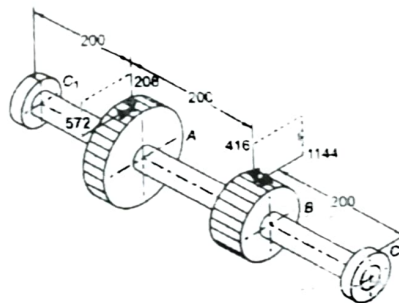


Minor-2(Dec-2022) Design of Machine Elements-

1. Figure 1 shows the shaft of a gearbox, supporting two spur gears A and B. The PCD of gear A and B as 500mm and 250mm respectively.

(i) Design the shaft on the basis of strength if the allowable shear stress for the shaft material is 100MPa. The combined shock and fatigue factors for bending and torsion may be taken as 2 and 1.5 respectively. 302

(ii) Also design the shaft on the basis of rigidity if the allowable twist for the shaft is 0.25° per metre length and the modulus of rigidity is 79300 N/mm^2 . (10) 706



2. Discuss about the stresses induced in a fulcrum pin. (5)

3. Lever arms are usually tapered. Why. (3)

4. Discuss the difference in the bolt design of a flange coupling to the design of pin in a pin type flexible coupling. (4)

5. A machine vice, as shown in following figure, has single-start, square threads with 22 mm nominal diameter and 5 mm pitch. The outer and inner diameters of the friction collar are 55 and 45 mm respectively. The coefficients of friction for thread and collar are 0.15 and 0.17 respectively. The machinist can comfortably exert a force of 125 N on the handle at a mean radius of 150 mm. Assuming uniform wear for the collar calculate (i) the clamping force developed between the jaws and (ii) the overall efficiency of the clamp. (9)

