17422

21314

4 Hours / 100 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. a) **Attempt any <u>SIX</u> of the following:** **12**

i) Define eccentricity and bending stress.

ii) Write the equation for slope and deflection at free end for a cantilever beam having u.d.l. over entire span and meaning of terms used in it.

iii) Define slope of a beam and deflection of a beam.

iv) State the boundry conditions for cantilever beam used to evaluate C_1 and C_2 in the double integration method.

v) State any two advantages and any two disadvantages of fixed beam over simply supported beam.

Marks

vi) State and sketch the types of port frame.

vii) Define carry over moment and carry over factor.

viii) Define perfect frame with example.

b) **Attempt any <u>TWO</u> of the following:** **8**

i) Calculate limit of eccentricity for rectangular section having dimensions 1200 mm × 800 mm from basic principle.

ii) A hollow circular steel column having external diameter 400 mm and thickness 25 mm carries an eccentric load of 200 KN acting at an eccentricity of 50 mm. Calculate maximum and minimum stress developed.

iii) Define with sketch:

1) Deficient frame

2) Redundant frame.

2. Attempt any <u>FOUR</u> of the following: **16**

a) A rectangular strut is 300 mm wide and 100 mm thick. It carries a load of 80 KN at an eccentricity of 50 mm in the plane bisecting 300 mm side. Calculate resultant stresses at base and draw stress distribution diagram.

b) A hollow circular column having external diameter 200 mm and internal diameter 160 mm carries an eccentric load of 60 KN at an eccentricity of 40 mm from vertical axis. Calculate 6 max and 6 min. Draw stress distribution diagram.

c) A masonry wall 10 m high, 3 m wide and 1.5 m thick is subjected to a wind pressure of 1.2 KN/m^2. Find maximum and minimum intensity induced on the base, if the unit weight of masonry is 22 KN/m^3.

Marks

d) A wooden cantilever beam of span 2.5 m has a cross section 130 mm wide and 240 mm deep. A load of 6 KN is acting at free end, calculate the deflection and slope at the free end. Take $E = 1 \times 10^5$ N/mm^2.

e) Giving sketch state Clapeyron's theorem of three moments for beam having same MI and different MI giving meaning of terms used in it.

f) A simply supported beam of span 4 m carries a central point load of 20 KN and u.d.l. of 10 KN/m over entire span. Find maximum slope and maximum deflection of the beam. $Ixx = 2 \times 10^8$ mm^4 $E = 2 \times 10^5$ N/mm^2.

3. Attempt any <u>FOUR</u> of the following: **16**

a) A simply supported beam of span 6 m carries central point load of 40 KN. Determine constants of slope and deflection (in terms of EI) using double integratation method.

b) A cantilever of length 3 m carries a u.d.l. of 6 KN/m over half the span from the fixed end. If the section is 60 mm wide and 120 mm deep, find the slope at the free end. $E = 1 \times 10^5$ N/mm^2.

c) A fixed beam of span 5 m carries a u.d.l. of 12 KN/m over full length. Using first principle method determine support moments.

d) A fixed beam of 5 m span is subjected to two point loads 40 KN and 60 KN at 1 m and 2 m respectively from left hand support. Calculate fixed end moments only.

e) State four assumptions made in the analysis of simple frame.

Marks

f) Using method of joint or method section determine forces in members CD, BC, BD and AB as shown in Fig. No. 1.

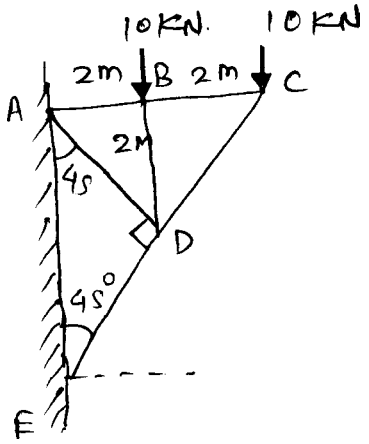

Fig. No. 1

4. Attempt any FOUR of the following: **16**

a) A continuous beam ABC is supported at A, B and C. AB = 3 m, BC = 3 m. AB carries a central point load of 12 KN and BC carries a u.d.l. of 10 KN/m over entire span BC. Calculate moment at 'B' using theorem of three moments.

b) A proped cantilever AB of span 5 m carries u.d.l. of 10 KN/m over entire span. A is fixed and B is simply supported using three moment theorem find support moment and draw B.M.D.

c) Using theorem of three moments calculate support moments and draw BMD giving net BM only for a continuous beam as shown in Fig. No. 2.

