

B.Tech II Year II Semester (R13) Regular & Supplementary Examinations May/June 2016

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)
- State the assumptions made for developing torsion equation.
 - Define the state of plane stress at a point.
 - What is generalized Hook's law?
 - What are the various theories of failure?
 - Define cumulative fatigue damage.
 - Define point of contraflexure.
 - What is strain energy?
 - What is hogging and sagging of beams?
 - State the Castigliano's theorem.
 - What is modulus of resilience?

PART – B

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

UNIT – I

- 2 A compound bar of length 500 mm consists of a strip of aluminum 50 mm wide × 20 mm thick and a strip of steel 50 mm wide × 15 mm thick rigidly joined at ends. If the bar is subjected to a load of 50 kN, find the stresses developed in each material and the extension of the bar. Take elastic modulus of aluminum and steel as 1×10^5 N/mm² and 2×10^5 N/mm² respectively.

OR

- 3 Derive the expression for Maximum Energy Theory.

UNIT – II

- 4 The stress component at a point are given by $\sigma_x = 10$, $\sigma_y = 15$, $\tau_{xy} = 10$, $\tau_{yz} = 20$ MPa. Calculate the strain components. Assume $E = 200$ GPa and $\nu = 0.25$.

OR

- 5 A thick cylinder of external and internal diameter of 300 mm and 180 mm is subjected to an internal pressure of 42 N/mm² and external pressure 6 N/mm². Determine the stresses in the material. Now if the external pressure is doubled, what internal pressure can be maintained without exceeding the previously determined maximum stress?

UNIT – III

- 6 Derive the equation for torsional moment.

OR

- 7 Derive the equation for closed coiled helical springs of radius R subjected to an axial load.

UNIT – IV

- What are the limitations of Euler's theory?
- Derive the Euler's equation for the condition both ends are fixed.

OR

- 9 A built up section has an overall depth of 400 mm, width of flanges 50 mm and web thickness 30 mm. It is used as a beam with simply supported ends and it deflects by 10 mm when subjected to a load of 40 kN/m length. Find the safe load if this I-section is used as a column with both ends hinged. Use Euler's formula. Assume a factor of safety 1.75 and take $E = 2 \times 10^5$.

UNIT – V

- 10 Derive graphical solution for Mohr's stress circle.

OR

- A circular bar 40 mm diameter carries an axial tensile load of 105 kN. What is the value of shear stress on the planes on which the normal stress has a value of 50 MN/m² tensile?
- What are the salient features of
