Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 712005N **Date: 10-01-2013**

Subject Name: Basic Concepts of Structural Behaviour

Time: 02.30 pm – 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.**

Q.1 **(a)** What are the primary structural components? Explain the load distribution pattern in a general structure. **07**

(b) Determine the unknown reaction forces R_A & R_B in the structure shown in fig.1 **07**

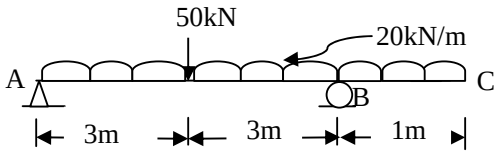

Fig.1

Q.2 **(a)** Explain the types of various structural failures and remedial measures to prevent them. **07**

(b) Draw shear stress distribution in beam of cross-section: rectangular, T-shape, H-shape and I-shape. **07**

OR

(b) State and explain the Principle of Parallellogram of forces and its application. **07**

Q.3 **(a)** Explain various types of loads that are considered in Analysis and design of a structure in general. **07**

(b) State the classification of structures with respect to: **07**

1. Geometry
2. Stiffness
3. Behaviour

OR

Q.3 **(a)** Draw shapes of Shear force and bending moment diagrams for the following two beams: **07**

- Simply supported beam with udl on entire length.
- Cantilever of length ‘L’with point load at ‘L/2’.

(b) What is stress and strain? What are the different types of stresses and strains in general. **07**

Q.4 **(a)** Draw and explain various components of cable stayed and cable suspended structures. **07**

(b) Determine maximum bending stress for a cantilever beam of length 2m carrying a concentrated load of 20 kN at the free end. The cross-section of the beam is rectangular (B=200mm, D=300mm). **07**

OR

Q.4 **(a)** For the three hinged parabolic arch of 20m span and central rise of 3m is loaded with udl and a point load of 20kN at a distande of 5m from right end support as shown in fig.2 calculate Support reactions and Horizontal thrust. **07**

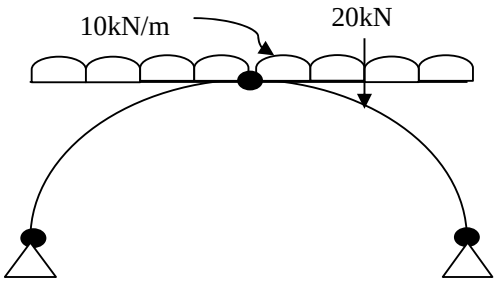

Fig.2

(b) Explain the basic difference between a plate structure and a grid structure. **07**

Q.5 **(a)** Determine internal forces in all members of a truss shown in fig.3 **07**

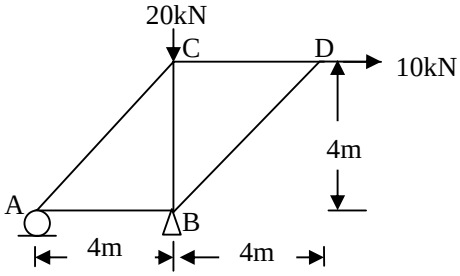

Fig.3

(b) Explain design considerations and design steps of a flexural member (Beam). **07**

OR

Q.5 **(a)** Draw and explain the behavior of stress-strain curve of a mild steel bar subjected to tensile force. **07**

(b) Explain determinate, indeterminate, stable and unstable trusses with neat sketch and appropriate conditions. **07**

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