

Code: CE4T3

**II B.Tech - II Semester – Regular / Supplementary Examinations
April 2019**

**MECHANICS OF SOLIDS-II
(CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22 M

1.

- a) State moment area theorems I and II.
- b) Express a relation between bending moment and curvature of a beam.
- c) Define isotropic stress with sketch.
- d) What are the various theories of failure?
- e) Explain the limitations of Euler buckling stress formula.
- f) Differentiate between buckling stress and yield stress of mild steel.
- g) Define unsymmetrical bending.
- h) Define angle of repose.
- i) Define principal stresses.
- j) What is the practical implication of shear centre for steel channel section and Angle section?
- k) Differentiate between hoop stress and longitudinal stress.

PART – B

Answer any **THREE** questions. All questions carry equal marks.

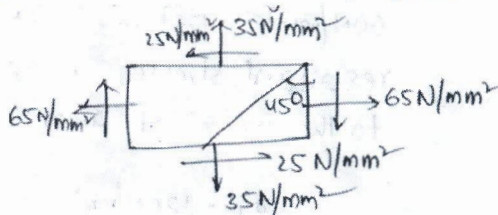
$$3 \times 16 = 48 \text{ M}$$

2. a) Determine the maximum deflection and slope in a simply supported beam of 4.5m span with a UDL of 36 kN/m over its left half. Assume $EI=20\text{MNm}^2$. 8 M

- b) Determine the minimum flexural rigidity of a cantilever beam so that the span to maximum deflection ratio is not less than 250, and the slope does not exceed 0.003radian, when supporting 10kN/m of load over a span of 7.4m. 8 M

3. a) The tensile stresses at a point across two mutually perpendicular planes are 120MPa and 60MPa. Determine normal, tangential and resultant stresses on plane inclined at 30° to the axis of minor stress. 8 M

- b) A point in a strained material is subjected to stresses shown in figure. Using Mohr's circle method, determine normal and tangential stresses across oblique plane. 8 M



4. a) A cylindrical shell 100 cm long 20 cm internal diameter having thickness of metal as 10 mm is filled with atmospheric pressure. If an additional 25 cm^3 of fluid is pumped into cylinder, find (i) the pressure exerted by the fluid on the cylinder and (ii) the hoop stress induced. Take $E = 200 \text{ GPa}$ and poisson's ratio as 0.3. 8 M

b) A compound cylinder is made by shrinking of external diameter 200 mm and internal diameter 160 mm over another cylinder of external diameter 160 mm and internal diameter 120 mm. The radial pressure at the junction after shrinking is 8 N/mm^2 . Find the final stresses setup across the section, when compound cylinder is subjected to an internal fluid pressure of 60 N/mm^2 . 8 M

5. a) Derive the expression for crippling load when both the ends of the column are hinged. 8 M

b) External and internal diameters of hollow cast iron column are 5 cm and 4 cm respectively. If length of this column is 3m and both of its ends are fixed, determine crippling load using Rankines formula. Take $\sigma_c = 550 \text{ N/mm}^2$ and $\alpha = 1/1600$ in Rankines formula. 8 M

6. The rectangular cross section shown in figure is subjected to a bending moment of 12kN-m. Determine the normal stress developed at each corner of the section, and specify the orientation of neutral axis.
- 16 M

