Code No: R1621013 **R16** SET - 1

II B. Tech I Semester Supplementary Examinations, May - 2019
STRENGTH OF MATERIALS - I
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

~~~~~~

PART –A

1. a) Define strain energy. (2M)
   b) Draw the B.M.D of a cantilever beam of L, subjected to a couple M at the free end. (2M)
   c) Write section modulus for circular section (2M)
   d) Write the shear stress equation and explain the terms. (3M)
   e) State the moment area theorems. (2M)
   f) Deduce the circumferential stress equation for a thin cylindrical shell subjected to an internal pressure of intensity 'p' with a thickness't' and diameter 'd'. (3M)

PART –B

2. A copper bar 30 mm diameter is completely enclosed in a steel tube, 30 mm internal diameter and 50 mm external diameter. A pin, 10 mm in diameter is fitted transversely to the axis of the bar near each end, to secure the bar to the tube. Calculate the intensity of shear stress induced in the pins when the temperature of the whole is raised by 50^{o} K. Take $E_c = 1x10^5$ N/mm^2; $E_s = 2x10^5$ N/mm^2 and $\alpha_c = 17x10^{-5}$ per ^{o}K ; $\alpha_s = 11x10^{-6}$ per ^{o}K. (14M)

3. a) Deduce the relation between Shear force and bending moment. (4M)
   b) A simply supported beam of span 10 m carries point loads 6 kN each at distance of 3 m and 5 m from left support and also a uniformly distributed load of 2 kN/m between the two point loads. Draw the S.F and B.M diagrams for the beam. (10M)

4. a) Derive the bending equation from fundamentals M/I= f/y = E/R (8M)
   b) A beam is simply supported and carries a uniformly distributed load of 40 kN/m for the whole span. The section of the beam is rectangular having depth as 500 mm. If the maximum stress in the material of the beam is 120 N/mm^2 and moment of inertia of the section is $7x10^8$ mm^4, find the span of the beam. (6M)

5. a) Find the ratio of maximum shear stress to average shear stress in case of a rectangular section of size bxd. (4M)
   b) The cross section of joist is a tee section 150 mm x 100 mm x 13 mm with 150 mm side horizontal. Find the maximum intensity of shear stress and sketch the distribution of stressacross the section, if it has to resist a shear force of 45 (10M)

||''|'''|''|'|'''||
~~~~~~

6. A Simply supported beam of span 6 m loaded point load of 12 kN at its centre, in addition to the UDL of 6 kN/m for the whole span. Find slopes at the supports and maximum deflection. Use double integration method. (14M)

7. a) Show that the sum of radial and hoop stresses in a thick cylinder is constant. (6M)

   b) Find the thickness of metal necessary for a cylindrical shell of internal diameter 160 mm to withstand an internal pressure of 8.5 N/mm^2. The maximum hoop stress in the section is not to exceed 35 N/mm^2. (10M)

||''|'''|''|'|''''||