22402

23124

4 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

a) Define direct load and eccentric load.

b) Draw stress distribution diagram when

i) Direct stress > Bending stress

ii) Direct stress < Bending stress

c) Identify nature of support if

i) $\theta = 0, \quad y = 0$

ii) $\theta = 0, \quad y \neq 0$

d) State differential equation for slope and deflection.

e) State concept of zero span or imaginary span in case of Clapeyron's theorem.

P.T.O.

Marks

f) State the effect of continuity on continuous beam.

g) Define -

i) Stiffness factor

ii) Carry over factor

2. Attempt any <u>THREE</u> of the following : 12

a) Explain effect of eccentric load with sketch with respect to stresses developed.

b) A hollow circular column having external diameter 600 mm and internal diameter 400 mm carries a vertical load of 300 kN acting at an eccentricity of 80 mm from c.g. Calculate maximum and minimum stress developed.

c) Calculate the maximum and minimum stresses at the base of masonry Chimney having outer dimension 3 m × 3 m and 1 m thickness. Height of Chimney is 20 m subjected to wind pressure of 1.4 kN/m^2 Use unit weight of masonry = 22 kN/m^3.

d) Define core of section. Calculate core of section for rectangular section having dimensions 800 mm × 400 mm and draw sketch for it.

3. Attempt any <u>THREE</u> of the following : 12

a) A simply supported beam carries u.d.l. at 5 kN/m over entire span of 3 m. Find the max. slope and max. deflection.
Take E = 2 × 10^5 N/mm^2.
I = 2 × 10^8 mm^4.

b) Calculate fixed end moments and draw B.M.D. for a fixed beam subjected to u.d.l. W kN/m over entire span *l* from first principle.

Marks

c) Calculate fixed end moments and draw B.M.D. for a fixed beam as shown in Figure No. 1.

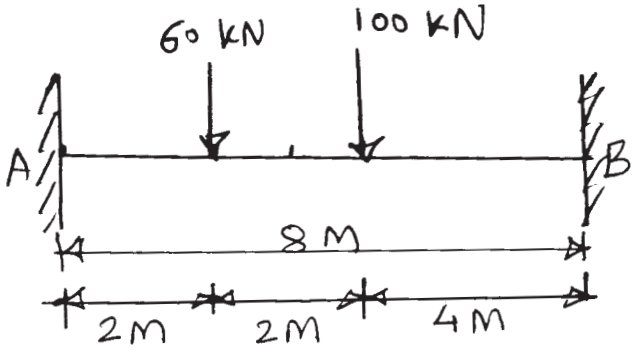

Fig. No. 1

d) State advantages and disadvantages of fixed beam.

4. Attempt any THREE of the following : **12**

a) State Clapeyron's theorem of three moments for same EI State meaning of each term involved using neat sketch.

b) Calculate support moment and draw B.M.D. for a continuous beam by using three moment theorem as shown in Fig. No. 2.

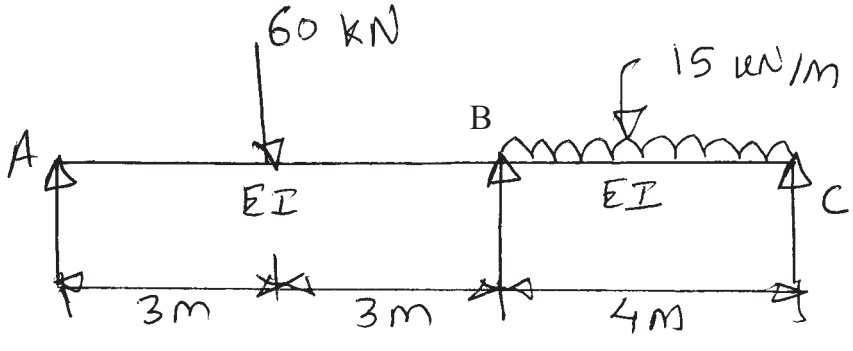

Fig. No. 2

Marks

c) Calculate the distribution factors for member OA, OB, OC, OD for the joint 'O' as shown in Fig. No. 3.

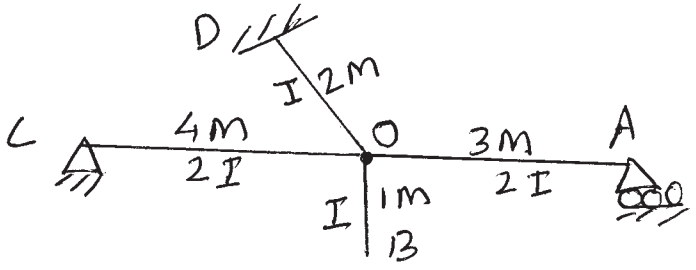

Fig. No. 3

d) Calculate support moments and draw BMD for a beam as shown in Fig. No. 4 by using moment distribution method.

