BAR-024

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

□□228

June, 2016

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.*

1. Choose the most appropriate answer from the options given in the questions (a) to (g) below :

    7×2=14

    (a) Shear stress on a beam section is maximum
        (i)   on the extreme free surface fibres
        (ii) at the neutral axis
        (iii) at free edges
        (iv) None of these

    (b) The necessary condition for the equilibrium of a body is
        (i) $\Sigma V = 0$
        (ii) $\Sigma H = 0$
        (iii) $\Sigma M = 0$
        (iv) All of these

(c) The members which support the covering material of a sloping roof are

(i) Rafters

(ii) Purlins

(iii) Battens

(iv) Struts

(d) If a material has identical elastic properties in all directions, it is said to be

(i) Homogeneous

(ii) Isotropic

(iii) Completely elastic

(iv) None of these

(e) The effective length of a column having length 'L' and one end fixed and the other end hinged is given by

(i) 0·65 L

(ii) 1·2 L

(iii) 0·8 L

(iv) 1·5 L

(f) Modulus of rupture of a material is a measure of

(i) compressive strength

(ii) direct tensile strength

(iii) flexural tensile strength

(iv) None of these

(g) Method of joints may be applied for the analysis of a truss having

(i) Rigid joints

(ii) Welded joints

(iii) Pinned joints

(iv) None of these

2. (a) Explain factor of safety. Discuss its role in the analysis of structures. 7

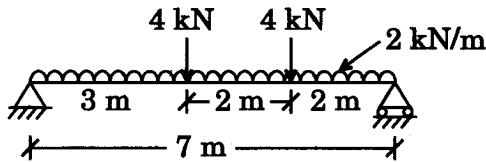(b) Draw S.F.D. and B.M.D. for the beam shown in Figure 1. 7

Figure 1

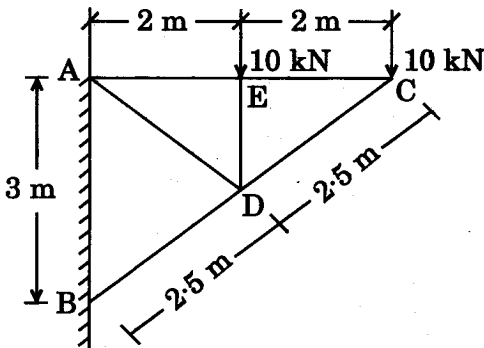3. Determine the forces in all members of the cantilever truss as shown in Figure 2. 14

Figure 2

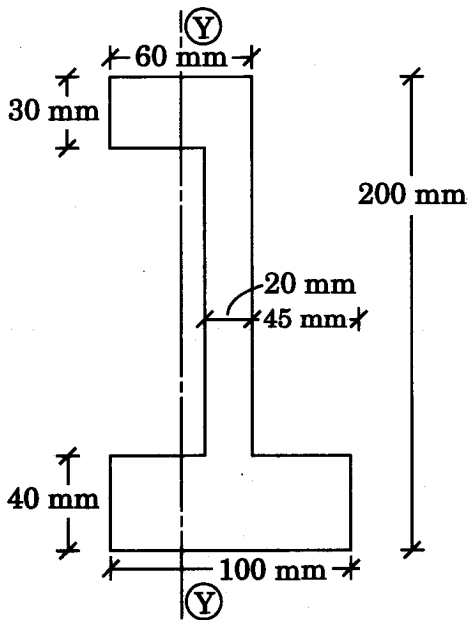**4.** **(a)** Calculate the moment of inertia of the section shown in Figure 3 about centroidal 'YY' axis. 7

Figure 3

(b) Define ductile and brittle materials. Discuss how a ductile material is better as compared to a brittle material. 7

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

(b) Derive the expression for shear stress in a circular cross-section of a beam. Also prove that the maximum shear stress is 1·33 times of the average shear stress. 7

6. (a) A simply supported beam of span of 5 m is loaded with a UDL of 6 kN/m over the entire span. The beam has a rectangular cross-section of 150 mm width and 250 mm depth. Calculate the maximum bending stress in the beam. 7

(b) Explain the importance of deflection in a structure. Discuss briefly the necessity of computation of deflections. 7

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

(a) Composite Materials

(b) Point of Contraflexure

(c) Poisson's Ratio