

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – SUMMER 2013****Subject Code: 150605****Date: 03-06-2013****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.

- Q.1** (a) Explain the term shape factor and collapse load **07**
 (b) Give the uses of dome and beam curved in plan **07**

- Q.2** (a) Calculate the shape factor for a square section arranged as shown in Figure 1. **07**
 (b) Obtain the formula to calculate plastic moment of resistance of a propped cantilever beam of span L carrying uniformly distributed load of W_c throughout the span. **07**

OR

- (b) Calculate plastic moment of resistance required for a fixed beam of span 10 m loaded by a collapse uniformly distributed load of 18 kN/m over left half 5 m and a collapse point load of 45 kN at 7.5 m from the left support. **07**

- Q.3** (a) Formulate the stiffness matrix, S , and load vector, A_D-A_{DL} , for the beam shown in the Figure 2. Take EI constant. **07**
 (b) For the above problem Q.3 (a), calculate the joint displacements using stiffness method and draw the shear force and bending moment diagrams. **07**

OR

- Q.3** (a) Formulate the flexibility matrix, F , and D_Q-D_{QL} vector for the beam shown in the Figure 2. Assume reactions at supports B and C as redundants. Take EI constant. **07**
 (b) For the above problem Q.3 (a), calculate the values of all the unknown reactions using flexibility method and draw the shear force and bending moment diagrams. **07**

- Q.4** (a) A curved beam circular in plan symmetrically supported on six columns has a radius of 6 m, carries uniformly distributed load of 40 kN/m, including self weight. Calculate shear force, bending moment and twisting moment at 10° interval. **07**
 (b) Derive the expression for M_ϕ and T_ϕ for a curved beam fixed at ends. **07**

OR

- Q.4** (a) A spherical dome having 8 m span and 1.5 m rise is subjected to a load of 4 kN/m², including self weight and a lantern load of 1 kN at the crown. Thickness of the dome is 150 mm. Calculate stresses in the dome. **07**
Q.4 (b) A conical dome having 8 m span and 4.0 m rise is subjected to a load of 5 kN/m², including self weight and a concentrated load at vertex of 10 kN. Calculate stresses in the dome. The thickness of the dome is 100 mm. **07**

- Q.5** (a) Differentiate between straight beam and curved beam. **07**
 (b) Derive an expression for stresses in conical dome subjected to concentrated load at crown. **07**

OR

- Q.5** (a) Give the properties of flexibility and stiffness matrix. **07**

- (b) State and explain 'static theorem' and 'kinematic theorem' of plastic theory. 07

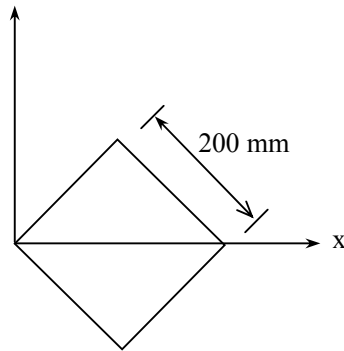


Figure 1

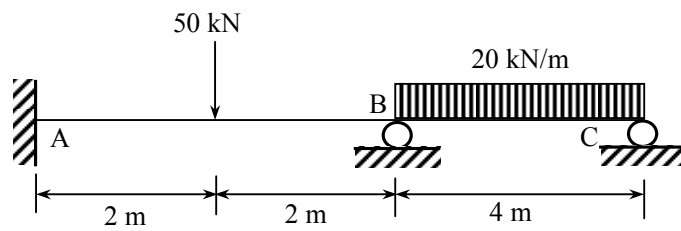


Figure 2