MECHANIC ADVANCED MACHINE TOOL MAINTENANCE

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5

SECTOR – PRODUCTION & MANUFACTURING

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

MECHANIC ADVANCED MACHINE TOOL MAINTENANCE

(Revised in 2019)

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NSQF LEVEL - 5

Version 1.0

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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Co-ordinator for the course: Sh. Nirmalya Nath., ADT

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Remarks
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1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by Directorate General of Training (DGT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate (engineers), technician (diploma) and technician (vocational) apprentices.**

Entry Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by DGT and those successful in the trade tests are awarded the National Apprenticeship Certificate (NAC) by DGT having worldwide recognition.

The period of apprenticeship training for graduate (engineers), technician (diploma) and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices. It will ensure stronger collaboration between industry and the trainees which will augment supply of skilled workforce and enable development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of DGT for propagating vocational training.

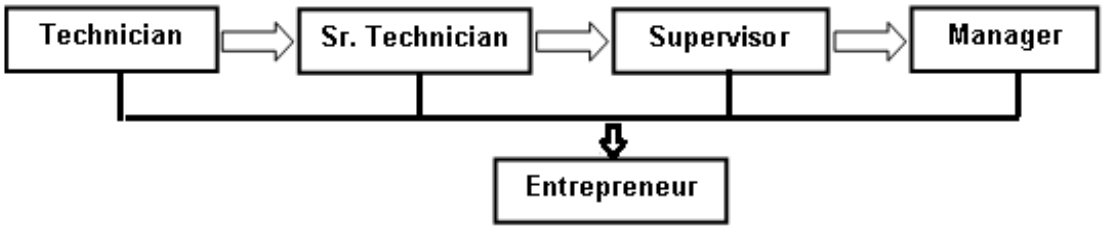
Mechanic Advanced Machine Tool Maintenance trade under ATS is delivered nationwide through different industries. The course is of two years duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by DGT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- On completion of the training the trainee will have an opportunity to move in vertical/horizontal pathways to promote to higher designations. The trainee can further undergo other specialised courses to excel in the relevant field.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years (*Basic Training and On-Job Training*): -

Total training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	**BT I**	**-----**	**BT II**	**------**
Practical Training (On - job training)	**----**	**OJT I**	**------**	**OJT II**

A. Basic Training

For 02 yrs. Course (Engg) :- (**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)

S No.	Course Element	Total Notional Training Hours (For 02 Yrs. Course)
1.	Professional Skill (Trade Practical)	550
2.	Professional Knowledge (Trade Theory)	240
3.	Workshop Calculation & Science	40
4.	Engineering Drawing	60
5.	Employability Skills	110
	Total (Including internal assessment)	**1000**

B. On-Job Training:-

For 02 yrs. Course (Engg):- (**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg)	1000 hrs.	3120 hrs.	4120 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge Employability skills and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by DGT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40% (except for Employability Skill it is 34%). The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while

undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • 60-70% accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% accuracy achieved while undertaking different work with those demanded by the component/job/set

	standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles:

Mechanic Maintenance, General repairs and overhauls workshop machines and equipment periodically and on break downs to maintain them in working condition. Examines machines and equipment to ascertain nature and location of defects. Dismantles unit partly or completely using hand tools, adopters, twists, dollies, roller etc., as necessary, at spot or after shifting to mill wright section according to nature of defects and removes damaged and worn out parts. Obtains replacements or repairs defective parts by re-metaling, chipping, machining, filing, scraping, drilling, screwing, grinding etc. and assembles them with supplementary tolling as necessary ensuring accuracy of fit, alignments, prescribed clearances and functional efficiency. Tests reassembled equipment and makes necessary adjustments. Installs machines and equipment in correct position and aligns power shifting and pulleys using plumbs bobs, thread line spirit level etc. as necessary. Checks, adjusts and lubricates equipment periodically or directs helper to do so and maintains them in working order. May work in various industries on plant and equipment peculiar to those industries. May specialize in repairing particular types of machines or equipment in premises.

Maintenance Fitter-Mechanical dismantles, removes and replaces faulty equipment at component or unit level on a variety of different types of mechanical assemblies and sub-assemblies and diagnosing, locating faults, overhauling, fitting and adjusting mechanical systems and equipment.

Machinery Mechanics and Fitters, other perform number of routine and low skilled tasks in overhauling and repairing engines, pumps machines, etc., such as dismantling defective parts, cleaning components, adjusting parts and are designated as Refrigeration Mechanic Helper, Maintenance Mechanic Helper, etc. according to type of work done.

