



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

TUTORIAL QUESTION BANK

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| Course Name | : | LUBRICATION ENGINEERING |
| Course Code | : | AME806 |
| Class | : | |
| Branch | : | MECHANICAL ENGINEERING |
| Year | : | 2019-2020 |
| Course Coordinator | : | Mr. A Venu Prasad, Assistant Professor |
| Course Faculty | : | Mr. A Venu Prasad, Assistant Professor |

OBJECTIVES:

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| I | Understand the properties of lubricants for the design and operation of components. |
| II | Understand the genesis of friction and wear |
| III | Learn about the lubrication regimes, hydrodynamic lubrication and hydrostatic lubrication. |
| IV | Understand manufacture of lubricants. |

| S No | QUESTION | Blooms Taxonomy level | Course Learning Outcomes |
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| UNIT – I | | | |
| INTRODUCTION TO AUTOMATION | | | |
| Part - A (Short Answer Questions) | | | |
| 1 | How do you define the lubricant. | Understand | |
| 2 | What is the classification of refrigerants? | Remember | |
| 3 | Define viscosity and viscosity index. | Understand | |
| 4 | What is the pour point of a lubricant? | Remember | |
| 5 | Define fire point and flash point. | Understand | |
| 6 | What do you mean by acid value of lubricant? | Remember | |
| 7 | Define cloud point of a lubricant. | Understand | |
| 8 | Describe kinematic viscosity and give the units. | Remember | |
| 9 | What is absolute viscosity and provide the units. | Understand | |
| 10 | Discuss the relationship between temperature and viscosity. | Remember | |
| 11 | Define Newton's law of viscosity. | Understand | |
| 12 | List thermal properties of a lubricant. | Understand | |
| 13 | Describe the relationship between viscosity and pressure. | Remember | |
| 14 | List the instruments used for measurement of a viscosity. | Understand | |
| 15 | What are the temperature characteristics of a lubricant? | Remember | |
| 16 | Discuss the optical properties of lubricants. | Understand | |
| 17 | List the impurities and contaminants of a lubricant. | Remember | |
| 18 | What do you mean by additive compatibility of a lubricant? | Understand | |

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| 19 | Describe the solubility of a lubricant. | Remember | |
| 20 | Discuss the solubility of gases in oils. | Understand | |
| Part – B (Long Answer Questions) | | | |
| 1 | Explain the mechanism of lubrication. | Remember | |
| 2 | Explain the desirable characteristics of oils. | Understand | |
| 3 | How does the temperature Influences the viscosity, explain with the help of V–T curve. | Remember | |
| 4 | Illustrate the viscosity index with the help of V–T curve. | Understand | |
| 4 | Describe the effect of shear rate on viscosity using pressure viscosity chart. | Remember | |
| 5 | How do you classify the viscosity grades and list out ISO viscosity grades. | Understand | |
| 6 | What is gas solubility? Explain, how gas solubility affect the characteristic of fluid? | Remember | |
| 7 | Classify oil cleanliness and discuss the oil cleanliness grades. | Remember | |
| 8 | What is the function of a filter and list out various types of filters used in lubricants? | Understand | |
| 9 | Describe the working of capillary viscometer with the help of a neat sketch. | Remember | |
| 10 | Describe the working of rotary viscometer with the help of a neat sketch.. | Understand | |
| 11 | Explain the procedure for determination of the flash point. | Remember | |
| 12 | Illustrate the procedure for revealing foaming characteristics of lubricants. | Understand | |
| 13 | What is the purpose of aging test for lubricants and explain anyone method. | Remember | |
| 14 | Discuss the dropping point of lubricants. | Understand | |
| 15 | What is the purpose of an additive and classify the additives. | Remember | |
| 16 | Why the mixing of fluids is required and what is the role of viscosity index in mixing? | Understand | |
| 17 | Discuss the improvement mechanism of mixing fluids. | Remember | |
| 18 | What is detergent and dispersant? Elaborate the functions of detergents and dispersants | Understand | |
| 19 | What is a solid lubricant? Explain the solid lubricating compounds. | Remember | |
| 20 | What do you mean by ‘Environmentally Friendly Lubricants’? list out the objective criteria. | Understand | |
| UNIT-II | | | |
| FLUID FILM LUBRICATION | | | |
| Part – A (Short Answer Questions) | | | |
| 1 | Define Reynolds’s equation. | Understand | AME806 .13 |
| 2 | Explain journal bearings. | Understand | AME806 .14 |
| 3 | Explain thermal effects in bearings. | Understand | AME806 .13 |
| 4 | Explain limits of hydrodynamic lubrications. | Remember | AME806 .14 |
| 5 | Explain hydrodynamic lubrication with non-Newtonian fluids. | Understand | AME806 .13 |
| 6 | Explain Reynolds’s equation for squeeze films. | Understand | AME806 .14 |
| 7 | Explain about porous bearing. | Understand | AME806 .13 |
| 8 | Define hydrostatic lubrication. | Understand | AME806 .14 |
| 9 | Explain aerostatic bearing. | Understand | AME806 .13 |

