

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)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Define the terms principal planes and principal stresses.
 - What are the various theories of failure?
 - State the assumptions made in LAME's theory.
 - Define circumferential and hoop stress.
 - State the assumptions made in theory of torsion.
 - Differentiate close and open coiled helical springs.
 - What is equivalent length of a column?
 - Define the terms crushing load and buckling load of column.
 - Write the expression for position of neutral axis in case of curved beams.
 - 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.
- 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/m².

OR

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.
- 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 $E = 200 \text{ GPa}$ 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.
- 7 Derive an expression for the maximum bending stress developed in the leaf spring and also the central deflection of a leaf spring.

OR

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 $E = 2 \times 10^5 \text{ MPa}$.
- 9 Derive Rankine formula for crippling load.

OR

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.