Total No. of Questions – [06]

Total No. of Printed Pages:02

G.R. No.	

MARCH 2020 INSEM (T1)

S. Y. B.TECH. (MECHANICAL ENGINEEIRNG) (SEMESTER –IV)

COURSE NAME: STRENGTH OF MATERIALS

COURSE CODE: MEUA22184

(PATTERN 2018)

Time: [1 Hour]

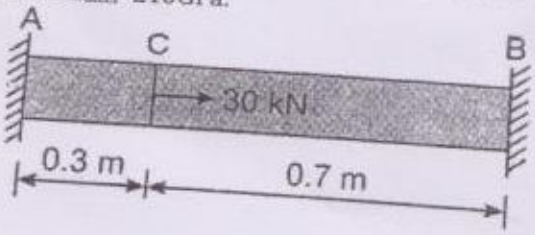
[Max. Marks: 20]

(*) Instructions to candidates:

1. Attempt Q.1 **OR** Q.2, Q.3 **OR** Q.4, Q.5 **OR** Q.6
2. Figures to the right indicate full marks.
3. Use of scientific calculator is allowed.
4. Assume suitable data wherever required.

Q. 1) Draw and explain a typical stress-strain curve for steel material. [4+4]

Find the deformation of portion AC and maximum stress induced in steel bar as shown in following figure of cross sectional area 300mm². Given E_{steel}=210GPa.



OR

Q. 2) Explain the terms: Modulus of elasticity, Bulk modulus, Modulus of rigidity, factor of safety and thermal stresses. [08]

A steel rail is 12 m long. The maximum temperature difference expected is 22°C. Calculate the temperature stresses developed in the rails, if 1.5 mm gap is provided for expansion. Take E = 2×10^5 N/mm² and $\alpha = 12 \times 10^{-6}$/°C.

Q. 3) Why need 'Failure Theories'? Explain maximum shear stress theory. [4+4]

At a point in a crank shaft the stresses on two mutually perpendicular planes are 30 MPa (tensile) and 15 MPa (tensile). The shear stress across these planes is 10 MPa. Using Mohr's circle method, find the normal, and shear stress on a plane making an angle 30^0 with the plane of major stress. Find also magnitude and direction of resultant stress on the plane.

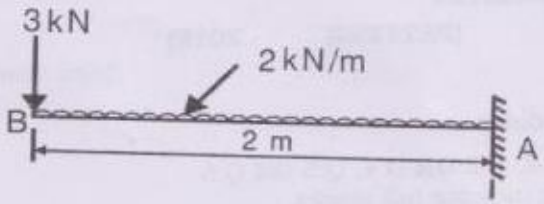
OR

P.T.O.

Q. 4) In the wall of a cylinder the state of stress is given by, σ_x=85MPa (compressive), σ_y=25MPa (tensile) and shear stresses τ_{xy}=60MPa. Calculate the principal stresses using graphical method. [4+4]

List various 'Theories of Failure'. Explain the widely-recommended 'failure theory' for brittle materials.

Q. 5) Draw shear force and bending moment diagram of beam shown in following figure. [4]



OR

Q. 6) Draw shear force and bending moment diagram for simply supported beam of length 9m and carrying a uniformly distributed load of 10kN/m for distance 6m from the left end. Also determine maximum bending moment. [4]

****End****