Syllabus for Pump Operator

Course Name	**Pump Operator**
Sector	Capital Goods
Course Code	CGM/2023/PUOP-RPL/265
Level	RPL LEVEL 3
Occupation	**Pump Operator**
Job Description	The individual will be able to identify, check, repair and operate different pumps and pumping equipment for various process operations.
Course Duration	Total Duration 80 Hrs. (T-25, P-55) RPL
Trainees' Entry Qualification	Grade 8 with more than 5 Year Experience in the relevant Field
Trainers Qualification	B.Voc/Degree in Automobile/ Mechanical Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. OR 03 years Diploma in Automobile/ Mechanical Engineering from AICTE/ recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. OR NTC/NAC passed in the Trade of "Pump Operator cum Mechanic" with three-year post qualification experience in the relevant field.

Structure of Course:

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs)
1.	**Workplace Safety**	Apply safe working practices in the industry	1	1	2
2.	**Basic Engineering Drawing**	Practice & interpret technical drawings	2	6	8
3	**Pump Operator Tools and SOP Production**	Identify and select tools, set up, and produce pump components following SOPs	2	6	8
4	**Integrated Diesel Engine Component Classification and NDT Techniques**	Explain the differences in Diesel Engine components and execute different types of nondestructive tests	6	10	16
5	**Hydraulic & Pneumatic Components Identification in Diesel Engines**	Identify the hydraulic and pneumatic components in Diesel Engine	2	6	8
6	**Diesel Engine Inspection and**	Identify and check functionality of stationary Diesel Engine -	6	10	16

	Performance	components, & engine performance on load and engine speed			
7	**Diagnose and Troubleshoot Diesel Engines for Mechanical & Electrical causes**	Identify diagnose and troubleshoot techniques for mechanical and electrical issues in Diesel engines.	2	6	8
8	**Reciprocating Pump Components and Installation**	Identify and check functionality of major components and assemblies of reciprocating pumps.	2	6	8
9	Employability Skill	As per guided curriculum	2	4	6
		TOTAL:	25	55	80

SYLLABUS:

Module No. 1: Workplace Safety

Outcome: Apply safe working practices in the industry

Theory Content:

1. Awareness of safety norms.
2. Safety-PPE usage and its benefits
3. Fire prevention and personal safety.
4. Ergonomic safety and health principles.
5. Use various PPE while working.
6. Safety during machine / material handling

Practical Content:

1. Accident prevention and safety regulations while material handling, eliminating unsafe conditions, unsafe actions, discovering causes of accidents.
2. Fire prevention and personal safety.
3. Safety during machine handling.
4. Emergencies, rescue and first aid procedures.
5. Familiar with Personal protective Equipment's and clothes Different Type of Safety Sign, First Aid Box, Safety instrument and clothing

Tools & Equipment needed:

Protective clothing (aprons, gloves), eye and hearing protection, respiratory gear, steel-toed boots, hard hats, welding helmets, ventilation systems, first aid kits, PPE, fire safety equipment, and organizational tools like anvil stands.

Module No. 2: Basic Engineering Drawing

Outcome: Practice & interpret technical drawings

Theory Content:

- Introduction of technical drawing and lettering
- Use and care drawing boards and different drawing instruments, Drawing sheets and their sizes.
- Explain Types of Lines: Horizontal, Vertical, Inclined, parallel lines.
- Concept of using Scales in Drawing – Enlarging, Full Size & Reducing Scale.

Practical Content:

Introduction of technical drawing and lettering

- How to begin a drawing – Layout of drawing sheet.
- Drawing of — i) Horizontal lines, ii) Vertical lines, iii) Inclined lines, iv) Parallel lines,
- Single stroke Lettering by conventional method.
- Dimensioning—System of Dimensioning

Geometrical Construction

- Geometrical construction of Polygons (Pentagon, Hexagon & Octagon) by general method.

Orthographic Projection of Line & Lamina

- Projector; Plane of projection – Vertical Plane, Horizontal Plane & Profile Plane. Concept of 1st angle
- Projection; 3rd angle Projection. Reference Line – Symbol of methods of projection. (Demonstration with models).
- Projection of Points, Lines & Lamina (Square, rectangular, triangular, hexagonal, pentagonal and circular) parallel to VP and angle with HP & vice versa.

