Lesson 1: Principles of Lubrication

**Topics**
- Lubrication; Lubricant Classification; Characteristics of Friction; Why Lubricate Machinery?; Reducing Wear; Dampening Shock; Cooling Action of Lubricants; Corrosion Prevention; Sealing Action of Lubricants; Preventive Maintenance

**Objectives**
- Define lubrication and describe the four forms of lubricants.
- Discuss the characteristics of static, kinetic, fluid, and rolling friction.
- Explain how a lubricant reduces wear and dampens shock.
- Discuss the cooling action of lubricants and explain how they prevent corrosion.
- Explain the importance of a lubricant’s sealing action and explain how it works.

Lesson 2: Lubricant Characteristics

**Topics**
- Types of Lubricants; Sources of Petroleum; Refining Petroleum; Finish Processing of Lubricants; Chemistry of Petroleum; Properties of Lubricating Oils; Viscosity; Viscosity Index; Flash Point and Fire Point; Pour Point; Oxidation Resistance; Emulsification; Greases; Lubricant Selection

**Objectives**
- Describe how lubricating oils are obtained and processed and briefly discuss the chemistry of petroleum.
- Explain how viscosity is rated and measured in lubricating oils.
- Explain how flash point, fire point, pour point, oxidation resistance, and emulsification affect a lubricant.
- Describe the five major properties of greases.
- Name four factors that affect lubricant selection.

Lesson 3: Additives, Lubricating Action, and Bearing Lubrication

**Topics**
- The Nature of Additives; Multipurpose Lubricants; Bearing Lubrication; Problems in Bearing Lubrication

**Objectives**
- Describe the nature and purpose of pour-point depressants, oxidation inhibitors, viscosity-index improvers, and antifoam agents.
- Explain how rust and corrosion inhibitors, extreme-pressure additives, and detergent-dispersants work.
- Discuss the use of emulsifying and demulsifying agents, oiliness and antwearing agents, tackiness agents, and other additives.
- Describe the differences between mixed-film, boundary, and full-film lubrication.
- Discuss elements which determine proper bearing lubricant selection.
- Identify common bearing lubrication problems and ways to avoid them.

Lesson 4: Oils and Their Applications

**Topics**
- General-Purpose and Special-Purpose Oils; Oil Bases; Equipment; Types of Lubricating Oils; Circulating Oils; Gear Oils; Machine Oils; Spindle Oils; Refrigeration Oils; Steam Cylinder Oils; Internal Combustion Engine Oils; Lubricating Wire Ropes

**Objectives**
- Describe the four types of oil bases.
- Name three types of circulating oils and describe their properties.
- Compare the characteristics and uses of gear oils, machine oils, and spindle oils.
- Discuss the special properties of refrigeration oils, steam cylinder oils, and internal combustion engine oils.

Lesson 5: General-Purpose Greases

**Topics**
- Why Grease?; Grease Defined; How Greases Are Made; Characteristics of Greases; Classification of Greases; Calcium-Soap Greases; Sodium-Soap Greases; Barium-Soap Greases; Lithium-Soap Greases; Aluminum-Soap Greases; Other Soap-Based Greases; Nonsoap-Based Greases; Guidelines for Grease Selection; Bearing Relubrication Techniques; General Do’s and Don’ts

**Objectives**
- Define grease and compare the advantages of using greases and using oils.
- Describe methods for making grease and compare the uses and properties of at least five soap-based greases.
- State the advantages and disadvantages of using nonsoap-based greases.
- Discuss grease selection and application for plain and antifriction bearings.

Lesson 6: Special-Purpose Greases and Dry-Film Lubricants

**Topics**
- Multipurpose Greases; Additives; Extreme-Pressure Greases; Water-Repellent Greases; High- and Low-Temperature Greases; Lamellar Greases; Silicone Greases; Dry-Film Lubricants; Dry-Film Lubricant Application

**Objectives**
- List three purposes for grease additives and explain how extreme-pressure greases accomplish their purpose.
- Compare uses and characteristics of water-repellent and high- and low-temperature greases.
- Describe lamellar greases, giving an example, and list some special uses for silicone greases.
- Compare three types of dry-film lubricants and describe how and where to use them.
Lesson 7: Lubrication Systems and Methods

**Topics**
- Selecting a Lubrication System
- Lubricating Methods
- Manual Lubrication
- Gravity Lubrication
- Natural Lubrication
- Pressure Lubrication

**Objectives**
- Name four main considerations for selecting a lubrication system and explain the importance of each.
- Explain how manual and drip lubrication methods work.
- Describe the operating principles of natural and pressure lubrication methods.

Lesson 8: Automatic Lubrication Methods

**Topics**
- Automatic Lubrication
- Oil Lubrication
- Sight-Glass Flow Indicators
- Spray Nozzles and Valves
- Metered Systems
- Header Systems
- Single-Line Metering
- Two-Line Metering
- Progressive Metering

**Objectives**
- Describe a typical positive feed oil lubrication system.
- Compare three types of sight glass flow indicators.
- Describe types and operation of various spray nozzles and valves used in automatic lubrication systems.
- Compare the operation of header and progressive metering systems.

Lesson 9: Lubricant Storage and Handling

**Topics**
- Importance of Proper Storage
- Inside Storage
- Outside Storage
- Drum and Tank Dispensing
- Direct Dispensing
- Inventory and Rotating Stock
- Purification and Reclamation
- Gravity Separation
- Centrifuges
- Strainers
- Absorbent Filters

**Objectives**
- Explain the importance of proper lubricant storage and describe good inside and outside storage practices.
- Describe various methods of dispensing lubricants.
- Discuss proper inventory and stock rotation procedures and define lubricant purification and reclamation.
- Explain how gravity separation, centrifuges, strainers, and filters work.

Lesson 10: Lubrication Management

**Topics**
- Good Lubrication Practices
- Manual Systems of Lubrication Control
- Establishing Oiler Routes
- Color-Coding the Lubrication Points
- Computer-Managed Lubrication Programs
- Installing the System
- Useful Computer Reports
- Expanded Programs
- Making the System Work

**Objectives**
- Explain the importance of good lubrication management practices and describe seven different kinds of information that should be included on an equipment lubrication survey form.
- Explain how to set up an oiler route and how to color-code the lubrication points.
- Discuss the considerations involved in establishing and installing a computerized lubrication program.
- Describe the purposes of several types of basic computer lubrication forms and list advantages of expanded programs.