Branch- CIVIL / SE SEM-IV / SH-2022/ 12-12-2022
QP Code- 10016235
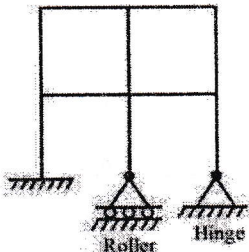
(3 Hours)   [Total Marks: 80]

NOTE:
- Question No. 1 is compulsory.
- Attempt any Three out of the remaining five questions.
- Figure to the right indicates full marks. Draw neat sketches wherever necessary.
- Assume suitable data wherever required.

Q.1 Answer **any four** from the following.   20
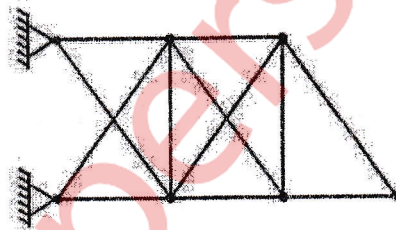
(a) Find the static and kinematic indeterminacy of the structures given below.

i)

ii)

0.5

(b) State the assumptions in plastic theory.   05

(c) A three hinged parabolic arch of span L and rise h carries a uniformly distributed load of 'w' per unit over the whole span. Show that the arch is not subjected to any bending moment at any section.   05

(e) Two-wheel loads 70kN and 120kN spaced at 5m apart move on a girder of span 20m. Find the maximum positive and negative shear force at a section 8m from the left end. Any wheel load can lead the other.   05
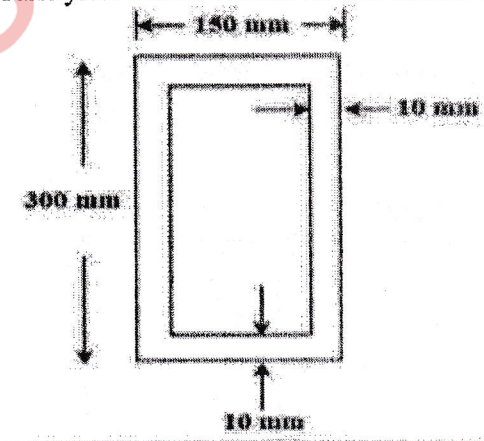
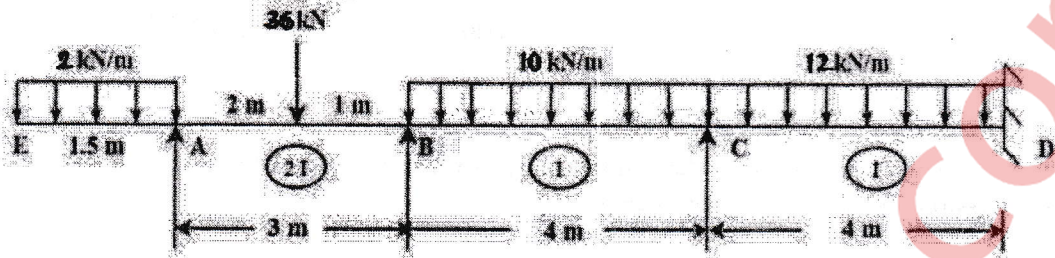(f) Develop the stiffness matrix for the structure given below: 05

