

Hall Ticket Number :									
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<b>R-20</b>
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**Code: 20A17ET**

IV B.Tech. I Semester Regular Examinations November 2023

**Foundation Engineering**

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

**(Compulsory question)**

- |  |    |    |
|--|----|----|
| 1. Answer <i>all</i> the following short answer questions ( 5 X 2 = 10M )  | CO | BL |
| a) What are the types of soil samples?   | 1  | 2  |
| b) The angle of slope and frictional angles of soil in infinite slopes are 20 <sup>0</sup> and 30 <sup>0</sup> respectively. What is its factor of safety? | 2  | 3  |
| c) What are the different types of earth pressure?   | 3  | 2  |
| d) Define Shallow foundation.  | 4  | 1  |
| e) What is "Negative skin friction" and explain its effect on pile capacity.   | 2  | 2  |

**PART-B**

**Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )**

Marks CO BL

**UNIT-I**

- |   |     |     |
|---|-----|-----|
| 2. Discuss Standard Penetration Test. What are the various corrections? What is the importance of the test in geotechnical engineering? |     |     |
|   | 12M | 1 3 |

**OR**

- |   |    |     |
|---|----|-----|
| 3. a) A SPT was conducted in a dense sand deposit at a depth of 22m, and a value of 48 was observed for N, The density of the sand was 15kN/m <sup>3</sup> . What is the value of N, corrected for overburden pressure? |    |     |
|   | 6M | 3 3 |
| b) What are the factors that affect the sample disturbance? How are these effects minimized?  |    |     |
|   | 6M | 1 2 |

**UNIT-II**

- |  |     |     |
|--|-----|-----|
| 4. How a slope analyzed using Swedish circle method? Derive an expression for the factor of safety |     |     |
|  | 12M | 2 4 |

**OR**

- |  |    |     |
|--|----|-----|
| 5. a) An embankment is inclined at an angle of 35 <sup>0</sup> and its height is 15m. The angle of shearing resistance is 15 <sup>0</sup> and the cohesion intercept is 200 kN/m <sup>2</sup> . The unit weight of soil is 18.0 kN/m <sup>3</sup> . If the Taylor's stability number is 0.06; find the factor of safety w.r.to cohesion. |    |     |
|  | 6M | 2 4 |

- b) Derive an expression for the factor of safety of an infinite slope in cohesion less soil. 6M 2 3

**UNIT-III**

6. a). Derive the expressions for active and passive pressure of Rankine's theory. 6M 3 3
- b). Explain how you can check stability of retaining walls. 6M 3 4

**OR**

7. A 6-m-high retaining wall is to support a soil with unit weight  $\gamma = 17.4 \text{ kN/m}^3$ , soil friction angle  $\phi = 26^\circ$ , and cohesion  $c' = 14.36 \text{ kN/m}^2$ . Determine the Rankine active force per unit length of the wall both before and after the tensile crack occurs and determine the line of action of the resultant in both cases. 12M 3 4

**UNIT-IV**

8. a) Explain the factor affecting the bearing capacity of soil? 6M 4 2
- b) Differentiate between general shear failure and local shear failure. How the ultimate bearing capacity in local shear is determined. 6M 4 2

**OR**

9. a) Explain assumptions in Terzaghi's theory of bearing capacity. 6M 4 2
- b) Determine the ultimate bearing capacity of a strip footing, 1.20m wide, and having the depth of foundation of 1.0m. Use Terzaghi's theory and assume general shear failure. Take  $\phi = 35^\circ$ ,  $\gamma = 18 \text{ kN/m}^3$ , and  $c' = 15 \text{ kN/m}^2$ ,  $N_c = 57.8$ ,  $N_q = 41.4$  and  $N_{\phi} = 42.4$  6M 4 4

**UNIT-V**

10. a) Explain the settlement in pile groups in clayey soils? 6M 5 2
- b) 200mm diameter, 8m long piles are used as foundations for a column in a uniform deposit of medium clay ( $q_u = 100 \text{ kN/m}^2$ ). The spacing between the piles is 500mm. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume adhesion factor = 0.9 6M 5 4

**OR**

11. a) Explain the Components of wells 6M 5 2
- b) Write a note on Tilts and shifts 6M 5 2

\*\*\* End \*\*\*

Hall Ticket Number :

R-20

Code: 20A17FT

IV B.Tech. I Semester Regular Examinations November 2023

### Finite Element Method

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two marks**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

#### PART-A

(Compulsory question)

