

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY- GURAJADA VIZIANAGARAM
II B. Tech I Semester Regular Examinations, November – 2024
STRENGTH OF MATERIALS
(CIVIL ENGINEERING)

Time: 3 hours**Max. Marks: 70**

Question paper consists of Part A, Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.

PART-A**(20 Marks)**

- 1 a) What is Hooks law [2]
- b) Define stress and stain [2]
- c) What are the assumptions of simple bending? [2]
- d) In which point the bending moment is maximum? [2]
- e) Write the basic equation for bending [2]
- f) Define shear stress [2]
- g) Write the deflection formula for simply supported beam with central point load? [2]
- h) Draw overhanging beam [2]
- i) Classify the types of column [2]
- j) Write the limitations Euler's theory [2]

PART-B**(50 Marks)****Unit-1**

- 2 a) Draw stress - strain diagram for mild steel. Indicate salient points and define them. [5]
- b) Explain the following: - [5]
 - (a) Working stress
 - (b) Factor of safety
 - (c) Volumetric strain

(OR)

- 3 a) Explain about Yield strength. [5]
- b) Obtain a relationship between E, K & G. [5]

Unit-2

- 4 A simply supported beam 6 m long is carrying a uniformly distributed load of 5 kN/m over a length of 3 m from the right end. Draw shear force and bending moment diagrams for the beam and also calculate the maximum bending moment on the beam [10]

(OR)

- 5 A simply supported beam of length 8 m rests on supports 5 m apart, the right-hand end is overhanging by 2 m and the left-hand end is overhanging by 1m. The beam carries a uniformly distributed load of 5 kN/m over the entire length. It also carries two-point loads of 4 kN and 6 kN at each end of the beam. The load of 4 kN is at the extreme left of the beam. Whereas the load of 6 kN is at the extreme right of the beam. Draw S.F and B.M diagrams for the beam and find the points of contra flexure [10]

Unit-3

- 6 From first principles show that for a rectangular section the maximum shear stress is 1.5 times the average stress. Sketch the variation of shear stress. [10]

(OR)

- 7 An I section is having overall depth as 550mm and overall width as 200mm. The thickness of the flanges is 25mm whereas the thickness of the web is 20mm. If the section carries a shear force of 45kN, calculate the shear stress values at salient points and draw the sketch showing variation of shear stress. [10]

Unit-4

- 8 A beam 7m long carries a uniformly distributed load of 20 kN/m run throughout its length. The beam is supported over a span of 5m with overhang of 2m one side. Determine the slope and deflection at the cantilever end $E = 200 \text{ GPa}$ $I = 80^2 \text{ m}^4$. [10]

(OR)

- 9 What is moment area method? Explain the two Mohr's theorems, as applicable to the slope and deflection of a beam. [5]

Unit-5

- 10 A steel column is of length 8 m and diameter 600 mm with both ends hinged. Determine the crippling load by Euler's formula. Take $E = 2.1 \times 10^5 \text{ N/mm}^2$ [10]

(OR)

- 11 Derive the expression for crippling load when the both ends of the column are hinged. [10]
