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No. of Printed Pages : 6

BAR-024

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

December, 2015

BAR-024 : THEORY OF STRUCTURES – III

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions, including question no. **1** which is **compulsory**. Use of scientific calculator is permitted. All questions carry equal marks.*

1. Choose the most appropriate answer from the options given in questions (a) to (g) below : *7×2=14*

(a) The variation of S.F. in the segment of a beam when the load is Uniformly Distributed Load is

(i) zero

(ii) linear

(iii) parabola

(iv) None of these

(b) The number of members (m) a statically determinate pin jointed plane frame has is

(i) $m > 2j - 3$

(ii) $m = 2j - 3$

(iii) $m = 3j - 6$

(iv) $m > 3j - 6$

(c) The effective length of a column depends upon

(i) support conditions

(ii) unsupported length

(iii) Both (i) and (ii)

(iv) None of these

(d) In a stress-strain – curve for High Yielding Strength Deformed bars (HYSD), the vertical axis ('Y') represents

(i) stress value

(ii) strain value

(iii) either stress or strain value

(iv) None of these

(e) A beam has a bending moment, M and bending stress, σ. The correct relation is

(i) $M = \frac{\sigma y}{I}$

(ii) $M = \frac{I\sigma}{y}$

(iii) $\sigma = \frac{IY}{M}$

(iv) None of these

(f) The shear force and bending moment is zero at the free end of a cantilever beam, if it carries

(i) point load at the free end

(ii) point load at the middle of its length

(iii) uniformly distributed load over the whole length

(iv) Both (ii) and (iii)

(g) Any structure should have

(i) strength

(ii) stability

(iii) Both of these

(iv) None of these

2. (a) Calculate the moment of inertia of the cross-section as shown in Figure 1 about centroidal 'XX' axis. 7

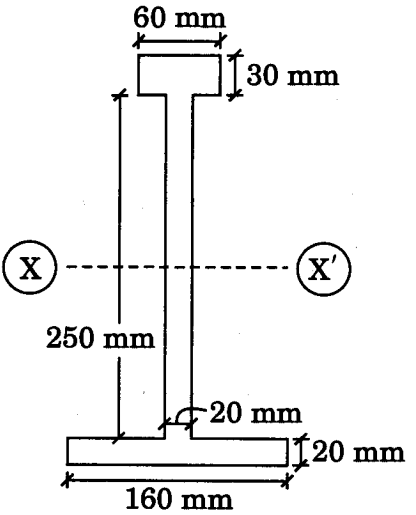

Figure 1

(b) Define determinate structures. Explain the importance of these structures in the analysis of structures. 7

3. Determine the forces in all the members of the truss as shown in Figure 2. *14*

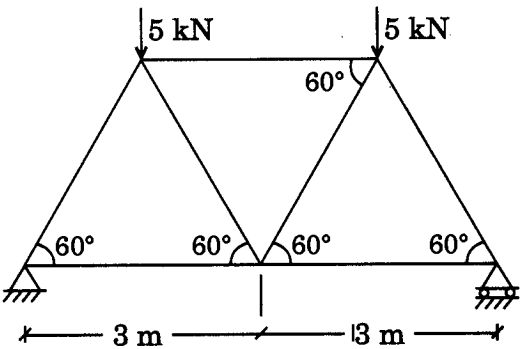

Figure 2

4. (a) Define modulus of elasticity. Explain how it is obtained. 7

(b) Draw SFD and BMD for the beam as shown in Figure 3. 7

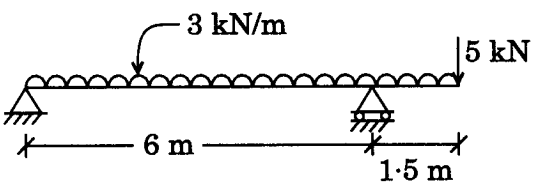

Figure 3

5. (a) Determine the resultant of the coplanar system of forces as shown in Figure 4. 7

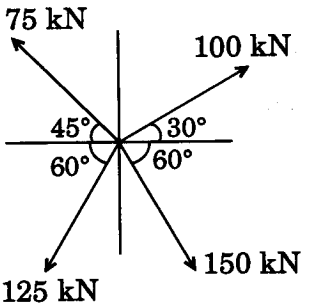

Figure 4

(b) Derive the formulae for bending stress in the case of simple bending, from first principles. 7

6. (a) Derive the Euler formula for critical load, if both the ends are hinged. 7

(b) A 'T' section beam as shown in Figure 5 is subjected to a shear force of 20 kN. Calculate the shear stress at the neutral axis. 7

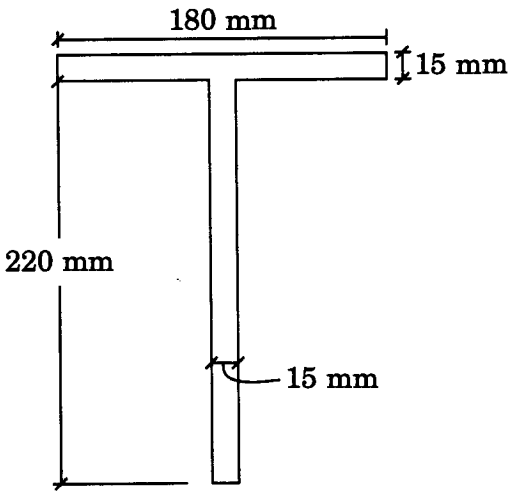

Figure 5

7. Write short notes on any ***two*** of the following : *2×7=14*

(a) Free Body Diagrams

(b) Modular Ratio

(c) Thermal Stresses