22402

12425 04 Hours / 70 Marks Seat No.

Instructions – (1) All Questions are Compulsory.

- (2) Answer each next main Question on a new page.
- (3) Illustrate your answer 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

10

1. Attempt any \underline{FIVE} of the following:

- a) State the types of stresses developed due to eccentric load.
- b) Define core of the section.
- c) Give the relationship between bending moment, slope and deflection.
- d) Define fixed beam.
- e) State Clapeyron's theorem.
- f) Define distribution factors.
- g) Define carry over moment.
- h) Define perfect frame. Write the equation for the perfect frame.

22402

- a) Explain effect of eccentric load with sketch with respect to stress developed.
- b) A simply supported beam carries udl at 5 kN/m over entire span of gm. Find the max slope and max. deflection. Take $E = 2 \times 10^5$ N/mm². $I = 2 \times 10^8$ mm⁴.
- c) Calculate fixed end moment and draw BMD for a fixed beam as shown in Figure No. 1



Fig. No. 1

d) Draw SFD for a continuous beam as shown in Figure. No. 2.



Fig. No. 2

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

a) Calculate fixed end moments and draw BMD for a beam as shown in Figure No. 3. Use first principle method.



12

b) Calculate support moments and draw BMD of a beam as shown in Figure No. 4 Use three moment theorem method.



Fig. No. 4

- c) Draw the sketches of any four perfect trusses.
- d) State the assumptions made in the analysis of simple frame.

12

 a) Calculate deflection under point load of a simply supported beam as shown in Figure. No. 5. (Take EI - constant) Use Macaulay's method.





b) Calculate fixed end moment and draw BMD for a fixed beam as shown a Figure No. 6.



Fig. No. 6

Marks

- c) Explain the concept of imaginary zero span.
- d) A continuous beam of uniform section ABCD is supported at A, B, C and D. AB = 6m, BC = 9m, CD = 3m. Calculate the distribution factors at joints at joint B and C.
- e) A solid circular column of diameter 150 mm carries vertical load of 50 kN at its outer edge of column. Calculate resultant stresses.

5. Attempt any <u>TWO</u> of the following:

12

a) Determine support moment and draw BMD using Clapeyron's theorem Figure No. 7.



b) Calculate support moment by using moment distribution method for a beam as shown in Figure. No. 8.



Fig. No. 8

Marks

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



Fig. No. 9

6. Attempt any TWO of the following:

a) Calculate slope and deflection for a simply supported beam $(I = 1 \times 10^8 \text{ mm}^4, \text{ E} = 210 \times 10^3 \text{ N/mm}^2)$ Figure No. 10.



b) Find maximum and minimum stresses induced at the base of Masonary wall 5 m high, 3 m wide and 1 m thick. The wall is subjected to horizontal wind pressure of 1.25 kN/m² acting on 3 m side. Consider density of Masonary 22 kN/m².

12

Marks

c) Calculate support moment for a beam as shown in Figure No.11. Use moment distribution method.



Fig. No. 11