Roll No. .....

24476

B. Tech 7th Semester (ME) Examination – May, 2018

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 : Attempt *five* questions in total selecting *one* question from each of the four Section. Question No. 1 is *compulsory*.

1. (i) Define proof resilience.

(ii) Define maximum principle stress theory.

(iii) Define shear centre.

(iv) Define longitudinal stress in case of thin cylinder.

(v) Write Lamne's equation for thick cylinderical vassel.

(vi) Define leaf spring.

(vii) Define flexural axis.

(viii) Define efficiency of joint in case of thin cylinder.

(ix) Define circumfrential strain and volumetric strain in case of thin cylinder.

(x) Define shear strain energy theory. 2 × 10 = 20

SECTION – A

2. Explain the following : 20

(i) Castigliano's theorem

(ii) Maxwell's theorem.

3. Explain the graphical representation of different theories of failure in details. 20

SECTION – B

4. Explain the following terms in details : 20

(a) Product of inertia

(b) Ellipse of Inertia

5. A cylinderical vassel whose ends are closed by means of rigid flange plates, is made of steel plate 3 mm thick. The length and the internal diameter of the vassel are 50 cm and 25 cm respectively. Determine the longitudinal and hoop stress in the cylinderical shell due to an internal fluid pressure of 3 N/mm^2. Also calculate the increase in length, diameter and volume of the vassel Take $E = 2 \times 10^5$ N/mm^2 and $\mu = 0.3$. 20

SECTION – C

6. A compound cylinder is made by shrinking a cylinder of external diameter 300 mm and internal diameter 250 mm over another cylinder of external diameter 250 mm and internal diameter 200 mm. The radial pressure at the junction after shrinking is 8 N/mm^2. Find the final stresses setup across the section, when the comnpond cylinder is subjected to an internal fluid pressure 84.5 N/mm^2. 20

7. Find an expression for the circumfrential and radial stresses developed in a rotating solid disc. 20

SECTION – D

8. Determine (i) Position of neutral axis and (ii) Maximum and Minimum stresses when a curved beam of circular section of diameter 100 mm is subjected to pure bending moment of + 11.5 KN-m. The radius of curvature is 100 mm. 20

9. Explain in details : 20

   (i) Open coiled helical spring subjected to axial load and twisting moment.

   (ii) Concentric spring.
