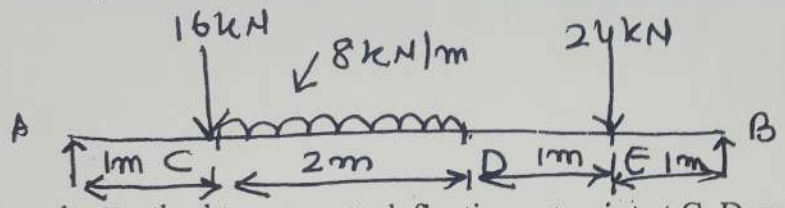
B. Tech 3rd semester (Mechanical Engineering)- Dec 2024

sessional test 2

Strength of materials (PEC-ME-302/21)

Time :90 Minute **MM: 30**

Note: Attempt all questions. Assume suitable data any if missing.

	Statement	Marks	CO
Q 1	A simply supported beam of span 5 m carries two concentrated loads and uniformly distributed load over 2 m portion of span indicated below  Use Macaulay method to compute deflections at point at C, D and E of the beam. For the given beam E = 200 kN/mm^2 and I = 60× 10^6 mm^4.	5	3
Q 2	Two shafts of same material and same length are subjected to same torque. The first shaft is of solid circular section and the second shaft is of hollow circular section with internal diameter 0.6 times the external diameter. Compare the weights of the two shaft if the maximum shear stress developed in each of them is same Or A laminated steel spring is simply supported at the ends and is centrally loaded over a span of 750 mm. the spring is required to carry a proof load of 8250 kN. And its central deflection is not to exceed 60 mm. the ratio of width to thickness of plate is 10 and the plates are available in multiples of 1 mm for the thickness and in multiples of 4 mm for width. If the permissible bending stress is 400 MPa, make calculations for a) Thickness, width and number of plates. b) Radius to which the plates to be formed. The modulus of elasticity for steel is 200 GN/m^2.	5	4
Q 3	A thick hollow cylinder of 150 mm outside radius and 100 mm inside radius is subjected to an external pressure of 30 MN/m^2 and internal pressure of 60 MN/m^2. Calculate the maximum value of shear stress at the inner radius. **Or** A cylindrical pipe made up of cast iron 220 mm outside diameter and 10 mm thick is strengthening by a single layer of 5mm diameter steel wire which is wound under a constant tensile stress of 50 N/mm^2. Determine a) Initial compressive stress in the pipe section. b) Stresses set up in the pipe when water pressurized to 3.6 N/mm^2 is admitted in the pipe. c) Take modulus of elasticity of cat iron and steel is 100 GN/m^2 and 200 GN/m^2 respectively. Take Poisson's ratio =0.28	5	5