Code: 13A01401 **R13**

B.Tech II Year II Semester (R13) Supplementary Examinations May/June 2017

STRENGTH OF MATERIALS – II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Define the terms principal planes and principal stresses.
(b) What are the various theories of failure?
(c) State the assumptions made in LAME's theory.
(d) Define circumferential and hoop stress.
(e) State the assumptions made in theory of torsion.
(f) Differentiate close and open coiled helical springs.
(g) What is equivalent length of a column?
(h) Define the terms crushing load and buckling load of column.
(i) Write the expression for position of neutral axis in case of curved beams.
(j) Write the expression for the major and minor principal stresses.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Derive an expression for the major and minor principal stresses on an oblique plane, when the body is subjected to direct stresses in two mutually perpendicular directions accompanied by a shear stress.

OR

3 A mild steel shaft 120 mm diameter is subjected to a maximum torque of 20 kN-m and maximum bending moment of 12 kN-m at a particular section. Find the factor of safety according to maximum shear stress theory, if the elastic limit in simple tension is 220 MN/m^2.

UNIT – II

4 A pipe with internal diameter 400 mm is to carry a fluid at a pressure of 10 MPa. If the maximum stress in the material of the pipe is restricted to 150 MPa, calculate the minimum thickness of pipe.

OR

5 A closed cylindrical drum 600 mm in diameter and 2 m long has a shell thickness of 12 mm. if it carries fluid under a pressure of 3 MPa, calculate the longitudinal and hoop stress in the drum wall and also determine the change in diameter, length and volume of drum. Take E = 200 GPa and $\mu = 0.3$.

UNIT – III

6 Compare the torque carrying capacity of equal lengths of hollow and solid shaft for the same maximum shear stress and weight, if the inside diameter is (2/3) of the outside.

OR

7 Derive an expression for the maximum bending stress developed in the leaf spring and also the central deflection of a leaf spring.

UNIT – IV

8 A round steel bar of 16 mm diameter and 2 m length is subjected to a gradually increasing axial compressive load. Determine the buckling load, safe load when FOS = 4 and also the maximum deflection when both the ends are fixed. Take E = 2 x 10^5 MPa.

OR

9 Derive Rankine formula for crippling load.

UNIT – V

10 A beam of rectangular section, 80 mm wide and 120 mm deep is subjected to a bending moment of 20 kN-m. The trace of the plane of loading is inclined at 45° to the YY-axis. Locate the neutral axis of the section and calculate bending stress induced at each corner of beam.

OR

11 Calculate the stresses in curved beams and state the assumptions made in the analysis of curved beams.

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