

SYLLABUS

For the trade of

**MECHANIC POWER ELECTRONICS (INVERTER,
UPS & MAINTENANCE OF DRIVES)**

Under

Apprenticeship Training Scheme

**Government of India
Ministry of Labour & Employment
Directorate General of Employment & Training
New Delhi-110001**

GENERAL INFORMATION

Name of the Trade	:	Mechanic Power Electronics (Inverter, UPS & Maintenance of drives)
N.C.O. Code No.	:	7241.10, 7242.10
Entry Qualification	:	Passed 10 th class examination under 10+2 system of education or its equivalent.
Duration of the Apprenticeship Training	:	02 years
Rebate allowed in Apprenticeship Training	:	One year and six months for trainees completed Broad Based Basic Training in Electronics Sector under Centre of Excellence Scheme and Advanced module of Centre of Excellence Scheme in Embedded Systems and PLC.
Ratio of apprentices to workers other than unskilled workers	:	1:2
Terminal Behavior	:	On completion of the training the trainee should design & develop application Inverter, UPS, Stabilizer & Industrial drives.

Course Outline : The training shall comprise of-

a) *On the job training*

On the shop floor training apprentice should learn complex operations or skills and develop methods of work speed, accuracy and finish in jobs which should consist of operations/skills already learnt earlier.

b) *Project*

Each apprentice shall undertake a project. The duration of the project shall be two Weeks.

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SR.NO.	SHOPFLOOR TRAINING	RELATED INSTRUCTIONS
1	<p>1) Testing & Installation of single phase Digital / Sine wave Inverters. with respect to industries</p> <p>2) Testing & Installation of three phase / Digital / Sine wave Inverters with respect to industries</p> <p>3) Fault finding of single phase Digital / Sine wave Inverters.</p> <p>4) Fault finding of three phase / Digital / Sine wave Inverters. with respect to industries</p>	<p>Inverters Classification of Inverters as</p> <ul style="list-style-type: none"> a) Single Phase b) Three Phase c) Analogue d) Digital e) Sine Wave f) Using FET/ MOSFET's g) Using IGBT's h) Using Microprocessor, Microcontroller. <p>Principle of operation, Block diagram, circuit diagrams and service manuals of different brands available in the market, Selection of Inverter as per requirement & Load conditions, Installation of Inverters, fault finding & fault rectification, High power Inverters.</p> <p>Selection of Batteries, SMF Battery, Tubular Battery, Rating, Back up time, Maintenance & Care, Testing of Battery, Battery Charging Circuits</p>

<p>2</p>	<p>1) Installation and testing of single phase Off line UPS. 2) Installation and testing of three phase Off line UPS. 3) Installation and testing of single phase On line UPS. 4) Installation and testing of three phase On line UPS.</p> <p>5) Fault finding of single phase / On line / Off line UPS.</p> <p>6) Fault finding of three phase / On line / Off line UPS. with respect to industries</p>	<p>UPS Classification of UPS a) Single Phase b) Three Phase c) On Line d) Off Line f) Using FET / MOSFET's g) Using IGBT's h)Using Microprocessor / Micro controller.</p> <p>Principle of operation, Block diagram, circuit diagrams and service manuals of different brands available in the market, Rating, Selection of UPS as per requirement & Load conditions, Installation of UPS, fault finding & fault rectification, High power UPS.</p>
<p>3</p>	<p>1) Assembling, testing & Fault finding of Voltage stabilizer of different ratings. with respect to industries 2) Assembling, testing & Fault finding of Servo stabilizer of diff. ratings. with respect to industries 3) Assembling, testing & Fault finding of S.M.P.S. of diff. ratings. with respect to industries</p>	<p>Voltage Stabilizers CVT, Spike suppressor, Automatic Voltage Stabilizers, Servo Stabilizers</p> <p>Principle of operation, Block diagram, circuit diagrams and service manuals of different brands available in the market, Rating, fault finding & fault rectification in Stabilizers.</p>
<p>4</p>	<p>1) Testing & Installation of DC drives (single phase, three phase) 2) Testing & Installation of AC drives (single phase, three phase) 3) Testing & Installation of speed control of D.C. motor using D.C. Drive 4) Testing & Installation speed control of A.C. motor using A.C. Drive with respect to industries</p>	<p>Industrial Drives AC Drives - Principle of operation, types of control of the Drivers, Block diagram, Detailed circuit diagram, service manuals of a Practical AC Drive for Single / Three Phase Induction Motors used in Industries.</p> <p>DC Drives - Principle of operation, Block diagram, Detailed circuit diagram, service manuals of a Practical DC Drive for Series Field, Shunt, Compound DC Motors used in Industries. Starters used for DC Motors, Universal Motor.</p>

5	<p>1) To understand Microcontroller 8051 based application in system programming & applications such as,</p> <p>a) Generation of Firing angle for inverter, chopper, cycloconverter etc. with respect to industries</p> <p>b) To assemble, Implementation & view the system signal waveform on CRO.</p> <p>c) Fault finding in applications circuit.</p> <p>d) Fault finding in designed circuit.</p> <p>e) Applications on Micro controller 8751, 8032, 8052, 8752, 68HC05, 68HC11, 68HC32 based system design for power electronics control circuits. with respect to industries</p>	<p>Power electronics controllers</p> <p>Block diagram, Architecture, Addressing Modes, Instruction Set for Microprocessors & Microcontrollers i.e. MP 8085, MP 8086, Micro controller 8031 / 8051, Programming of Microprocessors & Microcontrollers (MP 8085, MP 8086, Micro controller 8031 / 8051), Microprocessors & Micro controller based applications used in power electronics.</p>
6	<p>To install operate & maintain solar based systems such as,</p> <ol style="list-style-type: none"> 1) UPS 2) Street light 3) Water heaters etc with respect to industries 	<p>Introduction to photonics, opto electronics various devices solar cell, photo voltaic cell & their application.</p>
7	<p>Project work:- Like, Inverter, chopper, Stabilizer etc</p>	<p>Soldering technique, Manual, Wave soldering, SMD / SMT Technology.</p> <p>SMD Soldering Technique.</p> <p>PCB Design with Latest software/ Tools Available in the market.</p>