Syllabus for FITTER

Course Name	FITTER
Sector	Capital Goods
Course Code	CGM/2023/FITT-RPL/269
Level	RPL LEVEL 3
Occupation	FITTER
Job Description	The job role is responsible for Ensuring accurate dimensions using measurement tools, fitting tasks, operating drilling machines, assembling metal parts, inspecting finished products, and maintaining equipment in a safe work environment.
Course Duration	Total Duration 80 Hrs (T-27, P-53)
Trainees' Entry Qualification	Grade 10 OR Grade 8 with two year of (NTC/ NAC) after 8th OR Grade 8 pass and pursuing continuous schooling in regular school with vocational subject OR 8th grade pass with 2 yrs relevant experience OR Previous relevant Qualification of NSQF Level 2 with one yr experience OR Previous relevant Qualification of NSQF Level 2.5 with 6 months experience
Trainers Qualification	Degree or Diploma in Mechanical Engineering with 1 yr experience in relevant field OR ITI in relevant trade with 3 yr experience in relevant field

Structure of Course:

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]
1	Workplace Safety	Apply Safe Working Practices	1	1	2
2	Basic Engineering Drawing	Practice & interpret technical drawings	2	6	8
3	Introduction to Fitting and Measurement	Demonstrate the basics of fitting, including the necessary measuring tools.	6	10	16
4	Tools and Equipment	Identity and select tools and equipment required for the fitting job	6	10	16
5	Drilling Processes	Demonstrate the Drilling	6	10	16

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]
	and Machines in Fitting	Processes and Machines in Fitting			
6	Stakes and Metal Joints in Fitting	Describe the various types of Stakes and Metal Joints in Fitting.	2	6	8
7	Riveting Techniques in Fitting	Demonstrate the Riveting Techniques in Fitting	2	6	8
8	Employability Skill		2	4	6
		TOTAL:	27	53	80

SYLLABUS:

Module No. 1: Workplace Safety

Outcome: Apply Safe Working Practices
Mapped to CGM/0703/OC1

Theory Content:

- Need of safety
- Occupational health & safety
- Personal Protective Equipment (PPE),
- Safe condition for prevention of accident- basic idea,
- First aid & First Aid Box,
- Fire extinguisher & its use,
- Different sign/slogan/banner/hoarding indicating warning against accident
- Safety rule, standards.

Practical Content:

- Use of appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions.
- Testing the firefighting equipment to verify whether they belong to working condition or not.
- Use the appropriate type of fire extinguisher to extinguish different types of fires safely.
- Mock drill for using appropriate first aid to the injured personnel
- Demonstration of the process of carrying out appropriate documentation following a health and safety incident at work, including all the required information

Tools & Equipment needed: Personal Protective Equipment, Cleaning Equipment and Materials, Sanitizer, Soap, Mask, First Aid Box, Fire Extinguisher/ Chart related to use of Different Fire Extinguisher.

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: Introduction to Fitting and Measurement

Outcome: Demonstrate the basics of fitting, including the necessary measuring tools.

Theory Content:

- Definition of Fitter Trade and its Importance
- Explanation of Precision Measurements in Fitting
- Introduction to Basic Linear Measurement Tools: Dividers, Calipers, Hermaphrodite, Center Punch, Dot Punch, Prick Punch

Practical Content:

- Demonstrate the Basic Measurement Tools
- Demonstration of Safe Usage and Handling the Measurement Tools.
- Measure and Mark the Workpieces

Tools & Equipment needed: Wing dividers, Spring dividers, Vernier calipers, Dial calipers, Adjustable hermaphrodite, Center punch, dot punch, prick punch, Workbench, Vise, Pencils, Marking chalk.