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| 10 | Define hybrid bearings. | Understand | AME806 .14 |
| 11 | Explain about stability of journal bearing. | Understand | AME806 .13 |
| 12 | Explain briefly about converging- divergent wedges | Remember | AME806 .14 |
| 13 | List out the applications of journal bearings. | Understand | AME806 .13 |
| 14 | Explain the application of aerostatic bearings. | Understand | AME806 .14 |
| 15 | Define Newtonian fluids. | Understand | AME806 .13 |
| 16 | Define non-Newtonian fluids | Understand | AME806 .14 |
| 17 | List out the applications of hydrodynamic lubrication. | Remember | AME806 .13 |
| 18 | Explain about aerostatic bearing. | Understand | AME806 .14 |
| 19 | How stability of journal bearing is performed. | Understand | AME806 .13 |
| 20 | Explain about hydrodynamic lubrication | Understand | AME806 .14 |
| Part – B (Long Answer Questions) | | | |
| 1 | Explain thermal effect in bearing with sketches. | Understand | AME806 .14 |
| 2 | Derive Reynolds's equation for fluid film lubrication. | Remember | AME806 .13 |
| 3 | Differentiate between Newtonian and non-Newtonian fluids | Understand | AME806 .14 |
| 4 | Explain converging and diverging wedges. | Understand | AME806 .13 |
| 5 | Explain about hydrodynamic lubrication in non-Newtonian fluids | Understand | AME806 .14 |
| 6 | List out the limitations for hydrodynamic lubrications. | Understand | AME806 .13 |
| 7 | Derive Reynolds's equation for squeeze films. | Remember | AME806 .14 |
| 8 | Explain regimes of fluid film lubrication. | Understand | AME806 .13 |
| 9 | Derive Reynolds's equation for squeeze films. | Understand | AME806 .14 |
| 10 | Explain about hydrodynamic lubrication, how thermal effect in lubrication effects. | Understand | AME806 .13 |
| 11 | Explain hydrodynamic and boundary lubrication with neat sketches. | Understand | AME806 .14 |
| 12 | Stating the assumptions made in deriving Reynolds, derive the Reynold' s equation in two dimensions. | Understand | AME806 .13 |
| 13 | Derive an expression for oil flow rate in a hydrostatic bearing. | Remember | AME806 .14 |
| 14 | Discuss any six desirable properties of bearing materials. | Understand | AME806 .13 |
| 15 | Explain the properties and applications of commonly used bearing materials. | Understand | AME806 .14 |
| 16 | Discuss role of eccentricity in hydrodynamic lubrication of journal bearing. | Understand | AME806 .13 |
| 17 | Give complete design procedure for oil lubricated journal bearing. What are design considerations of pattern of oil flow grooves with respect to oil. | Remember | AME806 .14 |
| 18 | Explain the working principle of journal bearing. | Understand | AME806 .13 |
| 19 | Derive Reynold's equation for 3-D hydrodynamic lubrication. Also statethe assumptions made in this derivation. | Understand | AME806 .14 |

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| 20 | Explain in brief practical situation where hydrostatic squeeze film lubrication can be observed | Understand | AME806 .13 |
| S No | QUESTION | Blooms Taxonomy level | Course Learning Outcomes |
| UNIT – III | | | |
| THEORY OF LUBRICATION | | | |
| Part - A (Short Answer Questions) | | | |
| 1 | What is the total engine friction? | Understand | |
| 2 | What is grease? | Remember | |
| 3 | Explain the composition? | Understand | |
| 4 | Explain the importance base oils? | Remember | |
| 5 | What is elasto hydrodynamic lubrication? | Understand | |
| 6 | What is Additives in lubrication? | Remember | |
| 7 | What is Lubrication Mechanism of Greases? | Understand | |
| 8 | What is lubricant additives in lubrication? | Remember | |
| 9 | Explain Grease – composition? | Understand | |
| 10 | What is soap and its complexes? | Remember | |
| 11 | What is meant solid lubricants? | Understand | |
| 12 | What is meant by performance enhancing? | Understand | |
| 13 | What is meant by lubricant protective? | Remember | |
| 14 | What is Oil refining? | Understand | |
| 15 | Write a part program hydrodynamic lubrication? | Remember | |
| 16 | What do understand bearing lubrication? | Understand | |
| 17 | What do understand by bearing lubrication? | Remember | |
| 18 | What is meant total engine friction? | Understand | |
| 19 | What is meant by effect of engine variables on friction? | Remember | |
| 20 | What is meant by functions of bearing lubrication? | Understand | |
| Part – B (Long Answer Questions) | | | |
| 1 | Explain the concept of total engine friction in detail? | Remember | |
| 2 | Explain the effect of engine variables on friction? | Understand | |
| 3 | Explain the hydrodynamic lubrication process ? | Remember | |
| 4 | Explain concept of elasto hydrodynamic lubrication? | Understand | |
| 4 | What are the boundary lubrication processes? | Remember | |