Freehand Sketch

Introduction – Necessity.

b) Free hand sketches of rolled steel sections – i) T-section, ii) I-section, iii) Angle section, iv) Channel section, v) Circular section, vi) Rectangular Section, vii) Steel flat, viii) Double ended wrench, ix) Screw driver, x) Nail puller

Tools & Equipment needed: Drawing instrument box, Drawing instrument box, Set square celluloid 30°-60°, French-curves (set of 12 celluloid), T-Square or Mini drafter, Drawing board.

Module No. 3: Pump Operator Tools and SOP Production

Outcome:

Identify and select tools, set up, and produce pump components following SOPs

Theory:

- Understand the criteria for selecting the right tools and equipment required for pump operator

operations
- Explain the importance of SOPs and the procedures for setting up and producing components
- Explore safety measures associated with operating tools and equipment

Practical:

- Identifying tools and equipment for pump operator.
- Practice setting up and producing components following SOPs

Tools and equipment:

Wrenches, screwdrivers, pipe wrenches, flow meters, pressure gauges, safety gloves, and SOP manuals for identifying, setting up, and producing pump components

Module No. 4: Integrated Diesel Engine Component Classification and NDT Techniques

Outcome:

Explain the differences in Diesel Engine components and execute different types of nondestructive tests

Theory:

- Understand difference in manufacturing process of diesel engine components.
- Understanding selection of the right tools and equipment for NDT testing
- Plan and organize non-destructive testing (NDT) activities
- Explore different types of NDT tests such as Liquid penetrant test and Magnetic particle test

Practical:

- Differentiating diesel engine components by manufacturing process
- Identifying different tools for different types of NDT tests.
- Hands-on exercises on NDT tests such as Liquid penetrant test and Magnetic particle test using appropriate equipment

Tools and Equipment:

Calipers, micrometers, ultrasonic testing equipment, magnetic particle inspection tools, liquid penetrant testing kits, and NDT testing devices for hands-on exercises in differentiating diesel engine components and conducting nondestructive tests.

Module No. 5: Hydraulic & Pneumatic Components Identification in Diesel Engines
Outcome:

Identify the hydraulic and pneumatic components in Diesel Engine

Theory:

- Understanding the fundamentals of hydraulic and pneumatic systems
- identify key hydraulic and pneumatic components, such as pumps, valves, and actuators, and their functions
- Explain the operational significance of these components

Practical:

- Practical session on identification of hydraulic and pneumatic components in diesel engines

- Hands-on exercises to test the functionality of pumps, valves, and actuators within a diesel engine

Tools & Equipment List:

Wrenches, pressure gauges, flow meters, hydraulic and pneumatic component kits, system diagrams, and diagnostic tools for hands-on identification and testing of fluid power components in diesel engines.

Module No. 6: Diesel Engine Inspection and Performance
Outcome:

Identify and check functionality of stationary Diesel Engine - components, & engine performance on load and engine speed
Theory:

- Introduction to key diesel engine components, such as cylinder block, piston, and fuel system, highlighting their functions.
- Understanding engine performance under load conditions and proper engine speed regulation
- Emphasis on safety protocols during engine inspection

Practical :

- Identifying different components of diesel engine.
- Practical exercises simulating various loads to observe and regulate engine performance under different conditions.

Tools & Equipment:

Flashlights, inspection mirrors, hand tools, compression tester, multimeter, tachometer, oil and fuel filter wrenches, lubrication tools, safety gear, load bank, dynamometer, fire extinguisher, first aid kit, emergency shutdown switches, training engine, PPE, safety signage, simulation software, training manuals, audiovisual equipment, and emergency response props

Module No. 7: Diagnose and Troubleshoot Diesel Engines for Mechanical & Electrical causes

Outcome:

Identify diagnose and troubleshoot techniques for mechanical and electrical issues in Diesel engines.

Theory:

- Explore common mechanical & electrical issues in diesel engines
- Understanding the systematic troubleshooting process to diagnose the arising problems

Practical:

- Identifying common mechanical & electrical problems in diesel engines
- Hands on exercises on diagnose techniques of the arising problems

Tools & Equipment:

Multimeter, Compression Tester, Fuel Pressure Gauge, Engine Analyzer, Diagnostic Software, Inspection Camera, Hand Tools, Simulation Software, Wiring Diagrams, and Engine Cutaway Models.

Module No. 8: Reciprocating Pump Components and Installation

Outcome:

Identify and check functionality of major components and assemblies of reciprocating pumps.

Theory:

- Introduction to different components of reciprocating pumps and their operation
- Installation technique of reciprocating pump

Practical:

- Dismantling of reciprocating pumps- valves, pistons, cranks, seals etc. for inspection
- Cleaning of parts & assembling
- Installing of reciprocating pumps.

