(vi) The probable number of collapse mechanisms to occur for plastic frame fig. 2 is

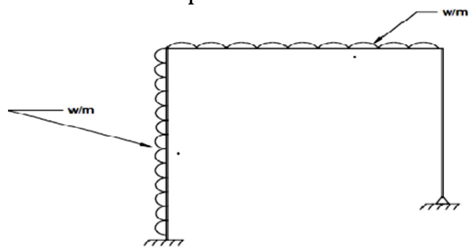

Fig. 2

(a) 3 (b) 5 (c) 6 (d) 7.

(vii) A suspension bridge with a two hinged stiffening girder is
(a) statically indeterminate
(b) indeterminate of one degree
(c) indeterminate of two degree
(d) a mechanism.

(viii) The value of shape factor (S) for diamond section is:
(a) 1.5 and above (b) 1.75 (c) 2.0 (d) 1.25.

(ix) If n = no. of bays, the shear resisted by an exterior column of any storey is equal to
(a) (1/2n) of total shear (b) (1/4n) of total shear
(c) (1/n) of total shear (d) (1/3n) of total shear.

(x) The displacement method is more useful when:
(a) degree of kinematic indeterminacy is more than static indeterminacy.
(b) degree of kinematic indeterminacy is less than static indeterminacy.
(c) degree of kinematic indeterminacy is same as static indeterminacy.
(d) degree of kinematic indeterminacy is zero.

Group – B

2. (a) A continuous beam ABC consists of spans AB = 6 m and BC = 4 m as shown in fig. 3. The end A is simply supported while the end C is fixed. The span AB carries a uniformly distributed load of 30 kN/m. The span BC does not carry any load. The beam is of uniform section. Using slope deflection method, find the support moments and draw the bending moment diagram.

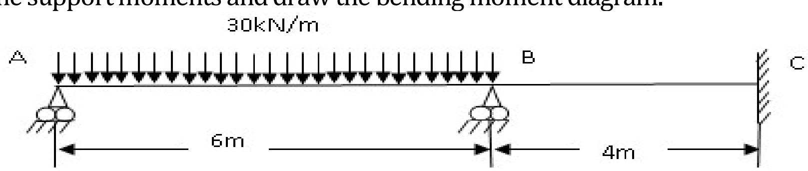

Fig. 3

(b) Determine the shape factor for the triangular section shown in fi

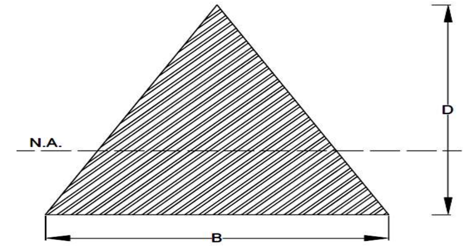

Fig. 9

6 + (

7. (a) Show the various independent collapse mechanisms viable to oc the gable frame as shown in fig. 10.

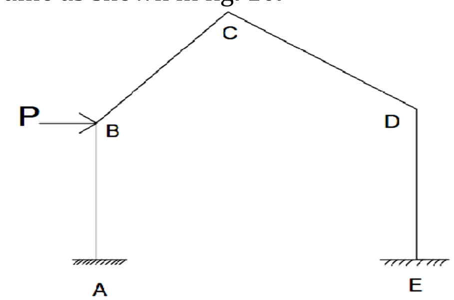

Fig. 10

(b) Find the collapse load (W_c) for the frame shown in fig. 11.

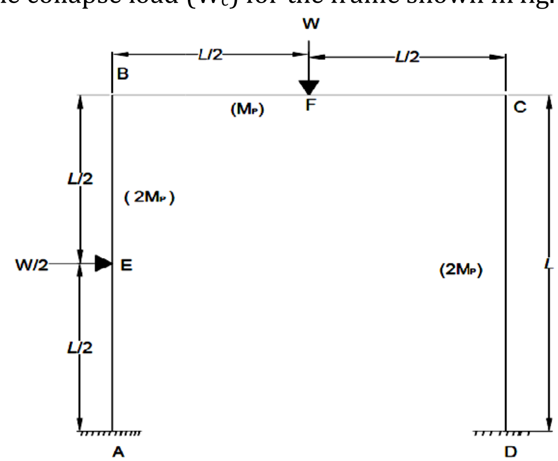

Fig. 11

6 + (

Group – E

8. For the multi storey frame shown below in the fig. 12, determine all the column-end and beam-end moments due to lateral loads as shown. Analyse the frame using Cantilever method.

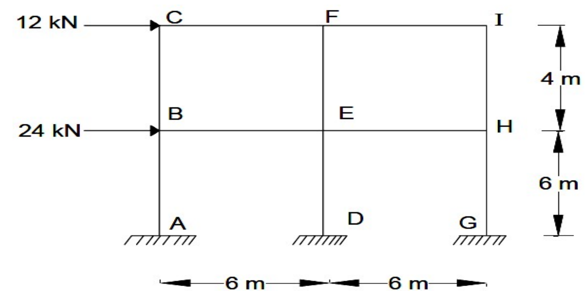

Fig. 12

12

9. Analyse the portal frame as shown in fig. 13 using stiffness method: (Redundants are Δ_1, Δ_2 and Δ_3).

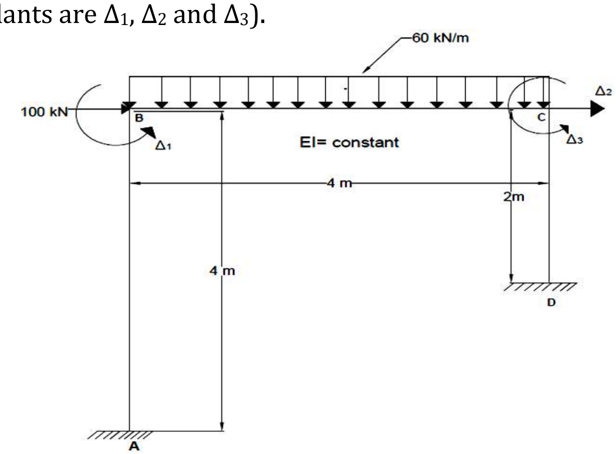

Fig. 13

12

ANALYSIS OF STRUCTURES II
(CIVL 3101)

