Dhanpat Rai Publishing Company
4. Punmia,BC, Environmental Engineering, Vol.Iand II, Laxmi Publishers
5. Basak NN, Environmental Engineering, McGraw Hill Publishers.

Suggested E-learning references

1. http://nptel.ac.in
2. https://www.youtube.com/watch?v=KTWxG1uUT-0
3. https://www.youtube.com/watch?v=h4fCkhb4Y5I
4. https://www.youtube.com/watch?v=vFzP-iqEpxY
5. http://nitttrchd.ac.in/sitenew1/nctel/civil.php

Suggested Learning Outcomes

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

1.1 Collect the different water samples using different methods from different sources as per IS:3025(Part-I)-1987

1.2 Test the given water sample for measurement of conductivity in water using Conductivity meter as per IS:3025(Part 14)

1.3 Test the given water sample for measurement of Turbidity in water using Turbidity meter as per IS:3025(Part 10)

1.4 Test the given water sample for measurement of pH in water using Litmus paper/pH meter as per IS:3025(Part 22) or IS:3025(Part 11)

2.1 Determine the quantity of total solids, suspended solids and dissolved solids in water using standard methods as per IS:3025 (Part 15,16 and 17)

2.2 Determine alkalinity in given sample of water using standard procedure as per IS:3025(part 23)

2.3 Determine hardness in given sample of water using standard procedure as per IS:3025(part 21)

2.4 Determine quantity of chlorides in given sample of water using standard procedure as per IS:3025(part 32)

3.1 Determine the optimum dose of coagulant in given sample of water for its treatment using jar test as per IS:3025(Part-50)

3.2 Determine the quantity of dissolved oxygen present in given sample of water as per IS:3025(Part 38)

3.3 Determine BOD of given sample of water as per IS:3025(Part-44)

3.4 Determine the break-point chlorine demand in given sample of water as per IS:3025(Part-25)

Suggested Student Activities

1. Collect the list of reagents used for testing water for various quantities
2. Visit to nearby water treatment plant
3. Prepare a report on suitable treatment for bore water in college campus
4. Tech fest/Srujana
5. Paper/Poster presentation
6. Quiz
7. Group discussion
8. Surprise Test

CO-PO Mapping Matrix

	Basic knowledge and Discipline Knowledge	Problem analysis	Design/development of solutions	Engineering tools, experimentation and testing	Engineering practices for society, sustainability & environment	Project management	Life long learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	2			2	2	2	2	1,4,5,6,7
CO2	2			2	2	2	2	1,4,5,6,7
CO3	2			2	2	2	2	1,4,5,6,7
CO4	2			2	2	2	2	1,4,5,6,7
CO5	2	1	1	2	2	2	2	1,2,3,4,5,6,7
CO6	2	1	1	2	2	2	2	1,2,3,4,5,6,7

State Board of Technical Education and Training, Telangana
MID SEM-I Examination
Model Question paper
DCE VSemester practical

Course Code: CE-508 **Duration:1 Hour**
Course Name: Environmental Engineering 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. Collect the different water samples using different methods from different sources
2. Determine conductivity of given sample of water using Conductivity meter
3. Determine Turbidity of given sample of water using Turbidity meter
4. Determine pH of given water sample using Litmus paper/pH meter

State Board of Technical Education and Training, Telangana
MID SEM-II Examination
Model Question paper
DCE V Semester practical

Course Code: CE-508 **Duration: 1 Hour**
Course Name: Environmental Engineering 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. Determine the quantity of total solids, suspended solids and dissolved solids in given sample of water
2. Determine alkalinity in given sample of water
3. Determine hardness in given sample of water
4. Determine quantity of chlorides in given sample of water

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

Course Code: CE-508 **Duration: 2Hours**
Course Name: Environmental Engineering 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. Determine conductivity of given sample of water using Conductivity meter
2. Determine Turbidity of given sample of water using Turbidity meter
3. Determine pH of given water sample using Litmus paper/pH meter
4. Determine the quantity of total solids, suspended solids and dissolved solids in given sample of water
5. Determine alkalinity in given sample of water
6. Determine hardness in given sample of water
7. Determine quantity of chlorides in given sample of water
8. Determine the optimum dose of coagulant in given sample of water for its treatment using jar test
9. Determine the quantity of dissolved oxygen present in given sample of water
10. Determine BOD of given sample of water
11. Determine the break-point chlorine demand in given sample of water

