



## End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: B Tech. V<sup>th</sup> Semester (ME)

Name of the Paper: Design of Machine Elements- I

Paper Code: TME-502

Time: 3 hour

Maximum Marks: 100

### Note:

- All the questions are compulsory.
- Answer any two sub questions from a, b and c in each main question.
- Total marks for each question is 20 (twenty).
- Each sub-question carries 10 marks.

Q1.

(2X10=20 Marks) Co1

- Explain the various phases of mechanical design and their importance in product development. (CO1)
- Discuss the different factors influencing the design of machine elements with suitable examples. (CO1)
- Explain the procedure for selecting engineering materials for a machine component. What are the key considerations? (CO1)

Q2.

(2X10=20 Marks) Co2

- Derive the relationship between axial stress, bending stress, and torsional stress for a machine component. (CO2)
- Explain the concept of Principal Stresses and determine them for a two-dimensional stress system. (CO2)
- What is a Factor of Safety? Discuss how it is chosen for different materials and loading conditions. (CO2)

Q3.

(2X10=20 Marks) Co3

- Explain the difference between Low Cycle and High Cycle Fatigue with suitable examples. (CO3)
- Draw and explain the S-N Curve and its significance in fatigue design. (CO3)
- Define Endurance Limit and explain how it is affected by size, surface finish, and stress concentration. (CO3)

Q4.

(2X10=20 Marks) Co4

- Derive the equation for the torsional strength of a solid circular shaft. (CO4)
- Design a transmission shaft to transmit a given power at a specific speed using ASME/BIS code recommendations. (CO4)
- Explain the design procedure for a shaft subjected to fluctuating bending and torsional loads. (CO4)

Q5.

(2X10=20 Marks) Co5

- Design a riveted joint for a boiler shell with given internal pressure and dimensions. (CO5)
- Explain the design procedure for an eccentrically loaded welded joint subjected to bending and torsion. (CO5)
- Compare the strength of Butt, Fillet, and Parallel welded joints. (CO5)