Total No. of Questions – [03]

Total No. of Printed Pages: [02]

| PRN No. | |
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| Paper Code | U222-264(ESE) |
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# MAY 2022 - ENDSEM EXAM

## S.Y. B. TECH. (MECHANICAL) (SEMESTER - II)

## COURSE NAME: STRENGTH OF MATERIALS

## COURSE CODE: MEUA22204

## (PATTERN 2020)

Time: [1 Hr]

[Max. Marks: 30]

**Instructions to candidates:**

1) **Figures to the right indicate full marks.**
2) **'a' part of every question is compulsory**
3) **Use of scientific calculator is allowed**
4) **Use suitable data whereever required**

Q.1 a) What assumptions do we have to make when discussing theory of pure bending? [4]

b) A 200 mm × 80 mm 'I' section beam is to be used as a simply supported beam of 6.75 m span. The web thickness is 6 mm and the flanges are of 10 mm thickness. Estimate what concentrated load can be carried at a distance of 2.25 m from the one support if the maximum permissible stress is 80 MPa. [6]

**OR**

b) Estimate the maximum shear stress and shear stress at a distance of 30 mm above the neutral axis for a rectangular beam of 100 mm wide and 250 mm deep when subjected to a shear force of 50 kN. [6]

Q2 a) Elaborate the importance of the measurement of beam deflection. [4]

b) Derive the equation for slope and maximum deflection for a simply supported beam of length 'L' carrying a uniformly distributed load 'W' N/m over the entire span. [6]

**OR**

b) A simply supported beam of length 6 m subjected to a point load of 50 kN at a distance of 4 m from left support. Estimate the deflection at the load point. Use the Macaulay method. Take E = 200 GPa, I = $7.33 \times 10^7 mm^4$. [6]

Q.3

a) A steel bar with 38 mm diameter and 450 mm long is subjected to a torque of 1.27 kNm. The angular twist is found as $1.922^0$. Estimate elastic constant. [4]

b) Derive the following expression [6]

$$\frac{T}{J}=\frac{\tau}{r}=\frac{G\theta}{L}$$

**OR**

b) Derive Euler's formula for buckling load for a column with both hinged ends. [6]