1. Answer all the following short answer questions ( 5 X 2 = 10M )
- |   |     |    |
|---|-----|----|
|   | CO  | BL |
| a) Write a short note on advantages and disadvantages of FEM?                 | CO1 | L1 |
| b) Explain the boundary conditions used in bar element?                       | CO2 | L2 |
| c) Explain the terms Nodes, Primary nodes, Secondary nodes and Internal nodes | CO3 | L1 |
| d) State 3 basic theorems of isoparametric concept?                           | CO4 | L2 |
| e) Define static condensation?  | CO5 | L1 |

#### PART-B

Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

#### UNIT-I

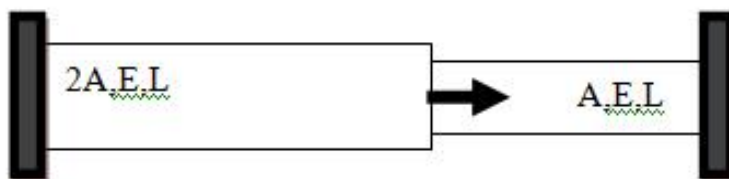
2. a) Explain the discretization process with examples (1D, 2D & 3D)? 6M CO1 L3  
b) Explain with Neat sketches, plain stress and plain strain for 2 dimensions 6M CO1 L3

OR

3. a) Compute the value of central deflection of a simply supported beam carrying a point load P at its centre by using Rayleigh-Ritz methods? 6M CO1 L3  
b) Explain the principle of minimum potential energy and principle of virtual work? 6M CO1 L2

#### UNIT-II

4. Find the Nodal displacements and stresses in two bar elements which is loaded with force P at the intersection of 2 elements and fixed at both ends as shown in Fig



12M CO2 L4

OR

5. a) Explain briefly about the difference between global coordinate system and natural coordinate system? 9M CO2 L4

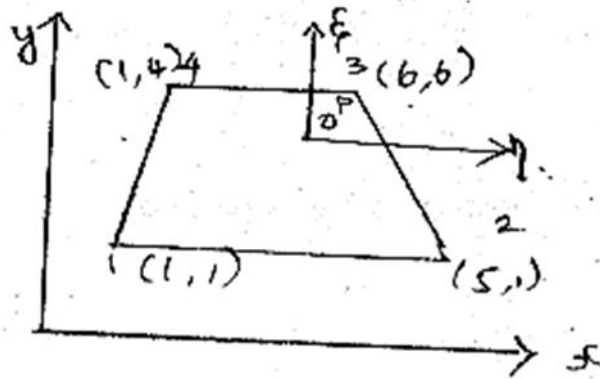
- b) Write a short note on shape functions? 3M CO2 L2

**UNIT-III**

6. a) Write a short note on structural applications of CST and LST element? 6M CO3 L4
- b) Derive the shape function of 2-D triangular element 6M CO3 L4

**OR**

7. For isoparametric 4 node rectangular element (shown in fig.), Determine the coordinate at point P which has local coordinate  $\xi = 0.5$  and  $\eta = 0.5$  where pt.1(1,1), pt 2 (5,1), pt 3 (6,6) & pt 4 (1,4),



9M CO3 L4

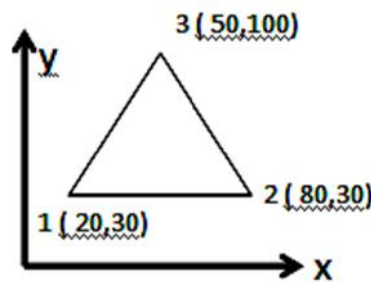
- b) State the shape function for CST element? 3M CO3 L2

**UNIT-IV**

8. a) Discuss brief on serendipity elements? 6M CO4 L3
- b) Write down the stiffness matrix equation for two dimensional CST elements hence explain the different terms used in details? 6M CO4 L4

**OR**

9. Determine the stiffness matrix for the constant strain triangle element as shown in fig. coordinates are given in mm. Assume plane stress condition take  $G = 210 \text{ GPa}$ ,  $t = 10 \text{ mm}$  &  $\nu = 0.25$



12M CO4 L4

**UNIT-V**

10. a) Write a short note on Gaussian quadrature Integration for 1-D integral? 6M CO5 L5
- b) Explain in brief the Variational approach? 6M CO5 L3

**OR**

11. Write a short note on Numerical integration techniques? 12M CO5 L5

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<b>R-20</b>
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**Code: 20A17IT**

IV B.Tech. I Semester Regular Examinations November 2023

**Prestressed Concrete**

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two marks**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

- |   |    |    |
|---|----|----|
| 1. Answer all the following short answer questions ( 5 X 2 = 10M )                            | CO | BL |
| a) Define post tensioning.  | 1  | L2 |
| b) List the types of losses of pretensioning.   | 2  | L3 |
| c) What is pressure line?   | 3  | L4 |
| d) List the different types of flexural failure modes observed in prestressed concrete beams? | 4  | L4 |
| e) Define the term anchorage zone.  | 5  | L3 |

