**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**
(AUTONOMOUS)
B.Tech II Year I Semester Regular & Supplementary Examinations December-2023
STRENGTH OF MATERIALS
(Civil Engineering)

Time: 3 Hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

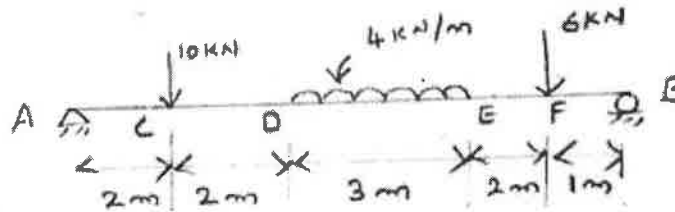**UNIT-I**

1 a List and explain different types of beams based on support conditions   CO1 L1 6M
   b A cantilever beam AB, 2 m long carries a uniformly distributed load of   CO1 L3 6M
      1.5 kN/m over a length of 1.6 m from the free end. Draw shear force and
      bending moment diagrams for the beam
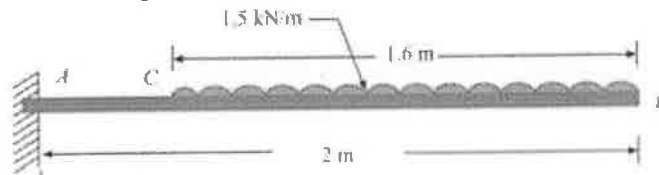
OR

2 A 10 m long simply supported beam carries two point loads of 10 kN and 6   CO1 L3 12M
   kN at 2 m and 9 m respectively from the left end. It has a niformly
   distributed load of 4 kN/m run for the length between 4 m and 7 m from the
   left hand end. Draw shear force and bending moment diagrams.

UNIT-II

3 List the assumptions made in deriving the flexure formula. Derive the   CO2 L2 12M
   equation.
   $$\frac{\sigma}{y} = \frac{M}{I} = \frac{E}{R}.$$

OR

4 A timber beam of rectangular section supports a load of 20 kN uniformly   CO2 L4 12M
   distributed over a span of 3.6 m. If depth of the beam section is twice the
   width and maximum stress is not to exceed 7 MPa, find the dimensions of
   the beam section.

UNIT-III

5 a Define the terms: Torsion, torsional rigidity and polar moment of inertia.   CO3 L1 6M
   b A solid shaft of 150 mm diameter is used to transit torque. Find the   CO3 L3 6M
      maximum torque transmitted by the shaft if the maximum shear stress
      induced to the shaft is 45 kN/mm^2.

OR

6 Two shafts of the same material and same lengths are subjected to the same   CO3 L4 12M
   torque, if the first shaft is of a solid circular section and second shaft is of
   hollow circular section, whose internal diameter is 2/3 of the outside
   diameter and the maximum shear stress developed in each saft is the same,
   compare the weights of the shafts.

UNIT-IV

7   A simply supported beam of length 'l' is carrying a uniformly distributed load of magnitude w per unit length throughout the span. Using Moment Area Method determine slope at the supports and deflection at the mid span.   **CO4 L3 12M**

OR

8   State the assumptions and derive the equation   **CO4 L2 12M**

$$M = EI \frac{d^2y}{dx^2}.$$

UNIT-V

9   A hallow alloy tube 4 m long with external and internal diameters of 40 mm and 25 mm respectively was found to extend 4.8 mm under a tensile load of 60 kN. Find the buckling load for the tube with both ends pinned. Also find the safe load on the tube, taking a factor of safety as 5.   **CO5 L4 12M**

OR

10 A hollow circular column having external and internal diameters of 300 mm and 250 mm respectively carries a vertical load of 100 kN at the outer edge of the column. Calculate the maximum and minimum intensities of stress in the section.   **CO5 L3 12M**

*** END ***