

Code: 19B111T

M.Tech. I Semester Regular & Supplementary Examinations July 2021

Advanced Structural Analysis

(Structural Engineering)

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 term indeterminacy. Write the equations to determine the various indeterminacies in case of pin jointed trusses and rigid jointed frames of plane and spacial nature. 12M

OR

2. a) Explain the degrees of freedom for different types of structural elements. 6M
b) Briefly explain the term structural idealization. 6M

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. 12M

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. 12M

UNIT-III

5. Analyse the portal frame ABCD whose both ends A and D are fixed. AB=4m , BC= 4m and CD=4m. BC is loaded with a udl of 20KN/m and at B a horizontal load of 25KN acts towards C. Use displacement method. 12M

OR

6. Analyse the continuous beam ABC using force method, whose both ends A and C are fixed. Support B rests on rollers. AB=BC= 6m. BC carries a udl of 50KN/m. Treat bending moments at A and C as redundant. 12M

UNIT-IV

7. a) Brief the term element approach. 6M
b) Write the procedure to analyse a continuous beam using direct stiffness method. 6M

OR

8. Explain about static condensation with an example. 12M

UNIT-V

9. Determine the solution of equations by Gauss elimination method
 $4x_1 + 2.5x_2 + 3x_3 = 37$
 $4x_1 + 10x_2 + 3x_3 = 35$
 $2x_1 + 4x_2 + 5x_3 = 19$ 12M

OR

10. Determine the solution of equations by Cholesky method.
 $16x_1 + 4x_2 + 4x_3 - 4x_4 = 32$
 $4x_1 + 10x_2 + 4x_3 + 2x_4 = 26$
 $14x_1 + 4x_2 + 6x_3 - 2x_4 = 20$
 $-4x_1 + 2x_2 - 2x_3 + 4x_4 = -6$ 12M

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R-19

Code: 19B11ET

M.Tech. I Semester Regular & Supplementary Examinations July 2021
Structural Health Monitoring, Repair and Rehabilitation of Structures
(Structural Engineering)

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. How do concrete properties like strength, permeability, volume change, thermal properties affect the durability and serviceability of structures? Discuss. 12M

OR

2. a) Evaluate the effects of cover thickness and cracking in the context of durability of structural members. 6M
b) Classify the methods of Corrosion protection and explain the mechanism involved in each of them. 6M

UNIT-II

3. a) Explain about the quality assurance for concrete construction. 6M
b) Discuss briefly the reasons for maintenance of any constructed facilities. 6M

OR

4. Write short notes on (i) Expansive cement, (ii) polymer concrete, (iii) Sulphur infiltrated concrete, and (iv) Fiber reinforced concrete 12M

UNIT-III

5. Distinguish between the various techniques for repair of cracks. 12M

OR

6. Write a short notes on (i) shoring and (ii) underpinning 12M

UNIT-IV

7. Describe the various conventional strengthening techniques commonly used in the field. 12M

OR

8. Explain the strengthening techniques for the structural member exposed to Marine atmosphere. 12M

UNIT-V

9. a) Describe the types of maintenance and mention the special features of each of them. 6M
b) As a maintenance Engineer, what would you think, are the reasons for decay of structures? List. 6M

OR

10. Enlist the basic components of SHM and elaborate its working mechanism. 12M

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R-19

Code: 19BE11T

M.Tech. I Semester Regular & Supplementary Examinations July 2021

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 any two multivariate techniques used in data analysis?

OR

2. Elucidate the various errors in selecting the research problem.

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 Patent, Design, Trade and Copyright.

OR

6. Explain the international scenario on Patent.

UNIT-IV

7. Elucidate the Patent rights.

OR

8. Explain Licensing and Transfer Technology in Patent.

UNIT-V

9. Elucidate the patent information and databases.

OR

10. Elucidate the new developments in IPR

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R-19

Code: 19B11BT

M.Tech. I Semester Regular & Supplementary Examinations July 2021

Stability of Structures

(Structural Engineering)

Max. Marks: 60

Time: 3 Hours

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

UNIT-I

1. a) Explain the concepts of stability. 5M
- b) Calculate the critical load for a column with both ends fixed of uniform cross section using the deflected shape by employing the principle of stationary potential energy. 7M

OR

2. a) Explain the following.
(i) Imperfection approach (ii) Energy approach 6M
- b) Explain the characteristics of stability problems. 6M

UNIT-II

3. a) Explain the procedure of Raleigh-Ritz method. 6M
- b) Derive the empirical relationship for a short column with both ends hinged. 6M

OR

4. A column of length 12 meters is subjected to an axial load of 53 Tons. Flexural rigidity of the member is uniform throughout. Compute the critical load using finite difference method by dividing it in to five equal parts. 12M

UNIT-III

5. Explain the behaviour of structural elements subjected to torsional buckling. 12M

OR

6. Explain the behaviour of structural elements subjected to torsional flexural buckling. 12M

UNIT-IV

7. Discuss the applications of Timoshenko method in the stability analysis of structures. 12M

OR

8. Explain the applications of Raleigh-Ritz method in the stability analysis of structures 12M

UNIT-V

9. Using energy method, determine the critical loading of a simply supported, square plate loaded in the X direction by a linearly varying distributed load. 12M

OR

10. Explain the steps involved in the determination of critical load of a rectangular plate with sides A and B uniformly compressed in two directions. 12M

Code: 19B112T

M.Tech. I Semester Regular & Supplementary Examinations July 2021

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=60Marks)

UNIT-I

1. a) What is generalized Hooke's law? Establish the stress – strain relationship for isotropic materials and also derive the relationship between E, G and K. 6M
- b) Explain the compatibility conditions and their physical significance. Derive compatibility equations for 3 dimensional bodies. 6M

OR

2. Explain plain stress and plain strain problems with examples 12M

UNIT-II

3. a) Explain the use of Airy stress function in the solution of two dimensional problems in Elasticity. 6M
- b) Explain St. Venant's principle and its applications related to civil engineering field. 6M

OR

4. A cantilever beam of span l is subjected to a point load of P at end of section, for this beam
- i. Obtain the main equations that describe the bending behavior of the beam based on the conditions of equilibrium, compatibility and boundary conditions
- ii. Explain the stress function approach for solution in the above 3-dimensional problem. 12M

UNIT-III

5. Derive the three dimensional equilibrium equations in polar coordinates system. 12M

OR

6. a) Derive Lamé's equations for a thick walled cylinder subjected to internal and external pressure. 6M
- b) Explain stress concentration and its implications on the design of structures 6M

UNIT-IV

7. Derive the expression for maximum shear stress in three dimensional case and show the planes of maximum shear stress on principal coordinate system 12M

OR

8. Explain
- i. Principle of superposition ii. Uniqueness theorem
- iii. Reciprocal theorem iv. Homogeneous deformation 12M

UNIT-V

9. a) Discuss the effect of shear and torsion on
- i) Elliptical cross section
- ii) Triangular cross section of bar. 6M
- b) A hollow thin walled brass tube has an equilateral triangular section the mean length of the side of the triangle is 125mm and thickness of the wall is 3mm the tube is subjected to a twisting moment of 2×10^4 N-mm. find the maximum shearing stress and the angle of twist per unit length. 6M

OR

10. By choosing a suitable torsional stress function, solve the problem of pure torsion of an membrane analogy theory with semi major and semi minor axes 'a' and 'b' respectively and determine the location and magnitude of maximum shear stress. 12M