**PART-B**

Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

**UNIT-I**

- |  |    |   |    |
|--|----|---|----|
| 2. a) Distinguish between post tensioned members and pretensioned members. | 6M | 1 | L2 |
| b) Explain the advantages and limitations of prestressed concrete.         | 6M | 1 | L2 |

**OR**

- |   |     |   |    |
|---|-----|---|----|
| 3. Explain Freyssinet system of prestressing using a neat sketch. | 12M | 1 | L2 |
|---|-----|---|----|

**UNIT-II**

- |  |     |   |    |
|--|-----|---|----|
| 4. A pre-tensioned beam 250 mm wide and 300 mm deep is prestressed by 12 wires each 7 mm diameter initially stressed to 1200 N/mm <sup>2</sup> with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep shrinkage and relaxation using IS: 1343 code with the following data: Relaxation of steel stress=90N/mm <sup>2</sup> ; Es = 210 kN/mm <sup>2</sup> ; Ec = 35 kN/mm <sup>2</sup> ; Creep coefficient ( ) = 1.6; Residual shrinkage strain = 3 x 10 <sup>-4</sup> . | 12M | 2 | L3 |
|--|-----|---|----|

**OR**

- |  |     |   |    |
|--|-----|---|----|
| 5. A prestressed concrete beam, 200 mm wide and 300 mm deep, is prestressed with wires (area = 320 mm <sup>2</sup> ) located at a constant eccentricity of 50 mm and carrying an initial stress of 1000 N/mm <sup>2</sup> . The span of the beam is 10 m. Calculate the percentage loss of stress in wires if (a) the beam is pretensioned for the following data: Es = 210 kN/mm <sup>2</sup> ; Ec = 35 kN/mm <sup>2</sup> ; Relaxation of steel stress = 5 per cent of initial stress; Shrinkage of concrete = 300 x 10 <sup>-6</sup> for pretensioning; Creep coefficient = 1.6; Slip of anchorage = 1 mm; Frictional coefficient for wave effect = 0.0015 per m. | 12M | 2 | L3 |
|--|-----|---|----|

<b>UNIT-III</b>
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6. A rectangular concrete beam of cross section 30 cm deep and 20 cm wide is prestressed by means of 15 wires of 5 mm diameter located 6.5 cm from the bottom of the beam and 3 wires of diameter of 5 mm, 2.5 cm from the top. Assuming the prestress in the steel as  $840 \text{ N/mm}^2$ , Calculate the stresses at the extreme fibres of the mid span section when the beam is supporting its own weight over a span of 6 m. If a uniformly distributed live load of  $6 \text{ kN/m}$  is imposed, evaluate the maximum working stress in concrete. The density of concrete is  $24 \text{ k/m}^3$ .

12M 3 L4

OR

7. Distinguish between concentric and eccentric tendons, indicating their practical applications.

12M 3 L4

<b>UNIT-IV</b>
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8. A pretensioned prestressed concrete beam having a rectangular section, 150 mm wide and 350 mm deep, has an effective cover of 50 mm. If  $f_{ck} = 40 \text{ N/mm}^2$ ,  $f_p = 1600 \text{ N/mm}^2$ , and the area of prestressing steel  $A_p = 461 \text{ mm}^2$ , calculate the ultimate flexural strength of the section using IS: 1343 code provisions.

12M 4 L4

OR

9. The support reaction of a prestressed concrete beam, 120 mm wide and 250 mm deep, is required to support an ultimate shear force of 60 kN. The compressive prestress at the centroidal axis is  $5 \text{ N/mm}^2$ . The characteristic cube strength of concrete is  $40 \text{ N/mm}^2$ . The cover to the tension reinforcement is 50 mm. If the characteristic tensile strength of steel in stirrups is  $250 \text{ N/mm}^2$ , design suitable reinforcements at the section using IS: 1343 code specifications.

12M 4 L4

<b>UNIT-V</b>
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10. The end block of a prestressed concrete beam, rectangular in section, is 120 mm wide and 300 mm deep. The prestressing force of 250 kN is transmitted to concrete by a distribution plate, 120 mm wide and 75 mm deep, concentrically located at the ends. Calculate the position and magnitude of the maximum tensile stress on the horizontal section through the centre of the end block using (i) Magnel, and (b) Guyon method. Design the reinforcement for the end block for the maximum transverse tension. Yield stress in steel =  $260 \text{ N/mm}^2$ .

12M 5 L3

OR

11. Briefly outline the Magnel's method of computing the horizontal and transverse stresses in end blocks subjected to concentrated force from anchorage.

