PVP 14

Code: CE313

II B.Tech-I Semester–Regular Examinations–December 2015

MECHANICS OF SOLIDS-I
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1 a) Draw Stress-Strain diagram of mild steel and locate the salient features.
b) Write the relation between three elastic modules.
c) Neatly sketch the Fixed, Cantilever and Simply support and continuous supports of a beam subjected to uniform distributed load=w, and mention type of reaction forces acting at supports.
d) What is meant by Point of contra flexure? Explain it's significance.
e) Write Four assumptions made in theory of Pure bending.
f) What is meant by Kernel of a section?
g) Draw shear stress diagram of T-Section and locate salient features.
h) What is Uniaxial and Biaxial bending?
i) Write strain energy formulae for gradually applied and suddenly applied axial loads.
j) Write the basic equation for Torsion.
k) Differentiate the stiffness if two springs of stiffness K1 & K2 are arranged in series and in parallel.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2 a) Derive an expression for volumetric strain of a rectangular block subjected to normal stresses fx,fy, fz applied on all it's three faces. Assume poisson's ratio γ, E elastic modulus? 8 M

b) A steel rod of 20mm diameter and 6m length connected to two grips one at each end at a temperature 120° C. Find the pull exerted, when the temperature falls to 40° C under the following conditions. Assume Young's modulus of steel Es= 2 x 10^5 N/mm^2 and thermal coefficient of steel α_t =1.2 x 10^{-5} per °C 8 M

i) If the ends do not yield ii) If the ends yield by 1.10 mm.

3 a) A simply supported over hang beam of length 6m carries a triangular load, whose intensity varies from 0 kN/m at the left and 60kN/m at the right end. It has one support at 1.50m from left end and another support at right end. Draw Shear force and bending moment diagrams. Show the Maximum Bending moment, Shear force and point of contra flexure. 12 M

b) Draw Shear force and bending moment diagrams of a fixed beam of effective span L subjected to UDL load W. 4 M

4 a) A rolled steel I- section (flange 250x24mm , web 552x12mm) overall depth 600mm carries UDL load 50kN/m on a simply supported clear span of 8m. Calculate the maximum stress produced due to bending. 8 M

b) Derive the bending equation E/R = f/y = M/I with assumptions used. 8 M

5 A steel I section beam 600mm deep and 250mm flange width, 25mm thickness of flange and 15mm thickness of web, subjected to a shear force 500kN. Draw the shear stress diagram of the beam section and locate the salient values for the following conditions.

a) If the beam is in vertical position. 8 M

b) If the beam is in horizontal position 8 M

6 a) A closed helical spring 100mm mean diameter, made with 10mm dia rod with 20 turns. The spring carries axial load 200N. Assume modulus of rigidity of material $G= 8.4x10^4 N/mm^2$.

i) Determine the shear stress. 4 M

ii) Determine the deflection when 200N applied. 4 M

iii) Find the stiffness of spring. 4 M

b) Find the power transmitted by a circular shaft 600mm diameter, rotate at a speed of 180 r.p.m. Assume permissible shear stress $85N/mm^2$. 4 M