CE-509- FIELD PRACTICES LAB

Course Title	Field Practices Lab	Course Code	CE-509
Semester	V Semester	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture+ Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

1.Basic knowledge of surveying and mathematics

2.Basic knowledge of reading working drawings

3. Basic knowledge on Quantity Surveying& Construction Practice

Course Outcomes

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

CO1	Mark for earthwork excavation and centre line marking for residential building using total station
CO2	Prepare cement mortar with specified mix proportion by manual mixing and volumetric proportioning
CO3	Examine the quality of plastering and masonry work
CO4	Explain the construction of 230mm brick wall in English bond
CO5	Place reinforcement for stairs spanning longitudinal case
CO6	Practice the placement of reinforcement and positioning shuttering to various elements of structure

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods
1	Marking of centre line	15
2	Practice Plastering, masonry, flooring	15
3	Placing of reinforcement and positioning shuttering	15
	Total	45

Course Contents

UNIT 1: Marking of Centre Line **Duration: 15 Periods(L: 5 – P: 10)**

1. Marking for the earth work excavation for foundation of column.
2. Marking the centre line of a one roomed building
3. Marking for the earth work of a simple two roomed building.
4. Marking for the centre line of a one room in a residential building with reference to the given point using Total Station.

UNIT 2: Practice Plastering, masonry, flooring

Duration: 15 Periods (L: 5 – P: 10)

1. Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.
2. Construction of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.
3. Supervisory skills of Plastering of a wall.
4. Supervisory skills for construction of Cement Concrete Flooring.

UNIT 3: Placing of reinforcement and positioning shuttering

Duration: 15Periods (L: 5 – P: 10)

1. Placement of reinforcement in an Isolated Column Footing with proper cover.
2. Positioning of shuttering to the column reinforcement.
3. Placement of reinforcement for sun shade (with specific attention of location).
4. Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).
5. Placement of reinforcement for slab
6. Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).

Key competencies to be achieved by the student

S.No	Experiment title	Key competency
1	Marking for the earth work excavation for foundation of column	Mark the size of pillar with reference to the centre lines
2	Marking for the earth work for the junction of two walls	Mark the centre line of main walls from the markings on burjis
3	Marking the centre line of a one roomed building	Mark the centre line of cross wall perpendicular to main wall
4	Marking for the earth work of a simple two roomed building	Check the accuracy by measuring length of two diagonals and their equality.
5	Marking for the centre line of a one room in a residential building with reference to the given point using Total Station	Transfer the first corner point on to the ground.
6	Preparation of cement mortar with specified	Dry mix both sand and cem

	mix proportion by manual mixing and volumetric proportioning.	thoroughly to a uniform colour
7	Construction of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.	Arrange the quoin header in line with the two perpendicular threads
8	Supervisory skills of Plastering of a wall.	Complete the ceiling plaster before commencement of wall plaster
9	Supervisory skills for construction of Cement Concrete Flooring.	The cement slurry shall be properly processed and finished smooth
10	Placement of reinforcement in an Isolated Column Footing with proper cover.	Mark centre of the outer reinforcing rods of footing in either direction.
11	Positioning of shuttering to the column reinforcement	Place the shuttering box around the column and fix the fastenings
12	Placement of reinforcement for sun shade (with specific attention of location).	Place the grill for sun shade such that the main reinforcement is in the top zone leaving the cover
13	Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).	Exercise care in the placement of reinforcement of at the junction of waist and loading slab.
14	Placement of reinforcement for slab	Locate reinforcing bars and mesh so that there is enough or between the bars to place and compact the concrete.
15	Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).	Decide detailed location of opening/hole and supply adequate details for reinforcements around the openings.

Recommended Books

1. CPWD SPECIFIATIONS, Govt of India Vol I&II, 2009
2. Practical Civil engineering hand book – Kale and Shaw
3. Building Construction – Bindra& Arora
4. National Building Code- BIS publication

Suggested E-learning references

1. http://nptel.ac.in
2.https://www.youtube.com/education

Suggested Learning Outcomes

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

1.1 Mark for the earth work excavation for foundation of column.
1.2 Mark the centre line of a one roomed building
1.3 Mark for the earth work of a simple two roomed building.
1.4 Mark for the centre line of a one room in a residential building with reference to the given point using Total Station.

2.1 Prepare of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.
2.2 Construct 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.
2.3 Supervise the Plastering of a wall.
2.4 Supervise the construction of Cement Concrete Flooring.