Reference NCO-2015:

a) 7233.1200
b) 7233.0101
c) 7233.9900

4. NSQF LEVEL COMPLIANCE

NSQF level for **Mechanic Advanced Machine Tool Maintenance** trade under ATS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

a. Process
b. professional knowledge
c. professional skill
d. core skill
e. Responsibility

The Broad Learning outcome of **Mechanic Advanced Machine Tool Maintenance** trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	**MECHANIC ADVANCED MACHINE TOOL MAINTENANCE**
NCO - 2015	7233.1200, 7233.0101, 7233.9900
Trade Code	DGT/3195
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years.
Duration of Basic Training	a) BT–I : 3 months b) BT– II : 3 months **Total duration of Basic Training: 6 months**
Duration of On-Job Training	a) OJT–I: 9 months b) OJT–II : 9 months **Total duration of Practical Training: 18 months**
Entry Qualification	Passed 10+2 with Physics, Chemistry and Mathematics
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for Basic Training	As per related Trade of ITI
Examination	The internal examination/ assessment will be held on completion of each year. Final examination for all subjects will be held at the end of course and same will be conducted by DGT.
Rebate to Ex-ITI Trainees	01 year
CTS trades eligible for Mechanic Advanced Machine Tool Maintenance Apprenticeship	1. Mechanic Machine Tools Maintenance 2. Operator Advanced Machine Tools

Note:

- *Industry may impart training as per above time schedule for different year, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to DGT.*

6. LEARNING OUTCOME

6.1 SPECIFIC LEARNING OUTCOME

The following are minimum broad Specific Learning Outcome after completion of the Mechanic Advanced Machine Tool Maintenance course of 02 years duration under ATS.

First Year:

1. Plan and organize the work to make job as per specification applying different types of basic fitting operation with proper maintenance.
2. Evaluate performance of making work pieces by operations like hacksawing, filing, hammering, chiselling, stamping and check the working condition of forging tools and equipment etc.
3. Evaluate the performance of tools and equipment in case of pipe fitting and pipe bending.
4. Plan and organize the work to use basic maintenance skill by using hand tools.
5. Monitor the work of dismantle, Repair and Assembling of mechanical power transmission elements in machine tools and check for functionality.
6. Evaluate components for assembly by carrying out surface finishing operations like scrapping, lapping etc. and different Heat Treatment like Hardening, Tempering case hardening etc.
7. Evaluate different joints by setting up of gas and arc welding machines and sheet metal work.
8. Monitor the work of dismantle, Repair and assembling of mechanical power transmission elements in machine tools and check for functionality.
9. Test and evaluate the performance of basic electrical and electronics instruments along with measurement of technical parameters.

Second Year

10. Monitor the work of dismantle, replace and assembling of different machine parts including pneumatics and hydraulics components like Compressor, Pressure Gauge, Filter Regulator Lubricator, Valves and Actuators.
11. Check the machine tools for alignment, leveling and test all geometrical parameters.
12. Demonstrate basic functioning of different electrical equipment DC/ AC motors, passive & active electronic components, resistor, capacitor, inductors, rectifier, diode transistor, SCRS & ICS, proximity & ultrasonic sensors and application of such knowledge in industries including basic maintenance work.

13. Plan and organize dismantling and assembly of clutch mechanisms, gear train along with inspection and cleaning and repair/replacement of all internal damaged and wear parts.
14. Check circuit construction of pneumatics and hydraulics observing standard operating procedure & safety aspect.
15. Check straightness, flatness, scoring/ scuffing marks and condition of machine guide ways, slides oil grooves and wear.
16. Demonstrate PLC Programme and interface with other devices to check its Applications, evaluate part programme, test on simulation software and provide solutions to different errors.
17. Evaluate fault to carryout maintenance work and break down of different machineries/ equipments viz., shaper, surface grinding, drilling, lathe, milling, in the shop floor, using appropriate tools &equipments to ensure its functionality.
18. Demonstrate on CNC machine operational features with reference to driving mechanism, with use of CNC codes (G & M codes) and programming.
19. Reading, analysing and rectification of alarm message and preventive maintenance of CNC Machine.

6.2 GENERIC LEARNING OUTCOME

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study. [Different mathematical calculation & science – Conversion of Units, Percentage, & Mensuration-Area & Volume of different surfaces and solids, and Properties of materials, Ferrous & non-ferrous metals, Mass, weight, Density, Specific Gravity etc.]
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. [Different engineering drawing-Geometrical figures like Triangles, Square, Rectangle, Rhombus, Parallelogram, Circle etc., Lettering & Numbering, Freehand sketching of Hand tools used for Mechanic Advanced Machine Tool Maintenance / Wireman/Electrician/ trade & wire joints, Signs & symbols for Electrical components used in electrical circuits and AC/DC systems,Electrical wiring diagram of different lamps, Schematic diagram of plate and pipe earthing, insulators used in over head line, Layout diagram of a substation, Single line Diagram of Electrical substation feeders.]
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.

