

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

P. Pages : 2

Time : Three Hours



**GUG/S/25/14264**

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. Illustrate your answers wherever necessary with the help of neat sketches.
  5. Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.

1. a) What are the different types of forces? Explain with suitable examples? 3
- b) Derive compatibility equation for plane stress condition in the presence of the body forces. 17

**OR**

2. a) Describe the components of direct strain and also enlist the assumptions. 3
- b) Derive the relations for stress components in case of simply supported beam subjected to uniformly distributed load, using the approach of stress function. 17
3. a) Derive the expression for stresses in case of curved beam subjected to couples at its ends using the approach of stress function. 20

**OR**

4. a) Explain the effect of circular hole on stresses in case of plate subjected to tensile load. 5
- b) Derive the expression for stresses in a rotating circular disk having inner radius of 'a' and outer radius 'b' The angular velocity of disk is 'w' and density of material of disk is 'ρ'. 15
5. a) Explain the following terms: 4
- i) Circularly Polarised light.
- ii) Elliptically polarised light
- b) Describe the procedure for preparing photoelastic model. 6
- c) Which are the various separation methods? Explain any one of them. 10

**OR**

6. a) Explain stress – optic law with necessary derivation. 10
- b) Discuss Tardy's methods of compensation in detail. 10

7. a) Explain in detail Brittle coating method. **10**
- b) Derive the equation for bridge output voltage for following cases. **10**
- i) When four arms are sensitive to the strain with all linear gauges.
  - ii) When four arms are sensitive to the strain with two linear and two lateral gauges.

**OR**

8. Write short notes on: **20**
- i) Slicing of photoelastic model.
  - ii) High temperature strain gauges.
  - iii) Reflection polariscope.
  - iv) Commercial strain indicators.

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