1126

Code : 15CE31T

Register Number

III Semester Diploma Examination, Nov./Dec. 2018

ENGG. MECHANICS & SOM

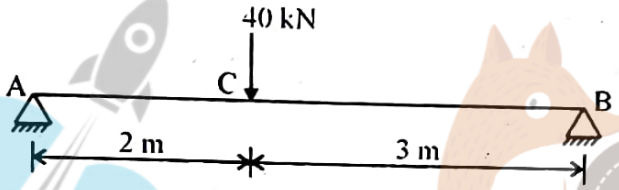
Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **six** questions from PART – A.

(ii) Answer any **seven** questions from PART – B.

PART – A

1. Define the term force and write the characteristics of the load for a beam AB resting on A & B. At point C, a load of 40 kN is acting vertically downward as shown in fig. **5**



2. Define the following : **5**
   (a) Elasticity
   (b) Plasticity
   (c) Ductility
   (d) Stress
   (e) Strain

3. State Hooke's Law. Explain. **5**

4. State parallel axis and perpendicular axis theorem. **5**

5. List the various types of beams. Sketch them. **5**

6. Define : **5**
   (a) Shear force
   (b) Bending moment
   (c) Point of contra-flexure
   (d) Cantilever beam
   (e) Concentrated load

7. Define section modulus. Write the expression for calculating section modulus for 5

   (a) rectangular section

   (b) Circular section

8. Define : 5

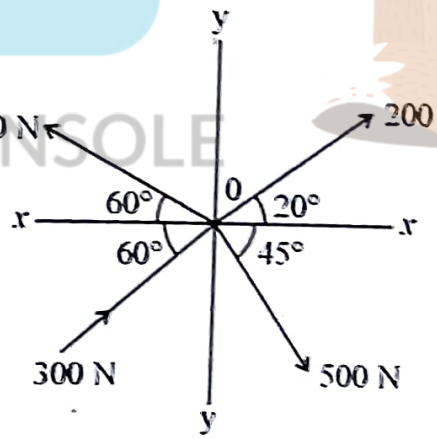
   (a) Slope

   (b) Deflection with a sketch

9. Write any five assumptions made in Euler's column theory. 5

PART – B

10. Find the magnitude and direction of resultant for the system of forces acting at 0 as shown in fig : 10

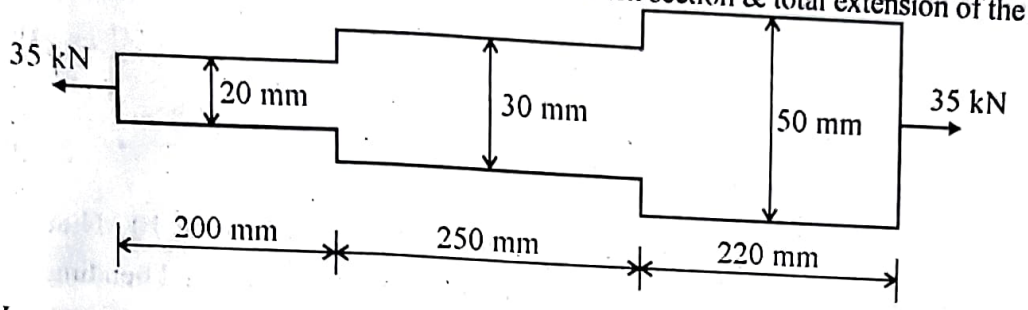


11. (a) A brass rod of 25 mm dia and 2 m long is subjected to an axial load of 40 kN. Find the stress, strain and elongation of the rod, if the modulus of elasticity for brass is 90 kN/m^2. 6