Tools & Equipment:

Presentation gear for theory, wrenches, screwdrivers, pliers, cleaning brushes, lubricants, torque wrench, hoists, and alignment tools for hands-on dismantling, cleaning, assembling, and installing reciprocating pump components

Module No. 9: Employability Skills

Detail Content

- **Basic English Skills**

1. Converse using basic English sentences.
2. How to Greet others
3. Read and interpret text written in basic English
4. Write a short note/paragraph / letter using basic English

- **Communication Skills**

1. Demonstrate how to communicate effectively using verbal and nonverbal communication Etiquette.
2. Discuss the significance of working collaboratively with others in a team

- **Financial Skills**

1. Outline the importance of selecting the right financial institution, product and service
2. Demonstrate how to carry out offline and online financial transactions, safely and securely like net banking, wallet payment, UPI.
3. List the common components of salary and compute income, expenditure, taxes, investments etc.

- **Essential Digital Skills**

1. Familiarization of working with computer
2. Discuss the significance of displaying responsible online behavior while browsing using various social media platforms, e-mails, etc., safely and securely
3. Send email with attachment. Receive email and download attachment

- **Customer Service Skills**

1. Explain the significance of identifying customer needs and responding to them in a professional manner.
2. Discuss the significance of maintaining hygiene and dressing appropriately

Learning Outcome – Assessment Criteria

Module No.	Outcome	Assessment Criteria
1	Apply safe working practices in the industry	**After completion of this module students will be able to:** 1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements. 1.2 Identify basic first aid and use them under different circumstances. 1.3 Identify different fire extinguisher and use the same as per requirement. 1.4 Identify safety alarms accurately 1.5 Follow about General safety precaution in industry with Blacksmithing Work
2	Practice & interpret technical drawings	**After completion of this module students will be able to:** 2.1 Draw plane figures applying drawing instruments with proper layout and folding of drawing sheets. 2.2 Construct Line, Lettering, Dimensioning, and Scale – Plain, Diagonal 2.3 Draw plan, elevation, side view of different objects with appropriate type of lines and dimensions as per standard convention. 2.4 Draw simple geometrical figure like square, rectangle, circle using CAD.
3	Identify and select tools, set up, and produce pump components following SOPs	**After completion of this module students will be able to:** 3.1 Identify and select different tools for pump operation 3.2 Describe the importance of SOPS 3.3. Demonstrate the procedure for setting up and producing components 3.4 Follow safety measures while operating tools and equipment.
4	Explain the differences in Diesel Engine components and execute different types of nondestructive tests	**After completion of this module students will be able to:** 4.1 Identify and check the manufactural differences in diesel engine components 4.2 Identify and select right tools and equipment for NDT testing 4.3 Make a plan and organize NDT test activities. 4.4 Execute different types of NDT tests.

Module No.	Outcome	Assessment Criteria
5.	Identify the hydraulic and pneumatic components in Diesel Engine	**After completion of this module students will be able to:** 5.1 Explain the fundamental principle of hydraulic and pneumatic systems 5.2 Identify various hydraulic and pneumatic components. 5.3 Demonstrate the functions of various hydraulic and pneumatic components. 5.4 Explain the operational significance of these components 5.5 Execute hands-on exercises to test the functionality of different components
6	Identify and check functionality of stationary Diesel Engine - components, & engine performance on load and engine speed	**After completion of this module students will be able to:** 6.1 Identify different diesel engine components. 6.2 Explain engine performance under various load condition. 6.3 Illustrate proper engine regulation. 6.4 Follow safety protocols during engine inspection 6.5 Execute hands on exercises on simulation of Engine performance under various loads.
7	Identify diagnose and troubleshoot techniques for mechanical and electrical issues in Diesel engines.	**After completion of this module students will be able to:** 7.1 Identify common mechanical & electrical issues in diesel engines 7.2 Explain the systematic troubleshooting process. 7.3 Perform diagnosis process of the arising problem.
8	Identify and check functionality of major components and assemblies of reciprocating pumps.	**After completion of this module students will be able to:** 8.1 Identify major components of reciprocating pumps. 8.2 Check functionality of different components 8.3 Explain the operations of different components. 8.4 Demonstrate dismantle and assemble process of reciprocating pumps components

Module No.	Outcome	Assessment Criteria
		8.5 Perform installation of reciprocating pumps.
9	Employability Skill	As per guided curriculum