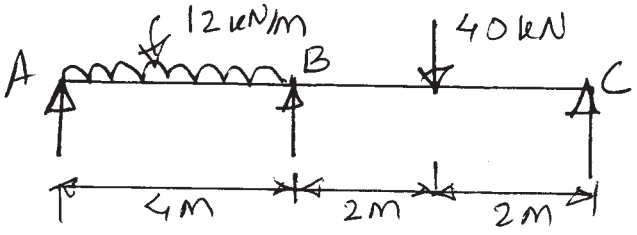

Fig. No. 4

e) Draw one sketch each of the following

i) Perfect frame

ii) Imperfect frame

iii) Symmetrical Portal frame

iv) Unsymmetrical Portal frame

5. Attempt any TWO of the following : **12**

a) A cantilever of span 2N carries a point load at free end. If maximum slope at free end is 2°, determine maximum deflection at free end in mm.

Marks

b) Calculate maximum slope and maximum deflection for a simply supported beam as shown in Fig. No. 5 by using Maculay's method in terms of EI.

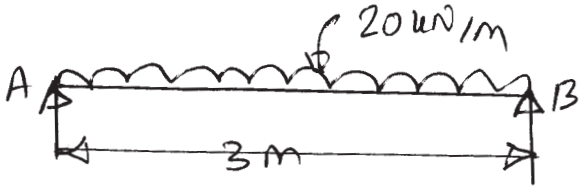

Fig. No. 5

c) Calculate support moment and draw BMD and SFD for a beam as shown in Figure No. 6 by using three moment theorem.

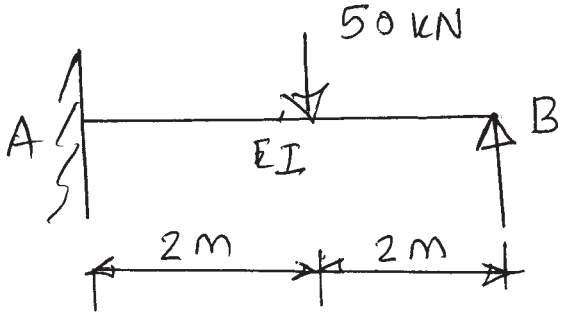

Fig. No. 6

6. Attempt any TWO of the following : **12**

a) Calculate support moment by using moment distribution method for a beam as shown in Fig. No. 7.

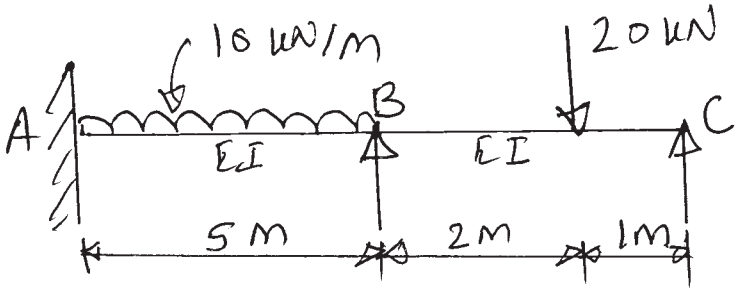

Fig. No. 7

Marks

b) Using method of joints calculate magnitude and state nature of forces in all members of the truss as shown in Fig. No. 8.

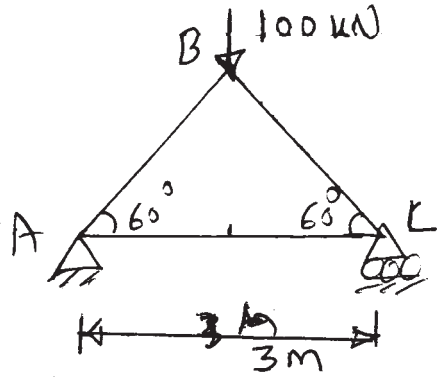

Fig. No. 8

c) Calculate magnitude and state nature of forces in members AB and AE and DE only by using method of sections for a truss as shown in Fig. No. 9.

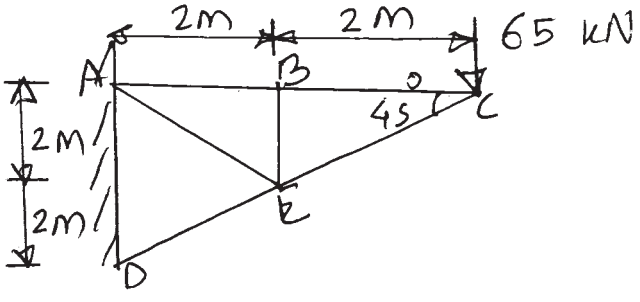

Fig. No. 9