12M 5 L3

\*\*\* End \*\*\*

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<b>R-20</b>
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**Code: 20A17DT**

IV B.Tech. I Semester Regular Examinations November 2023

**Structural Health Monitoring, Repair and Rehabilitation of Structures**

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

**(Compulsory question)**

- |   |    |    |
|---|----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 2 = 10M ) | CO | BL |
| a) What is the effect of poor quality steel for construction?             | 1  | 1  |
| b) What is meant by sulfate attack in concrete?                           | 2  | 1  |
| c) Mention the use of external steel plate.                               | 3  | 2  |
| d) Why do you collect the core concrete sample from the structure?        | 4  | 1  |
| e) Mention any two limitations of health monitoring of the structures.    | 5  | 2  |

**PART-B**

**Answer five questions by choosing one question from each unit ( 5 x 12 = 60 Marks )**

- |  | Marks | CO | BL |
|--|-------|----|----|
| <b>UNIT-I</b>  |       |    |    |
| 2. Illustrate any three causes and preventive measures for the deterioration of G+5 RCC building near a congested traffic area.  | 12M   | 1  | 3  |
| <b>OR</b>  |       |    |    |
| 3. Describe four causes for deterioration of steel structures mentioning their effects/symptoms.   | 12M   | 1  | 2  |
| <b>UNIT-II</b>   |       |    |    |
| 4. Cathode protection method is considered as one of the best corrosion protection methods for structures in underground water. Justify the statement.   | 12M   | 2  | 5  |
| <b>OR</b>  |       |    |    |
| 5. Elaborate the use of corrosion inhibitors in mitigating the corrosion in RCC structures with (i) the mechanisms involved (ii) Advantages and limitation of corrosion inhibitors.  | 12M   | 2  | 5  |
| <b>UNIT-III</b>  |       |    |    |
| 6. Explain the principles behind pull out test, Rebound hammer test and also mention the advantages and limitations of these methods. Suggest which you would recommend for deciding the formwork removal time?                                    | 12M   | 3  | 2  |
| <b>OR</b>  |       |    |    |
| 7. Explain the principles behind half-cell potential test and Ground penetrating Radar (GPR) and also mention the advantages and limitations of these methods. Suggest which you would recommend for finding the condition of foundation concrete? | 12M   | 3  | 2  |
| <b>UNIT-IV</b>   |       |    |    |
| 8. You are asked to give a training regarding the types of conventional/traditional repair materials to the interns in your office also to mention the special features of each of them. What aspects you would be discussing with them. Explain.  | 12M   | 4  | 3  |
| <b>OR</b>  |       |    |    |
| 9. With simple sketches explain the methods of improving the strength of existing columns and beams.   | 12M   | 4  | 2  |
| <b>UNIT-V</b>  |       |    |    |
| 10. Discuss about static monitoring of the structures with suitable sketches.  | 12M   | 5  | 1  |
| <b>OR</b>  |       |    |    |
| 11. Discuss about the innovative structural health monitoring techniques with examples.  | 12M   | 5  | 1  |

\*\*\* End \*\*\*

Hall Ticket Number :

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**R-20**

**Code: 20A170T**

IV B.Tech. I Semester Regular Examinations November 2023

## **Watershed Management**

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

### **PART-A**

**(Compulsory question)**

1. Answer **all** the following short answer questions ( 5 X 2 = 10M )
- |   | CO  | BL |
|---|-----|----|
| a) What are the objectives of watershed management?                       | CO1 | L1 |
| b) Write down the causes of soil erosion                                  | CO2 | L2 |
| c) What is mean by rain water harvesting?                                 | CO3 | L1 |
| d) What is the difference between Artificial recharge & natural recharge? | CO4 | L1 |
| e) Define saline soils  | CO5 | L2 |

### **PART-B**

**Answer five questions by choosing one question from each unit ( 5 x 12 = 60 Marks )**

Marks CO BL

#### **UNIT-I**

2. Explain in detail the necessity watershed. How can you classify the watersheds? Water down its objectives
- 12M CO1 L1

**OR**

3. Draw a neat sketch of hydrological cycle. Explain its components
- 12M CO1 L2

#### **UNIT-II**

4. Explain different types of erosion. What are the preventive measures its methods with neat sketches?
- 12M CO2 L2

**OR**

5. Discuss in detail about contour techniques and Rockfill dams' erosion control methods
- 12M CO2 L1

#### **UNIT-III**

6. What are the basic steps to begin the process of rain water harvesting explain with neat sketch.
- 12M CO3 L2

**OR**

7. Describe the role of check dam, farm ponds and percolation tanks in rain water harvesting.
- 12M CO3 L2

#### **UNIT-IV**

8. What are the factors consider for artificial recharge in drought prone areas.
- 12M CO4 L1

**OR**

9. Explain different methods of Artificial recharge.
- 12M CO4 L1

#### **UNIT-V**

10. Explain in details inter, mixed and strip cropping.
- 12M CO5 L2

**OR**

11. Write a short note on Reclamation of saline soils.
- 12M CO5 L1

\*\*\* End \*\*\*



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<b>R-20</b>
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**Code: 20A17LT**

