Hall Ticket Number :										

R-19

Code: 19B111T

M.Tech. I Semester Regular Examinations February 2020

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)

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UNIT–I

1. Deduce the force displacement relationships for a beam element of length " l " fixed at one end and free at other end , the other end being subjected to different displacements. 12M

OR

2. List out the similarities and dissimilarities in stiffness and flexibility matrix methods. Also enlist the advantages of both methods. 12M

UNIT–II

3. Analyse using flexibility method, the continuous beam ABC with ends A and B simply supported and end C fixed. Span AB= 3m and carries a central point load of 100 KN. Span BC=4m and it carries a udl of 60KN/m. Assume uniform EI and sketch the BMD. 12M

OR

4. Analyse the continuous beam ABC if the downward settlements of supports B and C are 1500/EI and 500/EI. Span AB= 8m and span BC= 6m. Two midpoint loads of 200KN and 100KN are acting on the beam. Use displacement method. 12M

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. 12M

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. 12M

UNIT–IV

7. Explain a) Banded matrix and semi band width. 6M

   b) Sub-structuring 6M

OR

8. Explain a) Transformation of matrices from local to global coordinates. 6M

   b) Static condensation. 6M

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. 12M

$16x_1+4x_2+4x_3-4x_4=32$

$4x_1+10x_2+4x_3+2x_4=26$

$14x_1+4x_2+6x_3-2x_4=20$

$-4x_1+2x_2-2x_3+4x_4=-6$

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Hall Ticket Number :										

R-19

Code: 19B11ET

M.Tech. I Semester Regular Examinations February 2020

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)

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UNIT–I

1. a) Elaborate various components of quality control for concrete construction. 6M

   b) Discuss about the design and construction errors leading to deterioration of a structure. 6M

OR

2. How do climate, temperature, chemicals, wear and erosion cause deterioration on concrete? Explain. 12M

UNIT–II

3. What do you understand by physical Inspection of damaged structures, Structural and Economic appraisal? Discuss the necessity of them. 12M

OR

4. Elaborate the applications of special concretes, mortar and concrete chemicals as a repair material. 12M

UNIT–III

5. a) Illustrate the steps involved in the repair of rebars in the constructed facilities. 6M

   b) Briefly explain the techniques of repair using foamed concrete and vacuum concrete. 6M

OR

6. Discuss in detail about the repair techniques for i) Dry pack and ii) shot Crete. Also recommend under what circumstances they are selected as techniques to be used. 12M

UNIT–IV

7. Explain briefly about advanced techniques available for strengthening with suitable sketches. 12M

OR

8. Explain the various strengthening techniques to overcome low member strength 12M

UNIT–V

9. a) "Maintenance of constructed facilities is mandatory". Justify the statement by mentioning the importance of the same. 6M

   b) Assume yourself appointed as a maintenance Engineer in a government building. What would be your role and responsibilities? 6M

OR

10. Structural Health monitoring is tool maintenance of structures" Justify the statement. 12M

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Hall Ticket Number :										

R-19

Code: 19BE11T

M.Tech. I Semester Regular Examinations February 2020

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)

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UNIT–I

1. Explain the characteristics of a good research problem?

OR

2. Elucidate the different types of Data collection process.

UNIT–II

3. Explain the various types of research reports.

OR

4. Elucidate the format of writing a good research report.

UNIT–III

5. Elucidate the Patent Process.

OR

6. Explain the procedure for grants of Patents.

UNIT–IV

7. Elucidate the patent information and databases.

OR

8. Elucidate the scope of patent rights.

UNIT–V

9. Elucidate the IPR of Biological systems and Computer software.

OR

10. How to administrating patent system.

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Hall Ticket Number :										

R-19

Code: 19B11AT

M.Tech. I Semester Regular Examinations February 2020

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)

