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BT-4 / M–14

STRENGTH OF MATERIALS–II

Paper–ME–206 E

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any five questions.*

1. A simply supported beam of 6-m span carries a uniformly distributed load of 10 kN per meter length over the entire span. Determine the deflection of the mid point by strain energy method. E = 200 GPa and I = 80 × 10^6 mm^2 20

2. A shaft of 72 mm diameter supported on bearings 640 mm apart transmits 32 kW of power at 400 rpm. The shaft carries a flywheel weighing 5 kN midway of the shaft. Find the principal stresses and the maximum shear stress induced in the shaft. 20

3. A cantilever consists of 100 mm × 100 mm × 10 mm angle with the top face horizontal. It carries a vertical uniformly distributed load of 2 kN per meter over a span of 2 m. Determine the maximum stress and the position of neutral axis. 20

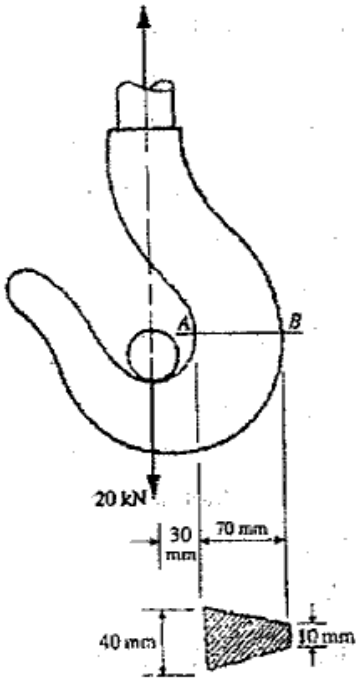
4. A closed end copper tube of 72 mm internal diameter, 800 mm long and 2 mm thick is filled with water under pressure. Find the change in pressure if the additional volume of 4000 mm^3 of water is pumped into the tube. Take E = GPa, K = 2200 MPa and Poisson's ratio = 0.3. 20

5. A compound cylinder is made by shrinking an outer tube on to an inner tube, the final dimensions being; external diameter

300 mm, internal diameter 200 mm and diameter at junction 250 mm. If the common radial pressure between the two tubes due to shrinking be 20 Mpa, show by means of a diagram how radial and hoop stresses vary with the radius. 20

6. A hollow disc of 100 mm external diameter and 50 mm internal diameter having uniform thickness is rotating at 2000 r.p.m. Determine the maximum stresses induced in the disc. Show by means of a diameter how radial and hoop stresses vary with the radius. Derive the formula used. 20

7. Consider a crane hook subject to a vertical load of 20 kN. The contour is trapezoidal and section AB has the dimensions shown in Fig. Determine the tensile stress at point A 20



8. A leaf spring 750 mm long is required to carry a central load of 8 kN. If the central deflection is not to exceed 20 mm and bending stress no greater than 200 MPa, determine thickness width and number of plates. Also compute the radius to which the plates must be curved assume width of plate to be twelve times its thickness. E= 200 GPa. Derive the formulae used. 20