

S. B. Roll. No.....

STRUCTURAL MECHANICS
3rd Exam/Civil/5703/Nov'24
(For 2023 Batch)

Duration: 3Hrs.

M.Marks:50

SECTION-A

Q1. Fill in the blanks any nine of the following.

9x1=9

- a. The unit of stress in SI system_____
- b. The strength of beam is proportional to it's _____
- c. A beam supported on more than two supports is known as _____
- d. According to Hooke's law, within limit of elasticity stress is proportional to _____
- e. The ratio of change in dimension to the original dimension is known as _____
- f. The unit of moment of inertia of a plane area is in _____
- g. The bending of beam not accompanied by shear force is known as _____
- h. A _____ beam is supported freely on the supports at its both ends.
- i. The bending stress on the neutral axis is _____
- j. Cast iron is a _____ material.
- k. The unit of strain is _____
- l. I-section beams are most economical. (T/F)

SECTION-B

Q2. Attempt any five questions.

5x4=20

- i. What are the assumptions made in the theory of simple bending?
- ii. Define the terms M.O.I and radius of gyration.
- iii. Explain the different types of stresses and strains.
- iv. Explain stress strain curve for mild steel specimen.
- v. Explain section modulus.
- vi. Write a short note on bending moment and shear force.
- vii. Define hook's law. And explain different types of modulus of elasticity.

SECTION-C

Q3. Attempt any three questions.

3x7=21

- a. Define moment of inertia, radius of gyration and modulus of section.
- b. A simply supported beam AB of 16 m effective span carries the point load of 400N; 500N and 300N at distances 3, 7 and 11 metre respectively from support A. Calculate maximum shear force and maximum bending moment. Draw shear force diagram and bending moment diagram.
- c. A bar 300mm long is 50X50 mm in section for 120mm of its length, 20mm diameter for 80mm length and 40 mm diameter for the remaining. If the tensile force of 80KN is applied to the bar, calculate the stresses induced in the different section. Take $E=2 \times 10^5 \text{ N/mm}^2$.
- d. A cantilever beam of length 2.5m carries a UDL of 1.5 KN/m run over the whole length and a point load of 2KN at a distance of 0.5 m from the free end. Draw S.F.D and B.M.D for the cantilever.
- e. Write the assumptions made in Euler's theory. Explain its limitations.