

G.R. No.	
----------	--

paper code: P119-151(T1)

OCTOBER 2019 / INSEM (T1)

F. Y. M. TECH. (Mechanical Design Engineering) (SEMESTER - I)**COURSE NAME: Advanced Stress Analysis****COURSE CODE: MEPA11181****(PATTERN 2018:R1)**

Time: [1 Hour]

[Max. Marks: 20]

(*) Instructions to candidates:

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q. 1 Derive equilibrium equation in polar coordinate system. 10

OR

Q. 2 Investigate problem of plane stress is satisfied by the stress function 10

$$\phi = \frac{3F}{4d} \left[xy - \frac{xy^3}{3d^2} \right] + \frac{P}{2} y^2$$

applied to the region included in $y = 0$, $y = \pm d$, $x = 0$ and $x = L$ on the side x positive. Also represent the stress distribution.

Q. 3 a A delta strain gauge rosette reading are given as: 06

$$\epsilon_A = 220 \mu, \epsilon_B = 500 \mu, \epsilon_C = 780 \mu$$

Determine principal strain and stress. Take $E = 200 \text{ GPa}$ and $\nu = 0.285$

b Explain plane polariscope with neat sketch. 04

OR

Q. 4 a The strain readings of a rectangular strain gauge rosette are given as: 06

$$\epsilon_A = 85 \times 10^{-6}, \epsilon_B = 45 \times 10^{-6}, \epsilon_C = 130 \times 10^{-6}$$

Determine principal stress and maximum shear stress.

Take $E = 70 \text{ GPa}$ and $\nu = 0.3$

b Write short note on isoclinic fringe analysis. 04