Q.P. Code: 16CE111 **R16**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations February-2022

STRENGTH OF MATERIALS-II

(Civil Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1 A rectangular block of material is subjected to a tensile stress of110 N/mm2 on one plane and a tensile stress of 47 N/mm2 on the plane at right angles to the former. Each of the above stresses is accompanied by a shear stress of 63 N/mm2 and that associated with the former tensile stress tends to rotate the block anticlockwise. **12M**

Find:

i) The direction and magnitude of each of the principal stress and

ii) Magnitude of the greatest shear stress.

OR

2 **a** Explain maximum shear stress theory. **6M**

b Explain maximum shear strain energy theory. **6M**

UNIT-II

3 A cylindrical thin drum 80 cm in diameter and 3 m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of 2.5 N/mm2, determine (i) change in diameter (ii) change in length and (iii) change in volume. Take E= 2x 10^5 N/mm2 Poisson's ratio 0.25. **12M**

OR

4 Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of 8 N/mm2. Also sketch the radial pressure and hoop stress distribution across the section. **12M**

UNIT-III

5 A line of thrust, in a compression testing specimen 15 mm diameter, is parallel to the axis of the specimen but is displaced from it. Calculate the distance of the line of thrust from the axis when the maximum stress is 20 %greater than the mean stress on a normal section. **12M**

OR

6 A closely coiled helical spring of 100 mm mean diameter is made of 10 mm diameter and has 20 turns. The spring carries an axial load of 200 N. Determine the shearing stress, take value of the modulus of rigidity =8.4*10^4 N/mm^2. Determine the deflection when carrying this load. Also calculate the stiffness of the spring and frequency of free vibrations for a mass hanging from it. **12M**

UNIT-IV

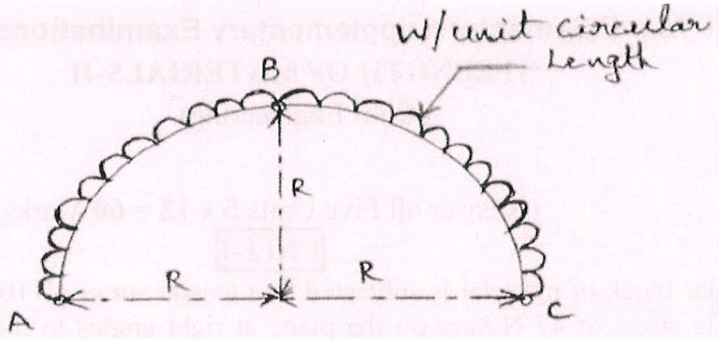
7 Design a hollow circular mild steel column, 6 m long, one end fixed and another end is hinged, to carry an axial load of 500 kN. Take the factor of safety as 3. The internal diameter is 0.65 times of the external diameter. The Rankine's constants are 320 MPa and 1/7500. **12M**

OR

8 An I section has an overall depth of 400 mm, width of flanges are 150 mm, thickness of web and flanges are 30 mm. It is used as a beam with simply supported ends and it deflects by 10 mm when subjected to a load of 40 kN/m length. Find the safe load if this I-section is used as a column with both ends hinged. Use Euler's formula. Assume a factor of safety 1.75 and take E = 2 × 105 N/mm^2. **12M**

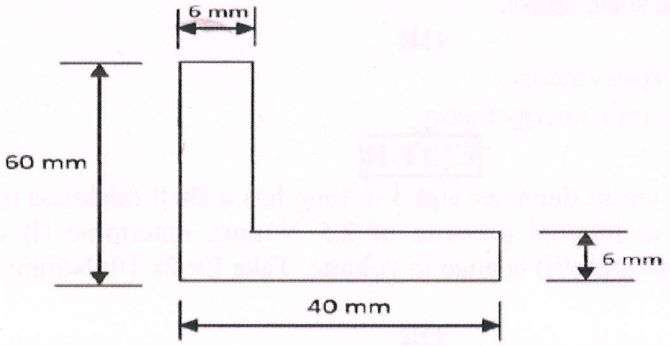
UNIT-V

9 A curved beam as shown in figure below is semicircular in plan and supported on three equally spaced supports. The beam carries a uniformly distributed load per unit of the circular length. Analyze the beam and sketch the bending moment and twisting moment diagrams. **12M**



OR

10 Determine the principal moment of inertia for unequal angle section 60 × 40 × 6 mm shown in figure below. **12M**



*** END ***