6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

SPECIFIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
FIRST YEAR 1. Plan and organize the work to make job as per specification applying different types of basic fitting operation with proper maintenance. 2. Evaluate performance of making work pieces by operations like hacksawing, filing, hammering, chiselling, stamping and check the working condition of forging tools and equipment etc. 3. Evaluate the performance of tools and equipment in case of pipe fitting and pipe bending. 4. Plan and organize the work to use basic maintenance skill by using hand tools. 5. Monitor the work of dismantle, Repair and Assembling of mechanical power transmission elements in machine tools and check for functionality. 6. Evaluate components for assembly by carrying out surface finishing operations like scrapping, lapping etc. and different Heat Treatment like Hardening, Tempering case hardening etc. 7. Evaluate different joints by setting up of gas and arc welding machines and sheet metal work. 8. Monitor the work of dismantle, Repair and Assembling of mechanical power transmission elements in machine tools and check for functionality. 9. Test and evaluate the performance of basic electrical and electronics instruments along with measurement of technical parameters. **SECOND YEAR** 10. Monitor the work of dismantle, replace and assembling of different machine parts	Assessment Criteria for each specific learning outcome mentioned under **Year – I &Year – II** (section: 10) ensures the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of – **Planning** (Identify, ascertain, estimate etc.); **Execution** (perform, illustration, demonstration etc. by applying – 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in the field of work or study 3) Desired Mathematical Skills and some skill of collecting and organizing information, communication) and **Checking / Testing** to ensure functionality during the assessment of each outcome. The assessments parameters also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.

including pneumatics and hydraulics components like Compressor, Pressure Gauge, Filter Regulator Lubricator, Valves and Actuators. 11. Check the machine tools for alignment, leveling and test all geometrical parameters. 12. Demonstrate basic functioning of different electrical equipment DC/ AC motors, passive & active electronic components, resistor, capacitor, inductors, rectifier, diode transistor, SCRS & ICS, proximity & ultrasonic sensors and application of such knowledge in industries including basic maintenance work. 13. Plan and organize dismantling and assembly of clutch mechanisms, gear train along with inspection and cleaning and repair/replacement of all internal damaged and wear parts. 14. Check circuit construction of pneumatics and hydraulics observing standard operating procedure & safety aspect. 15. Check straightness, flatness, scoring/ scuffing marks and condition of machine guide ways, slides. oil grooves and wear. 16. Demonstrate PLC Programme and interface with other devices to check its Applications, evaluate part programme, test on simulation software and provide solutions to different errors. 17. Evaluate fault to carryout maintenance work and break down of different machineries/ equipments viz., shaper, surface grinding, drilling, lathe, milling, in the shop floor, using appropriate tools &equipments to ensure its functionality. 18. Demonstrate on CNC machine operational features with reference to driving mechanism, with use of CNC codes (G & M codes) and programming. 19. Reading, analysing and rectification of alarm message and preventive maintenance of CNC Machine.	

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1.5 Identify and observe site policies and procedures in regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.8 Identify and observe site evacuation procedures according to site policy.
	1.9 Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first aid and use them under different circumstances.
	1.11 Identify different fire extinguisher and use the same as per requirement.
	1.12 Identify environmental pollution & contribute to avoidance of same.
	1.13 Take opportunities to use energy and materials in an environmentally friendly manner
	1.14 Avoid waste and dispose waste as per procedure
	1.15 Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study. apply in day to day	2.1 Explain concept of basic science related to the field such as Material science - Properties of materials, Ferrous & non-ferrous metals, etc.
	2.2 Mass, weight, Density, Specific Gravity etc.
	2.3 Use scale/ tapes to measure as per specification.

	work.*[Different mathematical calculation & science - Conversion of Units, Percentage, & Mensuration-Area & Volume of different surfaces and solids, and Properties of materials, Ferrous & non-ferrous metals, Mass, weight , Density, Specific Gravity etc.]*	2.4 Calculate area / volume of the materials. 2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials. 2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
3.	Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-. Geometrical figures like Triangles, Square, Rectangle, Rhombus, Parallelogram, Circle etc., Lettering & Numbering, Freehand sketching of Hand tools used for Mechanic Advanced Machine Tool Maintenance / Wireman / Electrician/ trade & wire joints, Signs & symbols for Electrical components used in electrical circuits and AC/DC systems, Electrical wiring diagram of different lamps, Schematic diagram of plate and pipe earthing, insulators used in over head line, Layout diagram of a substation, Single line Diagram of Electrical substation*	3.1 Read & interpret the information on drawings and apply in executing practical work. 3.2 Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters. 3.3 Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work. 3.4 Read & interpret the signs and symbols for electrical components and AC/DC systems. 3.5 Encounter drawings with electrical circuit diagrams and layout diagrams.

feeders.]	
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments such as Ammeter, voltmeter, meggar, earth tester etc. (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7.1 Explain personnel finance and entrepreneurship.
	7.2 Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7.3 Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8.1 Use documents, drawings and recognize hazards in the work site.
	8.2 Plan workplace/ assembly location with due

		consideration to operational stipulation
	8.3	Communicate effectively with others and plan project tasks
	8.4	Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.

