22402

12223

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) State the types of stresses developed due to eccentric load.

b) Give the relationship between slope, deflection and radius of curvature.

c) State middle third rule.

d) State the boundary conditions for a simply supported beam using deflected shape.

e) State the nature of moment induced due to continuity in beams.

f) Define stiffness factor and distribution factor.

g) State the methods of analysis of frames.

Marks

2. Attempt any THREE of the following: 12

a) Draw the sketch of core of section

i) Rectangular section having dimensions B×D.

ii) Circular section having D as diameter.

b) A hollow circular steel column having external and internal diameter 500 mm and 300 mm respectively carries an eccentric load of 200 kN acting at an eccentricity of 60 mm. Calculate the maximum and minimum stresses developed.

c) A rectangular pier 1.5m wide and 1m thick carries a compressive load of 400 kN eccentric about the axis bisecting the thickness. The eccentricity is 0.2m. Find the resultant stress at the base of pier.

d) A masonry wall 10m high, 3m wide and 1.5m 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 the masonry is 22 kN/m^3. Consider wind is acting on 3m side.

3. Attempt any THREE of the following: 12

a) Using standard formulae calculate maximum slope and deflection in terms of EI of a simply supported beams as shown in Figure No. 1.

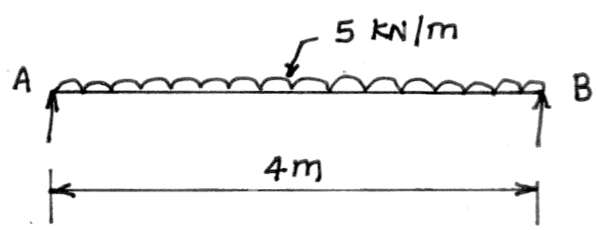

Figure No. 01.

b) Calculate value of load 'W' for a fixed beam as shown in Figure No. 02.

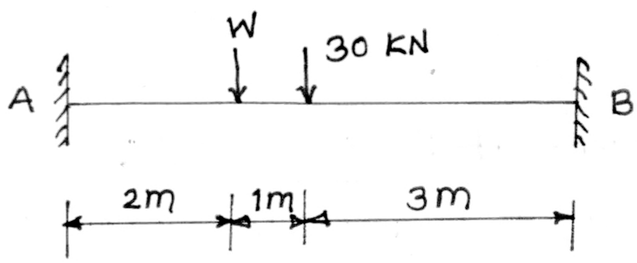

Figure No. 02.

Marks

c) A fixed beam of span 7m is subjected to a point load P. Find out position of load if left hand support moment is 2 times that of right hand support moment.

d) State advantages and disadvantages of a fixed beam. State the nature of stresses at supports and at mid-span.

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

a) A beam ABC is supported at A, B, and C. AB = 6m, BC = 5m. AB carries a udl of 30 kN/m and BC carries udl of 25 kN/m. Calculate the support moments. Refer Figure No. 03.

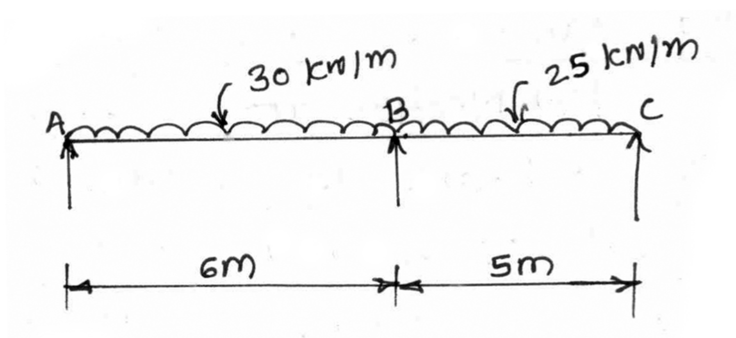

Figure No. 03.

b) A propped cantilever AB of span 4m is fixed at A and propped at B. Carrying udl of 20 kN/m. Using Clapeyron's theorem calculate support moment and draw BMD. Refer Figure No. 04.

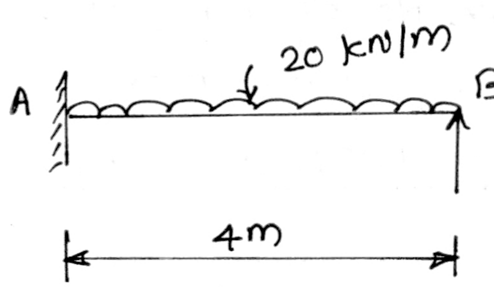

Figure No. 04.

c) Using moment distribution method determine the moments at fixed end of a propped cantilever of span 5m carrying a udl of 25 kN/m over entire span.

Marks

d) Using moment distribution method calculate the support moment of a beam as shown in Figure No. 05.

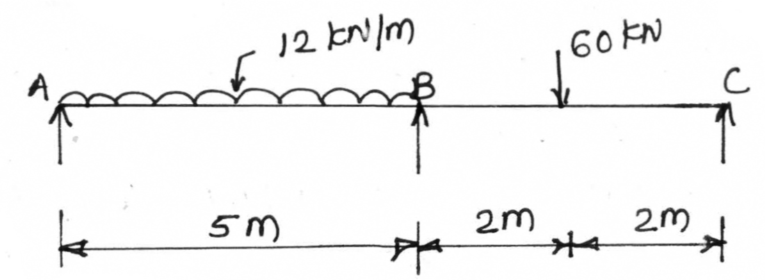

Figure No. 05.

