24476

B. Tech 7th Sem. (ME)
Examination – December, 2014

Strength of Material-II

Paper : ME-401-F

Time : Three Hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. **1** is *compulsory*. Attempt **5** questions in total at least *one* question from each section.

1. (i) Define the Maxwell's theorem.   20

   (ii) Define the thick and thin cylinder.

   (iii) What is the role of spring ? What are various types of spring ?

   (iv) What is the difference between rotating rim and discs ?

SECTION – A

2. Drive the expression for the strain energy stored in a body when load is applied :   20

   (i)   Gradually

   (ii) Suddenly

   (iii) Impact

3. Discuss the various theories of elastic failures with derivations and graphical representations.   20

SECTION – B

4. A steel bar of rectangular section 6 cm × 4 m is arranged as a cantilever projecting horizontally 50 cm beyond the support. The broad face of the bar makes 30° with horizontal. A load of 200 N is hung from the free end. Find out the neutral axis, the horizontal and vertical deflections of free end, maximum tensile stress E = 200 GPa.   20

5. The ends of a thin cylinder 20 cm internal diameter and wall thickness 3 mm are closed by rigid plates and it is then filled with a fluid. When on axial

compressive force of 50 kN is applied to the cylinder, the pressure of the fluid rises by 60 kPa. Find the bulk modulus of fluid. Assume E= 200 GPa. V = 0.3   20

SECTION – C

6. A thick cylinder with internal radius of 8 cm and external radius of 16 cm is subjected to an internal fluid pressure of 80 MPa. Draw the variations of radial and hoop stresses in the cylinder wall. Also find out maximum shear stress in the cylinder wall.   20

7. A Disc with outer radius 15 cm and inner radius 2.5 cm is press fitted on to a shaft of radius 2.5075 cm. Both member are steel with E = 210 GPa, V= 0.29, and with densities 7800 kg/m³. Find out, (a) the stress distribution in the disc at 5000 r.p.m. (b) Speed for which the interference pressure goes to zero.   20

SECTION – D

8. A proving ring is 25.0 mm mean diameter 40 mm wide and 6 mm thick. The maximum stress permitted is 550 MN/m². Find out the Load to cause this stress

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and the Load to give 6 mm deflection along the load line, E = 200 GN/m². 20

9. A leaf spring is to be made of seven steel plates 6.5 cm wide and 6.3 mm thick. Find out the length of the spring so that it may carry a central load of 2.75 kN. The stress being limited to 160 MPa. Also find out the deflection at the centre of the spring. E= 210 GPa. 20