

B.E. Mechanical Engineering (Model Curriculum) Semester-VII
PEC-MEL-421 - Stress Analysis

P. Pages : 2

Time : Three Hours



GUG/W/23/14264

Max. Marks : 80

- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Diagrams and Chemical equation should be given wherever necessary.
 5. Illustrate your answers wherever necessary with the help of neat sketches.
 6. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.

1. a) Explain plane stress and plane strain condition with suitable examples. 5
- b) Derive compatibility equation for plane stress condition in the presence of Body forces. 15

OR

2. Considering the stress function of third degree polynomial, draw the stress distribution around a rectangular strip having a length 'l' and height '2h' and with unit thickness. 20
3. Derive general equations of equilibrium in polar coordinate system. 20

OR

4. a) Explain the effect of circular hole on stresses in case of plate subjected to tensile load. 5
- b) Explain the concept of symmetric stress distribution with suitable examples. 5
- c) Derive the equations for stresses in the circular cylinder subjected to internal external pressure. Assume inner radius and outer radius of cylinder as 'a' and 'b' respectively. 10
5. a) Define isoclinics and isochromatics fringes and how they develop in plane polariscope setup. 4
- b) Explain stress optic law and derive the expression to get difference between principal stresses $\sigma_1 - \sigma_2$. 6
- c) Discuss Tardy's method of compensation in detail. 10

OR

6. a) State the various photoelastic materials. 4
- b) State and explain various properties of photoelastic materials. 6
- c) Which are the various separation methods? Explain any one of them. 10
7. a) Explain phenomenon of stress freezing in 3D photoelasticity. 5

- b) Explain the gauge factor of strain gauge and derive the relation for it. **5**
- c) Derive the equation for bridge output voltage of unbalance Wheatstone bridge. **10**

OR

- 8.** a) Write short notes on the following. **20**
- i) Fringe sharpening.
- ii) Brittle coating method of stress analysis.
- iii) Strain rosette.
- iv) Slicing of photoelastic model.
