24476

B.Tech. 7th Semester (F) Scheme (ME) Examination,

December-2018

STRENGTH OF MATERIAL-II

Paper-ME-401-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt **five** questions in total, selecting one question from each of the four sections.* ***Question no. 1 is compulsory.***

1. (i) Define modulus of resilience.

(ii) Define strain energy theory.

(iii) Define product of Inertia.

(iv) Define circumferential or hoop stress in case of thin cylinder.

(v) Write Lamne's equation for thick spherical vessel.

(vi) Write down the circumferential stress developed in a thin rotating cylinder.

(vii) What are the different types of leaf spring ?

(viii) Define ellipse of Inertia.

(ix) What do you mean by concentric spring ?

(x) Define volumetric strain in case of thin cylinder. 2×10=20

Section-A

2. Explain the expression for strain energy stored in a body when the load is appplied. 20

   (i) Graduallly applied load

   (ii) Suddenly applied load

   (iii) Load is applied with impact

3. According to the theory of maximum shear stress, determine the diameter of a bolt which is subjected to an axial pull of 9 KN together with a transeverse shear force of 4.5 KN. Elastic limit in tension is 225 N/mm^2, factor of safety = 3 and Poisson's ratio = 0.3. 20

Section-B

4. Explain the following terms in detail : 20

   (a) Shear centre and the flexural axis

   (b) Slope of the natural axis.

5. A boiler is subjected to an internal steam pressure of 2 N/mm^2. The thickness of the boiler plate is 2.6 cm and the permissible tensile stress is 120 N/mm^2. Find out the maximum diameter, when efficiency of longitudinal joint is 90% and that of circumferential joint is 40 %. 20

Section-C

6. Derive the expression for Lamne's equation for thick cylindrical shell. 20

7. A steel disc of uniform thickness and of diameter 90 mm is rotating about its axis at 3000 rpm. Determine the radial and circumferential stresses at the centre and the outer radius. The density of the material is 7800 kg/m^2 and Poisson ratio= 0.3. 20

Section-D

8. Determine :

   (i) Location of neutral axis

   (ii) Maximum and minimum stresses,

   when a curved beam of rectangular cross section of width 20mm and of depth 40 mm is subjected to pure bending of moment +600 N.m. The beam is curved in a plane parallel to depth. Radius of curvature is 50 mm. 20

9. Explain in detail :

   (i) Open coiled helical spring subjected to axial load

   (ii) Leaf springs 20