

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (OLD) EXAMINATION – SUMMER 2024

Subject Code:150605

Date:16-05-2024

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) Differentiate between stiffness method and flexibility method. **07**
 (b) Analyze the propped cantilever beam as shown in Fig.1. by flexibility method. **07**

- Q.2** (a) Explain various types of skeletal structures. **07**
 (b) Analysis the beam as shown in Fig. 2 using the flexible method choose R_B as redundant. **07**

OR

- (b) Define the terms: shape factor, plastic hinge, load factor, collapse load, plastic section modulus, dome, plastic hinge. **07**

- Q.3** (a) A roof of a hall having diameter 20 m is to be covered by a conical dome of 100mm thickness and 4 m rise. Assuming Live load and other loads as 1.5kN/m^2 , Calculate stresses in the dome **07**
 (b) List various uses of domes. What are the loads acting on domes? **07**

OR

- Q.3** (a) Explain types of domes with neat sketches and state their uses. **07**
 (b) Derive an expression for M_ϕ and T_ϕ for a curved beam fixed at the ends. **07**

- Q.4** (a) Give the uses of curved beams. **07**
 (b) A curved beam circular in plane symmetrically supported on six columns has radius 4 m. the beam carries a uniformly distributed load 2 kN/m, including self-weight of beam. Determine the shear force, bending moment and twisting moment at important location. **07**

OR

- Q.4** (a) Distinguish between a straight beam and a beam curved in plan. **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 mid height. **07**

- Q.5** (a) Determine the shape factor for a rectangular beam of width b and depth d. **07**
 (b) What is plastic hinge? In what way is it different from an ordinary hinge? **07**

OR

- Q.5** (a) State the assumption made in plastic design. **07**
 (b) A fixed beam of 6m span carries a uniformly distributed load of 175kN/m over the left half of the span. Determine the fully plastic moment for the beam. Also calculate plastic section modulus required. $F_y=250\text{MPa}$. **07**

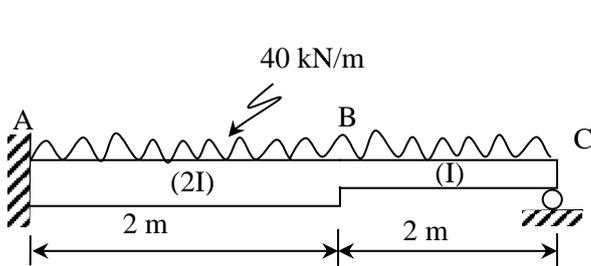


Fig.1

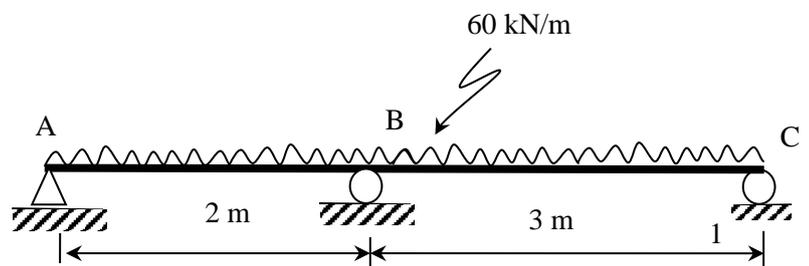


Fig.2