Total No. of Questions – [04] Total No. of Printed Pages: 02

G.R. No.	

P118-151(T1)

OCTOBER 2018 / IN - SEM (T1)

F. Y. M. TECH. (Design Engineering) (SEMESTER - I)

COURSE NAME: Advanced Stress Analysis

COURSE CODE: MEPA11181

(PATTERN 2018)

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 a Derive equilibrium equation in rectangular coordinate system [06]

b Prove that $\emptyset = A\,xy + B\frac{xy^2}{6}$ is a valid stress function. Also determine the stresses. [04]

OR

Q.2 The stress function $\emptyset = A\,\log r + B\,r^2\,\log r + C\,r^2 + D$ can be used to represent stress distribution in a hollow cylinder subjected to uniform pressure on the inner and outer surface. Boundary conditions are $\sigma_r = -P_i \text{ at } r = a \text{ and } \sigma_r = -P_o \text{ at } r = b$. Where, A, B,C,D are constants. Derive the expression for stresses. [10]

Determine the value of radial and circumferential stress in a thick cylinder subjected to an internal pressure of 6 N/mm². The cylinder has internal and external radius 100 and 150 mm respectively.

Q.3 a Explain the terms isoclinic and isochromatic in details [04]

b A delta strain gauge rosette measures strain at a point of aa stressed body. The strain readings are given by $\varepsilon_A = -220\,\mu$, $\varepsilon_B = 100\,\mu$, $\varepsilon_C = 340\,\mu$. Determine principal stress and its orientation. [06]

Take E = 200 GPa and ν = 0.285

OR

Q.4 a Explain working of circular polariscope in detail [06]

b The strain readings of a rectangular strain gauge rosette are given as: $\varepsilon_A = 285\,\mu$, $\varepsilon_B = 65\,\mu$, $\varepsilon_C = 102\,\mu$. Determine principal stress and its orientation. [04]

Take E = 70 GPa and ν = 0.32