

August/September 2022

B.Tech(ME) VI SEMESTER

## DESIGN OF MACHINE ELEMENTS- II (PCC-ME-306)

Time: 3 Hours

Max. Marks:75

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

**PART -A**

- Q1 (a) Define Endurance Limit. (1.5)
- (b) Differentiate between thick and thin film lubrication. (1.5)
- (c) Define Notch Sensitivity. (1.5)
- (d) Explain Stress Concentration. (1.5)
- (e) Name five different types of gears. (1.5)
- (f) Define Lewis' Form Factor. (1.5)
- (g) Explain Coefficient of Fluctuation of Speed for a Flywheel. (1.5)
- (h) Differentiate between Acme and Buttress Threads. (1.5)
- (i) Which gear has the maximum efficiency among all the types? (1.5)
- (j) In completely reversed loading, the mean stress is equal to \_\_\_\_\_. (1.5)

**PART -B**

- Q2 (a) Explain the S-N Curve in detail (10)
- (b) Differentiate between Solid Disk and Rimmed Flywheels. (5)
- Q3 (a) The torque developed by an engine is given by the following equation: (10)
- $$T = 15.25 + 2100 \sin\theta - 1300 \cos\theta$$
- Where T is the torque in N-m and  $\theta$  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 & the engine speed is 200 rpm. A solid circular disk 70 mm thick is used as a flywheel. The mass density of steel is  $7800 \text{ kg/m}^3$ . Calculate the radius of the flywheel disk.
- (b) Explain the design considerations for castings and forgings. (5)
- Q4 Derive the Lewis and Buckingham equation (15)
- Q5 (a) Explain the procedure for designing of a crank pin used in a crank shaft. (10)
- (b) Explain the phenomenon of Pitting in gears. (5)
- Q6 (a) Explain the phenomenon of Buckling in a Connecting Rod. (10)
- (b) Explain the reasons for presence of dynamic load in a gear system. (5)
- Q7 A single-row deep groove ball bearing No. 6002 is subjected to an axial thrust of 1000 N and a radial load of 2200 N. Find the expected life that 50% of the bearings will complete under this condition. (15)

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