8. SYLLABUS

BASIC TRAINING (BT – I) **Duration: (03) Three Months**		
Week No.	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
1	Familiarization with institute & work place Allocation of workplace. Issue of tool box & essential tools. General Safety rules. Fire fighting equipments & their uses. (Shop talk & demonstration) Familiarization with various hand tools used in the trade.	Importance of the Trade training, types of the work done by the trainee. Rules & regulations of the institute Introduction to First aid practices – Method of maintaining first air box.
2-3	Prepare filing, gripping the job suitably in the vice jaws for filing. Take correct standing posture with respect to bench vice for filing. Balancing of file. Filing to the marked lines using rough file. Care and precautions to be observed in handling these instruments. Practice measurement of various geometrical shapes. Practice marking lines on the work piece according to simple blueprints, using marking tools such as steel rule, scriber, marking blocks & divider. Scribe lines on chalked or colored (blue) surfaces of the work piece supported properly against the angle plate on marking off table to an accuracy ±0.5mm. Mark location of the centres of circle by drawing horizontal & vertical line & then scribing circle using dividers. Use of Dot & Centre Punch for punching the lines, centres & circles. Layout the dimensional features of the work pieces using vernier height gauge, engineering square, angle plate & surface plate. Practice Balancing of file using rough file	**Basic Bench working skills** Use of simple measuring instruments such as steel rule, vernier caliper, inside/ outside micrometer. Measurement by using inside/ outside calipers & scale. **Basic Maintenance Skills** Using Hand tools such as screw driver, single end / double end spanners, single end / double end ring spanners, box nut spanners, ratchet spanners, circlip pliers, wrenches, pullers, extractors, drift.

	to be continued on channel. Filing flanges of a channel for practicing balancing of file. Perform Filing flat surface & flanges of a channel maintaining parallelism between them using outside calipers within ±0.5mm. Check Depth with depth gauge. Correct method to be used and care to be taken in using these tools. Mark out keyways of various shapes Use cross cut chisel for cutting keyways. Use diamond point chisel for cutting corners.	
4-6	Practice filing the adjoining outside faces of flanges of channel square to flat surface of channel as reference surface. Perform filing faces of channel for maintaining – flatness & squareness of adjust faces using tri- square and parallelism between opposite sides. Filing with second cut file to prepare smooth surface. Practice filing to develop control on hand & feel for maintaining dimensions within ±0.1 mm using vernier caliper. Perform Filing with second cut file to prepare smooth surfaces. Mark profiles – combination of straight lines, circles, arcs & angles. Use of scale, divider, vernier height gauge, protractor, combination set etc for marking profiles. Mark the job piece for saw cuts, Gripping the job suitably in the vice jaws for hack sawing to dimensions. Perform hack sawing various metallic pieces (mild steel, aluminium, copper, brass, stainless steel etc.) of different thicknesses and cross sections (round, square, angles, flats etc) using hacksaw blades of different TPL's within dimensional accuracy of ±0.5mm. Practice Hack sawing different lengths	Marking off and layout tools, dividers, scribing block, odd leg calipers, punches- description, classification, material, care & maintenance. Try square, ordinary depth gauge, protractor- description, uses and cares. Calipers- types, material, constructional details, uses, care & maintenance of cold chisels materials, types, cutting angles Marking media, Prussian blue, red lead, chalk and their special application, description. Surface plate and auxiliary marking equipment, 'V' block, angle plates, parallel block, description, types, uses, accuracy, care and maintenance.

	with hacksaw frame in Horizontal & vertical positions. Perform Sawing along the parallel marked lines within 0.5mm allowance for filing. Practice Hack sawing steps and slots. Finishing hack saw cut pieces by filing for step & slot fitting. Cut sheet metal with chisel.	
7	Practice Hammering on vertically held round job Stamp letters & numbers on M.S. Plates, Practice on stamping to develop judgment, control on hand & feel. Stamp flat & round surfaces. Use of cross peen hammer for stretching of metal strip. Practice on upsetting, twisting, bending, punching, drilling and forge welding. Hardening and tempering of hand tools	Use of flat, cross cut & round nose chisels for chipping of edges & cutting grooves. Using cross cut chisels for cutting anyway on round bar. **Forging** Introduction to forging tools and equipments Use of hammers, sledges, set hammers, flatters, swages and swage blocks. **Heat Treatment** Introduction to various furnaces and tools.
8	Deepening the points with centre punch. Checking for centres distance. Drilling practice on sensitive drilling machine using different types of drills & drill holding devices. Safety to be observed while working on drilling machine. Marking, chain drilling & filling to produce square, round & triangular opening on 6 mm thick plate. Preparing inserts by hacks awing & filing Fitting inserts in the respective openings Practice on step & angular fitting. Fitting keys in keyways.	Introduction to drills, Preparations for drilling, marking out the positing of holes & dot punching.
9	Drilling practice on carrying thicknesses & different materials, such as Mild steel, cast iron stainless steel, copper, brass, nylon, epoxy etc. Practices on reaming with hand reamers & machine reamers. Internal threading by hand using tap sets. external threading by split die & finishing of thread by die nut. Marking centers on two and faces of a	Drilling on sheet metal. Precautions & safety to be observed. Counter sinking, counter boring & spot facing operations using bench drilling machine. **Turning, Grinding, Milling** Constructional Features and working principle of lathe machine, grinding