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			Marks	CO	BL
		UNIT–I			
1.		Derive the expression for deflection of a uniformly loaded rectangular plate with fixed edges subjected to cylindrical bending.	12M	1	6
		OR			
2.	a)	List the assumptions made in the analysis of plates?	3M	1	1
	b)	Derive the differential equation for cylindrical bending of rectangular plates.	9M	1	6
		UNIT–II			
3.		Derive the expression for deflection of a uniformly loaded circular plate with fixed edges.	12M	2	6
		OR			
4.		Derive the differential equation for circular plate with a circular hole at its centre subjected to shearing force Qo at its centre.	12M	2	6
		UNIT–III			
5.		Derive the differential equation of the deflection surface of the plates subjected to combined action of lateral loads and forces in the middle plane of the plate.	12M	3	6
		OR			
6.		Derive the expression for deflection of a rectangular plate with simply supported edges under the combined action of bending and stretching.	12M	3	6
		UNIT–IV			
7.		Explain the theory of application of orthotropic plates in the calculation of grid works.	12M	4	2
		OR			
8.		Calculate the rigidities for the following cases, assuming suitable data? a. Reinforced concrete slabs b. Ply wood and c. corrugated sheet	12M	4	3
		UNIT–V			
9.		Explain the basic steps involved in the finite element method of analysis for plate problems.	12M	5	2
		OR			
10.		Derive the expression for deflection of a simply supported rectangular plate subjected to concentrated load ‘P’.	12M	5	6

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Hall Ticket Number :										

Code: 19B112T

R-19

M.Tech. I Semester Regular Examinations February 2020

Theory of Elasticity and Plasticity

(Structural Engineering)

Max. Marks: 60 Time: 3 Hours

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

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UNIT–I

1. a) Prove that stress tensor is a symmetric second order tensor. 6M

   b) Find out the normal and shear stresses on a on plane having two of the direction cosines are 0.3 and 0.4 when the state of stress is given by

$$\begin{bmatrix} 50 & 70 & 100 \\ 70 & 100 & 30 \\ 100 & 30 & 150 \end{bmatrix} \text{MPa}$$

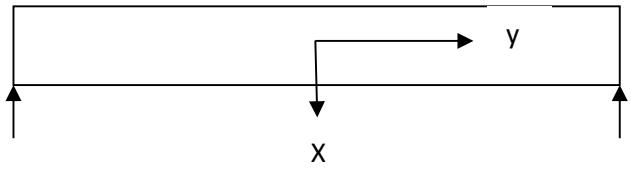
6M

OR

2. What are stress invariants? Derive the expression for principal stresses in 3-dimensional space. 12M

UNIT–II

3. For the following beam loaded by its own weight, find the expression for displacement components in X and Y directions. Length and thickness of the beams are 'L' and '2C' respectively



12M

OR

4. a) State and explain the Saint Venant's principle. 6M

   b) Find out what problem of plane stress is solved by the following stress function.

$$\emptyset = \frac{3F}{C}\left(xy - \frac{xy^3}{3C^2}\right) + \frac{P}{2}y^2$$

6M

UNIT–III

5. Prove that the general equation in polar coordinates as

$$\left(\frac{\partial^2}{\partial r^2} + \frac{1}{r}\frac{\partial}{\partial r} + \frac{1}{r^2}\frac{\partial^2}{\partial \theta^2}\right)\left(\frac{\partial^2 \emptyset}{\partial r^2} + \frac{1}{r}\frac{\partial \emptyset}{\partial r} + \frac{1}{r^2}\frac{\partial^2 \emptyset}{\partial \theta^2}\right) = 0$$

   Where ϕ is the stress function of 'r' and θ 12M

OR

6. Prove the stress distribution in a curved bar with a constant narrow rectangular cross section and circular axis bent In the plane of curvature by a couple 'M'.

$$\sigma_r = \frac{4M}{N}\left(\frac{a^2b^2}{r^2}\log\left(\frac{b}{a}\right) + b^2\log\left(\frac{r}{a}\right) + a^2\log\left(\frac{a}{r}\right)\right)$$

$$\sigma_\theta = \frac{-4M}{N}\left(\frac{a^2b^2}{r^2}\log\left(\frac{b}{a}\right) + b^2\log\left(\frac{r}{a}\right) + a^2\log\left(\frac{a}{r}\right) + b^2 - a^2\right)$$

Where $N = (b^2 - a^2) - 4a^2b^2\left(log\left(\frac{b}{a}\right)\right)^2$

Where a and b are inner and outer radii of the boundary and 'r' is any radius varying from a to b. 12M

UNIT–IV

7. State and explain about the principle of superposition 12M

OR

8. a) What is homogeneous deformation? 2M

   b) Derive the differential equations of equilibrium for a 2-demensional state of stress and state the same of for three dimensional state of stress 10M

UNIT–V

9. Show that for the same twist, the elliptical section has a greater shearing stress than he inscribed circular section (radius equal to the minor axis 'b' of the ellipse). Find out which of the above takes greater torque for the same allowable stress 12M

OR

10. Explain about Prandtle's membrane analogy for torsional problems taking a suitable case. 12M

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