Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5252]-102

S.E. (Civil) (I Sem.) EXAMINATION, 2017
STRENGTH OF MATERIALS
(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.
(*ii*) Figure to the right indicate full marks.
(*iii*) Use of electronic pocket calculator is allowed.
(*iv*) Assume suitable data, if necessary.
(*v*) Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.

1. (*a*) Determine load 'P' and total elongation of the bar. Refer figure 1.1. Assume E = 200 GPa. [6]

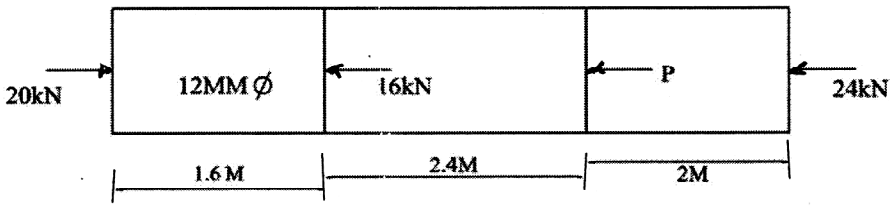

Figure 1.1

(*b*) A beam of cross-section 100 mm × 200 mm is simply supported at both ends. It carries two concentrated load of 100 kN each acting at 2m distance from each support span of the beam is 7 m. Determine the maximum bending stress induced in the beam. [6]

Or

2. (*a*) A reinforced concrete column 500 mm × 500 mm in section

P.T.O.

is reinforced with 4 steel bars of 25 mm diameter one in each corner. The column is carrying a load of 1000 kN. Find the stresses in the concrete & steel bars. Take E for steel = 210 Gpa, E fro concrete = 14GPa. [6]

(*b*) A timber beam of rectangular section is simply supported over a span of 5m & carries a uniformly distributed load of 3kN/m over the entire span. If the maximum shear stress is 7 MPa. If b = 2/3d. Find value of b & d. [6]

3. (*a*) A solid aluminum shaft 100 mm diameter is to be replaced by a hollow steel shaft having 100 mm outer diameter. The two shaft has same angle of twist per unit torque over the total length if shear modulus for steel = 3× shear modulus for aluminum. Find the inner diameter of the shaft. [6]

(*b*) Draw Mohr's circle for : [6]

(1) pure shear

(2) pure biaxial tension

(3) pure uniaxial compression

(4) pure uniaxial tension

Or

4. (*a*) A bar of 35 mm diameter stretches 3 mm under gradually applied load of 65 kN. If a weight of 2 kN is dropped on to a collar at the lower end of this bar through a height of 40 mm, calculate maximum instantaneous stress & elongation of bar. Assume E = 200 GPa.

(*b*) A bar of steel is 80 mm in diameter & 550 mm long. A tensile load of 100 kN is found to stretch the bar by 0.25mm. The same bar when subjected to a torque of 1.4 kNm is found to twist through 3º. Find the values of four elastic constant.[6]

5. (*a*) Draw SFD & BMD for a simply supported beam as shown in figure 5.1 [7]

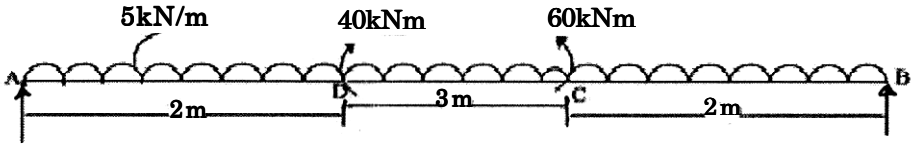

Figure 5.1

(*b*) Draw shearing force & bending moment diagram for a beam as shown in fig make maximum BMD. [6]