Module No. 4: Tools and Equipment

Outcome: Identity and select tools and equipment required for the fitting job

Theory Content:

1. **Types of Hammers and Their Applications in Fitting**
    - Various Types of Hammers and Their Functions
    - Importance of Selecting the Right Hammer for Specific Tasks
    - Safety Guidelines for Hammer Usage
2. **Bench Vise Operations and Maintenance**
    - Understanding Bench Vise Types and Components
    - Installation Guidelines and Best Practices
    - Importance of Regular Maintenance for Bench Vises
3. **Hacksaw Frames and Blades in Fitting**
    - Types of Hacksaw Frames and Blades Relevant to Fitting
    - Specifications and Descriptions
    - Safety Precautions for Hacksaw Usage
4. **Surface Plate and Auxiliary Marking Equipment in Fitting**
    - Utilizing Surface Plate for Precision Work
    - Functions of Auxiliary Marking Tools: V Block, Angle Plates, Parallel Blocks
    - Importance of Accuracy in Marking
5. **Micrometers and Depth Gauges in Fitting**
    - Understanding Outside Micrometers: Construction, Graduation, Reading
    - Inside Micrometers: Application in Fitter Trade
    - Micrometer Depth Gauge: Parts, Graduation, Reading
6. **Vernier Calipers and Height Gauges for Fitters**
    - Construction and Principle of Vernier Calipers
    - Application of Vernier Height Gauges in Fitter Trade

Practical Content:

- Identify Different types of Hammers and their uses
- Demonstrate Proper Workpiece Techniques with a bench vise
- Bench Vice Installation and Maintenance
- Procedure for the replacement of the blade
- Proper Use of Surface Plate and Auxiliary Tools
- Measure Depth Gauges in Fitting with Micrometers
- Demonstrate Digital Micrometers

Tools & Equipment needed: Hammers, Bench Vise, Hacksaw, Granite surface plate, V Block, Angle plates, Parallel blocks, Micrometers, Vernier calipers, Vernier height gauge, Digital Micrometers.

Module No. 5: Drilling Processes and Machines in Fitting

Outcome: Demonstrate the Drilling Processes and Machines in Fitting

Theory Content:

- Explain Bench, Pillar, and Radial Drilling Machines
- Applications of Gang and Multiple Drilling Machines
- Calculation and Implementation of Tap Drill Size

Practical Content:

- Demonstrate the operation of different Drilling Machines
- Measure Tap Drill Size in Drilling Processes

Tools & Equipment needed: Drilling Machines, Gang Drilling Machine, Multiple Drilling Machine, Drill Bits, Vernier calipers, micrometers, Workpieces, Workbench.

Module No. 6: Stakes and Metal Joints in Fitting

Outcome: Describe the various types of Stakes and Metal Joints in Fitting.

Theory Content:

- Bench Type Stakes: Parts and Applications in Fitting
- Describe Various Metal Joints and Their Selection
- Explanation of the Importance of Tolerance in Fitting Work.

Practical Content:

- Use of Bench Type Stakes in fitting
- Create Metal Joints with Tolerance Considerations.

Tools & Equipment needed: Bench type stake set, Metal Joints, Vernier calipers or micrometers, Feeler gauges, Marking chalk or pencil, Combination square, Metal workpieces, Workbench.

Module No. 7: Riveting Techniques in Fitting

Outcome: Demonstrate the Riveting Techniques in Fitting

Theory Content:

- Types and Uses of Riveting Tools in Fitting
- Application of dolly Snaps in Fitter
- Comparison of Hot vs. Cold Riveting in Fitting

Practical Content:

- Demonstrate the procedure of Riveting Techniques in fitting
- Perform on Riveting with Correct Tools and Methods

Tools & Equipment needed: Rivet gun, Rivet set, Bucking bar, Dolly Snaps, Portable forge, Rivets of various sizes, Workpieces, Workbench.

Module No. 8: 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	**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
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.