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| 5 | Explain the concept of total engine friction in detail? | Understand | |
| 6 | What are the advantages bearing lubrication process? | Remember | |
| 7 | What are the functions of the lubrication system? | Remember | |
| 8 | Discuss about the design of a lubricating system? | Understand | |
| 9 | What is the function Oil refining process in lubrication? | Remember | |
| 10 | What are the different types of oil refining with examples? | Understand | |
| 11 | What are the different categories of grading in lubrication? | Remember | |
| 12 | Explain the Grease – composition process in lubrication? | Understand | |
| 13 | What is a function of lubrication with suitable examples? | Remember | |
| 14 | What are the characteristics of lubrication ? | Understand | |
| 15 | What is the thickeners and additives | Remember | |
| 16 | Explain the soap and its complexes in lubrication? | Understand | |
| 17 | Explain the selection and its practices? | Remember | |
| 18 | What is the solid lubricants process? | Understand | |
| 19 | Explain performance enhancing process with some examples? | Remember | |
| 20 | What is the lubricant protective method explains in detail? | Understand | |

UNIT-IV
MANUFACTURE OF LUBRICANTS
Part – A (Short Answer Questions)

| S No | QUESTION | Blooms Taxonomy level | Course Learning Outcomes |
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| 1 | Define the lubricant. | Understand | AME806 .13 |
| 2 | Define ester oils and give some examples. | Understand | AME806 .14 |
| 3 | Define the single bond in the lubricant. | Understand | AME806 .13 |
| 4 | Define polyglycoles and give some examples. | Remember | AME806 .14 |
| 5 | Define Cyclic hydrocarbons. | Understand | AME806 .13 |
| 6 | Define the double bond in the lubricant. | Understand | AME806 .14 |
| 7 | Define Aromatic hydrocarbons. | Understand | AME806 .13 |
| 8 | Define Synthetic hydrocarbons. | Understand | AME806 .14 |
| 9 | Define the triple bond in the lubricant. | Understand | AME806 .13 |
| 10 | Define Polyisobutenes. | Understand | AME806 .14 |
| 11 | Define Tetra esters. | Understand | AME806 .13 |
| 12 | Define Polyglycoles. | Remember | AME806 .14 |
| 13 | Define Polyethylene Glycols. | Understand | AME806 .13 |
| 14 | List out the usage of Polyethylene Glycols. | Understand | AME806 .14 |
| 15 | Define Polypropylene Glycoles. | Understand | AME806 .13 |
| 16 | List out the usage of Polypropylene Glycoles. | Understand | AME806 .14 |
| 17 | Define Polybutylene Glycoles. | Remember | AME806 .13 |