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

5. Attempt any TWO of the following: 12

a) A cantilever beam ABCD is fixed at A and free at D. It carries udl of 10 kN/m over AB and a point load of 5 kN at C. AB = 4m, BC = CD = 2m. Find the slope and deflection at C in terms of EI. Refer Figure No. 06.

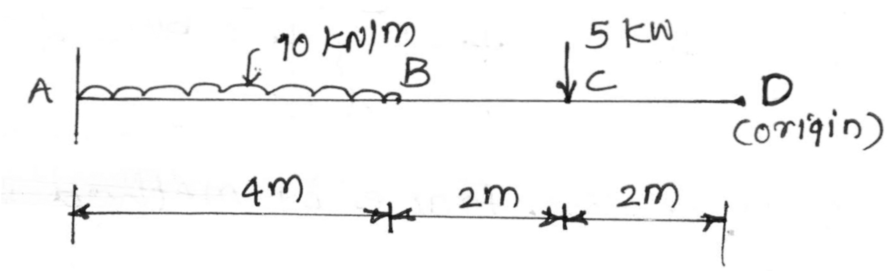

Figure No. 06.

b) Using standard formulae calculate slope and deflection at free end of a cantilever beam as shown in Figure No. 07. having cross section of beam as 100 mm width and 200 mm depth. Use E = 200 GPa.

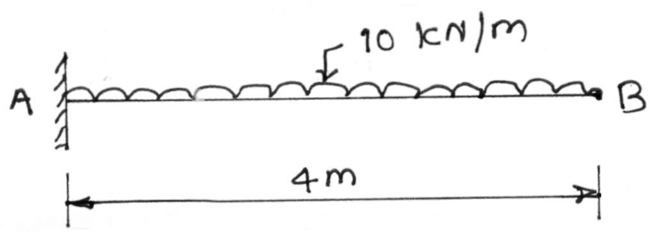

Figure No. 07.

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c) For the continuous beam as shown in Figure No. 08. Find the support moments by three moments theorem and draw BMD and SFD.

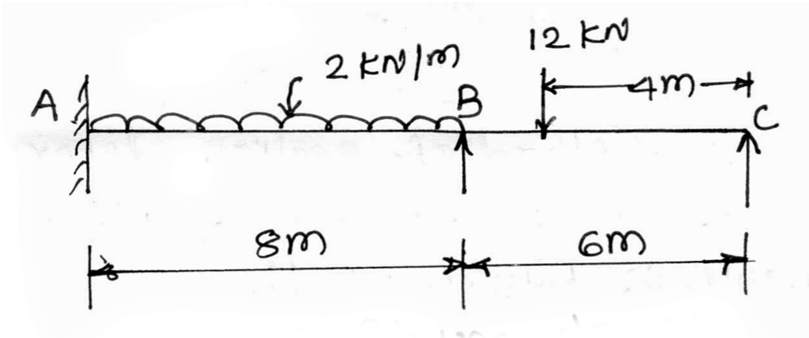

Figure No. 08.

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

a) A continuous beam ABCD is fixed at A and supported at B, C and D. Such that AB = BC = 4m and CD = 3m. It carries a udl of 20 kN/m over the entire length. Using moment distribution method. Calculate support moments and draw BMD showing all important values.

b) Analyse the frame by suitable method, find the forces in the members of BC, BE and FE of the frame as shown below in Figure No. 09.

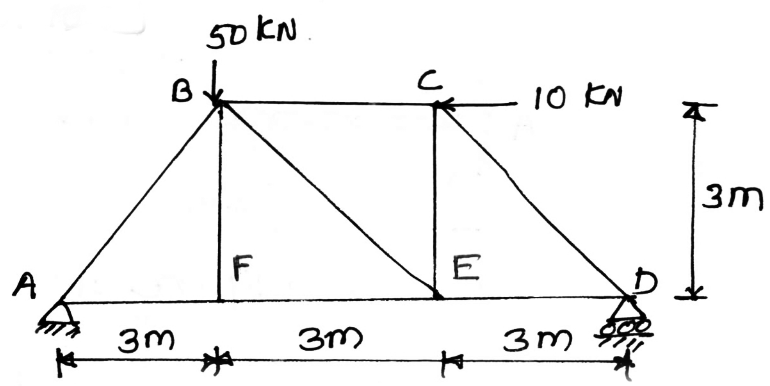

Figure No. 09.

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c) Using method of section, determine the forces in the members FE, FB and CB as shown in Figure No. 10.

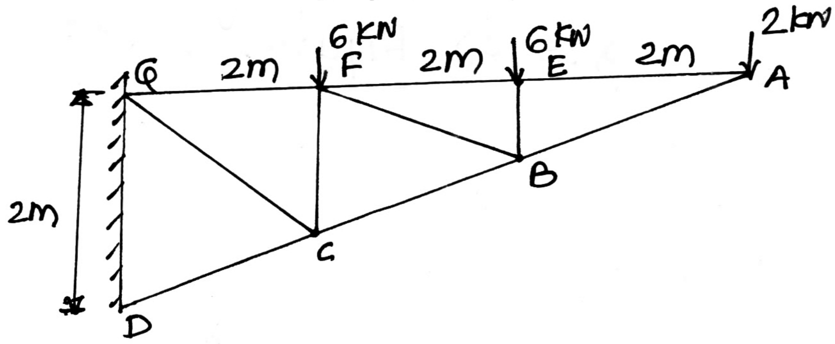

Figure No. 10.