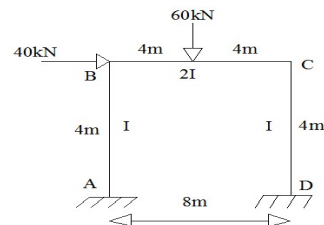
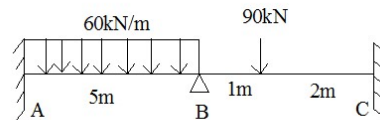


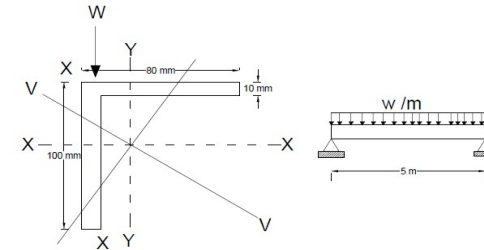
- (vi) For stable structures, one of the most important properties of flexibility and stiffness matrices is that elements on the main diagonal:
- of a stiffness matrix must be positive and that of flexibility matrix must be negative
 - of a stiffness matrix must be negative and that of flexibility matrix must be positive
 - of both stiffness and flexibility matrices must be negative
 - of both stiffness and flexibility matrices must be positive.
- (vii) A fixed beam of span L carries a uniformly distributed load w per unit length. The fixed end moment at B is
- $\frac{wl^2}{12}$
 - $\frac{wl^2}{6}$
 - $\frac{6EI\delta}{L^2}$
 - zero.
- (viii) In plastic analysis, the shape factor for a circular section is
- 1.5
 - 1.6
 - 1.7
 - 1.8.
- (ix) Beams which are curved in plan are subjected to:
- Shear force (V) only
 - bending Moment (M) only
 - Torsional Moment (T) only
 - All of the above.
- (x) The flexibility method of analysis of structures is analogous to:
- Stiffness method of structural analysis
 - Force method of structural analysis
 - Displacement method of structural analysis
 - Column Analogy method of structural analysis

Group - B

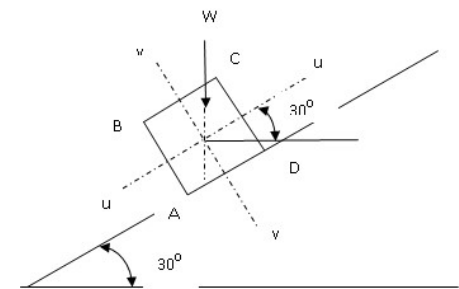
2. (a) Determine the support moments and reactions for the continuous beam shown in fig. by slope deflection method. Draw Shear force and Bending moment diagram. Assume EI is constant throughout the span.
- (b) The three hinged stiffened girder of a suspension bridge of span 120m is subjected to two point loads of 240kN and 300kN at a distance of 25m and 80m from left end. Find the shear force and bending moment for the girder at a distance of 40m from left end. The supporting cable has a central dip of 12m. Find the maximum tension in cable and draw Bending Moment diagram.

**12****Group - C**

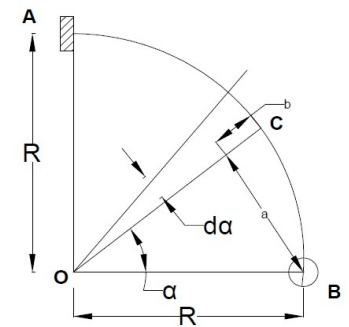
- 4.(a) An angle section $100 \text{ mm} \times 80 \text{ mm} \times 10 \text{ mm}$ is used as a beam over a span of 5 m. If the permissible stress is 100 MPa, find the uniformly distributed load that the beam can carry. The load passes through the shear centre.



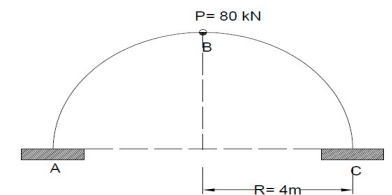
- (b) A wooden beam of cross section $100 \text{ mm} \times 150 \text{ mm}$ is used as shown in Fig. to support a sloping Mangalore tiled roof. It has an effective span of 4m and carries a uniformly distributed load of 3 kN/m acting vertically downward. Determine the maximum stresses developed in the beam.