Q.2 (a) Determine the shape factor for the steel beam section given below. Also find the plastic moment of resistance. Take yield stress of steel as 250 N/mm^2.   05
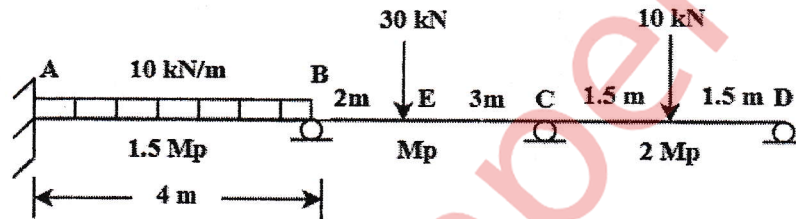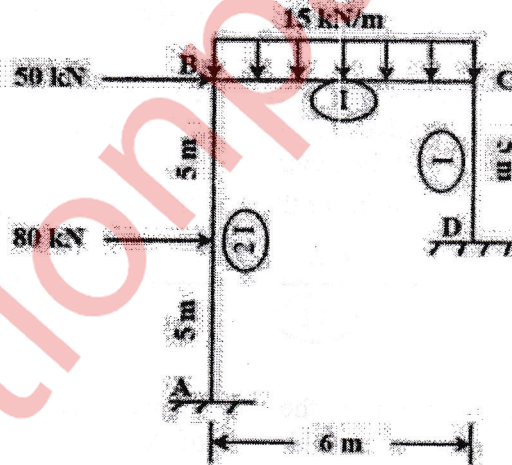
(b) Analyse the beam given below using **moment distribution method**. Draw the bending moment and shear force diagram.
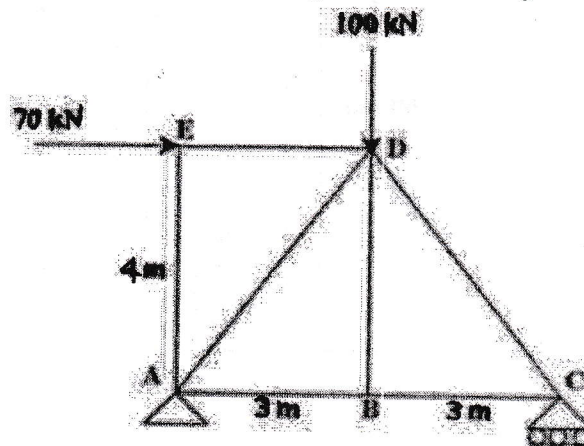

15

Q.3 (a) Find the Plastic Moment 'Mp' for the continuous beam given below.
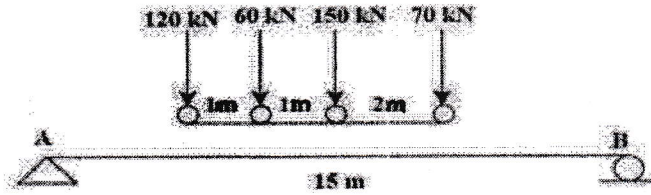

10

(b) Using **Stiffness matrix method**, analyze the given portal frame. Draw the Bending moment Diagram.

10

Q.4 (a) Find the forces in the members of the truss given below using the method of joints.

10

16235   Page **2** of **3**

(b) Find the absolute maximum bending moment on the girder with 70 kN load leading & moving from left to right.

10

120 kN   60 kN   150 kN   70 kN

1m   1m   2m

A

15 m

B

Q.5 (a) A three hinged parabolic arch (same level) has a span of 30m and a rise of 10m. The arch carries a UDL of 60 kN/m on the left half of its span. It also carries two concentrated loads of 160kN and 100kN at 5m and 10m from the right end respectively. Determine the Horizontal Thrust and Bending Moment under 160kN load.

05

The portal frame ABCD is loaded and supported as shown below. Use **flexibility method** for analysis, draw the bending moment diagram. Consider EI = Constant.

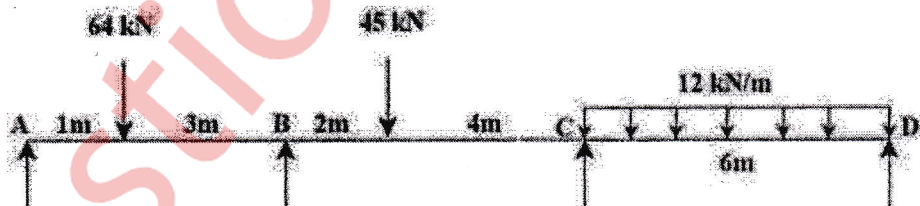30 kN/m

B   4 m   C

2 m

4 m

D

A

(b)
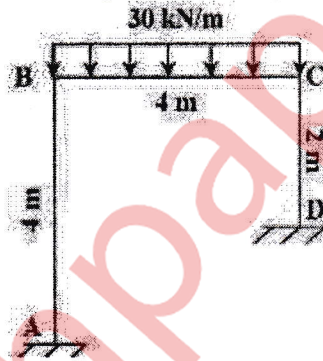
15

Q.6 (a) Analyse the continuous beam by Clapeyron's Theorem. Draw the bending moment diagram. Consider I to be constant throughout the beam.

08

64 kN   45 kN

12 kN/m

A   1m   3m   B   2m   4m   C   D

6m

(b) Find the vertical deflection at F (Δ_{VF}) using unit load method. AE = Constant.

12

B   C

4.0 m

H_A A   F   E   D

25 kN   25 kN

V_A 4.0 m   4.0 m   4.0 m V_D

****

9567D34F33550E7EAAD8605AA415AC71