

Roll No.

Total Pages : 3

013603

May- 2023

**B.Tech. (ME) Vth SEMESTER
DESIGN OF MACHINE ELEMENTS-II
(PCC-ME-603-21)**

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

1. (a) Define Stress Concentration. (1.5)
(b) Differentiate between thick and thin film lubrication. (1.5)
(c) Define Endurance Limit. (1.5)
(d) Explain Stress Notch Sensitivity. (1.5)
(e) Name five different types of gears. (1.5)

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- (f) Define Lewis' Form Factor. (1.5)
- (g) Differentiate between a Solid and Rimmed Flywheel. (1.5)
- (h) Name the different types of threaded fasteners. (1.5)
- (i) Which gear has the maximum efficiency among all the types? (1.5)
- (j) In case of completely reversed loading, the mean stress is equal to (1.5)

PART-B

- 2. (a) Explain the Goodman and Soderberg Diagram in detail. (10)
- (b) Define the Coefficient of fluctuation of Speed for a flywheel. (5)
- 3. (a) A rod of a linkage mechanism made of steel 40C8 ($S_{ut} = 550 \text{ N/mm}^2$) is subjected to a completely reversed axial load of 100 kN. The rod is machined on a lathe and the expected reliability is 95%. There is no stress concentration. Determine the diameter of the rod using a factor of safety of 2 for infinite life. (10)
- (b) Explain the design considerations for castings and forgings. (5)

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- 4. Derive the Reynold's Equation for hydrodynamic lubrication stating all the assumptions. (15)
- 5. (a) Explain the procedure for designing of a connecting rod. (10)
- (b) Explain the phenomenon of Wear in gears. (5)
- 6. (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)
- 7. It is required to design a pair of spur gears with 20° full depth involute teeth based on Lewis' Equation. The pinion shaft is connected to a 10 kW, 1440 rpm motor. The starting torque of the motor is 150% of the rated torque. The speed reduction is 4 : 1 and both the gears are made of steel 40C8 ($S_{ut} = 660 \text{ N/mm}^2$). The factor of safety 1.5. Design the gears, specify the dimensions. (15)

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