**6 + 6 = 12**

5. (a) A quarter circle beam of radius R curved in plan is fixed at end A and free at end B as shown below. It carries a vertical P at its free end. Determine the deflection at the free end and sketch the shear force, bending moment and torsional moment diagrams. Assume flexural rigidity (EI) = twice the torsional rigidity (GJ).



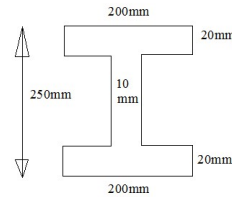
- (b) Find the bending moment at midspan of a semicircular beam loaded at the midspan with a concentrated load of 80 kN. The beam is fixed at both the supports. Find the maximum bending moment and maximum torque in the beam.

**6 + 6 = 12**

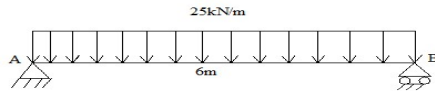
Group – D

6.(a) Briefly describe the various steps of “Plastic Bending of a beam section” with a neat diagram.

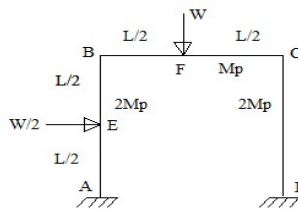
- (b) A mild steel I-section of 200mm wide and 250mm deep has a mean flange thickness of 20mm and a web thickness of 10mm. Calculate the shape factor. Find the fully plastic moment if $\sigma_y = 252 \text{ N/mm}^2$

**3 + 9 = 12**

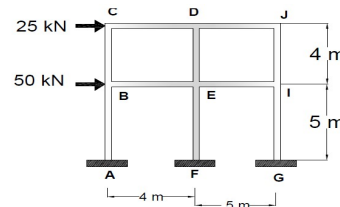
7.(a) Determine the collapse load of a simply supported beam shown below:



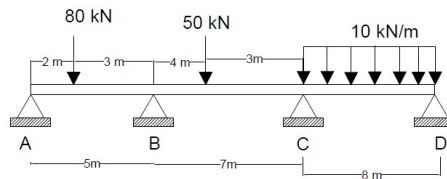
(b) Find the collapse load for the frame shown below:

**4 + 8 = 12****Group – E**

8. Analyse the building frame shown below using Cantilever Method. Draw separate diagrams to show S.F.D. and B.M.D of Columns and beams.

**12**

9. Analyze the continuous beam shown below by stiffness method. Draw the B.M.D., S.F.D. and elastic curve.

**12****ANALYSIS OF STRUCTURES II
(CIVL 3101)****Time Allotted : 3 hrs****Full Marks : 70***Figures out of the right margin indicate full marks.*

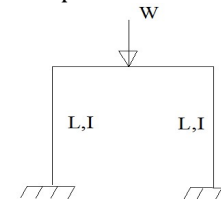
Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group. Candidates are required to give answer in their own words as far as practicable.

**Group – A
(Multiple Choice Type Questions)**

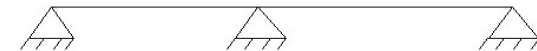
1. Choose the correct alternative for the following:

10 × 1 = 10

- (i) A propped cantilever beam AB of span L is subjected to a moment M at the prop end B. The moment at fixed end A is
(a) 2M (b) M/2 (c) M (d) 3M/4.
- (ii) A suspension bridge with two hinged stiffening girder is statically
(a) Determinate (b) Indeterminate to 1 degree
(c) Indeterminate to 2 degree (d) Indeterminate to 3 degree.
- (iii) The portal frame shown below will



- (a) No sway (b) Sway towards left
(c) Sway towards right (d) Sway either to left or right.
- (iv) The degree of kinematic indeterminacy of the beam shown below



- (a) 2 (b) 3 (c) 4 (d) 5
- (v) At the shear centre of any symmetric or unsymmetric section :
(a) Bending and Twisting both occurs
(b) Twisting is absent but bending occurs
(c) Twisting occurs but bending is absent
(d) None of the above.