Code: 13A01301

R13

B.Tech II Year I Semester (R13) Regular Examinations December 2014

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)

(a) Explain elastic limit.
(b) Explain resilience and sudden loading.
(c) Explain cantilever beam and its end conditions.
(d) Explain point of contra flexure.
(e) Derive the section modulus for circular section.
(f) Draw the shear stress distribution for rectangular section.
(g) Define slope, deflection and radius curvature.
(h) Explain moment area method.
(i) Explain a conjugate beam.
(j) Explain core of a section.

PART – B

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

UNIT - I

2 Derive the relation between the three elastic constants.

OR

3 The following data refer to a mild steel specimen tested in a laboratory:
Diameter of the specimen = 30 mm
Length of the specimen = 250 mm
Extension under a load of 15 kN = 0.055 mm
Load at yield point = 125 kN
Maximum load = 240 kN
Length of the specimen after failure = 410 mm
Neck diameter = 18 mm. Determine: (i) Young's modulus. (ii) Yield point. (iii) Ultimate stress. (iv) Percentage of elongation. (v) Percentage reduction in area. (vi) Safe stress adopting a factor of safety of 2.

UNIT - II

4 A cantilever of length 3 m carries a uniformly distributed load of 1.5 kN/m run over a length of 2 m from the free end. Draw SFD and BMD.

OR

5 A simply supported beam of length 6 m carries a uniformly increasing load of 600 N/m at one end to 1500 N/m run at the other end. Draw SFD and BMD for the beam. And also calculate the position and magnitude of maximum bending moment.

UNIT - III

6 Derive the formula for shear stress at a section.

OR

7 A timber beam of rectangular section is to support a load of 30 kN uniformly distributed over a span of 4 m when beam is simply supported. If the depth of section is to be twice the breadth, and the stress in the timber is not to exceed 8 N/mm^2, find the dimensions of the cross section.

Contd. in page 2

UNIT – IV

8 A beam of length 8 m is simply supported at its ends and carries two point loads of 36 kN and 46 kN at a distance of 1.5 m and 4 m from the left support. Find: (i) deflection under each load. (ii) Maximum deflection and (iii) The point at which maximum deflection occurs, given E = 2 x 10^5 N/mm^2 and I = 85 x 10^6 mm^4. Use Macaulay's method.

OR

9 A cantilever of length 4 m carries a uniformly distributed load 3 kN/m over a length of 1.5 m from the free end and a point load of 2 kN at the free end. Find the slope and deflection at the free end if E = 2.1 x 10^5 N/mm^2 and I = 6.667 x 10^7 mm^4.

UNIT – V

10 A simply supported beam AB of span 6 m carries a point load of 150 kN at its centre C. The value of I for the left half is 2 x 10^8 mm^4 and for the right half portion I is 3 x 10^8 mm^4. Find the slopes at the two supports and deflection under the load. Take E = 200 GN/m^2.

OR

11 A short column of external diameter 30 cm and internal diameter 20 cm carries an eccentric load of 60 kN. Find the greatest eccentricity which the load can have without producing tension on the cross-section.

*****