Module No.	Outcome	Assessment Criteria
		2.4 Draw simple geometrical figure like square, rectangle, circle using CAD.
3	Demonstrate the basics of fitting, including the necessary measuring tools.	**After completion of this module students will be able to:** 3.1 Demonstrate the importance of Fitter Trade 3.2 Perform precision measurements in fitting 3.3 Explain proper use and application of basic linear measurement tools 3.4 Apply safety practices while handling the measuring tools 3.5 Engage in hands-on exercises for marking and measuring workpieces
4	Identity and select tools and equipment required for the fitting job	**After completion of this module students will be able to:** 4.1 Identify different types of Hammers along with their application. 4.2 Explain the importance of selecting right hammer for right purpose 4.3 Demonstrate step by step process of Bench Vise Operations. 4.4 Identify different types of Hacksaw Frames and Blades for relevant fitting purpose. 4.5 Explain precise marking process using proper marking tools. 4.6 Demonstrate proper utilization of surface plate 4.7 Execute hands on exercises on measuring depth gauges with a micrometer. 4.8 Explain the role of Vernier Calipers and Height Gauge in fitting measurements. 4.9 Explain procedure for the replacement of the blade.
5	Demonstrate the Drilling Processes and Machines in Fitting	**After completion of this module students will be able to:** 5.1 Identify Bench, Pillar, and Radial Drilling Machines. 5.2 Explain the application of Gang and Multiple Drilling Machine 5.3 Demonstrate the operation of different Drilling Machines 5.4 Measure Tap Drill Size in Drilling Processes
6	Describe the various types of Stakes and Metal Joints in Fitting.	**After completion of this module students will be able to:** 6.1 Explain different parts and their application of Bench Type Stakes 6.2 Identify and select different metal joints 6.3 Explain the importance of tolerance 6.4 Create Metal Joints with Tolerance Considerations
7	Demonstrate the Riveting Techniques in fitting	**After completion of this module students will be able to:** 7.1 Demonstrate the procedure of Riveting Techniques in fitting

Module No.	Outcome	Assessment Criteria
		7.2 Illustrate the application of dolly snaps in fitting. 7.3 Identify hot and cold riveting in fitting 7.4 Perform on Riveting techniques with Correct Tools and Methods
8	Employability Skill	As per guided curriculum

List of Tools, Equipment & materials needed for 30 Trainees (Practical)

No.	Tool/Equipment	Specifications	Quantity
1	Dividers	Wing and Spring dividers	6
2	Calipers	Vernier and Dial calipers	6
3	Hermaphrodite	Adjustable hermaphrodite	6
4	Center Punch	Standard center punch	6
5	Dot Punch	Standard dot punch	6
6	Prick Punch	Standard prick punch	6
7	Safety Goggles	ANSI-approved safety goggles	30
8	Closed-toe Shoes		30
9	Gloves	Heavy-duty work gloves for hand protection	30
10	Workbench	Sturdy workbenches for securing workpieces	6
11	Hammers (Various Types)	Ball-peen, Claw, Cross-peen, Soft-faced hammers	6
12	Bench Vise	Bench vise with appropriate jaw width and opening capacity	6
13	Hacksaw (Frame and Blades)	Adjustable hacksaw frames and blades of different tooth counts	6
14	Surface Plate	Granite surface plates	6
15	Auxiliary Marking Tools	V Block, Angle Plates, Parallel Blocks	6
16	Micrometers	Outside and Inside Micrometers	6
17	Vernier Calipers	Vernier calipers	6
18	Height Gauges	Vernier height gauges	6

No.	Tool/Equipment	Specifications	Quantity
19	Drilling Machines (Bench, Pillar, Radial)	Bench, Pillar, and Radial Drilling Machines	3
20	Gang Drilling Machine	Gang drilling machine for group drilling operations	1
21	Multiple Drilling Machine	Multiple spindle drilling machine for simultaneous drilling	1
22	Drill Bits	Assorted drill bits of various sizes	Sufficient for practice
23	Vernier Calipers or Micrometers	Vernier calipers or micrometers for precise measurements	6
24	Depth Gauge	Depth gauge for measuring drill depths	6
25	Bench Type Stakes	Bench type stake set with various components	6
26	Various Metal Joints	Assorted metal joints (e.g., butt joints, lap joints, dovetail joints)	6
27	Vernier Calipers or Micrometers	Vernier calipers or micrometers for precise measurements	6
28	Feeler Gauges	Feeler gauges for checking clearances and tolerances	6
29	Marking and Layout Tools	Marking chalk or pencil, Combination square	30
30	Rivet Gun	Pneumatic rivet gun with adjustable pressure settings	6
31	Rivet Set	Assorted rivet sets for different rivet sizes	6
32	Bucking Bar	Various bucking bars with different profiles	6
33	Dolly Snaps	Assorted dolly snaps for various applications	6
34	Portable Forge or Heating Equipment (if applicable)	Gas or electric forge for hot riveting (if applicable)	1
35	Rivets (Various Sizes/Materials)	Assorted rivets for different practice scenarios	Sufficient for practice
36	Rivet Header or Setter	Appropriate rivet header for cold riveting	6
37	Metal Workpieces	Metal workpieces for riveting practice	30