IV B.Tech. I Semester Regular Examinations November 2023

## **Air Pollution and Control Engineering**

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

### **PART-A**

**(Compulsory question)**

- |   |     |    |
|---|-----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 2 = 10M )   | CO  | BL |
| a) Why is classification of pollutant important?  | CO1 | L1 |
| b) What are the types of air pollution related to damages on building structures and materials?                             | CO2 | L2 |
| c) Predict the AQI value for Chennai during Diwali Celebrations and also mention the category for that predicted AQI value. | CO3 | L2 |
| d) Name any two-air pollutant removal mechanism.  | CO4 | L3 |
| e) What are the available methods to control No <sub>2</sub> emission?  | CO5 | L4 |

### **PART-B**

Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

- |  | Marks | CO  | BL |
|--|-------|-----|----|
| <b>UNIT-I</b>  |       |     |    |
| 2. Write a brief note on classification of air pollutants.                                       | 12M   | CO1 | L1 |
| <b>OR</b>  |       |     |    |
| 3. Discuss in detail about pre and post industrialization scenarios on air pollution history.    | 12M   | CO1 | L1 |
| <b>UNIT-II</b>   |       |     |    |
| 4. Describe in detail on causes, formation and effects of Ozone layer depletion.                 | 12M   | CO2 | L2 |
| <b>OR</b>  |       |     |    |
| 5. a) How does poor air quality affect the social and economic status of the country?            | 6M    | CO2 | L1 |
| b) Write a short note on effects of air pollution on materials.                                  | 6M    | CO2 | L1 |
| <b>UNIT-III</b>  |       |     |    |
| 6. With a neat illustration, Explain the Plume behavior for the different atmospheric conditions | 12M   | CO3 | L3 |

**OR**

7. a) Explain the meteorological factors which affecting plume behaviour. 6M CO3 L3
- b) Discuss the various properties of atmosphere. 6M CO3 L3

**UNIT-IV**

8. What is the purpose of the gravity settling chamber? Justify the use of a gravity settling chamber in lowering levels of air pollution. Include the gravity settling chamber's maximum efficiency. Compile a list of the factors that influence gravity settling chamber's efficiency. 12M CO4 L3

**OR**

9. a) Provide an explanation of the gaseous pollutants' Gaussian plume dispersion equation. 6M CO4 L4
- b) Describe the criteria used to choose the particulate air control equipment. 6M CO4 L3

**UNIT-V**

10. Discuss the various air pollution management strategies that have been used to limit vehicle emissions in a brief manner. 12M CO5 L3

**OR**

11. Using a neat processing chart, describe the significance of in-plant control measures. 12M CO5 L4

\*\*\* End \*\*\*

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<b>R-20</b>
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**Code: 20A17BT**

IV B.Tech. I Semester Regular Examinations November 2023

**Advanced Transportation Engineering**

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

**(Compulsory question)**

- |   |    |    |
|---|----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 2 = 10M )             | CO | BL |
| a) Write the routing studies to be carried for establishment of metro rail alignment. | 1  | 1  |
| b) What do you mean by coning of wheels?  | 2  | 1  |
| c) What do you mean by crossing number  | 3  | 1  |
| d) What is pilot tunnel   | 4  | 1  |
| e) What is the need of air traffic control?   | 5  | 1  |

**PART-B**

**Answer five questions by choosing one question from each unit ( 5 x 12 = 60 Marks )**

Marks CO BL

**UNIT-I**

- |   |    |   |   |
|---|----|---|---|
| 2. a) Explain the role of railways in transportation? Bring-out the comparison with reference to highways.            | 6M | 1 | 2 |
| b) What is the purpose of a railway station? Discuss the factors that govern the site selection of a railway station. | 6M | 1 | 2 |

**OR**

- |  |    |   |   |
|--|----|---|---|
| 3. a) Discuss the different types of tractions role of Indian Railways in National development             | 6M | 1 | 2 |
| b) With a neat sketch explain the components of double track railway provided in cutting and on embankment | 6M | 1 | 2 |

**UNIT-II**

- |  |    |   |   |
|--|----|---|---|
| 4. a) Discuss the causes of rail failures? Explain the classification of wear on rails, how it is measured and what are the methods to reduce rail wear?   | 6M | 2 | 2 |
| b) A BG branch line track takes off as a contrary flexure through a 1 in 12 turnout from a main line track of a 3° curvature. Due to the turnout, the maximum permissible speed on the branch line is 30 km/h. Calculate the negative superelevation to be provided on the branch line track and the maximum permissible speed on the main line track (when it takes off from a straight track). | 6M | 2 | 3 |

