

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**DIPLOMA ENGINEERING – SEMESTER – III EXAMINATION – SUMMER 2016**

**Subject Code: 330603****Date: 20-05 -2016****Subject Name: Mechanics of Structure -I****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Each question carry equal marks (14 marks)

- Q.1** (a) Define the following terms. **07**  
 (1) Hooke's law (2) Section modulus (3) Normal stress (4) Shear stress  
 (5) Lateral strain (6) Poisson's ratio (7) Strain energy.
- (b) (1) What is pure bending? **02**  
 (2) State assumptions made in theory of pure bending. **05**
- Q.2** (a) A steel bar having 2 m length and 16 mm diameter is subjected to an axial tensile force of 100 kN. Find normal stress, linear strain and final length. Take  $E = 2 \times 10^5 \text{ N/mm}^2$ . **07**
- (b) A steel plate 600 mm long, 50 mm wide and 5 mm thick is subjected to an axial tensile force of 300 kN along its longer dimension. Calculate change in length, width, and thickness of the plate. Take  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $\mu = 0.25$ . **07**
- OR
- (b) A R.C.C. column 400 mm  $\times$  400 mm is reinforced with 8 steel bars of 16 mm diameter. If stresses in concrete and steel is  $6 \text{ N/mm}^2$  and  $200 \text{ N/mm}^2$  respectively. Find the load carrying capacity of the column. **07**
- Q.3** (a) A steel rod 25 mm diameter and 4 m long is subjected to gradually applied load of 60 kN. Calculate the strain energy stored and modulus of resilience. Take  $E = 2 \times 10^5 \text{ N/mm}^2$ . **07**
- (b) A square bar 25 mm  $\times$  25 mm is subjected to axial forces as shown in figure No. 1. Find total elongation if  $E = 2 \times 10^5 \text{ N/mm}^2$ . **07**
- OR
- Q.3** (a) (1) State parallel axis theorem. **03**  
 (2) Define radius of gyration. **02**  
 (3) Define section modulus **02**
- (b) Find moment of Inertia about x-x and y-y axis of I section consist of top and bottom flange 100 mm  $\times$  15 mm and web of size 10 mm  $\times$  230 mm. **07**
- Q.4** (a) Draw shear force and bending moment diagram for the loaded as shown in figure No. 2. **07**
- (b) A 300 mm  $\times$  600 mm rectangular steel beam is simply supported over a span of 6 m. The beam is loaded with UDL 40 kN/m over entire span and central point load of 20 kN. Determine the maximum bending stress and draw bending stress diagram. **07**
- OR
- Q.4** (a) Draw shear force and bending moment diagram for the loaded as shown in figure No. 3. **07**

- (b) A cantilever beam of span 3 m is loaded with UDL of 40 kN/m over its entire length. The cross section of beam is 200 mm wide and 400 mm deep. Draw shear stress distribution diagram for the section having maximum shear force. **07**
- Q.5** (a) Differentiate between truss and beam. **04**  
(b) Find forces in all the members of a truss as shown in figure No. 4 by method of joints. **10**
- OR
- Q.5** (a) Find forces in all the members of a truss as shown in figure No. 4 by graphical method. **10**  
(b) State assumptions made in analysis of plane truss. **04**

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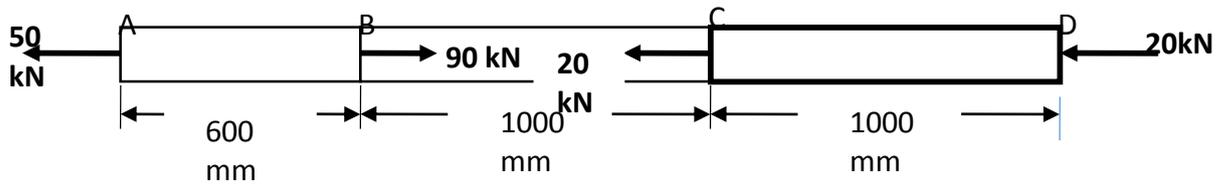


Fig.N  
o.1

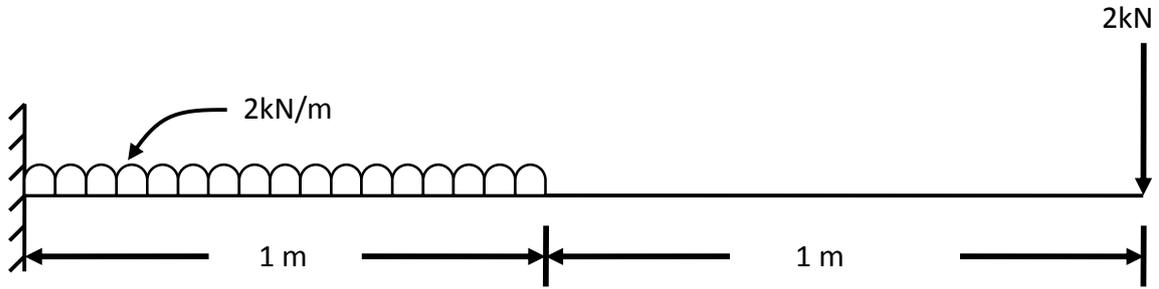


Fig.No.  
2

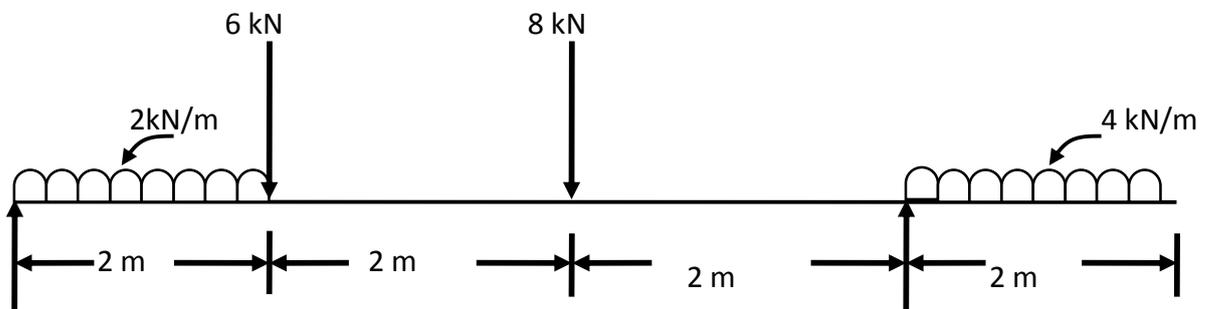


Fig.No.3

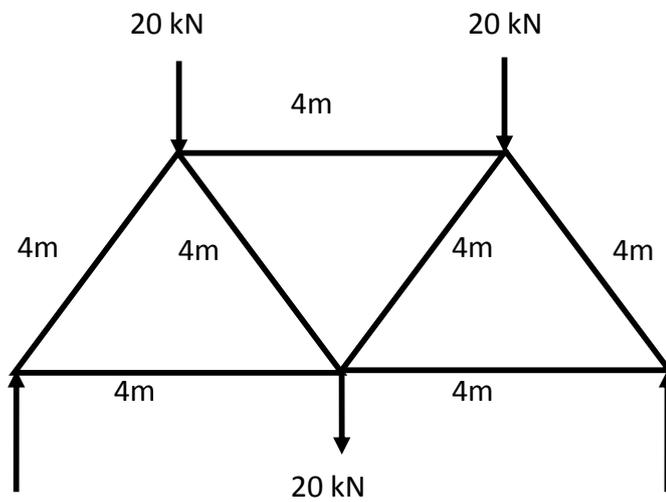


Fig. No. 4