Time Allotted : 3 hrs **Full Mark**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and <u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practic

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1**

(i) A statically indeterminate structure is one which
(a) cannot be analyzed at all
(b) can be analyze using equations of statics only
(c) can be analyzed using equations of statics and compatibility equa
(d) can be analyzed using equations of compatibility only.

(ii) The absolute stiffness of a prismatic member with one end hinge
(a) EI/L (b) 2EI/L (c) 3 EI/L (d) 4

(iii) The portal frame shown in Fig. 1

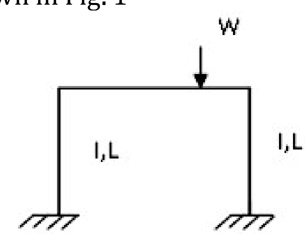

Fig. 1

(a) not sway (b) sway towards lef
(c) sway towards right (d) sway either to left or

(iv) In moment distribution method the sum of distribution factors the members meeting at any joint is always
(a) zero (b) <1 (c) >1 (

(v) A propped cantilever beam AB of span L is subjected to a momen the prop end B. The moment at fixed end A is
(a) 2M (b) M/2 (c) M (d) 3

(b) A symmetrical suspension bridge is formed by a set of two cables placed side by side at a distance of 6 m over a span of 90 m and central sag of 18 m. Each cable is stiffened by means of a three hinged stiffening girder having an internal hinge at mid span. The total dead load assumed to be uniformly distributed is 4.8 kN per square meter of floor area. Determine the maximum tension in the cable when the bridge is traversed by an axle load of 450 kN placed symmetrically with respect to the longitudinal axis of the bridge.

6 + 6 = 12

3. Analyse the portal frame shown in fig.4 by moment distribution method. All members have the same flexural rigidity.

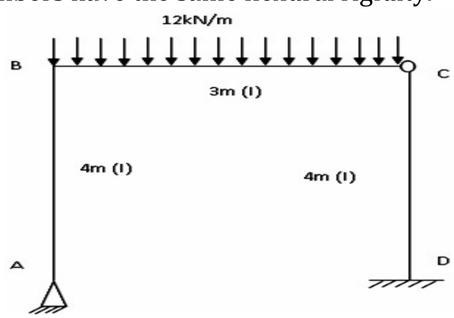

Fig. 4

12

Group – C

4. (a) Determine the centroidal principal moment of inertia of the equal angle section 90 × 90 × 10 mm as shown in fig. 5.

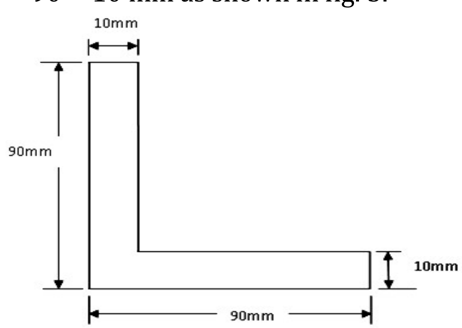

Fig. 5

(b) A 90 mm × 90 mm × 10 mm equal angle is placed with the one leg vertical as shown in fig. 6. 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.

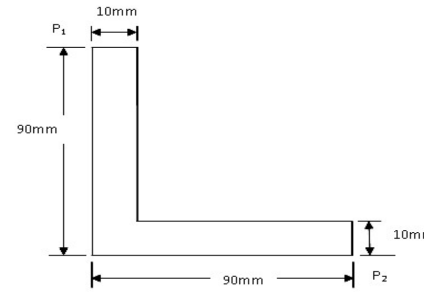

Fig. 6

6 + (

5. (a) A quarter circle beam of radius R curved in plan is fixed at end free at end B as shown in fig. 7. It carries a vertical load P at it end. Determine the deflection at the free end and sketch the force, bending moment and torsional moment diagrams. (As flexural rigidity EI = torsional rigidity GJ.)

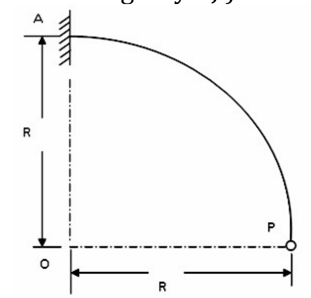

Fig. 7

(b) Obtain distribution of bending moment, shear force and torque in c a circular bow girder of radius 5m continuous over six su uniformly spaced and subjected to uniformly distributed load of 60 l

6 + (

Group – D

6. (a) Determine the plastic moment capacity for the continuous shown below. The loads provided are working loads. (Take λ_s = 1

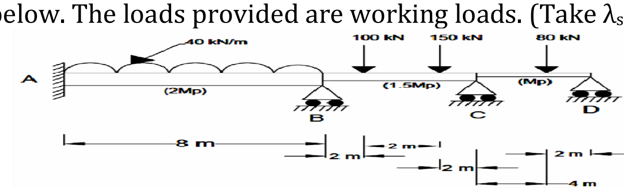

Fig. 8