PVP 14

Code: CE3T3

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2016

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) Define Shear resistance and Shearing stress.
b) What is Nominal stress and True stress.
c) Define Factor of Safety. What is the Factor of Safety value commonly taken in practice for steel, concrete and timber?
d) Define Shear force and Bending moment.
e) When a beam is said to be a statically determinate beam.
f) Illustrate the assumptions in Simple Theory of Bending.
g) Define core or kernel of the section.
h) Draw the shear stress distribution of rectangular, circular and I sections.
i) What is Resilience?
j) What are the assumptions in torsion equation?
k) What is Wahl's correction factor?

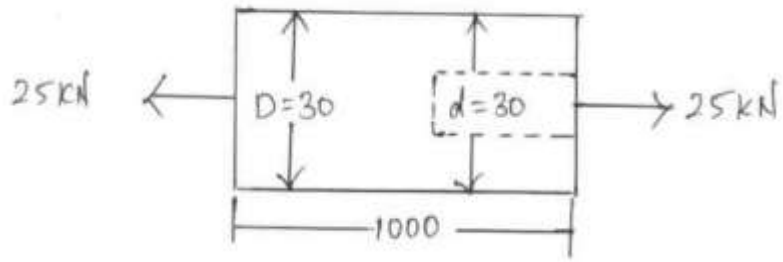
PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

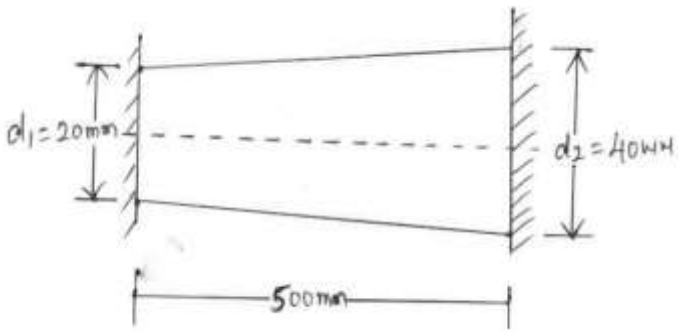
3 x 16 = 48 M

2.

a) A bar of length 1000 mm and diameter 30 mm is centrally bored for 400 mm, the bore diameter being 10 mm as shown below. Under a load of 25 kN, if the extension of the bar is 0.185 mm, what is the modulus of elasticity of the bar? 10 M

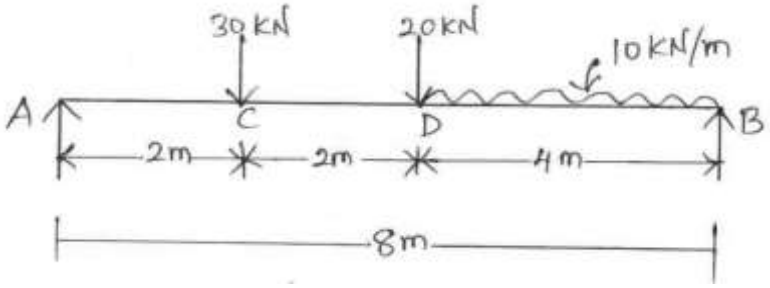


b) The steel bar of uniformly varying diameter shown in the figure is held between two Unyielding supports at room temperature. What is the maximum stress induced in the bar, if temperature rises by 30°C? Take $E_s=2\times10^5 N/mm^2$ and $\alpha_s=12\times10^{-6}/^\circ C$. 6 M

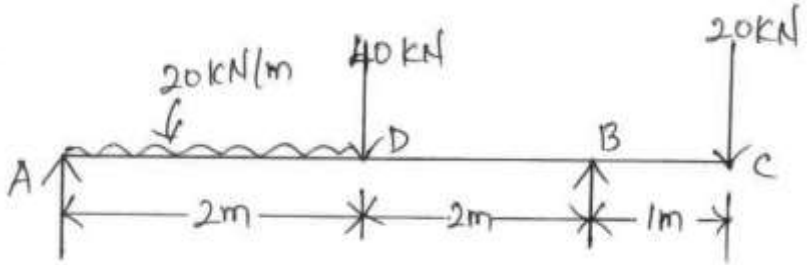


3.

a) Draw the shear force and Bending moment diagram for the simply supported beam given below. 8 M



b) Draw bending moment and shear force diagram for the overhanging beam shown in the figure. Clearly indicate point of contraflexure. 8 M



4.

a) Derive the relationship between moment and Radius of Curvature. 8 M

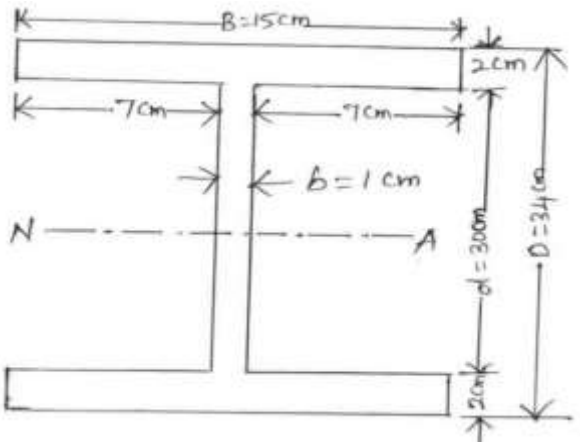
b) A load of 75kN is carried by a column made of cast-iron. The external and internal diameters are 200 mm and 180 mm respectively. If the eccentricity of the load is 35 mm, find:

i) the maximum and minimum stress intensities.

ii) Upto what eccentricity there is no tensile stress in the column? 8 M

5.

a) An I-section with the rectangular ends has the following dimensions: Flanges: 15 cm × 2 cm, Web: 30 cm × 1 cm. Find the maximum shear stress developed in the beam for a shearing force of 10kN. 8 M



b) A uniform metal bar has a cross-sectional area of 7 cm^2 and a length of 1.5 m. With an elastic limit of 160 MN/m^2, what will be its proof resilience? Determine also the maximum value of an applied load which may be suddenly applied without exceeding the elastic limit. Calculate the value of gradually applied load which will produce the same extension as that produced by the suddenly applied load above. Take E=200 $GN/m^{2.}$ 8 M

6.

a) Derive the Torsional equation. 10 M

b) A closely coiled helical spring is to carry a load of 500 N. Its mean coil diameter is to be 10 time that of the wire diameter. Calculate these diameter if the maximum shear stress in the material of the spring is to be 80 MN/m^2 .

6 M