**OR**

5. a) A transition curve is to be used to join the ends of a  $3.94^0$  circular curve with the straight. The length of the transition curve is 120m. Work out the shift and offsets at every 30m interval. How will you set this transition curve? 6M 2 3
- b) Calculate various leads for BG turnout of crossing number 1 in  $8 \frac{1}{2}$  with heel divergence as 114.30 3M 2 2
- c) Discuss the factors on which sleeper density depends. How is the sleeper density expressed? Find out the number of sleepers required for the construction of B.G. railway track 640m long. Assuming sleeper density as (N+5). Length of the rail for B.G. is 12.8m. 3M 2 3

**UNIT-III**

6. a) Discuss the human elements that contribute to railway accidents. What are the remedial measures that can be adopted? 6M 3 2
- b) What is meant by through packing? Describe the various steps involved in this procedure. What is the programme of annual track maintenance followed on Indian Railways? 6M 3 2

**OR**

7. Explain the points, crossings and turnout of railway track with neat diagram. 12M 3 2

**UNIT-IV**

8. a) What are the different methods of tunnelling in hard rock? Explain the full-face method along with its advantages 6M 4 2
- b) Discuss the types of lining adopted in tunnels and the factors affecting the thickness of lining for tunnels 6M 4 2

**OR**

9. a) Explain in detail with the help of sketches, the procedures for transferring the center line from the ground to the inside of the tunnel 6M 4 2
- b) Discuss the problems encountered during tunneling process and its possible mitigating measures 6M 4 2

**UNIT-V**

10. a) Explain the various survey to be conducted and the data to be collected for airport site selection 6M 5 2
- b) Discuss the following terms and their significance  
(i) Clear zone (ii) Approach Zone (iii) Inner and outer horizontal surface. (iv) Approach surfaces 6M 5 2

**OR**

11. The length of runway at sea level, standard atmospheric conditions and zero gradient is 1500 m. The airport site has an elevation of 900 m, and the reference temperature as  $20^{\circ}$  C. If the proposed runway grading permits an effective gradient of 0.20%, determine the actual runway length required at the site 12M 5 4

\*\*\* End \*\*\*

Hall Ticket Number :

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**R-20**

**Code: 20A17CT**

IV B.Tech. I Semester Regular Examinations November 2023

**Bridge Engineering**  
(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two marks**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

1. Answer **all** the following short answer questions ( 5 X 2 = 10M )
- |  | CO  | BL |
|--|-----|----|
| a) What are the factors to be considered while selecting suitable site for a bridge.   | CO1 | L1 |
| b) Briefly explain about the loading combinations used in deck slab bridges.   | CO2 | L1 |
| c) Draw the typical cross section of a T-beam RCC bridge with four beam arrangement showing the kerbs, the railing and appropriate reinforcement for slab. | CO3 | L2 |
| d) What is the purpose of providing lateral bracings in plate girder bridges?  | CO4 | L2 |
| e) List the various loads that are to be considered for a pier design.   | CO5 | L2 |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

**UNIT-I**

2. a) Write a note on the importance of impact factor in the design of bridges? 6M CO1 L2  
b) What is a bearing? What are the main functions of bearings? 6M CO1 L1

**OR**

3. Design a RC box culvert with inside dimensions 3 m height and 3 m width. It has to carry a superimposed load of 0.1 MPa and live load of 0.5 MPa. Assume the density of earth and angle of repose is 35 degrees. Adopt M20 grade concrete and Fe415 steel. Sketch the details of reinforcements in the box culvert. 12M CO1 L3

**UNIT-II**

4. Design a RC deck slab for NH to suit the following data: carriage way – two lane, foot path is 1 m on either side, clear span – 6 m, wearing coat – 80 mm, width of bearing – 400 mm. Adopt M20 grade concrete or Fe415 steel. Consider IRC class AA tracked loading. Sketch the details of reinforcements in the deck slab culvert. 12M CO2 L3

OR

5. **Design a reinforced concrete slab deck and sketch the details of reinforcements for a NH crossing to suit the following data:** Carriageway – Two lane (7.5 m wide); Footpaths – 1 m on either side; Clear span – 6 m; Wearing coat – 85mm; Width of bearing – 400 mm; Materials – M25 grade concrete and Fe-415 Grade HYSD bars; Loading – IRC Class AA tracked vehicle. 12M CO2 L4

UNIT-III
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6. An RCC T beam Girder Bridge to suit the following data. Clear width of road way – 9 m with span of 20, consider live load as IRC class AA tracked vehicle and provide thickness of wearing coat is 100 mm. Use M25 grade of concrete and Fe415 steel. Using Piguard's method, obtain the maximum moments in the longitudinal girders. Obtain maximum moments in the cross girders. 12M CO3 L4

