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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations August-2021

STRENGTH OF MATERIALS

(Common to ME & AGE)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

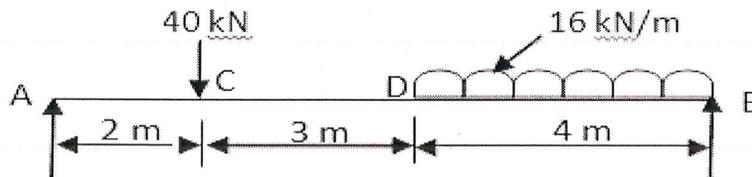
- 1 A steel rod of 3cm diameter is enclosed centrally in a hollow copper tube of external diameter 5cm and internal diameter of 4cm. the composite bar is then subjected to an axial pull of 45000N. If the length of each bar is equal to 15cm, determine: i) The stresses in the rod and tube, and (ii) Load carried by each bar. **12M**

OR

- 2 a Derive a relation between Young's modulus and Bulk modulus. **6M**
b Define Bulk Modulus. Calculate the Bulk modulus for a material having young's modulus $1.2 \times 10^5 \text{ N/mm}^2$ and $\mu=1/4$. **6M**

UNIT-II

- 3 A simply supported beam of 9m span is loaded as shown in figure below. Draw the BMD and SFD indicating principal values. **12M**



OR

- 4 A cantilever of length 3m carries a uniformly distributed load of 2.5 KN/m over the whole length and a point load of 3.5KN at the free end. Draw SFD and BMD for the cantilever. **12M**

UNIT-III

- 5 Derive the equation of theory of simple bending with usual notations. **12M**

OR

- 6 a Define section modulus. Derive the section modulus for hollow circular cross section. **6M**
b A timber beam 120mm wide and 200mm deep is simply supported over a span of 4m. The beam carries a UDL of 2.8 KN/m over the entire length. Find the maximum bending stress induced. Plot the bending stress distribution at the quarter span cross section of the beam. **6M**

UNIT-IV

- 7 Determine: (i) slope at the left support, (ii) deflection under the load and (iii) maximum deflection of a simply supported beam of length 6m, which is carrying a point load of 5KN at a distance of 2m from the left end. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 1 \times 10^8 \text{ mm}^4$. **12M**

OR

- 8 Derive an expression for Torque transmitted by a hollow circular shaft. **12M**

UNIT-V

- 9 A cast iron pipe 200mm internal diameter and 12mm thick is wound closely with a single layer of circular steel wire of 5mm diameter, under a tension of 60 N/mm^2 . Find the initial compressive stress in the pipe section. Also find the stresses set up in the pipe and steel wire, when water under a pressure of 3.5 N/mm^2 is admitted in to the pipe. Take $E = 1 \times 10^5 \text{ N/mm}^2$ for cast iron and for steel $E = 2 \times 10^5 \text{ N/mm}^2$. poisson's ratio is given as 0.3. **12M**

OR

- 10 Derive the expression for stresses developed in a compound thick cylinder (Lame's theorem). **12M**

*** END ***