	round bar with the help of 'V' & clamp. Drilling reaming of blind holes along the axis of round jobs. Grinding of drills & chisels of specifications & checking of angles with gauges. Functional relationship between various parts of a machine Cutting of spur and helical gears using simple indexing Practice on parallel & angular milling, grooving using end mills. Use of slotting attachment for cutting keyways Care and maintenance of machine	machine, milling machine Study of gear box, drive, work & tool holding devices. Study of lubrication system and preventive maintenance
10	Practice on filing – radius & angular filing using template & gauges. Prepare of plates for gauge fitting. File various angles & clearance of lathe tools on square bar within ±0.1 Grade wires and cables, colour coding used on them. Remove insulation wires/ cables & soldering free ends of copper strands. Join flexible cables by soldiering. Staggered joints in case of twin wires or multicore cables. Test switches, push button, limit switches, micro switches by using continuity tester by their operations Use multimeter for voltage, current and resistance measurement Use of Voltmeter and ammeter for voltage and current measurement.	Filing templates & gauges for checking lathe tool angles. Filing to an accuracy of ±0.04mm checking with and outside micrometer. **Basic Electricals** Safety Precautions applicable to electrical tools Familiarization with different types of plugs, sockets, switches, fuses and fuse holders, cut outs etc. with their specifications and applications. Identification of live, neutral and earthling wires before connecting plugs, sockets, switches and cut outs. Use of test lamp and multi meter for identifying single phase, three phase power supply.
11	Use Correct method &take care when using these tools. Perform Cold riveting, mark out location & drill holes for riveting. Use dolly & snap for forming rivet heads, lap & butt joint by cold riveting. Test and measure the parameters of electronics components using multimeters. Use resistance color codes.	Use of combination & round nose pliers to make different shapes/ profiles by bending wire to match the blue print to develop manipulative skills, hand control & eye judgment using hand tools such as driver, single end/ double spanners, Circlip pliers, ratchet spanners, drift. **Basic Electronics** Scope of industrial electronics with

	Identify Lead and test by multimeter Use oscilloscope for checking of input and output wave form. Assemble simple battery eliminator circuit using bridge rectifier and filter capacitor. Measure input and output voltage.	reference to its applications in machine tools operations Identification of basic components such as resistor, capacitor, inductors etc. from their outlooks. Types, specification and general application of the components Study of rectifiers available in different packages. Study of rectifier circuits – half wave, full wave and bridge rectifier. Study of solid state devices such as diodes, Transistors, SCRS and ICs available in different packages – type and applications.
12	**Project work** Mark parallel clamp, "C" clamp or micrometer stand by using acquired skills.	
13	**Assessment/Examination (03days)**	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

BASIC TRAINING (BT – II) **Duration: (03) Three Months**		
Week No.	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
1	Construct simple hydraulic circuit for linear/ rotary/ motions and testing for operation	Basic Industrial Hydraulics Industrial Hydraulics- principles, advantages, disadvantages and safety. Study of block diagram of hydraulic system in general.
2-4	Construction features, principles of operation, functions and uses of various hydraulic components such as pumps, valves, actuators and power pack. Hydraulic fluids- specifications, properties and applications. Identification of components from their out look and their specifications.	Study of hydraulic power pack and its control elements. Familiarization with various symbols used in hydraulic circuit diagram Hydraulic circuit reading and tracing practice Circuit drawing practice using symbols
5	Constructional features, principles of operation, function & uses of pneumatic components such as valves and actuators. Identify components from their outlook and their specifications.	**Basic Pneumatics** Pneumatic circuit reading (from manuals and circuit tracing practice. Circuit drawing practice using symbols for simple application.
6-7	Practice on leveling – use of spirit level, camel back, straight edge, bridge, parallel blocks etc. Level surface plates, marking table milling machine, grinding machine etc. preparation of test report indicating degree of flatness. Check lathe, milling, grinding machines for alignment and preparing test reports comparing with standard test charts.	**Leveling, Alignment & Geometrical Testing** Introduction to leveling of machines. Use of leveling bolts, taper wades for leveling of horizontal and vertical surfaces. Introduction to machine alignment. Use of test mandrel, master cylinder, straight edge, special fixtures, slip gauges and dial indicators for machine alignment.
8-9	**Spindle** Check of bearings for its performance-repairs and replacement as needed. **Shaft and Couplings** Locate and identify these elements on various machines. Dismantle clutch mechanisms. Clean and inspect parts for any damages/ wear out etc. and carry out repairs or replacements.	Study of various spindle drive mechanism used on bench grinding, drilling, milling, lathe and grinding machines. Study of shafts, axles, couplings and clutches used on various machines. Study of standard machine elements.

