**Q.P. Code: 16CE104** **R16**

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

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**

(AUTONOMOUS)

**B.Tech II Year I Semester Supplementary Examinations November 2020**

**STRENGTH OF MATERIALS**

**(ME & AGE)**

Time: 3 hours Max. Marks: 60

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

**UNIT-I**

**1** A steel rod of 3 cm diameter and 5 m long is connected to two grips and the rod is maintained at temperature of 95oC. Determine the stress and pull exerted when the temperature falls to 30oC, if (i) The ends do not yield, and (ii) The ends yield by 0.12 cm. 10M Take E=2x105 N/mm2 and α=12x10-6/oc **12M**

**OR**

**2** Derive the relation between the three elastic constants E, C and K. **12M**

**UNIT-II**

**3** Simply supported beam of length 6 m carries a uniformly increasing load of 600 N/m at one end to 1500 N/m run at the other end. Draw SFD and BMD for the beam. And also calculate the position and magnitude of maximum bending moment. **12M**

**OR**

**4** Draw the shear force and bending moment diagram for a simply supported beam AB of span 9 meters carrying a uniformly distributed load of 18 KN per meter for a distance of 4 meters from the left support A. **12M**

**UNIT-III**

**5** Derive the bending equation stating the assumptions made. Draw the strain variation, stress variation across the cross – section of the beam. **12M**

**OR**

**6** A beam is simply supported and carries a uniformly distributed load of 40KN/m run over the whole span. The section of the beam is rectangular having depth as 500mm. If the maximum stress in the material of the beam is 120 N/mm2 and moment of inertia of the section is 7 x 108mm4, find the span of the beam. **12M**

**UNIT-IV**

**7** A cantilever of length 4 m carries a uniformly distributed load 3 KN/m over a length of 1.5 m from the free end and a point load of 2 KN at the free end. Find the slope and deflection at the free end if E = 2.1 x 105 N/mm2 and I = 6.667 x 107 mm4. **12M**

**OR**

**8** A hollow shaft is 1 m long and has external diameter 50 mm. It has 20 mm internal diameter for a part of length and 30 mm for the rest of the length. If the maximum shear stress in it is not exceed 80 N/mm2, determine the maximum power transmitted by it at a speed of 300 r.p.m. If the twists produced in the two portions of the shafts are equal. Find the lengths of the two portions. **12M**

**UNIT-V**

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

**OR**

**10** 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 $N/mm^2$. Also sketch the radial pressure and hoop stress distribution across the section. **12M**

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