

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (OLD) EXAMINATION – WINTER 2021****Subject Code:150605****Date:15/12/2021****Subject Name:Structural Analysis - III****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Derive the expression for hoop and meridional stress for a conical dome subjected to uniformly distributed load. **07**
- (b) Distinguish between stiffness matrix method and flexibility matrix method. **07**
- Q.2** (a) Determine collapse load for a fixed beam having length “L” and subjected to central point load “W” by static and kinematic method. **07**
- (b) Evaluate maximum values of bending moment, shear force and torsion moment for a beam circular in plan having radius of 8m and is supported equally spaced 8 supports and loaded by uniformly distributed load of 40kN/m. **07**
- OR**
- (b) A conical dome of 18m diameter with a central rise of 3m supports total uniformly distributed load of 4kN/m<sup>2</sup> over the surface inclusive of self weight. Determine meridional and hoop stress at ring beam level. **07**
- Q.3** (a) Explain term “Plastic hinge”. State the upper bound and lower bound theorems for collapse load in plastic analysis. **07**
- (b) Derive the expression for hoop and meridional stress for a spherical dome subjected to uniformly distributed load. **07**
- OR**
- Q.3** (a) Derive expression for shear force and bending moment at support for a circular beam supported symmetrical. **07**
- (b) A spherical dome with span of 10m and rise 2m has a shell which is 120mm thick. The wind load on the dome is estimated to equivalent to 1.2kN/m<sup>2</sup>. Estimate stresses in the dome. **07**
- Q.4** (a) Calculate the value of shape factor for a beam of circular section with radius R. **07**
- (b) State and explain the basic assumptions made in the plastic theory. **07**
- OR**
- Q.4** (a) Evaluate the value of shape factor for a thin hollow circular section of internal diameter “d” and external diameter “D”. **07**
- (b) Enlist various types of loads acting on dome and also write advantages of domes. **07**
- Q.5** (a) Formulate the flexibility matrix [F] and load vector {DQL} for the beam as shown in Figure-1. **07**
- (b) For the beam as shown in Figure-1, Calculate values of unknown reactions using flexibility method. Also draw SF and BM diagrams. **07**
- OR**
- Q.5** (a) Formulate the stiffness matrix [S] and load vector {AD-ADL} for the beam as shown in Figure-2. **07**
- (b) For the beam as shown in Figure-2, Calculate the joint displacement and final end moments using stiffness method. **07**

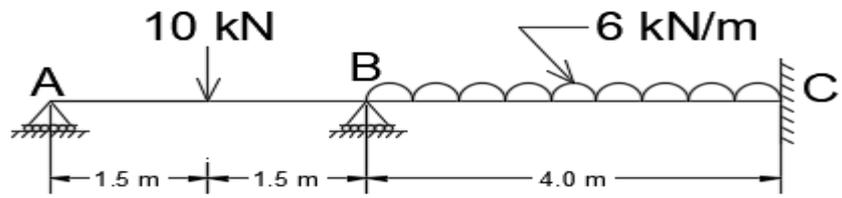


Figure-1

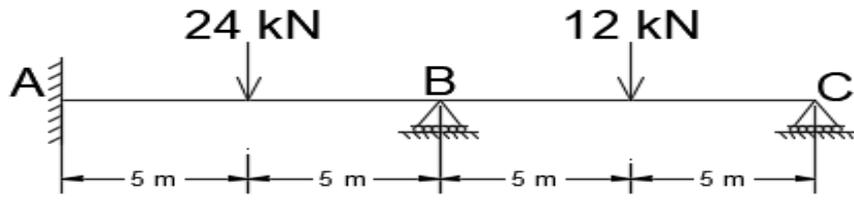


Figure-2

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