OR

7. Design an intermediate T-Beam for the following data-slab need not be designed. i. Road width 8.00m, Total width=10.68m ii. Span 20.00m iii. Number of main girders 4 and cross girders 6 iv. Concrete Grade M40 v. Thickness of slab 250mm vi. Steel Fe 500 vii. Thickness of wearing coat 75mm viii. Loading Class AA tracked. Sketch and show the main and lateral reinforcements. 12M CO3 L5

UNIT-IV
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8. Write down the step by step design procedure for plate girder bridges. 12M CO4 L3

OR

9. Describe the various design requirements of shear connectors. 12M CO4 L1

UNIT-V
--------

10. a) Explain using sketches the different safety checks made for piers of bridges. 6M CO5 L2  
b) What are the types of foundations in bridges? Explain any one in detail with neat sketches. 6M CO5 L2

OR

11. A masonry abutment is used for a highway bridge together with the forces acting per unit length of abutment. SBC of soil is 200kN/m<sup>2</sup>. Coefficient of friction between masonry and soil is 0.7. Density of stone masonry is 18 kN/m<sup>3</sup>. Compute the stresses developed at the base. Check for the stability of abutment. 12M CO5 L3

\*\*\* End \*\*\*

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**R-20**

**Code: 20A17GT**

IV B.Tech. I Semester Regular Examinations November 2023

**Design and Drawing of Irrigation Structures**

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

\*\*\*\*\*

**Answer any one question from the following ( 1 x 70 = 70Marks )**

Marks CO BL

1. Design a canal drop (notch type) of 2 m. with the following data.

**Hydraulic particulars of the canal above drop:**

Full supply discharge = 4 m<sup>3</sup>/s

Bed width is 6.00 m.

Bed level is + 10.00m.

Full supply depth: 1.50 m.

F.S.L. +11.50m.

Top of bank 2.00 m. wide at level + 12.50m.

Half supply depth: 1.00 m.

**Hydraulic particulars of canal below drop:**

Full supply discharge = 4 m<sup>3</sup>/s

Bed width is 6.00 m.

Bed level is + 8.00m.

Full supply depth: 1.50 m.

F.S.L. +9.50m.

Top of bank 2.00 m. wide at level + 10.50m.

The ground level at the site of work is + 10.50m. Good soil is available for foundations at +8.50m.

Draw to a suitable scale the following :

(a) Longitudinal section and

(b) Half plan at top and half plan at foundation level.

CO1, L3,  
70M CO2 L4

**OR**

2. Design a tank sluice with a tower head taking off from a tank irrigating 225 hectares at 1050 duty. The tank bund through which the sluice is taking off has a top width of 2.2 m with 2:1 side slopes. The top level of bank is +80.00m and ground level at site is +74.50m. Good hard soil for foundation is available at +73.50m. The sill of the sluice at off take is +74.00m. The maximum water level in the tank is 78.00m. The full tank level is +77.00m. Average low water level of the tank is + 75.00m. The details of the channel below the sluice are as under.

Bed Level +74.00m

F.S.L = +74.50m

Bed width = 1.25m

Side slopes = 1.5 to 1 with top of bank at +75.50m.

Draw to a suitable scale the following :

(a) Longitudinal section and

(b) Half plan at top and half plan at foundation level.

CO1, L3,  
70M CO2 L4

\*\*\* End \*\*\*

Hall Ticket Number :

**R-20**

**Code: 20A17MT**

IV B.Tech. I Semester Regular Examinations November 2023

**Disaster Management**

(Common to CE & CSE)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

- |   |    |    |
|---|----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 2 = 10M ) | CO | BL |
| a) Differentiate disaster and risk.                                       | 1  | 1  |
| b) Write any four impacts due to man-made disasters.                      | 2  | 1  |
| c) Explain about disaster risk reduction.                                 | 4  | 2  |
| d) Enlist the methods of crisis management.                               | 3  | 2  |
| e) Write about the meaning of 'capacity building of society'.             | 5  | 1  |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

**UNIT-I**

- |  |    |   |   |
|--|----|---|---|
| 2. a) Explain the occurrence of Tsunami and its characteristics. | 4M | 1 | 2 |
| b) Describe any one case study of Tsunami disaster in the world. | 8M | 1 | 2 |

**OR**

- |   |    |   |   |
|---|----|---|---|
| 3. a) Explain the cause and occurrence of cyclone.                  | 4M | 1 | 2 |
| b) Describe any one recent case study of Cyclone disaster in India. | 8M | 1 | 2 |

