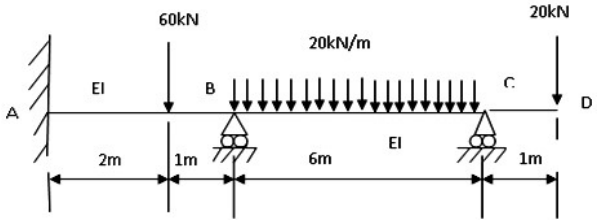
(viii) The ratio of Collapse Load (W_c) for a fixed beam under UDL (throughout) and a simply supported beam under point load at midspan is
(a) 1:2 (b) 1:1 (c) 2:1 (d) 1:3.

(ix) For approximate analysis of lateral loads, the portal method is applicable for
(a) only vertical loading on building frame
(b) only lateral loading on building frame
(c) both vertical as well as lateral loading on building frame
(d) none of these.

(x) Flexibility method is analogous to
(a) force method (b) displacement method
(c) energy method (d) none of these.

Group – B

2. Find the bending moment and draw the bending moment diagram for the beam shown in Fig. by slope-deflection method, if support B sinks by 9 mm. Given EI=1×12^{12} N- mm^2.



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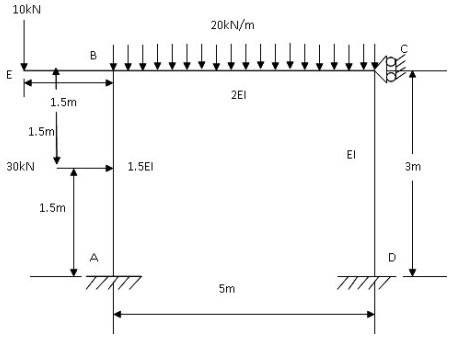
3. Find the moments at the critical sections. Draw the bending moment diagram for the frame shown in Fig. by moment distribution method



12

shown below, Fig.(i) represents the I-steel section and Fig.(ii) s the continuous beam ABCD. M_p is same throughout the beam out the following:
(i) Find the shape factor of the beam.
(ii) Determine the collapse loads (w kN/m) acting throughou beam.

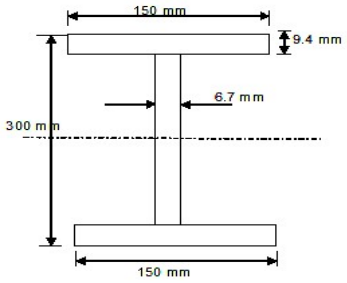


Fig.(i)

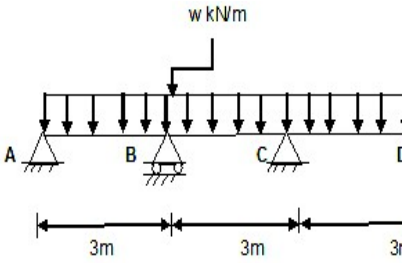
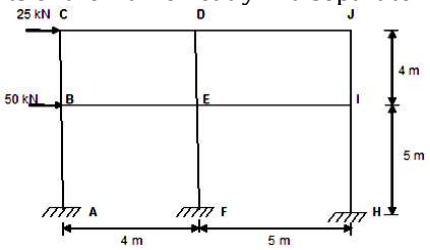


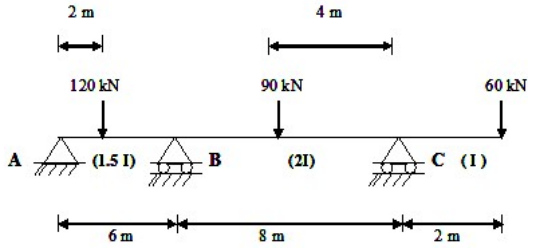
Fig.(ii)

Group – E

8. Determine the forces in the members of the building frame s below by portal method or cantilever method. Show all the mo at each joints of the frame neatly in a separate frame diagram.



9. Analyse the continuous beam using stiffness matrix method.



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 rectangular portal will have horizontal sway
(a) if it is subjected to horizontal load
(b) if its geometry is nonsymmetric
(c) if its loading is unsymmetric
(d) all the above.

(ii) The slope deflection method of structural analysis is
(a) displacement method (b) force method
(c) hybrid method (d) none of these.

(iii) The carry over factor in a prismatic member whose far end is hinged is
(a) 0 (b) 2 (c) 0.5 (d) 1.

(iv) Distribution factor for an overhanging beam for a cantilever portion is
(a) 0.5 (b) 1 (c) 0 (d) none of the above.

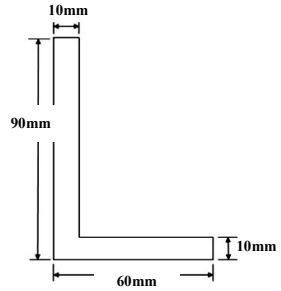
(v) Cables and arches are used to span
(a) large opening (b) small opening
(c) very small opening (d) none of these.

(vi) Plastic moment of a propped cantilever (length L) under UDL (w/ metre run) is
(a) $w_uL/11.656$ (b) $w_uL^2/11.656$
(c) $w_uL/121.656$ (d) $w_uL/8.656$.

