

## MECHANICAL TECHNOLOGY-MODULE 2 (MARCH/APRIL 2016)

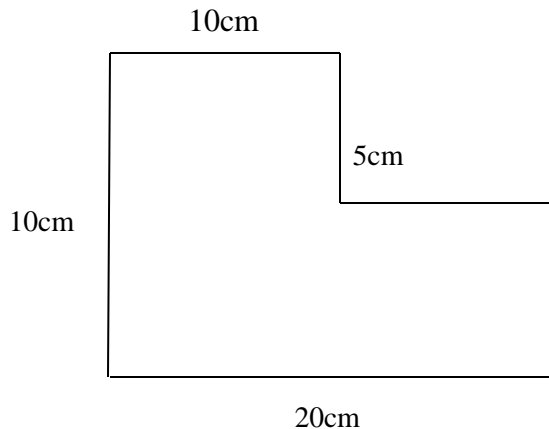
Answer ALL Questions

### SECTION A- STRENGTH OF MATERIALS

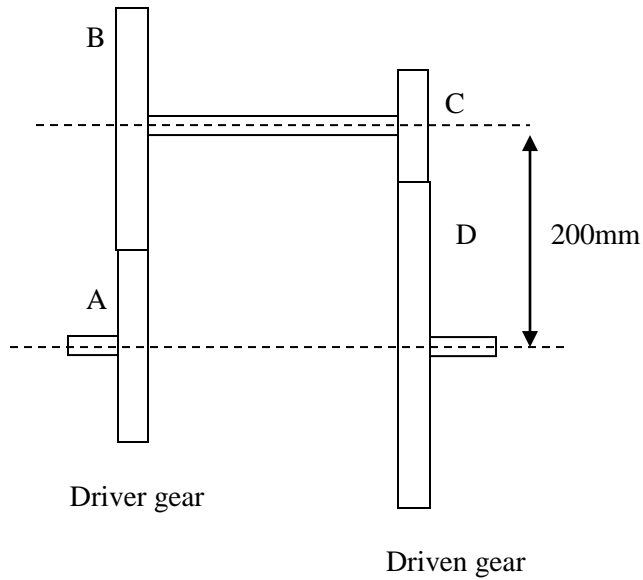
1. A hollow circular shaft 22mm thick transmits 380 kW power at 200 rpm. Determine the external diameter of the shaft if the shear strain due to torsion is not to exceed 0.00068. Take Modulus of rigidity to be  $8 \times 10^4 \text{ N/mm}^2$ . (10 Marks)
2. A beam of length 6m and of uniform rectangular section is simply supported at its ends. It carries a uniformly distributed load of 7 kN/m run over the entire length. Calculate the width and depth of the beam if permissible bending stress is  $7.3 \text{ N/mm}^2$  and central deflection is not to exceed 1.2 cm. (10 Marks)
3. A square beam  $25\text{mm} \times 25\text{mm}$  in section and 2m long is supported at the ends. The beam fails when a point load of 650 N is applied at the centre of the beam. What uniformly distributed load will break a cantilever of the same material 48 mm wide and 60mm deep and 4m long. (10 Marks)
4. A timber beam of rectangular section of length 9m is simply supported. The beam carries a uniformly distributed load of 10 kN/m run over the entire length and a point load of 10 kN at 4m from the left support. If the depth is two times the width and the stress in the timber is not to exceed  $8 \text{ N/mm}^2$ , find the suitable dimensions of the section. (10 Marks)

### SECTION B-MECHANICS OF MACHINES

5. Find the moment of inertia about the centroidal X-X axis for the figure shown below. (10 Marks)



6. The speed ratio of the reverted gear train shown below is 12. The module pitch of the gears A and B is 3.125mm and of gears C and D is 2.5mm. Calculate the suitable numbers of teeth for the gears if no gear is to have less than 24 teeth. (10 Marks)



7. In an epicyclic gear train an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed makes 300 rpm in the clockwise direction, what will be the speed of gear B. (10 Marks)