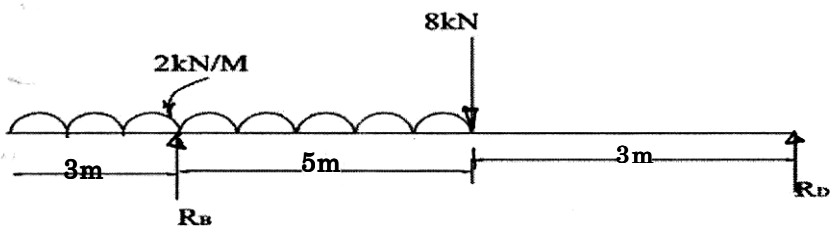

Figure 5.2

Or

6. (*a*) An overhang beam ABCDE is supported at A & D. DE = 1 m overhang BC = CD = 1 m, AB = 2 m. Position AB is subjected to UDL 16 kN/m. At C a point load of 20kN is acting. At E a point load 8 kN is acting. Draw SFD & BMD. Locate point of contra flexure calculate maximum Bending moment. Refer figure. 6.1 [7]

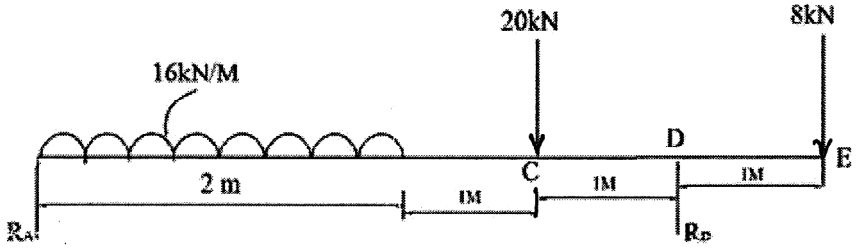

Figure 6.1

(*b*) The diagram shown in figure, shear force diagram for a beam which rests on two supports. Draw loading & bending moment diagram. [6]

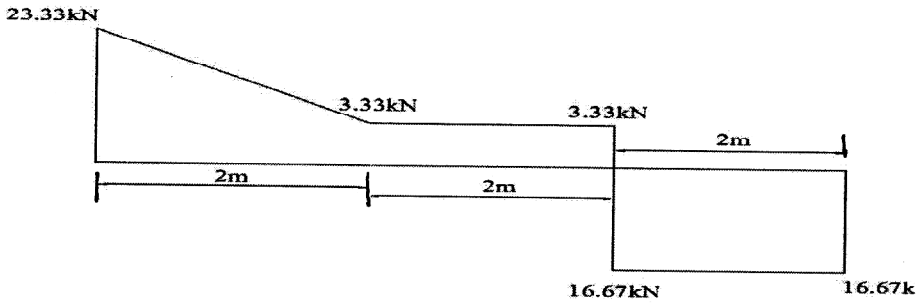

Figure 6.2

7. (*a*) State four end condition of columns and draw neat sketches showing deflected shape & effective length. [6]

(*b*) A 4 m length of a tube has a buckling load of 2 kN when used as a column hinged at both ends. Calculate buckling load for 4.5m length of the same tube when used as column if :[7]

(1) both ends are fixed

(2) one end fixed & other is hinged.

Or

8. (*a*) Explain core of the section & hence obtain a core section for hollow rectangular column of external & internal size B*x*D&b*x* d respectively. [7]

(*b*) A column support load of 400 kN as shown in figure. Find the stresses at the corner of the column at its base. (Refer figure 8.1) [6]

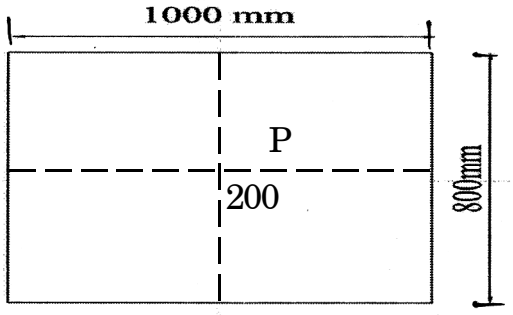

Figure 8.1