Seat No.: _____ Enrolment No.______

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-Vth Examination December 2010

Subject code: 150605 **Subject Name: Structural Analysis III**

Date: 20 /12 /2010 **Time: 03.00 pm - 05.30 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) 1) Define the flexibility coefficient fij and stiffness coefficient sij. **02**

2) Differentiate between the mechanical hinge and plastic hinge. **03**

(b) Fill in the blanks and rewrite the whole sentence. **09**

1) The final size of the stiffness matrix depends on ______ indeterminacy while the same of the flexibility matrix depends on _______ indeterminacy.
2) In the plastic method of analysis the shape factor is the ratio of ______________ to _____________.
3) Dome is the structure which resists force mainly by _____ stress and _______ stress.
4) In the curved beam the major internal forces are ________, _________ and ____________.

Q.2 (a) Calculate the shape factor for a square section arranged as diamond shape having size of 100mm and x axis passing through one of the diagonals. **07**

(b) Derive the formula for M_P required for the propped cantilever beam loaded by a collapse udl of W_c kN/m. **07**

OR

(b) Calculate the M_p required for a fixed beam of span 8m and loaded by a collapse udl of 20kN/m over left half 4m and a collapse concentrated load of 50kN at 6m from left span. **07**

Q.3 (a) For the structure shown in the figure.1 calculate the stiffness matrix and load vector. **07**

(b) For the above problem Q.3 (a),calculate the nodal displacements and hence draw the shear force and bending moment diagrams. **07**

OR

Q.3 (a) For the structure shown in the figure.1 calculate the flexibility matrix and displacement vector. Assume all the reaction at support B, C and D as unknown forces. **07**

(b) For the above problem Q.3 (a), calculate the values of all the unknown reactions and draw the shear force and bending moment diagrams. **07**

Q.4 (a) For the structure shown in the figure.2 calculate the stiffness matrix and load vector. **07**

(b) For the above problem Q.4 (a), calculate the nodal displacements and hence draw the shear force and bending moment diagrams. **07**

OR

Q. 4 (a) For the structure shown in the figure.2 calculate the flexibility matrix and displacement vector. Assume all the reaction at support D as unknown forces. **07**

(b) For the above problem Q.4 (a), calculate the values of all the unknown reactions and draw the shear force and bending moment diagrams. **07**

Q.5 (a) A beam circular in plan has radius of 8m and is supported at equally spaced 8 supports. It is loaded by a udl of 40 kN/m. Calculate the maximum values of bending moment, shear force and torsion moment. **07**

(b) A spherical dome with 20m span and 6m central rise has an opening of 4m horizontal diameter at top. If all inclusive udl of 6 kN/m^2 is acting on it, calculate the maximum value of hoop tension/compression in top and bottom ring beams. **07**

OR

Q.5 (a) A beam is in the form of quarter circle in plan with both the ends fixed. If the radius of the beam is 4m and is loaded by a udl of 30kN/m, draw the bending moment, shear force and torsion moment diagrams. **07**

(b) A spherical dome with a span of 15m and central rise of 3m has all inclusive load of $10kN/m^2$. Calculate all the stresses at the midheight. **07**

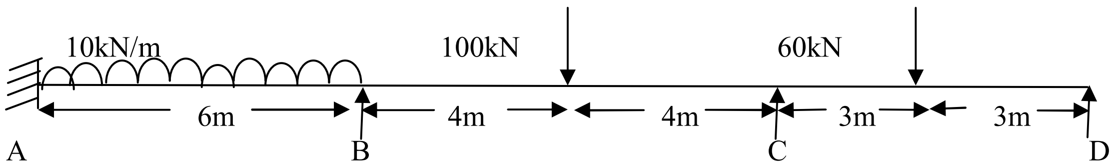

Figure.1

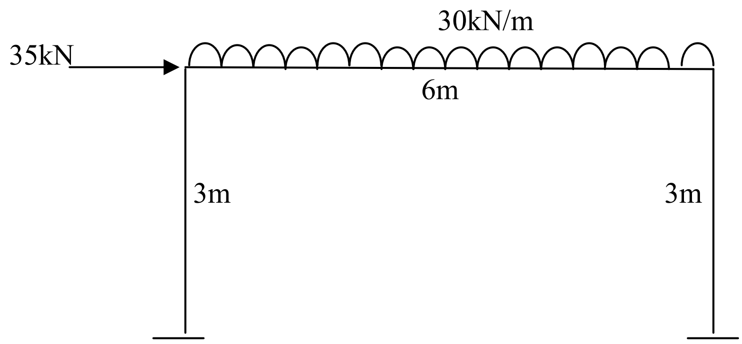

Figure.2

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