R09

Code No: C0406, C5201, C1502

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I - SEMESTER EXAMINATIONS, APRIL/MAY-2012
ADVANCED MECHANICS OF SOLIDS
(COMMON TO CAD/CAM, DESIGN FOR MANUFACTURING, MACHINE DESIGN)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

\- - -

1. Determine the location of shear centre for the channel section shown in Fig.1

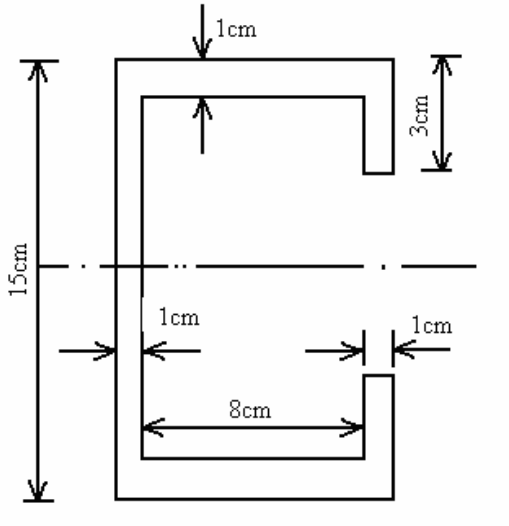

Fig.1

2. For the beam loaded by 30 KN as shown in Fig .2, determine the stress at A and locate the neutral axis.

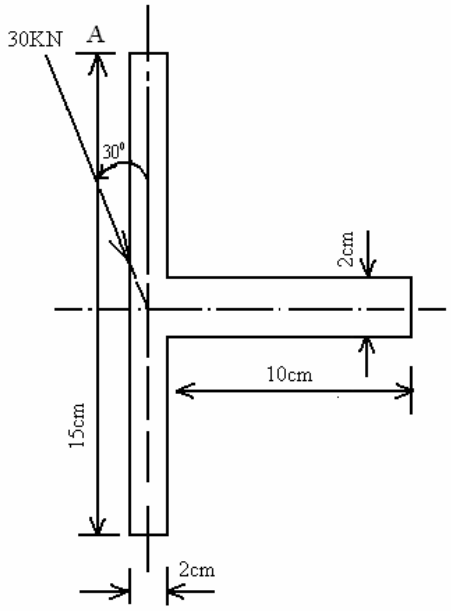

Fig .2

Cont…2

3. A ring made of 20 mm diameter steel bar carries a pull of 12 kN. Calculatethe maximum tensile and compressive stresses in the ring. The mean radius of the ring is 200 mm.

4. A T – section with flange 10cm x 1cm and web 19cm x 0.8cm is subjected to a torque of 200Nm. Find the maximum shear stress and angle of twist per metre length. $G = 82 KN / mm^2$.

5. A thin uniform steel disc of radius 28cm is rotating about its axis at 3200 r. p.m. Draw the radial and circumferential stress distribution diagram along the radius of the disc. What are the maximum and minimum values of circumferential and radial stresses? Weight density, $\rho = 0.078\, N / cm^3$; Poisson's ratio = 0.3; $g=9.81\, m / \sec^2$.

6. A square structural steel trap door (E = 200 GPa, $\upsilon = 0.29$ and $\gamma = 240$ MPa) has a side length of 1.50 m and thickness of 15mm. The plate is simply supported and subjected to a uniform pressure. Determine the yield pressure P_γ and maximum deflection when this pressure is applied.

7. A rail road uses steel rails (E =200GPa) with a depth of 184 mm. The distance from the top of the rail to its centroid is 9.91mm, and the moment of inertia of the rail is $36.9 x 10^6 mm^4$. The rail is supported by ties, ballast and a road bed that together are assumed to act as an elastic foundation with spring constant $K = 14.0 N / mm^2$. Determine the maximum deflection, maximum bending moment and maximum flexural stress in the rail for a single wheel load of 170KN.

8. A feed roll consists of two circular cylindrical steel rollers, each 200 mm in diameter and arranged so that their longitudinal axes are parallel. A cylindrical steel shaft (60mm in diameter) is fed between the rollers in such a manner that its longitudinal axis is perpendicular to that of the rollers. The total load P between the shaft and rollers is 4.5 KN. Determine the values of the maximum principal stress and maximum shear stress in the shaft.

* * * * * *