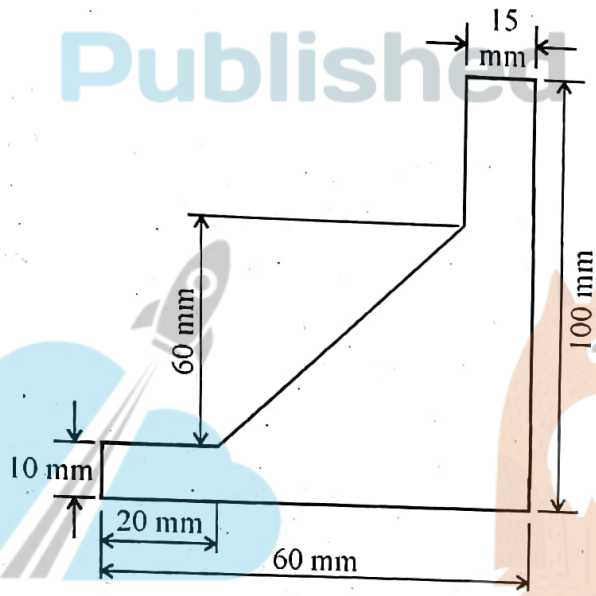
    (b) Determine the bulk modulus of a material whose Young's modulus is 1.2×10^5 N/mm^2 & Poisson's ratio is $\frac{1}{4}$. 4

1126

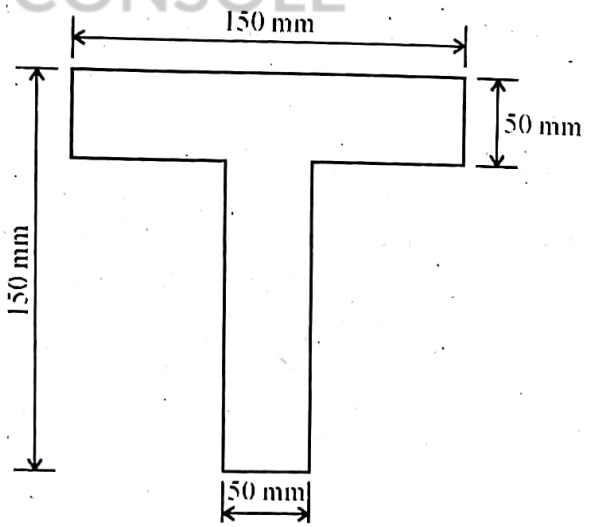
An axial pull of 35 kN is acting on a bar consisting of three lengths as shown in fig. If $E = 2.1 \times 10^5$ N/mm^2, determine the stresses in each section & total extension of the bar. **10**



Locate the centroid of the lamina. **10**



Find the moment of inertia of a T-section shown in fig about the horizontal centroidal axes. **10**



15. A simply supported beam of 8 m span carries point loads of 10 kN & 20 kN at 2 m and 4 m from left support. In addition it also carries a udl of 10 kN/m for 4 m starting from right support. Draw SFD & BMD & mention the salient values. 10

16. (a) List the different types of loads acting on a beam with neat sketch. 4

(b) A cantilever beam 5 m long carries a point load of 30 kN, 20 kN & 10 kN at distances of 1 m, 3 m & 5 m from fixed end. Construct shear force and bending moment diagrams. 6

17. (a) A rectangular beam 300 mm deep is simply supported over a span of 4 m. What udl the beam may carry, if the bending stress is not to exceed 120 MPa. Take $I = 9 \times 10^6$ mm^4.

(b) Draw the shear stress distribution diagram for a rectangular section wher subjected to bending.

18. (a) A timber beam of rectangular section 100 mm × 240 mm is simply supported over a span of 4 m. What UDL should the beam carry to produce a central deflection of 6 mm. Take $E = 0.11 \times 10^5$ N/mm^2. 4

(b) A cantilever beam of 150 mm wide and 200 mm deep projects 1.5 m out of wall & carrying a point load of 50 kN at the free end. Find slope and deflection of cantilever at free end. Take $E = 2.1 \times 10^5$ N/mm^2. 6

19. (a) Differentiate long column and short column.

(b) A strut 2.5 m long is 6 cm in diameter, one end of the strut is fixed while its other end is hinged. Find the compressive load for the member, using Euler's formula allowing a factor of safety of 3.5 and $E = 2.1 \times 10^5$ N/mm^2.