Q.P. Code: 19CE0150 **R19**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations Feb-2021

STRENGTH OF MATERIALS

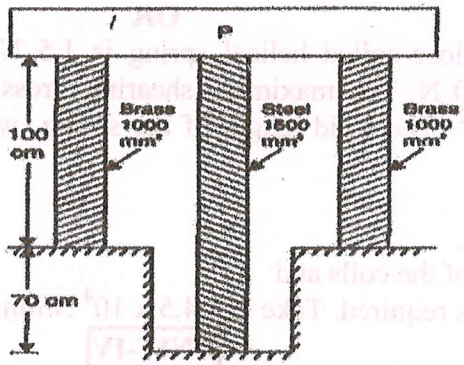
(Common to ME & AGE)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1 Two brass rods and one steel rod together supports a load as shown in fig. If the stresses in brass and steel are not to exceed 60 N/mm^2 and 120 N/mm^2, find the safe load that can be supported. Take E for steel = 2x10^5 N/mm^2 and for brass = 1x10^5 N/mm^2. The cross-sectional area of steel rod is 1500mm^2 and of each brass rod is 1000mm^2. **12M**



OR

2 Determine the diameter of a bolt which is subjected to an axial pull of 9 KN together with a transverse shear force of 4.5 KN using : **12M**

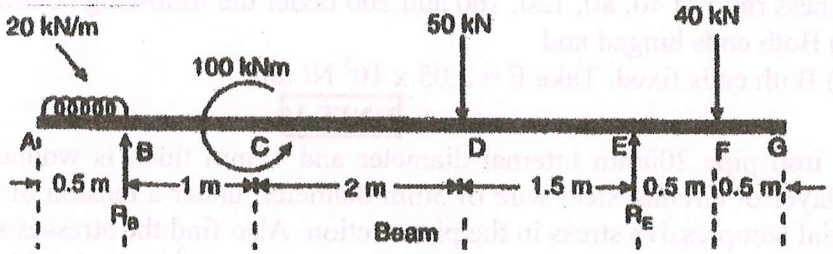
(i) Maximum principal stress theory.

(ii) Maximum principal strain theory.

Given the elastic limit in tension = 225 N/mm^2, factor of safety = 3 and poisson's ratio = 0.3.

UNIT-II

3 Construct the bending moment and shear force diagrams for the beam shown in the figure. **12M**

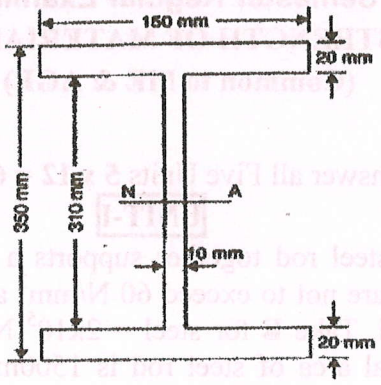


OR

4 Derive pure bending equation with necessary assumptions. **12M**

UNIT-III

5 An I-section beam 350mm x 150mm has a web thickness of 10mm and a flange thickness of 20mm. If the shear force acting on the section is 40 KN,find the maximum shear stress developed in the I-section. **12M**



OR

6 The stiffness of a close-coiled helical spring is 1.5 N/mm of compression under a maximum load of 60 N. The maximum shearing stress produced in the wire of the spring is 125 N/mm^2. The solid length of the spring (when the coils are touching) is given as 5cm. **12M**

Find :

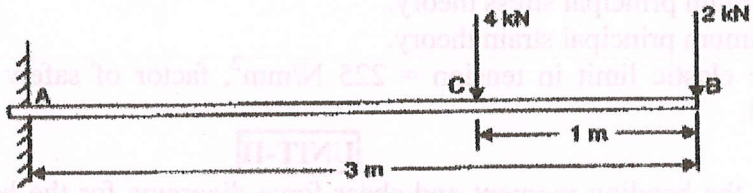
(i) Diameter of wire,

(ii) Mean diameter of the coils and

(iii) Number of coils required. Take $C = 4.5 \times 10^4$ N/mm^2.

UNIT-IV

7 A cantilever of length 3m carries two point loads of 2 KN at the free endand 4 KN at a distance of 1m from the free end. Find the deflection at the free end. Take $E = 2 \times 10^5$ N/mm^2 and $I = 10^8$ mm^4. **12M**



OR

8 Using Euler's formula, calculate the critical stresses for a series of struts having slenderness ratio of 40, 80, 120, 160 and 200 under the following conditions : **12M**

(i) Both ends hinged and

(ii) Both ends fixed. Take $E = 2.05 \times 10^5$ N/mm^2

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. **12M**

OR

10 Determine the maximum and minimum hoop stress across the section of a pipe of 400mm internal diameter and 100mm thick, when the pipe contains a fluid at a pressure of 8 N/mm^2. Also sketch the radial pressure and hoop stress distribution across the section. **12M**

*** END ***