PVP 14

Code: ME4T1

II B.Tech - II Semester – Regular Examinations – May 2016

MECHANICS OF SOLIDS - II
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

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

11x 2 = 22 M

1. a) Why hollow circular shafts are preferred when compared to solid circular shafts?
   b) What are the assumptions made in Torsion equation.
   c) Define Torsion and write torsional equation.
   d) What do you mean by a fixed beam? What is a continuous beam?
   e) What are the methods for finding out the slope and deflection at a section?
   f) What are the merits and limitations of the theorem of three moments?
   g) What do you mean by statically indeterminate beams? Give examples.
   h) What are the limitations of Euler's formula?
   i) What is meant by crippling or buckling load?
   j) State the assumptions made in Lame's theory.
   k) What are various types of stresses developed in a thin cylindrical vessel subjected to internal pressure ?

PART – B

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

2. a) A solid steel shaft transmits 100 kW at 150 rpm. Determine the suitable diameter of the shaft if the maximum torque transmitted exceeds the mean by 20% in each revolution. The shear stress is not to exceed 60 MPa. Also find the maximum angle of twist in a length of 4 m of the shaft. G = 80 GPa. 8 M

b) Find the maximum shear stress induced in a solid circular shaft of diameter 15 cm when the shaft transmits 150 kW power at 180 r.p.m. 8 M

3. a) A beam of uniform rectangular section 200mm wide and 300mm deep is simply supported at its ends. It carries a uniformly distributed load of 9 kN/m run over the entire span of 5m. If the value of E for the beam material is 1×10^4 N/mm^2, find: 8 M
i) the slope at the supports and ii) maximum deflection.

b) A beam 5m long, simply supported at its ends, carries a point load W at its centre. If the slope at the ends of the beam is not to exceed 1^0, find the deflection at the centre of the beam. 8 M

4. A continuous beam ABCD fixed at A and simply supported at B,C and D covers three spans, AB=1.5L, BC=3 L and CD=L. It carries uniformly distributed loads of 2w, w and 3w per metre run on AB, BC and CD respectively. If the girder is of the same cross-section throughout, find the bending moments at supports B and C and the pressure on each support. Also plot the B.M, and S.F, diagrams. 16 M

5. A 1.5 m long column has a circular cross-section of 5cm diameter. One of the ends of the column is fixed in direction and position and other end is free. Taking factor of safety as 3, calculate the safe load using:

   a) Rankine's formula, take yield stress, σ_c = 560 N/mm^2 and, a =1/1600 for pinned ends.
   b) Euler's formula, Young's modulus for C.I. = 1.2 x 10^5 N/mm^2.

   16 M

6. A thick cylinder of external and internal diameters of 300mm and 180 mm is subjected to an internal pressure of 42 N/mm^2 and external pressure 6 N/mm^2. Determine the stresses in the material. Now if the external pressure is doubled, what internal pressure can be maintained without exceeding the previously determined maximum stress?

   16 M