

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (Old) EXAMINATION – WINTER 2019****Subject Code: 150605****Date: 25/11/2019****Subject Name: Structural Analysis - III****Time: 10:30 AM TO 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.

- Q.1** (a) Explain with neat sketches the various mechanism of failure of plane frames in plastic analysis. **07**
(b) Derive an expression for Meridional stress and Hoop stress develop in a spherical dome subjected to UDL. **07**
- Q.2** (a) Find collapse load of fixed beam having length “L” and subjected to point load “W” acting at a distance “a” from left support and distance “b” from right support by static method and kinematic method. **07**
(b) Explain type of domes with neat sketches and state their uses. **07**
- OR**
- (b) Explain technical aspects of difference between curved beam and usual beam. **07**
- Q.3** (a) State the assumptions of Plastic theory. **07**
(b) Derive formula of $F\theta$, $M\theta$ and $T\theta$ at any section, for the quarter circular cantilever beam curved in plan, subjected to uniformly distributed load w per unit run throughout its length, with usual notations. **07**
- OR**
- Q.3** (a) State uses of domes and beams curved in plan. **07**
(b) Differentiate between stiffness method and flexibility method. **07**
- Q.4** (a) Analyze the beam shown in **fig. 1** using stiffness method. **07**
(b) State and explain static and kinematic theorem of plastic analysis. **07**
- OR**
- Q.4** (a) List and explain the stresses in spherical dome. **07**
(b) Analyze the frame as shown in **fig.2** by stiffness method and determine support moments only. **07**
- Q.5** (a) Analyze the beam as shown in **fig.3** by flexibility method and determine moment at support A & B. **07**
(b) Determine collapse load for a frame as shown in **fig.4** by kinematic method. **07**
- OR**
- Q.5** (a) The conical dome has following details. **07**
1) Span of Dome = 18 m
2) Rise = 3.0 m
3) LL or WL = 1.5 kN/m²
4) Thickness of Dome = 100 mm.
Calculate maximum meridional thrust and hoop force in the dome.
- (b) A beam is quarterly curved in plan forming an arc of circle with radius 4.0 m. **07**
The beam carries LL of 2.0 kN/m and having 300 mm x 600 mm cross section.
Draw SF, BM and TM. Take $G = 0.4E$ for concrete.

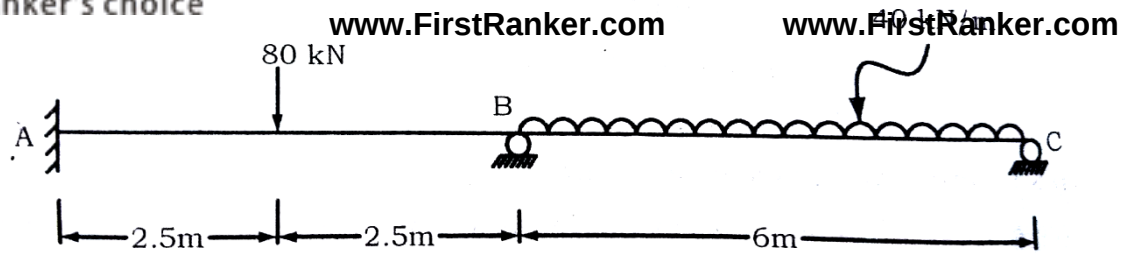


Fig.1 (Q.4 a)

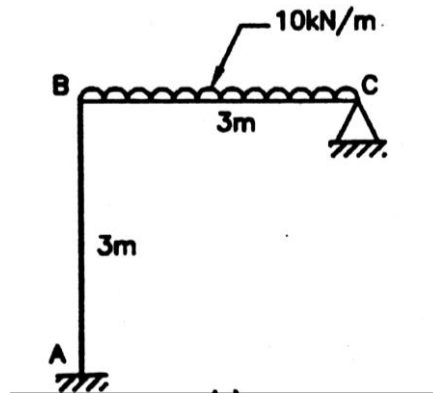


Fig.2 (Q.4 b OR)

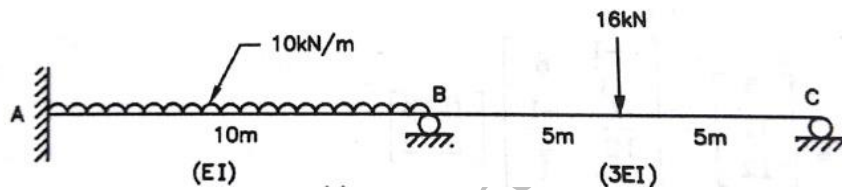


Fig.3 (Q.5 a)

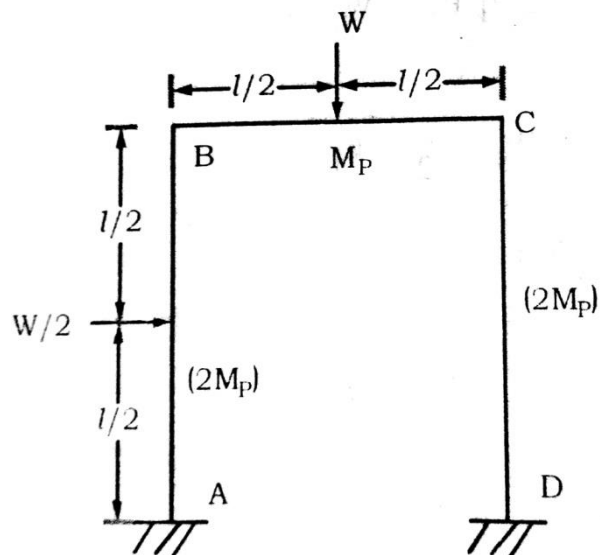


Fig.4 (Q.5 b)