	Assemble and fit back to its location. Test for operations. Prepare reports.	
10	**Drives and Power Transmission** Removing gear box from various machines and opening for inspection and study of gear box from various machines and opening for inspection and study of gear trains and their functional relationship. Dismantling of gear box completely. Study of various machine elements from the gear box. Cleaning and checking/ inspection of parts for damage/ repairs. Assembly of gear box and fitting back to the machine. Testing and preparation of report.	Study of Belt pulley, Chain, Gear, Rack & Pinion etc. used on different machines. Introduction to various gear transmission mechanisms Study of feed mechanism- Removing, dismantling, cleaning and oiling of its machine elements assembly and fitting back to its position. Testing for its operation. Mechanism to be studied- Lathe machine- carriage, apron, feed box, head stock etc. Milling machine- feed box (column, knee, saddle), rapid traverse gear box, intermediate gear box etc.
11	**Slides and Guide ways** Inspect machine guide ways and slides. Check straightness, flatness, scoring/ scuffing marks and condition of oil grooves and wear. Adjust of Gibs, wedges for setting the gap, Use filler gauges and dial indicator.	Familiarization with plain/ journal bearing, anti friction bearing used on machine assembly. Terminal marking procedure before disconnection of wires from terminals/ brushes.
12	**Bearing** Remove electrical motors from machine tools. Replacement of brushes, setting of brushes. Locate overloaded motor and finding out its causes such as fuse blown etc. Check electrical motors by measuring winding resistance, balance of resistance, body resistance. Check electromagnetic clutches, brakes, chuck magnets etc.	**CNC Machines:** Introduction to CNC machines. Difference between NC, CNC and GPM. Importance of CNC machines over other mass production processes. Constructional details & working principles of CNC machines – machine beds – Ball Screw mechanism – Servo drives – Feedback mechanism etc. Introduction to G and M codes. CNC tooling and fixtures.
13	**Assessment/Examination (03 days)**	

Note: - *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

BT – I		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Engineering Drawing: Introduction and its importance - Relationship to other technical drawing types - Conventions - Viewing of engineering drawing sheets - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003
2.	**Fractions**: Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	Drawing Instruments: their Standard and uses - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins/ Clips.
3.	**Square Root**: Square and Square Root, method of finding out square roots, Simple problem using calculator.	Lines: - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment
4.	**Ratio &Proportion**: Simple calculation on related problems.	Drawing of Geometrical Figures: Definition, nomenclature and practice of - Angle: Measurement and its types, method of bisecting. - Triangle-different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.

5.	**Percentage**: Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	Lettering and Numbering as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case.
6.	**Material Science**: Properties- Physical & Mechanical, Types–Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.	Dimensioning: - Definition, types and methods of dimensioning (functional, non-functional and auxiliary) - Types of arrowhead - Leader Line with text
7.	**Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.	Free hand drawing of - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension - Transferring measurement from the given object to the free hand sketches.
8.	**Speed and Velocity**: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.	Sizes and Layout of Drawing Sheets - Basic principle of Sheet Size - Designation of sizes - Selection of sizes - Title Block, its position and content - Borders and Frames (Orientation marks and graduations) - Grid Reference - Item Reference on Drawing Sheet (Item List)
9.	**Work, Power and Energy**: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	Method of presentation of Engineering Drawing - Pictorial View - Orthogonal View - Isometric view Symbolic Representation (as per BIS SP:46-2003) of- Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints. - Electrical and electronics element - Piping joints and fittings
10.	**Algebra**: Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	Construction of Scales and diagonal scale Practice of Lettering and Title Block
11.	**Mensuration:** Area and perimeter of	Dimensioning practice:

	square, rectangle, parallelogram, triangle, circle, semi-circle. Volume of solids – cube, cuboids, cylinder and Sphere. Surface area of solids – cube, cuboids, cylinder and Sphere.	- Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance. Text of dimension of repeated features, equidistance elements, circumferential objects.
12.	**Trigonometry:** Trigonometrical ratios, measurement of angles. Trigonometric tables	Construction of Geometrical Drawing Figures: - Different Polygons and their values of included angles. Inscribed and circumscribed polygons. - Conic Sections (Ellipse& Parabola)
13.	**Heat & Temperature**: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.	Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions. - Free Hand sketch of hand tools and measuring tools used in respective trades.
14.	**Basic Electricity**: Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections – series, parallel, electric power, Horse power, energy, unit of electrical energy.	Projections: - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) Symbol of 1st angle and 3rd angle projection as per IS specification.
15.	**Levers and Simple Machines:** Levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage.	Drawing of Orthographic projection from isometric/3D view of blocks Orthographic Drawing of simple fastener (Rivet, Bolts, Nuts & Screw) Drawing details of two simple mating blocks and assembled view.

