No. of Printed Pages : 7

00601
BAR-024

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination, 2019

BAR-024 : THEORY OF STRUCTURES-III

Time : 3 Hours] **[Maximum Marks : 70**

Note : Attempt **five** questions in total. **Question No. 1** is **compulsory**. Use of scientific calculator is permitted. All questions carry equal marks.

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1. Choose the most appropriate answer from the options given in questions below. [7×2=14]

   (a) Two forces going through the same point and being in the same plane are called :

   (i) Coplanar

   (ii) Concurrent

   (iii) Both (i) and (ii) above

   (iv) None of these

(b) Shear force at the fixed end in figure 1 shall be :

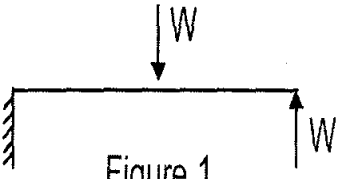

Figure 1

(i) W (ii) W^2

(iii) 2W (iv) Zero

(c) Free body diagram is an :

(i) isolated joint with all forces internal as well as external, acting on it

(ii) isolated joint with only body forces acting on it

(iii) isolated joint with internal forces acting on it

(iv) None of these

(d) The maximum bending moment (M) caused by a concentred load (W) acting at the mid span of simply supported beam will be :

(i) $M = (WL/8)$ (ii) $M = WL/12$

(iii) $M = (WL/2)$ (iv) $M = (WL/4)$

(e) For a statically determinates pin jointed plane frame, the relation between number of member 'm' and number of joints 'j' can be written as :

(i) $m = 2j - 3$ (ii) $m = 3j - 6$

(iii) $m > 2j - 3$ (iv) $m > 3j - 6$

(f) A simply supported beam with rectangular cross section is subjected to a central load. If width and depth of beam is doubled, the deflection at centre will be reduced to :

(i) 25% (ii) 12.5%

(iii) 6.25% (iv) 50%

(g) If a column has unsupported length 'L' with one end fixed and other end hinged, effective length of the column will be :

(i) 1.2L (ii) 0.8L

(iii) 0.65L (iv) 1.5L

2. (a) Explain concept of a 'Funicular polygon' for concurrent forces. Discuss the significance of the concept. [7]

(b) A beam AC is loaded as shown in figure 2. Draw B.M.D. and S.F.D. for the beam : [7]

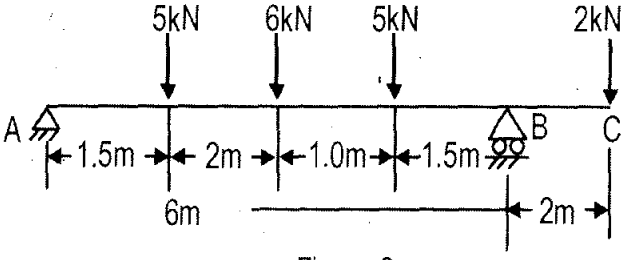

Figure 2

3. (a) Calculate the moment of inertia of the section as shown in figure 3 about centroidal 'YY' axis :[10]

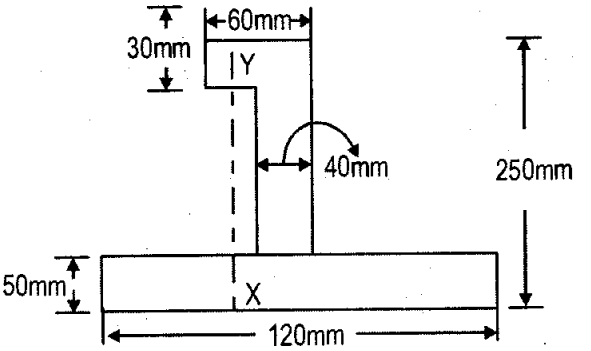

Figure 3

(b) Define modulus of elasticity. Explain how it is obtained. [4]

4. Determine the forces in all members of the truss as shown is figure 4 by method of joints. [14]

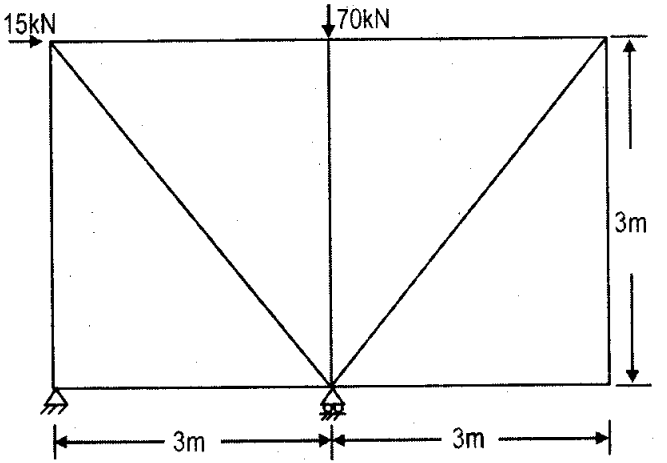

Figure 4

5. (a) Differentiate between short and long columns. Discuss factors affecting strength of a column. Explain the failure of short columns. [7]

(b) Calculate the shear stress of 'T' section at the centre of gravity of the section (figure 5). This section is subjected to a shear force of 50 kN. [7]

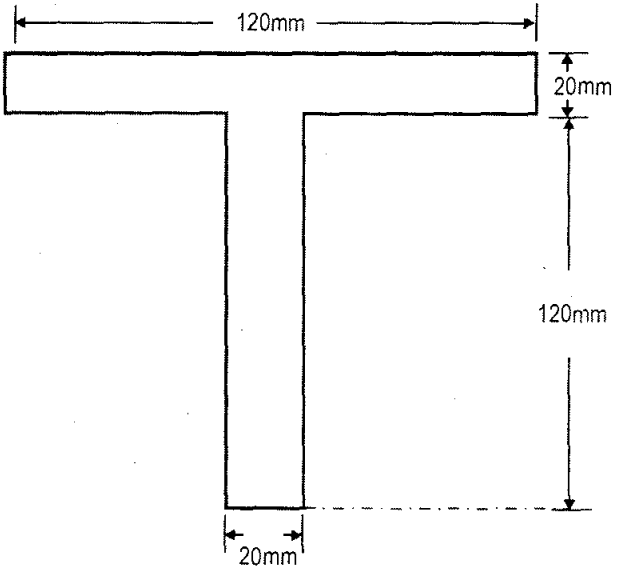

Figure 5

6. (a) For simple bending, derive the formula for bending stresses from first principles. [7]

(b) Define composite section. Discuss advantages of these sections. Explain the behaviour of these sections. [7]

7. Write short notes an any two of the following : [2×7=14]

(i) Types of trusses

(ii) Free body diagrams

(iii) Importance of deflection in a structure.

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