Seat No.: ________ Enrolment No.____________

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-V Examination-Nov/Dec.-2011

Subject code: 150605 **Date: 01/12/2011**
Subject Name: Structural Analysis – III **Time: 2.30 pm -5.00 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)** Give uses of domes and beams curved in plan. **06**

(b) Fill in the blanks with the most appropriate answer and rewrite the complete sentence. **08**

(1) The ratio of collapse load of a propped cantilever of span '*l*' carrying a uniformly distributed load throughout the span to that of a simply-supported beam carrying the same load is __________ (1.457, 1.5, 2.0, 3.0).

(2) The shape of the cross-section, which has the largest shape factor, is _____________(Rectangular, I-section, diamond, solid circular).

(3) In the theory of plastic bending of beams, the ratio of plastic moment to yield moment is called ________ (Shape factor, plastic section modulus, modulus of resilience, rigidity modulus).

(4) In the theory of plastic bending of beams, the ratio of the collapse load to the working load is called ________ (Load factor, shape factor, factor of safety, plastic section modulus).

Q.2 **(a)** Calculate the shape factor for the section shown in Figure 1. **07**

(b) Calculate the collapse load in terms of M_p for the fixed beam shown in Figure 2. **07**

OR

(b) A beam semicircular in plan with both the ends fixed has radius of 4m. It is loaded with a point load of 50kN at the mid-point of the semicircle. Draw the bending moment, shear force and torsion moment diagrams. Take GJ=0.8EI. **07**

Q.3 **(a)** A conical dome of 12 m diameter with a central rise of 4 m supports total uniformly distributed load of 4kN/m^2 over the surface inclusive of self weight. Calculate Meridional and hoop force at ring beam level. **07**

(b) Calculate the collapse load in terms of M_p for the fixed beam shown in Figure 3. **07**

OR

Q.3 **(a)** A spherical dome with a span of 14 m and central rise of 3.5m supports total uniformly distributed load of 3.5 kN/m^2 over the surface inclusive of self weight. Find the meridional and hoop stress at ring beam level. Assume dome thickness 105mm. **07**

(b) A beam circular in plan has radius of 4m and is supported on 6 supports spaced equally along the circumference. It is loaded by a uniformly distributed load of 50 kN/m. Calculate the maximum values of bending moment, shear force and torsion moment. **07**

Q.4 **(a)** Formulate the stiffness matrix (S) and load vector (A_D-A_{DL}) for the structure shown in the Figure 4. Take EI constant. **07**

(b) For the above problem Q.4 (a), calculate the joint displacements using stiffness method and draw the shear force and bending moment diagrams. **07**

OR

Q.4 **(a)** Formulate the flexibility matrix (F) and D_{QL} vector for the structure shown in the Figure 4. Assume reactions at supports B and C as redundants. Take EI constant. **07**

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

Q.5 **(a)** Calculate the stiffness matrix (S) and load vector (A_D-A_{DL}) for the structure shown in the Figure 5. Take EI constant. **07**

(b) Give the properties of flexibility and stiffness matrix. **07**

OR

Q.5 **(a)** Derive an expression for stresses in conical dome subjected to concentrated load at crown. **07**

(b) Differentiate between flexibility and stiffness methods of analysis. **07**

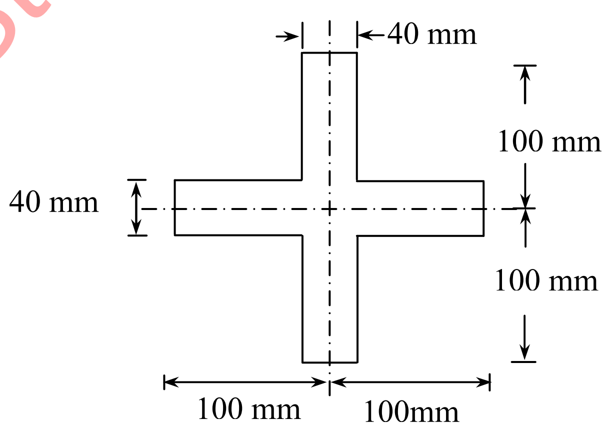

Figure 1.

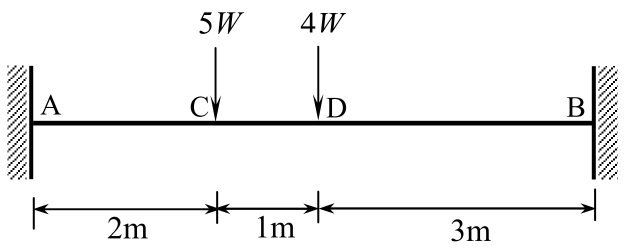

Figure 2.

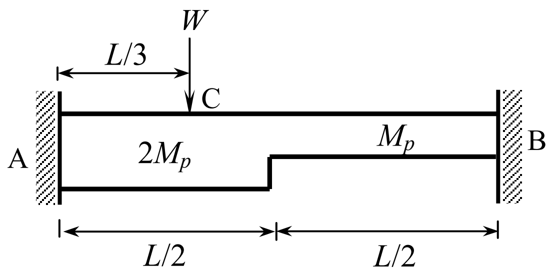

Figure 3.

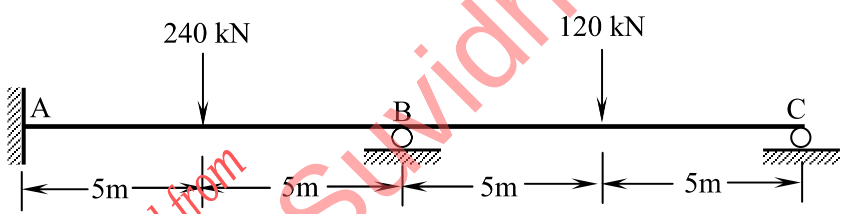

Figure 4.

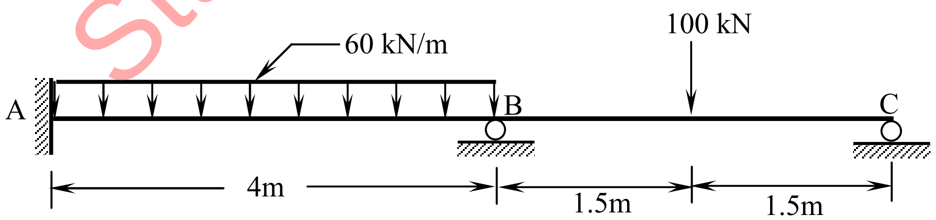

Figure 5.

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