II B. Tech I Semester Supplementary Examinations, May - 2018
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**

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PART –A

1. a) Define (i) Poisson's ratio and (ii) Volumetric strain (2M)

b) Find the SF at left support, if a simply supported beam of span 6m is subjected an eccentric point load of 9 kN at distance of 2 m from the left support. (2M)

c) Write the theory of simple bending equation with usual notation. (2M)

d) Write the shear stress equations and explain the terms. (2M)

e) Find the slope for a cantilever beam of span L, loaded with a UDL of w kN/m for the whole span. (3M)

f) Deduce the longitudinal stress for a thin spherical shell subjected to an internal pressure (3M)

PART -B

2. a) Deduce the total extension of a uniformly tapering rod of diameters d and D over a length of L, when the rod is subjected to an axial load P. (4M)

b) A steel rod of 3 cm diameter and 5 m long is connected to two grips and the rod is maintained at a temperature of 95^0 C. Determine the stress and pull, when the temperature falls to 30^oC, if (i) the ends do not yield and (ii) the ends yield by 0.12 cm. $E=2x10^5 N/mm^2$ and $\alpha = 12x10^{-6}/ {}^oC$. (10M)

3. Draw the S.F and B.M diagrams of the beam shown in figure 1.

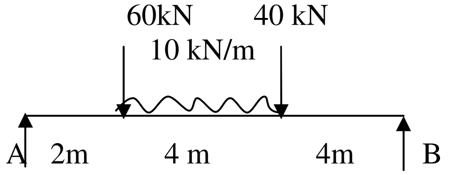

Figure 1

4. a) Write the assumptions made in the theory of simple bending. (4M)

b) A water main 80 cm diameter contains water at a pressure head of 100 m. If the density of water is 9810 N/m^3, find the thickness of the metal required for the water main. Given the permissible stress as 20 N/mm^2. (10M)

5. a) Derive the shear stress formula from fundamentals. (6M)

b) A 120 mm x 50 mm I-Section is subjected to a shearing force of 15kN. Calculate the shear stress at the neutral axis and at the top of the web. Given $I = 220x10^4$ mm^4, Area = $9.4x10^2$ mm^2, web thickness = 3.5 mm and flange thickness = 5.5 mm. (8M)
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6. a) State the moment area theorems. (6M)

   b) A simply supported beam of span L, carrying a point load P at 0.3L from left support. Determine the mid-span displacements and slopes at the supports, using the method of integration. (8M)

7. A compound cylinder is made by shrinking a cylindrical of external diameter 300 mm and internal diameter of 250 mm over an another cylindrical of external diameter 250 mm and internal diameter 200 mm. The radial pressure at the junction after shrinking is 8 N/mm^2. Find the final stresses sent up across the section, when the compound cylinder is subjected an internal fluid pressure of 84.5 N/mm^2. (14M)