**UNIT-II**

- |   |    |   |   |
|---|----|---|---|
| 4. a) Explain about oil spill and its general impacts on ocean. | 4M | 2 | 2 |
| b) Describe about Ennore oil spill and its disaster impacts.    | 8M | 2 | 2 |

**OR**

- |   |    |   |   |
|---|----|---|---|
| 5. a) Explain about the causes of accidents in case of road and rail. | 6M | 2 | 2 |
| b) Describe about the recent rail accident in India.                  | 6M | 2 | 2 |

**UNIT-III**

- |   |    |   |   |
|---|----|---|---|
| 6. a) What is emergency management and mention its methods. | 6M | 3 | 2 |
| b) Explain the importance of emergency management.          | 6M | 3 | 2 |

**OR**



7. a) Discuss about the monitoring of hazardous components in places of public importance. 6M 3 2
- b) Discuss the importance of Industrial safety drills to educate industry staff. 6M 3 2

<b>UNIT-IV</b>
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8. a) Explain about concept of Disaster Risk Reduction (DRR). 4M 4 2
- b) Discuss about activities of national body in India working towards the DRR and risk assessment. 8M 4 3

**OR**

9. a) Explain any three methods of disaster risk assessment. 9M 4 2
- b) Discuss about international bodies working towards the cooperation of multi-nations during disaster and risk assessment. 3M 4 2

<b>UNIT-V</b>
---------------

10. a) Enlist the post disaster situations and explain any two. 6M 5 2
- b) Explain about the capacity building of industries. 6M 5 2

**OR**

11. a) Describe about the methods and strategies for re-development aftermath. 8M 5 2
- b) Discuss about the disaster resistant design in industries. 4M 5 2

\*\*\* End \*\*\*

Hall Ticket Number :									
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<b>R-20</b>
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**Code: 20A17JT**

IV B.Tech. I Semester Regular Examinations November 2023

**Environment Impact Assessment & Life Cycle Assessment**

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two marks**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

- |   |     |    |
|---|-----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 2 = 10M ) | CO  | BL |
| a) Compare EIA and EIS.   | CO1 | L2 |
| b) Explain uncertainty in prediction.                                     | CO2 | L2 |
| c) List the importance of Review in EIA.                                  | CO3 | L1 |
| d) Differentiate LCA and LCC  | CO4 | L3 |
| e) Write the stages involved in LCA inventory.                            | CO5 | L1 |

**PART-B**

Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

**UNIT-I**

- |   |    |     |    |
|---|----|-----|----|
| 2. a) Illustrate step-by-step procedure to develop EIA. | 6M | CO1 | L2 |
| b) Enumerate Environmental Index Method.                | 6M | CO1 | L2 |

**OR**

- |  |    |     |    |
|--|----|-----|----|
| 3. a) Explain the steps involved in project EIA.             | 6M | CO1 | L2 |
| b) Illustrate Overlay method with their merits and demerits. | 6M | CO1 | L2 |

**UNIT-II**

- |   |    |     |    |
|---|----|-----|----|
| 4. a) Compare direct impacts and indirect impacts with examples.  | 6M | CO2 | L2 |
| b) Enumerate cultural impacts and Economic impacts with examples. | 6M | CO2 | L2 |

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 5. a) Discuss methods for predicting impacts. | 6M | CO2 | L2 |
| b) Explain Policy impacts and Social impacts. | 6M | CO2 | L2 |

**UNIT-III**

- |   |    |     |    |
|---|----|-----|----|
| 6. a) Enumerate mitigative measures for various impacts.  | 6M | CO3 | L2 |
| b) Illustrate a case study of EIA for Nuclear power plant | 6M | CO3 | L2 |

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 7. a) Explain the operational control in highway project to reduce the impact during running phase. | 6M | CO3 | L2 |
| b) Illustrate a case study of EIA for Reservoir height increase.                                    | 6M | CO3 | L2 |

**UNIT-IV**

8. a) List and explain the limitations of life cycle assessment. 6M CO4 L2  
 b) Define Life cycle assessment and explain its importance in environmental conservation. 6M CO4 L2

**OR**

9. a) Discuss the role of life cycle assessment in assessing ecological risk and human risk. 6M CO4 L2  
 b) Enumerate energy issues of life cycle. 6M CO4 L2

**UNIT-V**

10. a) Enumerate Life Cycle Assessment of Buildings. 6M CO5 L2  
 b) Write a note on inventory framework, inventory analysis and system boundaries. 6M CO5 L2

**OR**

11. a) Explain Reuse/maintenance stage and Recycle stage in Life Cycle Assessment. 6M CO5 L2  
 b) Enumerate the objectives of Life Cycle Assessment Inventory. 6M CO5 L2

\*\*\* End \*\*\*