

**THE KAVERY ENGINEERING COLLEGE***(An Autonomous Institution)***M.E DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025***First Semester**Product Design and Development***PPDE2401 - Tribology in Design***Regulations - 2024**Duration : 3 Hrs**Maximum : 100 Marks***PART - A (ANSWER ALL QUESTIONS) (Marks 10\*2=20)**

| <i>Q.No</i> | <i>Questions</i>                                                               | <i>BTL</i> | <i>CO</i> | <i>Marks</i> |
|-------------|--------------------------------------------------------------------------------|------------|-----------|--------------|
| 1.          | Write the importance of Tribology in the design of different machine elements. | L2         | 1         | 2            |
| 2.          | Distinguish between sliding and rolling friction.                              | L2         | 1         | 2            |
| 3.          | Define abrasive wear with an example.                                          | L1         | 2         | 2            |
| 4.          | What is meant by laser surface treatment?                                      | L1         | 2         | 2            |
| 5.          | What are the physical properties of lubricants?                                | L1         | 3         | 2            |
| 6.          | Differentiate between hydrodynamic and hydrostatic lubrication.                | L2         | 3         | 2            |
| 7.          | Define Sommerfeld boundary conditions.                                         | L1         | 4         | 2            |
| 8.          | What are the desirable properties of bearing materials?                        | L1         | 4         | 2            |
| 9.          | Differentiate between soft EHL and hard EHL.                                   | L2         | 5         | 2            |
| 10.         | Write the applications of Elasto Hydrodynamic lubrication.                     | L1         | 5         | 2            |

**PART - B (ANSWER ALL QUESTIONS) (Marks 5\*16 = 80)**

| <i>Q.No</i> | <i>Questions</i>                                                                                                  | <i>BLT</i> | <i>CO</i> | <i>Marks</i> |
|-------------|-------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 11.         | a Explain the topographical features of surfaces and methods used to measure surface roughness.                   | L2         | 1         | 16           |
|             | Or                                                                                                                |            |           |              |
|             | b Explain briefly about the mechanisms of static and rolling friction.                                            | L2         | 1         | 16           |
| 12.         | a Explain in detail the different types of wear mechanisms with diagrams.                                         | L2         | 2         | 16           |
|             | Or                                                                                                                |            |           |              |
|             | b With the help of a suitable diagram explain the construction and working of Laser surface modification process. | L2         | 2         | 16           |
| 13.         | a i Derive Petroff's equation to find the frictional torque in a concentric journal bearing.                      | L3         | 3         | 10           |
|             | ii Discuss the selection criteria for lubricants in mechanical systems.                                           | L2         | 3         | 6            |
|             | Or                                                                                                                |            |           |              |
|             | b i Discuss about magneto-hydrodynamic lubrication and its applications.                                          | L3         | 3         | 10           |
|             | ii List out the merits and demerits of magneto-hydrodynamic lubrication.                                          | L2         | 3         | 6            |

|     |   |                                                                                                                  |    |   |    |
|-----|---|------------------------------------------------------------------------------------------------------------------|----|---|----|
| 14. | a | Derive and Explain the Reynolds equation with its limitations.                                                   | L4 | 4 | 16 |
|     |   | Or                                                                                                               |    |   |    |
|     | b | Analyze how different types of flow restrictors influence the performance and stability of hydrostatic bearings. | L4 | 4 | 16 |
| 15. | a | Explain the experimental approach to verify the Hertz contact stress in cylindrical contact.                     | L2 | 5 | 16 |
|     |   | Or                                                                                                               |    |   |    |
|     | b | Explain the concept of elasto hydrodynamic lubrication (EHL) with a neat diagram.                                | L2 | 5 | 16 |