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R-19

Code: 19BE11T

M.Tech. I Semester Regular & Supplementary Examinations June 2022

Research Methodology and IPR

(Common to All Branches)

Max. Marks: 60

Time: 3 Hours

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

UNIT-I

1. Explain the characteristics of a good research problem?

OR

2. Elucidate the different types of Data collection process.

UNIT-II

3. Elucidate the various sources of collecting review of literature. Also explain how to write a good review article.

OR

4. Elucidate the format of research proposal.

UNIT-III

5. Write a short note on:
a) Plagiarism
b) Research Ethics

OR

6. Explain the format of research proposal.

UNIT-IV

7. Elucidate the patent information and databases.

OR

8. Elucidate the scope of patent rights.

UNIT-V

9. What are the patentee rights under the Indian Patent Act, 1970?

OR

10. How to administrating patent system.

Hall Ticket Number :

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R-19

Code: 19B11ET

M.Tech. I Semester Regular & Supplementary Examinations June 2022
Structural Health Monitoring, Repair and Rehabilitation of Structures
(Structural Engineering)

Max. Marks: 60

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x12 = 60 Marks)

UNIT-I

1. What are the various types of construction and design errors? Discuss in detail the impact of these errors on concrete strength and durability.

OR

2. a) What are various actions of inhibitors to prevent corrosion? Explain in detail about the various corrosion inhibitors.
b) Discuss in detail the various coatings for steel rebars and concrete.

UNIT-II

3. a) Describe the initial and detailed inspections to the damaged structures and the purpose of these inspections.
b) Discuss in detail the types of polymer concrete and their applications.

OR

4. What is a super plasticizer? Discuss in detail the mechanism of super plasticizer in cement concrete or mortar.

UNIT-III

5. Define Shoring and under pinning. Explain the shoring and under pinning methods with the help of diagrams.

OR

6. Differentiate between Granite and shotcrete? Describe the procedure for Epoxy injection method of crack repair?

UNIT-IV

7. Discuss the Techniques for strengthening of RCC structures including the conventional and advanced techniques with neat sketches.

OR

8. Explain in detail the repair method to overcome the low member strength and deflection of an RCC beam.

UNIT-V

9. Define Maintenance. Classify the maintenance and explain in detail the various corrosion mitigation techniques adopted for RCC structures.

OR

10. What is SHM? What are the basic components of SHM? Explain the need for structural Health Monitoring of RCC structures.

Hall Ticket Number :																			
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R-19

Code: 19B11AT

M.Tech. I Semester Regular & Supplementary Examinations June 2022

Theory and Analysis of Plates
(Structural Engineering)

Max. Marks: 60

Time: 3 Hours

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

Marks CO BL

UNIT-I

1. Derive the expression for deflection of a uniformly loaded rectangular plate with simply supported edges subjected to cylindrical bending. 12M 1 6

OR

2. a) Define a plate? Explain the different types of plates. 6M 1 1

b) Explain in plane bending and transverse bending with sketches. 6M 1 2

UNIT-II

3. Derive the general differential equation for symmetrical bending of laterally loaded circular plates. 12M 2 6

OR

4. Derive the expression for deflection of a simply supported circular plate with hole at centre subjected to moments. 12M 2 6

UNIT-III

5. Derive the expression for deflection of a rectangular plate with simply supported edges subjected to combined action of uniform lateral load and uniform tension. 12M 3 6

OR

6. Derive the expression for deflection of a circular plate subjected to combined action of lateral load and tension. 12M 3 6

UNIT-IV

7. Derive the expression for deflection at the centre of a uniformly loaded orthotropic rectangular plate with simply supported edges. 12M 4 6

OR

8. Derive the governing differential equation for the orthotropic plates. 12M 4 6

UNIT-V

9. Calculate the deflection of the simply supported rectangular plates subjected to uniformly distributed load by finite difference method. 12M 5 3

OR

10. Give brief explanation about the application of the following approximate methods for the solution of the plate problems.
a. Strain energy method.
b. Finite element method. 12M 5 3

Hall Ticket Number :										
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R-19

Code: 19B112T

M.Tech. I Semester Regular & Supplementary Examinations June 2022

Theory of Elasticity and Plasticity

(Structural Engineering)

Max. Marks: 60

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x12 = 60 Marks)

	Marks
UNIT-I	
1. Derive the Hooke's Law and Differential equations of equilibrium?	12M
OR	
2. Derive Plain Stress and Plain strain with suitable examples	12M
UNIT-II	
3. Derive Solutions by polynomials and Saint Venant's principle.	12M
OR	
4. Explain the effect of Shear Force on Deflection of a Beam and calculate the displacement components.	12M
UNIT-III	
5. Obtain the solution for bending of a curved bar by a force at the end.	12M
OR	
6. Derive symmetrical stress distribution in a plate for two dimensional problems in polar coordinates.	12M
UNIT-IV	
7. Derive the differential equation of equilibrium in 3-dimensional view.	12M
8. Derive the expression for maximum shear stress in three dimensional case and show the planes of maximum shear stress on principal coordinate system	12M
UNIT-V	
9. Derive the solution for torsion of a prismatic bar. Also obtain the solution for an elliptic cross-section.	12M
OR	
10. Explain in brief the membrane analogy for torsion	12M

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Code: 19B111T

M.Tech. I Semester Regular & Supplementary Examinations June 2022

Advanced Structural Analysis

(Structural Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

UNIT-I

1. a) Explain degrees of freedom of different types of structural elements.
- b) Explain the static and kinematic indeterminacy of various structural components.

OR

2. a) Derive the stiffness matrix of a two noded truss element of length 'L, and axial rigidity 'AE'.
- b) Obtain the force-displacement equation of a beam element.

UNIT-II

3. A cantilever beam of length 4m carries a point load of 30KN at the end B, where a spring of stiffness EI/L supports the beam vertically upwards. Find the spring reaction using stiffness matrix method.

OR

4. Analyse the continuous beam ABC using flexibility matrix method. Span AB=5m and BC= 6m. The beam is fixed at A and supported on rollers at B and C. Span AB carries a udl of 35KN/m over the entire span and BC carries a central point load of 50KN. Sketch the BMD.

UNIT-III

5. Analyse the portal frame ABCD whose both ends A and D are fixed. AB=4m , BC= 4m and CD=2m. BC is loaded with a udl of 30KN/m and at B a horizontal load of 50KN acts towards C. Use displacement method.

OR

6. Analyse the L bent ABC with vertical member AB=5m and a horizontal member BC= 4m. The horizontal member BC carries a point load of 8 KN at the center. End A is fixed. Use force method of analysis.

UNIT-IV

7. a) Brief the term element approach.
- b) Write the procedure to analyse a continuous beam using direct stiffness method.

OR

8. Explain a) Transformation of matrices from local to global coordinates.
- b) Static condensation.

UNIT-V

9. Solve the following equations using Gauss elimination method.

$$5x_1 - 2x_2 + 4x_3 = 5$$

$$-2x_1 - x_2 + x_3 = 1$$

$$4x_1 + x_2 + 0x_3 = 6$$

OR

10. Find Cholesky decomposition for the following matrix shown below.

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$