| 18 | DefineAlcoholEthoxilates. | Understand | AME806 .14 |
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| 19 | DefineSiloxanes. | Understand | AME806 .13 |
| 20 | DefinePolyfluorinated Polyether base oil. | Understand | AME806 .14 |
| Part – B (Long Answer Questions) | | | |
| 1 | Discuss the role of lubricants briefly with examples. | Understand | AME806 .14 |
| 2 | Discuss briefly about Extreme Pressure additive. | Remember | AME806 .13 |
| 3 | Discuss briefly about Anti-Wear (AW) additive. | Understand | AME806 .14 |
| 4 | Explain greases and discuss its importance. | Understand | AME806 .13 |
| 5 | Differentiate between Extreme Pressure additive and Anti-Wear (AW) additive. | Understand | AME806 .14 |
| 6 | ExplainClay greases-structure and its uses. | Understand | AME806 .13 |
| 7 | Briefly explain about Di and Polyurea greases. | Remember | AME806 .14 |
| 8 | Briefly explain restrictions in the use of clay greases. | Understand | AME806 .13 |
| 9 | Explain in detail about Soap based greases. | Understand | AME806 .14 |
| 10 | Discuss in detail about antioxidants and list out its uses. | Understand | AME806 .13 |
| 11 | Explain briefly about Amine phosphate esters. | Understand | AME806 .14 |
| 12 | Explain briefly about Zinc- and Molybdenum dithio phosphates. | Understand | AME806 .13 |
| 13 | Discuss in detail about Sulfur additives and list out its uses. | Remember | AME806 .14 |
| 14 | Explain briefly about Polyfluorinated Polyether (PFPE) base oil. | Understand | AME806 .13 |
| 15 | Explain briefly about AlcoholEthoxilates. | Understand | AME806 .14 |
| 16 | Discuss briefly about PolybutyleneGlycoles (PBG). | Understand | AME806 .13 |
| 17 | Discuss briefly about Polypropylene Glycoles (PPG). | Remember | AME806 .14 |
| 18 | Explain briefly about Polyethylene Glycols (PEG). | Understand | AME806 .13 |
| 19 | Explain briefly about Polyglycoles (PG). | Understand | AME806 .14 |
| 20 | Discuss briefly about Phosphoric acid esters. | Understand | AME806 .13 |
| UNIT-V | | | |
| LUBRICANTS APPLICATIONS | | | |
| Part – A (Short Answer Questions) | | | |
| S No | QUESTION | Blooms Taxonomy level | Course Learning Outcomes |
| 1 | What is the purpose of lubrication? | Understand | AME806 .13 |
| 2 | What are the types of lubricants used? | Understand | AME806 .14 |
| 3 | What are the different types of oils in the lubricants? | Understand | AME806 .13 |
| 4 | What is the mineral oil? | Remember | AME806 .14 |
| 5 | What are the synthetic oils? | Understand | AME806 .13 |
| 6 | What are the vegetable oils? | Understand | AME806 .14 |
| 7 | What are the additives? | Understand | AME806 .13 |
| 8 | What are the anti-friction materials? | Understand | AME806 .14 |
| 9 | What are the lamellar solids? | Understand | AME806 .13 |
| 10 | Distinguish between Erosion-corrosion in lubricants? | Understand | AME806 .14 |
| 11 | What is the erosion? | Understand | AME806 .13 |
| 12 | What is the corrosion? | Remember | AME806 .14 |
| 13 | What is the lubricant storage? | Understand | AME806 .13 |

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| 14 | What is the lubricant handling? | Understand | AME806 .14 |
| 15 | What is the lubricant testing? | Understand | AME806 .13 |
| 16 | Write is the lubrication Safety in? | Understand | AME806 .14 |
| 17 | Write is the lubrication handling? | Remember | AME806 .13 |
| 18 | List the tribological components? | Understand | AME806 .14 |
| 19 | List the lubricants testing types? | Understand | AME806 .13 |
| 20 | List the management of lubrication system? | Understand | AME806 .14 |
| Part – B (Long Answer Questions) | | | |
| 1 | Explain the lubricants and its applications | Understand | AME806 .14 |
| 2 | What are the tribological components? | Remember | AME806 .13 |
| 3 | What are the industrial machinery? | Understand | AME806 .14 |
| 4 | Explain the Lubricants testing in details with example? | Understand | AME806 .13 |
| 5 | Write the purpose of Lubricants test methods? | Understand | AME806 .14 |
| 6 | List out the different Organization and management of lubrication? | Understand | AME806 .13 |
| 7 | Explain about lubricant storage in detail? | Remember | AME806 .14 |
| 8 | List the different types of lubricant storage and handling? | Understand | AME806 .13 |
| 9 | Write the Safety and health hazards in lubrications? | Understand | AME806 .14 |
| 10 | List the lubrication environmental regulations? | Understand | AME806 .13 |
| 11 | Write any three health hazards in the lubrication testing? | Understand | AME806 .14 |
| 12 | Explain the lubricant storage places with suitable examples? | Understand | AME806 .13 |
| 13 | What is the concept of lubrication testing methods? | Remember | AME806 .14 |
| 14 | What are limitations in lubrication testing? | Understand | AME806 .13 |
| 15 | List out the any safety precautions of lubrication. | Understand | AME806 .14 |
| 16 | Explain the concept of Minor Solid Lubricants ? | Understand | AME806 .13 |
| 17 | Explain the deposition methods of solid lubricants? | Remember | AME806 .14 |
| 18 | Explain the concept of modern methods of solid lubricant deposition | Understand | AME806 .13 |
| 19 | What are techniques of producing wear resistant coatings? | Understand | AME806 .14 |
| 20 | Explain the concept of deposition methods of solid lubricants? | Understand | AME806 .13 |