

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-V • EXAMINATION – WINTER 2013

Subject Code: 150605**Date: 11-12-2013****Subject Name: Structural Analysis - III****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Draw neat and clean figures wherever required.

- Q.1** (a) Find the [FAJ – FER] (Load vector) Matrix and stiffness [k] matrix for the beam shown in Fig. 1 where portion AB has flexural rigidity $2EI$ and BC has flexural rigidity EI . **07**
- (b) Determine basic unknowns and plot SF and BM diagrams for Fig.1 using stiffness matrix method. **07**
- Q.2** (a) Find the flexibility matrix [F] and [DQ – DQL] matrix for the beam shown in Fig.1 where portion AB has flexural rigidity $2EI$ and BC has flexural rigidity EI . **07**
- (b) Find the basic unknowns and plot SF and BM diagrams for Fig.1 using flexibility matrix method. **07**
- OR**
- (b) Develop flexibility matrix [F] for the frame shown in Fig. 2. **07**
- Q.3** (a) Using static method find the collapse load for Fig.3 **07**
- (b) Find the plastic moment capacity for Fig. 4 **07**
- OR**
- Q.3** (a) Find the plastic moment capacity for the frame shown in Fig. 5 **10**
- (b) Determine the shape factor for circular section of diameter D . **04**
- Q.4** (a) Determine the bending moment equation and torsional moment equation for a curved beam in plan with fixed supports subjected to UDL w kN/m. **07**
- (b) Determine the stiffness matrix [k] for truss shown in Fig. 6. **07**
- OR**
- Q.4** (a) Determine the variation of SF and BM at an interval of 10^0 for a circular curved beam of radius 5 m in plan symmetrically supported on six columns subjected to UDL of 5 kN/m throughout. Draw the diagrams of variation of SF and BM for one span between two supports in curved form. **10**
- (b) Explain the concept of plastic hinge. **04**
- Q.5** (a) Derive the equation of meridional stress and hoop stress for a conical dome subjected to point loads W at vertex. **07**
- (b) The continuous beam is shown in Fig. 7. What are the basic determinate structures (beams) are possible? What is the best option to be used for flexibility matrix method? Justify with proper reason. **07**
- OR**
- Q.5** (a) Derive the equation of meridional stress and hoop stress for a conical dome subjected to UDL. **07**
- (b) Explain the aspects on which curved beam in plan are differ from usual beams. **07**

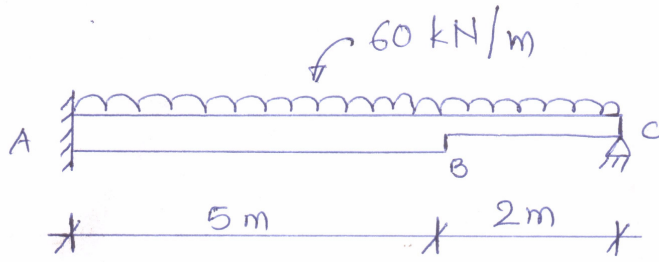
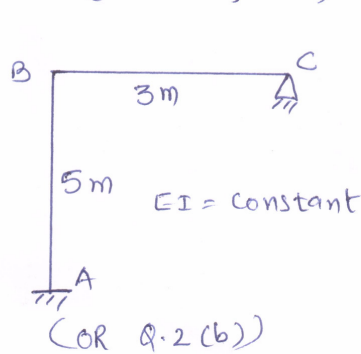


Fig. 1
(Q.1 (a), (b)) and (Q.2 (a), (b))



(OR Q.2 (b))

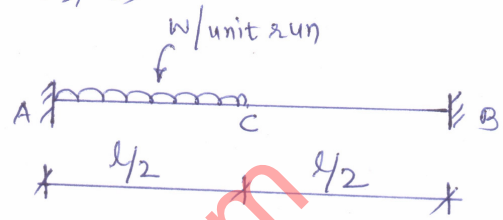


Fig. 3
(Q.3 (a))

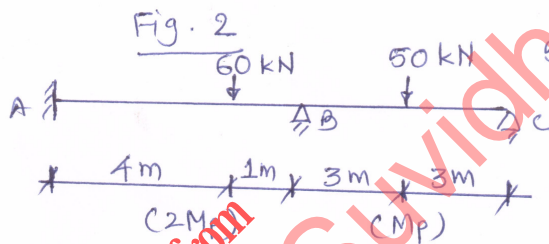


Fig. 2
(Q.3 (b))

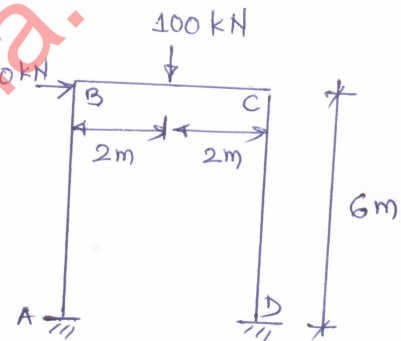


Fig. 5
(OR Q.3 (a))

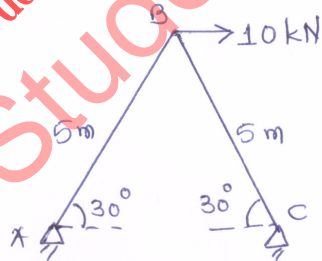


Fig. 6
(Q.4 (b))

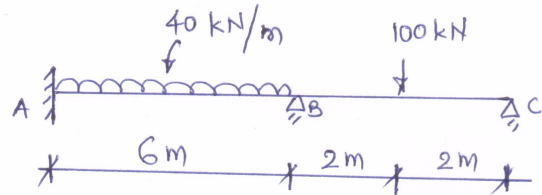


Fig. 7
(Q.5 (a))