H.T No: | | | | | | | | | | | **R18** Course Code: B30402

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

M.Tech I Semester Supplementary Examinations September-2023

Course Name: THEORY OF ELASTICITY

(Structural Engineering)

Date: 07.09.2023 FN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all FIVE questions (Compulsory)

Each question carries FOUR marks. **5x4=20M**

1. Define Hooks law and its applications. 4M
2. Write briefly about displacements. 4M
3. Define stress distribution briefly. 4M
4. Explain the principle of super position. 4M
5. Discuss the effects of torsion in circular shafts. 4M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

6. A). The state of stress at a point with respect to x,y,z co-ordinate system is given below. Determine the stress tensor to the x', y',z' co-ordinate system obtained by rotation of 35^0 about x axis $\begin{bmatrix} 3 & 2 & -2 \\ 2 & 0 & -1 \\ -2 & -1 & 2 \end{bmatrix}$. 10M

OR

6. B). Derive compatibility equations in terms of a stress for a plane stress problem. 10M

7. A). Illustrate stress distribution in stressed plate with a circular hole and elliptical hole. 10M

OR

7. B). Derive the expression in Cartesian and polar coordinates for two dimensional problem. 10M

8. A). Write briefly about various conditions of compatibility and principle of super position. 10M

OR

8. B). Derive the equilibrium equations in Cartesian co-ordinates for three dimensional stress field. 10M

9. A). Explain the following. 10M
   (i) Reciprocal theorem of strain energy.
   (ii) Conditions of compatibility.

OR

9. B). Describe the procedure of determination of principal strain and rotation. 10M

(P.T.O.)

10. A). A solid circular shaft of 120 mm radius is subjected to a twisting moment so that the outer 60 mm deep shell yields plastically. If the yield stress is shear for the shaft material is 185 M/mm^2, determine the twisting couple applied and the associated angle of twist. Assume the shear modulus of the shaft material as 94 kN/mm^2. 10M

OR

10. B). Derive and expression for the torsion of thin rectangular section. 10M

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