

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree Regular Examination June 2023 (2019 Scheme)

Course Code: MET454**Course Name: INDUSTRIAL TRIBOLOGY****Max. Marks: 100****Duration: 3 Hours****PART A***Answer all questions, each carries 3 marks.*

Marks

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| 1 | Explain the industrial significance of tribology | (3) |
| 2 | Define surface roughness profile and explain any TWO parameters used to define surface roughness | (3) |
| 3 | Explain the Stribeck curve with a neat sketch | (3) |
| 4 | Explain any ONE method to measure film-thickness in lubricated contacts | (3) |
| 5 | List any THREE methods to perform wear debris analysis | (3) |
| 6 | Write the differences between two body abrasion and three-body abrasive wear | (3) |
| 7 | Explain the importance of lubricants in metal working. | (3) |
| 8 | What is the difference between greases and lubricating oils | (3) |
| 9 | Explain the difference between nitriding and carburizing methods | (3) |
| 10 | List THREE coating methods in trobo-components | (3) |

PART B*Answer any one full question from each module, each carries 14 marks.***Module I**

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| 11 | a) Explain the physico-chemical characteristics of surface layers with the aid of a sketch | (7) |
| | b) Explain the following surface roughness characterization methods a) Surface profilometry b) optical microscopy | (7) |

OR

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| 12 | Explain the working of a scanning electron microscope (SEM) with the aid of a sketch and discuss the different modes of operation of SEM | (14) |
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Module II

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| 13 | a) Explain the working of a pin-on-plate arrangement with neat sketch. Discuss the applications | (7) |
| | b) Explain the various lubrication regimes with neat sketch | (7) |

OR

- 14 a) Explain the any TWO theories of friction (7)
b) Explain the concept of plowing and adhesion in boundary lubrication (7)

Module III

- 15 a) Describe the working of four ball tester and give the applications (7)
b) Explain the Archard wear equation with parameters (7)

OR

- 16 Explain a) Abrasive, b) Adhesive wear with their mechanism, how wear is quantified at tribo-contacts? (14)

Module IV

- 17 Write a short notes on the following regarding lubricants (i) Classification based on carbon chains, ii) viscosity index (iii) Additives (iv) Bio-degradability (v) SAE viscosity grades (14)

OR

- 18 a) Explain the methods of disposal and recycling of used lubricating oils. (7)
b) Can vegetable oils be the alternative source of base oils for lubricants? Discuss (7)

Module V

- 19 a) Explain the Physical vapor deposition (PVD) and Chemical vapor deposition (CVD) methods and write the differences between PVD and CVD (7)
b) Explain the electrochemical deposition method and its applications (7)

OR

- 20 a) Why diagnostic method for monitoring bearing health is required? List important methods (7)
b) What are the desirable properties of a) rolling bearing material, b) Hydrodynamic bearing material (7)
