

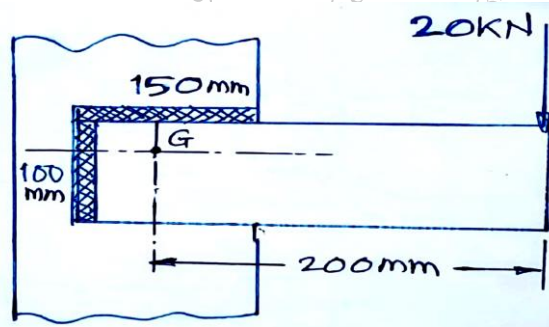
Time:03 Hours

Total marks – 80

- N.B.**
1. Question No 1 is **compulsory**
 2. Solve **Any Three** questions from the remaining **Five** questions.
 3. Assume any **suitable data** if necessary with justification.
 4. Use of **Design Data Book** is permitted.
 5. Figures to the right indicate maximum marks.

- | Q1. | Attempt any Four of the following. | Marks |
|------------|--|--------------|
| | (a) With neat sketch explain various types of threads used as power screws? | 05 |
| | (b) Define stress concentration and with neat sketches show various methods to reduce the effect of stress concentration. | 05 |
| | (c) Write in brief on Aesthetic and Ergonomics considerations in design. | 05 |
| | (d) Explain the nipping of the leaf spring with neat sketch. | 05 |
| | (e) State the characteristics of chain drive and discuss the polygon effect. | 05 |
| Q2. | (a) Selecting suitable material, design a Socket and Spigot Cotter Joint for an axial load of 50 KN. Draw a neat sketch of the joint. | 15 |
| | (b) Explain with neat sketches, various types of cyclic stresses. | 05 |
| Q3. | (a) A radial load on 360° hydro dynamically lubricated self-contained bearing supports 10kN. The journal rotates at 1450 rpm. Assuming journal length to its diameter as 1 with the bearing length as 50 mm. Take radial clearance as 20 microns, eccentricity as 20 microns, specific gravity of lubricants as 0.86, specific heat of lubricants 2.09 kJ/kg °C.
Find, i. Oil film thickness.
ii. Coefficient of friction.
iii. Viscosity | 10 |
| | (b) A DGBB is subjected to a radial load of 4.5 KN and axial load of 2.5 KN when operating on 600 rpm. Consider the expected life of 18000 hours with survival probability of 93%.
Select suitable standard bearing. | 10 |
| Q4. | (a) Design an unprotected type flange coupling to connect the output shaft of an electrical motor to the shaft of centrifugal pump. The motor delivers a power of 20 KW at 900 rpm. Select suitable material for various parts. | 10 |

- (b) Fig. No.1 shows a welded joint subjected to an eccentric load of 20KN. Determine the uniform size of weld on entire length of two legs. Take permissible shear stress as 100 MPa.



(Fig. No.1)

- Q5.** (a) A spur gear of 250 mm PCD is mounted at 300 mm to the right of left hand bearing and a 450 mm diameter pulley is mounted at 200 mm to the left of right hand bearing. The shaft is supported in bearing 900mm apart and transmits 20 KW at 400 r.p.m. A gear is driven by a pinion located vertically above and the pulley transmits power through belt to another pulley located vertically below it. The belt tension ratio at pulley is 2. The pulley weighs 500 N. Select suitable material and design shaft. 10
- (b) A multi-plate clutch transmits a power of 75 kW at 3000 rpm. The plates run in oil and coefficient of friction is 0.07. Axial intensity of pressure is not to exceed 0.15 N/mm². Due to space limitation external radius is restricted to 125 mm. Assuming number of springs as 6, design a) Input and Output Shaft b) Friction and pressure plates. 10
- Q6.** (a) A flat belt drive is used to transmit 6 kW power from an electric motor rotating at 1440 rpm to the blower operating at 400 rpm for 10 hours/ day and the expected life of belt is two and half years approximately. Centre to centre distance is 950 mm. Find
 a. Driving and Driven pulley diameter. 10
 b. Considering Rubber Canvas Material for the belt, determine the thickness and width of the belt.
- (b) A single cylinder four stroke cycle internal combustion engine produces 15 KW power at 700 rpm. Design a suitable flywheel, assuming coefficient of fluctuation of speed as 0.04. The torque developed during the power stroke may be considered as sine curve and work done during the power stroke is 30% more than the work done per cycle. 10
