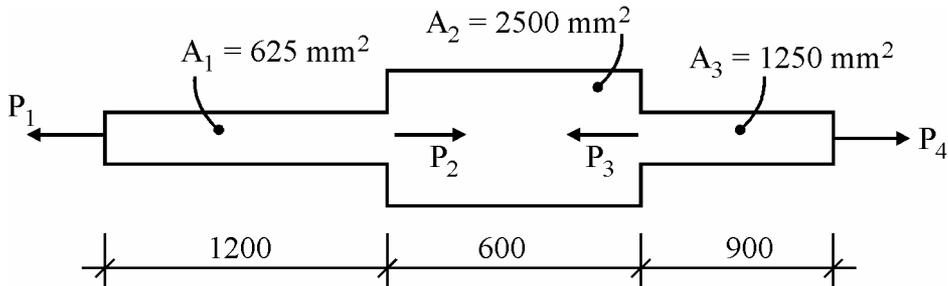


TY-103**B.Arch/ID/B.C.T. Sem.-II****May-2013****Structures – II (AR-204)****Time : 2 Hours]****[Max. Marks : 50**

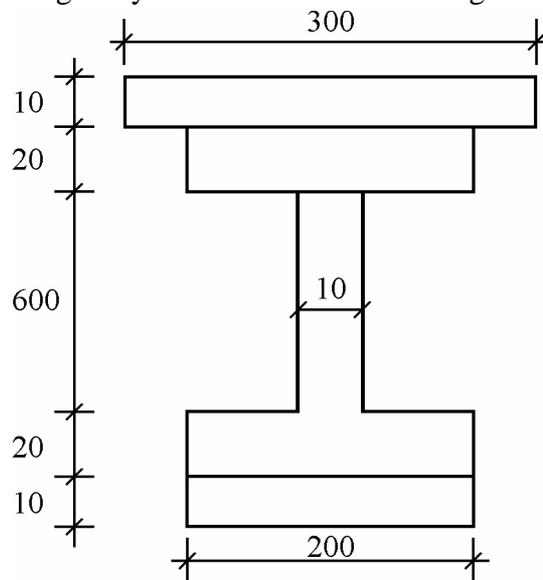
1. (a) Define (any six) : 6
- (i) Tensile stress
 - (ii) Lateral strain
 - (iii) Young's modulus
 - (iv) Linear strain
 - (v) Hoop stress
 - (vi) Poisson's ratio
 - (vii) Compressive strain
- (b) A steel rod of 45 mm. diameter and 300 cm. long is subjected to an axial pull of 60 kN. If the modulus of elasticity of the material is 2×10^5 N/mm². Determine (i) Stress (ii) Strain (iii) Elongation of the steel rod. 4
2. (a) Define Point of Contra flexure. 1
- (b) Enlist different type of supports and their reactions. 2
- (c) Draw shear force and bending moment diagram for the beam loaded as shown in figure, giving values of the ordinates at points A, B, C, D and E. Also locate point of contra flexure. 7
- The diagram shows a horizontal beam with points A, B, C, D, and E marked along its length. The segments are: AB = 1 m, BC = 3 m, CD = 1 m, and DE = 2 m. At point B, there is a downward point load of 20 kN. A uniformly distributed load of 15 kN/m is applied over the segment BC. At point C, there is a downward point load of 35 kN. A uniformly distributed load of 10 kN/m is applied over the segment DE. The beam is supported at points A, D, and E.
3. (a) Describe Principle of Superposition with neat sketch. 2
- (b) Attempt (any two) : 8
- (i) A hollow square bar of cast iron is having outside dimension – 30 mm × 30 mm, internal dimension 25 mm × 25 mm and length 600 mm. Determine how much force is required to compress it by 0.35 mm. Take $E = 190$ kN/mm². Also find stress and strain.
 - (ii) A compound tube consists of a steel tube 150 mm internal diameter and 20 mm thickness and on outer brass tube of 190 mm internal dia. And 10 mm thick. The two tubes are of same length 450 mm. The compound tube carries an axial load of 1250 kN. Find stresses and load carried by each tube and the amount it shorten. Take $E_s = 2 \times 10^5$ N/mm² and $E_b = 1 \times 10^5$ N/mm².



- (iii) A member ABCD is subjected to point load $P_1 = 200$ kN, $P_3 = 150$ kN, $P_4 = 130$ kN as shown in figure. Calculate force P_2 necessary for equilibrium and find net change in length of the member. Consider $E = 2 \times 10^5$ N/mm².



4. (a) Write engineering unit of strain, Poisson's ratio, moment of inertia and tensile stress. 2
 (b) Write differences between Centroid and Centre of Gravity. 2
 (c) State Parallel Axis Theorem. 1
 (d) Find the Centre of gravity of section as shown in figure. 5



5. (a) Choose correct answer from given options : 3
- (i) A Hinge support can develop _____ reaction components.
 (a) zero (b) one
 (c) two (d) three
- (ii) Moment of inertia of a rectangular section @ $x - x$ axis passing through its centroid is _____.
 (a) $bh^2 / 12$ (b) $bh^3 / 12$ (c) $bh^3 / 24$
- (iii) If a support develop three reaction components that it is a _____.
 (a) Hinge support (b) Fixed support (c) Roller support

(b) Find polar moment of inertia of Swastik as shown in figure :