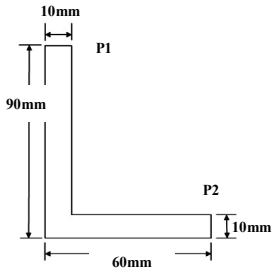
(vii) If the number of possible plastic hinges are 4 and the degree of indeterminacy of the structure is 2, then the number of possible independent mechanism(s) 'n' will be
(a) 6 (b) 4 (c) 2 (d) 1.

Group – C

4. (a) Determine the centroidal principal moment of inertia of the unequal angle section 90 × 60 × 10 mm as shown in Fig.

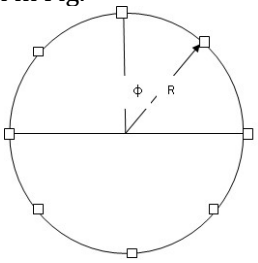


(b) A 90mm × 60mm × 10mm unequal angle is placed with the larger leg vertical as shown in Fig. It is subjected to a sagging bending moment of 700 N-m on the horizontal axis. Determine the stresses induced at points P1 and P2.



6 + 6 = 12

5. (a) Determine the shear force, bending moment and torsional moment at different points of a circular ring beam supported at n number of columns as shown in Fig.



(b) A crane hook of circular cross section of diameter 80 mm has axis curved in the form of a circular arc of radius 110 mm. Determine the

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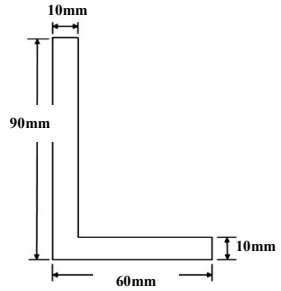
Group – C

4. (a) Determine the centroidal principal moment of inertia of the ur angle section 90 × 60 × 10 mm as shown in Fig.



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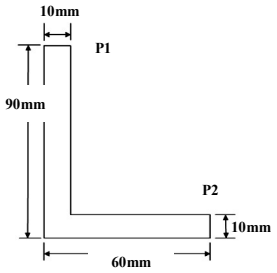

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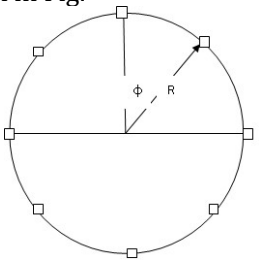
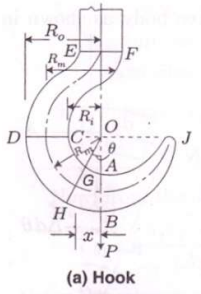


(b) A crane hook of circular cross section of diameter 80 mm ha curved in the form of a circular arc of radius 110 mm. Determi

maximum tensile and compressive stresses, if a load P=20kN is suspended from the hook with its line of action passing through the centre of curvature as shown in Fig.

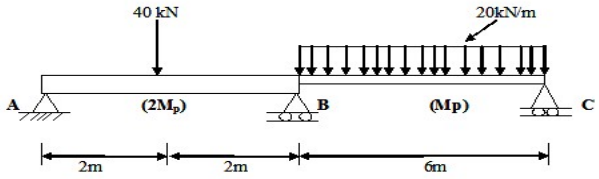


(a) Hook

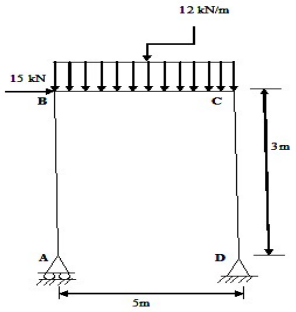
6 + 6 = 12

Group – D

6. (a) Determine the plastic moment capacity for the continuous beam shown below. The loads provided are working loads. (Take λ_s=1.5).



(b) A portal frame ABCD with a single bay is loaded up to collapse. Determine the plastic moment of resistance required if the section is uniform throughout. M_p is same throughout the frame.



6 + 6 = 12

7. The continuous beam ABCD rests on four supports A, B, C, D. The continuous beam ABCD is constructed using ISLB 300 section. As

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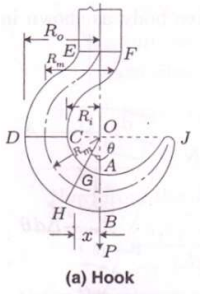
maximum tensile and compressive stresses, if a load P=20kN is suspended from the hook with its line of action passing through the centre of curvature as shown in Fig.

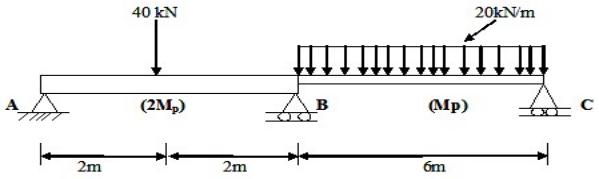


(a) Hook

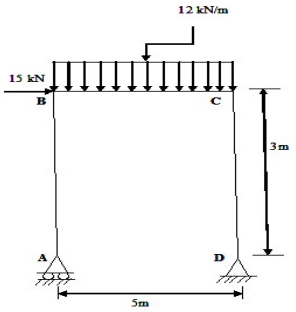
6 + 6 = 12

Group – D

6. (a) Determine the plastic moment capacity for the continuous beam shown below. The loads provided are working loads. (Take λ_s=1.5).



(b) A portal frame ABCD with a single bay is loaded up to collapse. Determine the plastic moment of resistance required if the section is uniform throughout. M_p is same throughout the frame.



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7. The continuous beam ABCD rests on four supports A, B, C, D. The continuous beam ABCD is constructed using ISLB 300 section. As