May 2025
B.Tech. (MECH) (Sixth Semester)
Design of Machine Elements - II
(PCC-ME-603/21)

Time : 3 Hours]　　　　　　　　　[*Maximum Marks : 75*

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other. Use of Design Data Book is allowed.

Part A

1. (a) Define Factor of Safety.　　　　　　1.5

   (b) Name the different types of threads used in industry.　　　　　　1.5

   (c) Differentiate between rolling contact and sliding contact bearings.　　　　　1.5

   (d) What is the Lewis' Form Factor ?　　1.5

   (e) Define Coefficient of Fluctuation of Energy.
   　　　　　　　　　　　　　　　　　1.5

   (f) What is Fatigue Failure ?　　　　　1.5

(g) Name the different types of threaded fasteners. **1.5**

(h) Which has gear the highest efficiency ? **1.5**

(i) Which bearing is preferred for noise-free operations ? **1.5**

(j) Name the factors used in the approximate estimation of endurance limit. **1.5**

Part B

2. (a) Explain the use of Goodman and Soderberg Diagrams with a neat sketch. **10**

(b) Differentiate between Hydrostatic and Hydrodynamic bearings. **5**

3. The torque developed by an engine is given by the following equation: **15**

$$T = 15.25 + 2100 \sin 2\theta - 1300 \cos 2\theta$$

Where T is the torque in N-m and θ is the crank angle from the inner dead centre position. The resisting torque of the machine is constant throughout the work cycle. The coefficient of speed fluctuations is 0.01 and the engine speed is 200 rpm. A solid circular disk 70 mm thick is used as a flywheel. The mass density of steel is 7800 kg/m³. Calculate the radius of the flywheel disk.

4. Derive the Lewis and Buckingham equation. **15**

5. Explain the process of Lubrication and different modes of lubrication. **15**

6. A cantilever beam made of cold drawn steel 40C8 (Sut = 600 N/mm² and Syt = 380N/mm²) is shown in Fig. The force P acting at the free end varies from -50 N to +150 N. The expected reliability is 90% and the factor of safety is 2. The notch sensitivity factor at the fillet is 0.9. Determine the diameter 'd' of the beam at the fillet cross-section. **15**
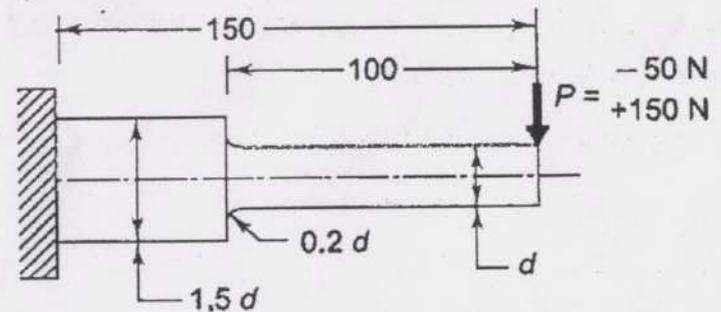
7. (a) Derive the Miner's Equation. **5**

(b) Explain the process of Bearing Selection from Manufacturer's Catalogue. **10**

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