

Code: 13A01301

B.Tech II Year I Semester (R13) Supplementary Examinations June 2015

STRENGTH OF MATERIALS - I

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

PART - A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Explain stress –strain diagram for mild steel.
 - Explain impact and shock loadings.
 - Explain simply supported beam and its end conditions.
 - Explain the rate of loading at a section of a beam.
 - Write the assumptions in theory of simple bending.
 - Derive the section modulus for rectangular section.
 - Explain double integration method.
 - Explain the elastic line of a beam.
 - Explain a real beam.
 - Write the conditions for stability.

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

- 2 A tensile load of 50 kN is acting on a rod of diameter 35 mm and of length 6 m. A bore of diameter 25 mm is made centrally on the rod. To what length the rod should be bored so that the total extension will increase 30% under the same tensile load. Take $E = 2 \times 10^5 \text{ N/mm}^2$.
- (OR)
- 3 A metallic bar 300 mm x 100 mm x 50 mm is subjected to a force of 6 kN (tensile), 8 kN (tensile) and 5 kN (tensile) along x,y, and z direction respectively. Determine the change in the volume of the block. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio = 0.25.

UNIT - II

- 4 A cantilever of length 3 m carries a uniformly distributed load of 2.5 kN/m length over the whole length and a point of 3.5 kN at the free end. Draw SFD and BMD for the cantilever.
- (OR)
- 5 A simply supported beam of length 8 m, carries point load of 4 kN and 7 kN at distances 3 m and 6 m from the left end. Draw SFD and BMD for the beam.

UNIT - III

- 6 Derive the bending equation.
- (OR)
- 7 A beam of cross – section of an isosceles triangle is subjected to a shear force of 45 kN at a section where base width = 125 mm and height = 400 mm. Determine:
- Horizontal shear stress at the neutral axis.
 - The distance from the top to the beam where shear stress is maximum and
 - Value of maximum shear stress.

UNIT - IV

- 8 Derive the relation between slope, deflection and radius of curvature.
- (OR)
- 9 Determine: (i) slope at the left support, (ii) deflection under the load and (iii) maximum deflection of a simply supported beam of length 6 m, which is carrying a point load of 5 kN at a distance of 2 m from the left end. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 1 \times 10^8 \text{ mm}^4$.

UNIT - V

- 10 A hollow rectangular column of external depth 1.5 m and external width 0.8 m is 12 cm thick. Calculate the maximum and minimum stress in the section of the column if a vertical load of 220 kN is acting with an eccentricity of 16 cm.
- (OR)
- 11 A Simply supported beam of length 5 m carries a point load of 2.5 kN at a distance of 1 m from each end. If $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 1 \times 10^8 \text{ mm}^4$ for the beam, then using conjugate beam method determine: (i) slope at each end and under each load (ii) deflection under each load and at the centre.
