

## Second Semester B. Arch Degree Examination, June/July 2017 Building Structure – II

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

1. a. What is the difference between centre of gravity and centroid? (04 Marks)
- b. Determine the centroid of the area shown in Fig 1(b) with respect to the axes shown.

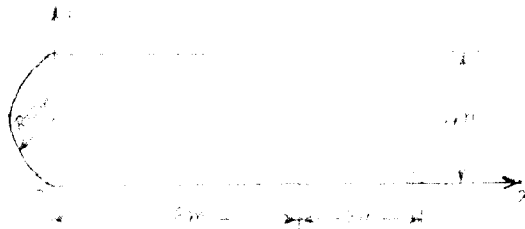


Fig Q1(b)

(16 Marks)

OR

2. a. Define: Beam. ii) Support Reaction. (04 Marks)
- b. Explain the types of Beams and support reaction with a neat sketch. (16 Marks)

### Module-2

3. a. Draw SFD and BMD for the cantilever beam shown in Fig Q3(a). (10 Marks)

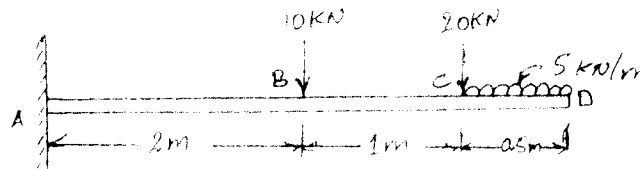


Fig Q3(a)

- b. Draw SFD and BMD for the SS beam shown in Fig Q3(b). (10 Marks)

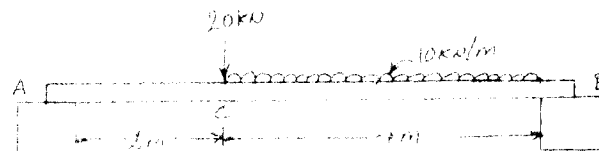


Fig Q3(b)

OR

4. a. Define shear force and bending moment with sign convention. (06 Marks)
- b. Compute Reactions and Draw shear force and BMD in Fig Q4(b) (14 Marks)

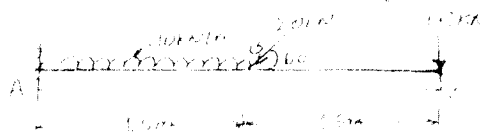


Fig Q4(b)

**Module-3**

- 5 a. What are the assumptions made in simple theory of bending? (06 Marks)  
 b. A simply supported beam of span 5m has a cross section 150mm × 250mm if the permissible stress is  $10 \text{ N/mm}^2$  find:  
 i) Maximum intensity of uniformly distributed load it can carry.  
 ii) Maximum concentrated load P applied at 1m from one end it can carry. (14 Marks)

**OR**

- 6 a. Provide the expression for finding out section modulus for  
 i) Rectangular section  
 ii) Hollow rectangular section  
 iii) Circular section  
 iv) Hollow circular section. (04 Marks)  
 b. A circular pipe of external diameter 70mm and thickness 8mm is used as a simply supported beam over an effective span 2.5m. Find the maximum concentrated load that can be applied at the centre of the span if permissible stress in pipe is  $150 \text{ N/mm}^2$ . (16 Marks)

**Module-4**

- 7 a. What is the difference between short column and long column? (06 Marks)  
 b. Determine the buckling load for a strut of the section the flange width being 100mm, overall depth 80mm and both flange and stem 10mm thick. The strut is 3m long is hinged at both ends. Take  $E = 200 \text{ G N/m}^2$ . (14 Marks)

**OR**

- 8 a. Define : i) Column ii) Slenderness ratio iii) Buckling load iv) Safe load. (04 Marks)  
 b. A built up I-section has an overall depth of 400mm, width of flanges 300mm, thickness of flanges 50mm and web thickness 30mm. It is used as a beam with simply supported ends and it deflects by 10mm when subjected to a load of 40kN/m length. Find the safe load if this I-section is used as a column with both ends hinged. Use Euler's formula. Assume a factor of safety 1.752 and take  $E = 2 \times 10^5 \text{ N/mm}^2$ . (16 Marks)

**Module-5**

- 9 Calculate the maximum load that can be carried by 450mm × 450mm column reinforced with 8 bars of 27mm dia. Use  $\sigma_s = 5 \text{ N/mm}^2$  and  $\sigma_c = 190 \text{ N/mm}^2$ . (20 Marks)

**OR**

- 10 The cross section of a square concrete column is 500mm × 500mm with 8 vertical 12mm  $\phi$  bars. Determine the strength of column with respect to steel and concrete separately for the given stresses in steel and concrete stresses are  
 i)  $115 \text{ N/mm}^2$  (steel)  $70 \text{ N/mm}^2$  (concrete)  
 ii)  $500 \text{ N/mm}^2$  (steel)  $25 \text{ N/mm}^2$  (concrete)  
 iii)  $250 \text{ N/mm}^2$  (steel)  $15 \text{ N/mm}^2$  (concrete) (20 Marks)