BT – II		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	Geometrical construction & theorem: division of line segment, parallel lines, similar angles, perpendicular lines, isosceles triangle and right angled triangle.	- Revision of first year topics.
2.	Area of cut-out regular surfaces: circle and segment and sector of circle.	- Machined components; concept of fillet & chamfer; surface finish symbols.
3.	Area of irregular surfaces. Application related to shop problems.	- Screw thread, their standard forms as per BIS, external and internal thread, conventions on the features for drawing as per BIS.
4.	Volume of cut-out solids: hollow cylinders, frustum of cone, block section. - Volume of simple machine blocks.	- Free hand Sketches for bolts, nuts, screws and other screwed members.
5.	Material weight and cost problems related to trade.	- Standard rivet forms as per BIS (Six types).
6.	Finding the value of unknown sides and angles of a triangle by trigonometrical method.	- Riveted joints-Butt & Lap (Drawing one for each type).
7.	Finding height and distance by trigonometry.	- Orthogonal views of keys of different types
8.	Application of trigonometry in shop problems. (viz. taper angle calculation).	- Free hand sketches for simple pipe, unions with simple pipe line drawings.
9.	Forces definition. Compressive, tensile, shear forces and simple problems. Stress, strain, ultimate strength, factor of safety. Basic study of stress-strain curve for MS.	- Concept of preparation of assembly drawing and detailing. Preparation of simple assemblies & their details of trade related tools/job/Practices with the dimensions from the given sample or models.
10.	Temperature measuring instruments. Specific heats of solids & liquids.	Free hand sketch of trade related components/ parts (viz., single tool post for the lathe, etc.)
11.	Thermal Conductivity, Heat loss and heat gain.	- Study of assembled views of Vee-blocks with clamps.
12.	Average Velocity, Acceleration & Retardation. Related problems.	- Study of assembled views of shaft and pulley.
13.	Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force	- Study of assembled views of bush bearing.
14.	**Graph:**	Study of assembled views of a simple

	Read images, graphs, diagrams Bar chart, pie chart. Graphs: abscissa and ordinates, graphs of straight line, related to two sets of varying quantities.	coupling.
15.	Simple problem on Statistics: - Frequency distribution table - Calculation of Mean value. - Examples on mass scale productions. -Cumulative frequency -Arithmetic mean	Free hand sketching of different gear wheels and nomenclature.
16.	Acceptance of lot by sampling method (within specified limit size) with simple examples (not more than 20 samples).	Free hand details and assembly of simple bench vice.
17.	Friction- co-efficient of friction, application and effects of friction in Workshop practice. **Centre of gravity** and its practical application.	Reading of drawing. Simple Practices related to missing lines, dimensions. How to make queries.
18.	Magnetic substances- natural and artificial magnets. Method of magnetization. Use of magnets.	Simple Practices relating missing symbols. - Missing views
19.	Electrical insulating materials. Basic concept of earthing.	Simple Practices related to missing section.
20.	Transmission of power by belt, pulleys & gear drive. Calculation of Transmission of power by belt pulley and gear drive.	Free hand sketching of different types of bearings and its conventional representation.
21.	Heat treatment and advantages.	Solution of DGT test. Simple Practices related to trade related symbols. Basic electrical and electronic symbols.
22.	Concept of pressure – units of pressure, atmospheric pressure, absolute pressure, gauge pressure – gauges used for measuring pressure.	Study of drawing & estimation of materials.
23.	Introduction to pneumatics & hydraulics systems.	Solution of DGT test papers.

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

BT – I (Duration – 55 hrs.)	
1. English Literacy	Duration: 20 Hrs. Marks : 09
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy	Duration: 20 Hrs. Marks : 09
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of

	Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills	Duration: 15 Hrs. Marks : 07
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude.
BT – II (Duration – 55 hrs.)	
4. Entrepreneurship Skills	Duration: 15 Hrs. Marks : 06

Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity	Duration: 10 Hrs. Marks : 05
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health and Environment Education	Duration: 15 Hrs. Marks : 06
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety

	measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in - house environment.
7. Labour Welfare Legislation	Duration: 05 Hrs. Marks : 03
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.
8. Quality Tools	Duration: 10 Hrs. Marks : 05
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.

