PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2022 - 23 Examination

Semester: 4th   **Date: 20/03/2023**
Subject Code: 203104281   **Time: 2.00 pm to 4.30 pm**
Subject Name: Mechanics of Materials   **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Each of one mark)   **(15)**
1. The carry over factor in a prismatic member whose one end is fixed is _____.
2. Moment Distribution Method is applicable to the determinate and indeterminate structure. True/False
3. In fixed beams, the slope at the supports is _____.
4. The number of slope deflection equations available for a two span continuous beam are _____.
5. Define Carryover Moment.
6. A beam which is inbuilt in at its support is called _____.
7. In the displacement method of structural analysis, the basic unknowns are _____.
8. The number of independent equations to be satisfied for static equilibrium of a plane structure is _____.
9. In moment distribution method, the sum of distribution factors of all the members at any joint is always _____.
10. Moment Distribution Method does not consider axial and shear effects for the displacement calculations for the given structure. True/False
11. A continuous beam is one which is
a) Fixed at both ends
b) Fixed at one end and free at the other end
c) Supported on more than two supports
d) Extending beyond the supports
12. The fixed support in a real beam becomes in the conjugate beam a
a) Roller support   b) Hinged support
c) Fixed support   d) Free end
13. The moment distribution is best suited for
a) in determinate pin jointed truss   b) rigid frames
c) space frames   d) trussed beam
14. While using three moments equation, a fixed end of a continuous beam is replaced by an additional span of
a) Zero length   b) Infinite length
c) Zero moment of inertia   d) None of the above
15. In the structural analysis, the unit load method used is
a) another name of stiffness method
b) an extension of Maxwell's reciprocal theorem
c) applicable only to statically indeterminate structures
d) derived from Castigliano's theorem

Q.2 Answer the following questions. (Attempt any three)   **(15)**
A) Define: Sway. What are the causes for Sway in portal frames?
B) Define: (i) Distribution factor (ii) Carry over factor
C) Write down equation for fixed end moment for the fixed beam for the following cases:
(a) sinking of support (b) beam loaded with eccentric point load and (c) moment acting on the span
D) State Castigliano's first and second theorem with its usefulness.

**Q.3** A) Analyse the continuous beam by slope deflection method and also draw BMD.   **(07)**
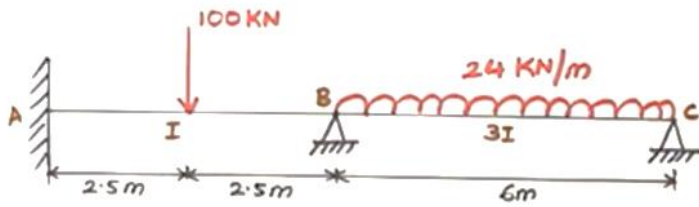
B) A beam ABC is simply supported at A, B & C. Spans AB & BC are of lengths 3m & 4m **(08)** respectively. AB carries a UDL. of 15kN/m over entire span & BC carries central point load of 30kN. Calculate support moment at B using three moment theorem & draw B.M.D.
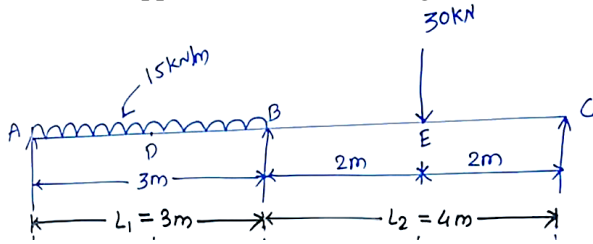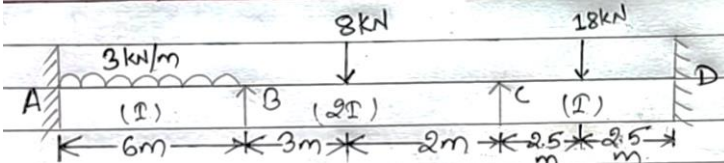

OR

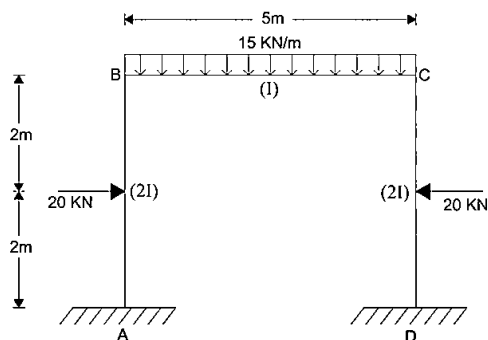**B)** Find out vertical displacement at C for a plane frame using energy principle. **(08)**
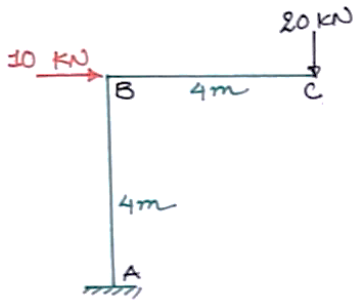
Q.4 **A)** Analyse the beam as shown in the figure using moment distribution method. **(07)**

OR

A) Analyse the beam as shown in the figure using moment distribution method. **(07)**

B) Calculate support reactions of given portal frame using energy principles. **(08)**