B.E. (Mechanical Engineering) Model Curriculum Semester-VII

PEC-MEL-421 - Stress Analysis

P. Pages : 1 **GUG/W/24/14264**

Time : Three Hours * 5 7 4 9 * Max. Marks : 80

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

1. a) Derive differential equation of equilibrium in Cartesian coordinate system. **10**

b) Considering the stress function of first and second degree polynomial, draw the stress distribution around a rectangular strip having a length ‘l’ and height ‘2h’ and with unit thickness. **10**

OR

2. a) Explain plane stress and plane strain condition with suitable examples. **5**

b) Derive compatibility equation for plane stress condition in the absence of Body forces. **15**

3. a) Explain the concept of symmetric stress distribution with suitable examples. **5**

b) Explain the effect of circular hole on stresses in case of plate subjected to tensile load. **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**

OR

4. Derive the expression for stresses in case of curved beam subjected to couples at its ends using the approach of stress function. **20**

5. a) Explain plane and circular polariscope setups with neat sketches. **10**

b) Discuss Tardy’s method of compensation in detail. **10**

OR

6. a) Explain Electric Analogy technique for separation of stresses. **10**

b) Explain oblique incidence method of stress separation. **10**

7. a) Explain in detail the slicing of photoelastic model. **10**

b) Derive the equation for bridge output voltage of unbalance Wheatstone bridge. **10**

OR

8. Write short noes on the following. **20**

i) Stress freezing.
ii) Brittle coating method of stress analysis.
iii) Fringe multiplication technique.
iv) High temperature strain gauges.

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