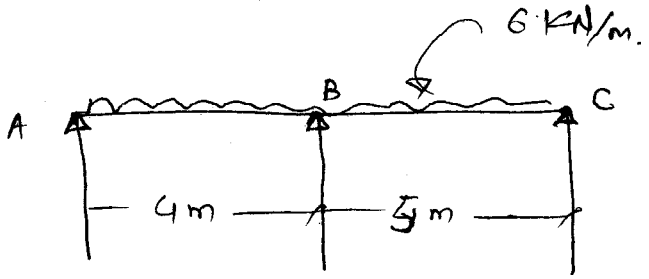

Fig. No. 2

Marks

d) Determine distribution factors at continuity for a continuous beam ABCD which is fixed at A and supported at B, C and D. Take AB = 4 m, BC = 3 m and CD = 5 m if M.I. for the spans is I_{AB} = 2 I, I_{BC} = I and I_{CD} = 3 I.

e) Solve question 4(a) by moment distribution method and draw SFD only.

f) Calculate support moments by moment distribution method for given continuous beam as shown in Fig. No. 3

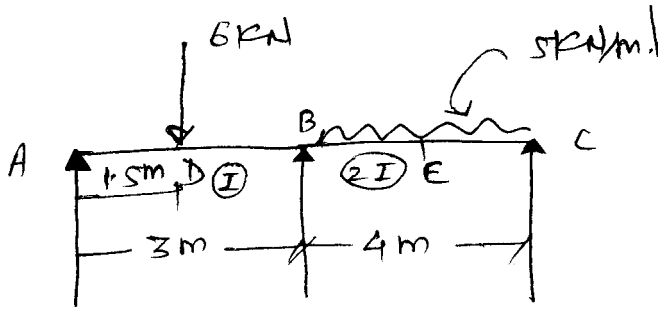

Fig. No. 3

5. Attempt any TWO of the following: **16**

a) A rectangular chimney having external dimensions 1.6 m × 1.0 m with wall thickness 200 mm is subjected to wind pressure 1.5 KN/m^2. Find out maximum height of chimney which can be allowed so that maximum stress in the masonry is not to exceed 230 KN/m^2 compressive consider unit weight of masonry is 23 KN/m^3.

b) A continuous beam ABCD is supported at A, B, C and D. Such that AB = 4 m, BC = 4 m, CD = 5 m. A central point load of 50 KN and 40 KN act on AB and BC. CD carries a u.d.l of 30 KN/m. Determine support moments using moment distribution method and draw SFD only.

Marks

c) Using method of sections, find the forces in the members BC, BE, FE and CD as shown in Fig. No. 4.

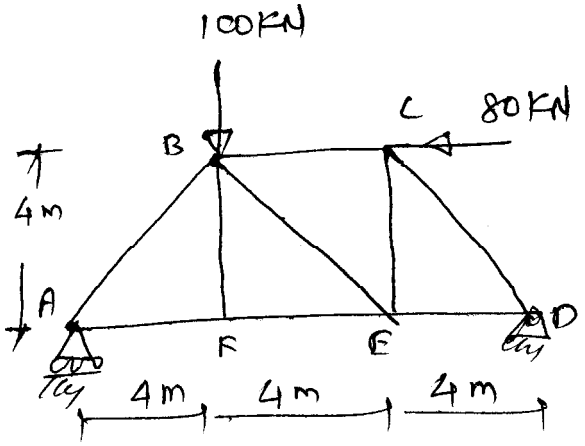

Fig. No. 4

6. Attempt any TWO of the following: **16**

a) A simply supported beam is subjected to two point loads 25 KN and 35 KN at 1 m and 3 m from the left support respectively. Span of the beam is 5 m. Calculate deflection under 25 KN. Load by Macaulay's method.
Take $E = 2 \times 10^5$ N/mm^2, $I = 3 \times 10^8$ mm^4.

b) A fixed beam AB of span 6 m carries a u.d.l of 20 KN/m over entire span. In addition it carries a point load of 60 KN at 2 m form L.H.S. Find fixed end moments at A and B. Draw B.M.D. giving net BM and one point of controflexure.

c) A beam ABCD is supported at A, B and C, CD being overhang. AB = 4 m, BC = 5 m and CD = 1.0 m AB and BC carries a central point of 15 KN and 12 KN respectively and a point load of 6 KN at D. Calculate support moments using three moment theorem and draw SFD and BMD giving net BM.

17422

21314
4 Hours / 100 Marks