BAR-024

BACHELOR OF ARCHITECTURE (B.Arch.)
Term-End Examination
December, 2014

00175

BAR-024 : THEORY OF STRUCTURES – III

Time : 3 hours   *Maximum Marks : 70*

*Note : Question no. **1** is **compulsory**. Answer any **four** questions from the remaining. Use of scientific calculator is permitted. All questions carry equal marks.*

1. Choose the most appropriate options in each question given below :   *7×2=14*

   (a) For the analysis of a plane truss by method of joints, the number of unknown forces at a joint of the truss should not be more than

      (i) 1

      (ii) 2

      (iii) 3

      (iv) 4

   (b) Centre of gravity of a square area is

      (i) at one of its corners

      (ii) at the mid-point location of one of its sides

      (iii) at the intersection of its diagonals

      (iv) None of the above

(c) For determining the moment of inertia of a compound figure having various parts, about an axis passing through its centre of gravity (C.G.)

  (i) location of C.G. of the whole figure is to be known

  (ii) locations of C.G. of various parts should be known

  (iii) Both the above should be known

  (iv) None of the above as M.I. is not in any way connected to C.G.

(d) Change in shear force along a beam for a UDL is

  (i) sudden

  (ii) gradual

  (iii) either sudden or gradual depending on the intensity of UDL

  (iv) sudden if the length of UDL is more than 25% of the length of the beam

(e) Euler's buckling load for a short column

  (i) is infinite

  (ii) is zero

  (iii) is not determined as it shall not fail by buckling

  (iv) is twice the load which fails the column in any way other than buckling

(f) Composite sections

    (i)   are made of steel

    (ii)   are of irregular shapes

    (iii) fail easily under loads

    (iv) are sections made of more than one material

(g) An internal hinge in a beam

    (i)   transfers bending moment (BM)

    (ii)   transfers shear forces (SF)

    (iii) transfers both BM and SF

    (iv) transfers none of BM and SF

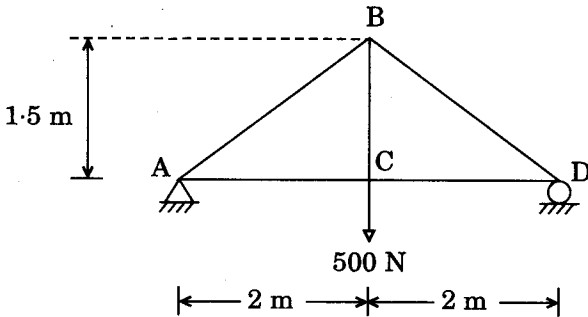**2.** (a) Calculate the forces in all the members of the truss shown in Figure 1.   7

Figure 1

(b) Differentiate between a fixed support and a roller support.   7

3. (a) State the 'Parallel axis theorem', and explain it with the help of a sketch. 7

(b) What do you understand by 'Pure bending' ? Explain. 7

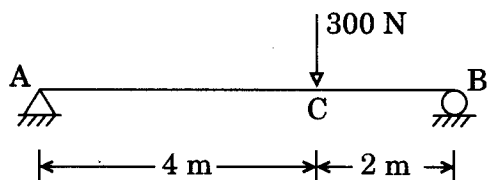**4.** (a) Draw SFD and BMD for the beam shown in Figure 2. 10

Figure 2

(b) If the load is at the centre of the beam, how will the above diagrams change ? 4

5. (a) Discuss why calculation of deflection in a structure is important, with the help of an example. 7

(b) Name any two types of truss. Describe any one of them briefly. 7

6. (a) Discuss why the entire area of a plane truss is divided into a number of triangle shaped areas with the help of various members. 7

(b) Briefly discuss the advantages of using composite sections. 7

7. Write short notes on any *four* of the following topics : $4 \times 3\frac{1}{2} = 14$

   (a) A graphical method of analysing a plane truss

   (b) Stability of a column

   (c) Conditions of static equilibrium for a plane structure

   (d) Hooke's law

   (e) Stress-strain relationship for mild steel

———