3.1 Place reinforcement in an Isolated Column Footing with proper cover.
3.2 Positioning the shuttering to the column reinforcement.
3.3 Place reinforcement for sun shade (with specific attention of location).
3.4 Place reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).
3.5 Place reinforcement for slab
3.6 Place reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).

Suggested Student Activities

1. Visit nearby construction site examine the marking given for earthwork excavation and prepare a report.
2. Visit building construction site examine the centre line marking of column, brick wall and wall column junction, and prepare the report.
3. With gained subject knowledge prepare your dream house plan and execute the same on the ground with available resources in your laboratory/survey stores.
4. Observe the process plastering on walls and types of brick masonry constructed at construction site in your locality, and prepare the report.
5. Visit the construction site and know the placing reinforcement and positioning of shuttering at different elements of building and prepare the report.

CO-PO Mapping Matrix

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

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

Course Code: CE-509 **Duration:1hour**
Course Name: Field practices **Max.Marks:20**

Instructions to the Candidate:

Pick and Answer any One of the following Questions from given lot.

1. Marking for the earth work excavation for foundation of column and column marking.
2. Marking the centre line of a one roomed building
3. Marking for the earth work of a simple two roomed building.
4. Marking for the centre line of a one room in a residential building with reference to the given point using Total Station.

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

Corse Code:CE-509 **Duration:1 hour**
Course Name: Field Practices lab **Max.Marks:20**

Instructions to the Candidate:

Pick and Answer any One of the following Questions from given lot

1. Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.
2. Construct of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.
3. Supervisory skills of Plastering of a wall.
4. Supervisory skills for construction of Cement Concrete Flooring.

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

Corse Code: CE-509 **Duration:2 hours**
Course Name: Field Practices lab **Max.Marks:40**

Instructions to the Candidate:

Pick and Answer any One of the following Questions from given lot.

1) Marking for the earth work excavation for foundation of column.
2) Marking the centre line of a one roomed building
3) Marking for the earth work of a simple two roomed building.
4) Marking for the centre line of a one room in a residential building with reference to the given point using Total Station.
5) Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.
6) Construct of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality
7) Supervisory skills of Plastering of a wall.
8) Supervisory skills for construction of Cement Concrete Flooring.
9) Placement of reinforcement in an Isolated Column Footing with proper cover.
10) Positioning of shuttering to the column reinforcement.
11) Placement of reinforcement for sun shade (with specific attention of location).
12) Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).
13) Placement of reinforcement for slab (with specific attention of chairs).
14) Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).

CE-510- PROJECT WORK

Course Title	Project Work	Course Code	CE-510
Semester	V Semester	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	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
CO2	Develop skills of curiosity, initiative, independence, reflection and knowledge transfer
CO3	Demonstrate ability to pursue new knowledge necessary to share their expertise in Civil engineering arena.
CO4	Appreciate the values of social, legal responsibility principles in real time projects
CO5	Analyze and discuss various ethical responsibility issues in Civil Engineering projects.
CO6	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 (Marks awarded by the External Examiner, Head of Section (i.e. Internal Examiner)and Guide.	20 20
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 and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	3	3	3			3	1,2,3,4,7
CO2	3			3		3	3	1,4,6,7
CO3	3			2	3	2	3	1,4,5,6,7
CO4	3			2		3	3	1,4,6,7
CO5	3			2	3	2	3	1,4,5,6,7
CO6	3			2		3	3	1,4,6,7

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
RUBRICS 2:

	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

CE-511- SKILL UPGRADATION

Course Title	Skill Upgradation	Course Code	CE-511
Semester	V Semester	Course Group	Practical
Teaching Scheme in Periods(L:T:P):	0:0:8	Credits	2.5
Type of Course	Practicals	Total Contact Periods	120

SKILL UPGRADATION ACTIVITIES

1. Visit nearby multistoried building and collect the structural detailing of various elements in all the floors and prepare a detailed report
2. 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.
3. Prepare a detailed report on various activities with CPM and PERT analysis to be carried out in any construction project.
4. 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.
5. 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.
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. Visit nearby New layout under construction and collect details of sewerage system and give presentation outlining the measures for improvement.
12. Collect and study different photographs of various prefabricated structures constructed by major Civil Engineering firms and prepare an analysis report.
13. Visit and Submit a Case study report on various heavy equipment used at the site during construction of high-rise buildings.
14. 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.
15. Prepare a report on suitable measures to be taken to make your college a green 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.