10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

OJT – I

1. Plan and organize the work to make job as per specification applying different types of basic fitting operation with proper maintenance.
2. Evaluate performance of making work pieces by operations like hacksawing, filing, hammering, chiselling, stamping and check the working condition of forging tools and equipment etc.
3. Evaluate the performance of tools and equipment in case of pipe fitting and pipe bending.
4. Plan and organize the work to use basic maintenance skill by using hand tools.
5. Monitor the work of dismantle, Repair and assembling of mechanical power transmission elements in machine tools and check for functionality.
6. Evaluate components for assembly by carrying out surface finishing operations like scrapping, lapping etc. and different Heat Treatment like Hardening, Tempering case hardening etc.
7. Evaluate different joints by setting up of gas and arc welding machines and sheet metal work.
8. Monitor the work of dismantle, Repair and assembling of mechanical power transmission elements in machine tools and check for functionality.
9. Test and evaluate the performance of basic electrical and electronics instruments along with measurement of technical parameters.

OJT- II

10. Monitor the work of dismantle, replace and assembling of different machine parts including pneumatics and hydraulics components like Compressor, Pressure Gauge, Filter Regulator Lubricator, Valves and Actuators.
11. Check the machine tools for alignment, leveling and test all geometrical parameters.
12. Demonstrate basic functioning of different electrical equipment DC/ AC motors, passive & active electronic components, resistor, capacitor, inductors, rectifier, diode transistor, SCRS & ICS, proximity & ultrasonic sensors and application of such knowledge in industries including basic maintenance work.
13. Plan and organize dismantling and assembly of clutch mechanisms, gear train along with inspection and cleaning and repair/replacement of all internal damaged and wear parts.

14. Check circuit construction of pneumatics and hydraulics observing standard operating procedure & safety aspect.
15. Check straightness, flatness, scoring/ scuffing marks and condition of machine guide ways, slides oil grooves and wear.
16. Demonstrate PLC Programme and interface with other devices to check its Applications, evaluate part programme, test on simulation software and provide solutions to different errors.
17. Evaluate fault to carryout maintenance work and break down of different machineries/ equipments viz., shaper, surface grinding, drilling, lathe, milling, in the shop floor, using appropriate tools &equipments to ensure its functionality.
18. Demonstrate on CNC machine operational features with reference to driving mechanism, with use of CNC codes (G & M codes) and programming.
19. Reading, analysing and rectification of alarm message and preventive maintenance of CNC Machine.

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

MECHANIC ADVANCED MACHINE TOOL MAINTENANCE			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
S No.	**Name of the Tool & Equipments**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Steel Rule	15 cm both side Graduated in Metric & English.	16 nos.
2.	Center punch	100 mm	16 nos.
3.	File flat 2nd cut	250 mm	16 nos.
4.	File flat bastard	350 mm	16 nos.
5.	File flat smooth	200 mm	16 nos.
6.	Hermaphrodite Caliper	150 mm	4 nos.
7.	Try Square	150 mm	4 nos.
8.	Hack Saw frame adjustable	250-300 mm with blades.	4 nos.
9.	Hammer ball peen	400 gm with handle.	4 nos.
10.	Cold Chisel	20 x200 mm	4 nos.
11.	Cross Chisel	10x150 mm	4 nos.
12.	Half Round Chisel	10x150 mm	4 nos.
13.	Diamond point Chisel	10x150 mm	4 nos.
14.	File Half round	2nd cut 250 mm	4 nos.
15.	File triangular smooth	200 mm	4 nos.
16.	File round smooth	200 mm	4 nos.
17.	File square smooth	200 mm	4 nos.
18.	Round nose pliers	200 mm	4 nos.
19.	Combination pliers	200 mm	4 nos.
20.	Scraper A	250 mm (Bearing)	4 nos.
21.	Scraper B	250 mm (Triangular)	4 nos.
22.	Scraper D	250 mm (Half Round)	4 nos.
23.	Spindle blade screw driver	100 mm	4 nos.
24.	Allen keys	2 to 16 mm (Hexagonal)	4 nos.
25.	Card file		4 nos.
26.	Screw driver set		4 nos.
B. INSTRUMENTS AND GENERAL SHOP OUTFIT			
27.	Tap and die set	M6, M8, M10, M12, M16, M20& M25 with necessary tap wrench	1 each

		and die holder.	
28.	Spanner socket	Set of 25 pieces (10 to 25, 27, 30, 32, mm = 18 pcs and assorted = 7 nos.)	1 no.
29.	Hammer soft	(faced 30 mm dia.) plastic tipped.	As required
30.	Pipe wrench	450	As required
31.	Chain pipe wrench	650	As required
32.	Telescopic gauges	13 mm to 300 mm.	As required
33.	Tap Extractor		1 no.
34.	Linear Actuator (Differential and non-differential)		1 each
35.	Cut section model of Pneumatic vales		1 no.
36.	Vibrometer		As required
37.	Flow Detector		1 no.
38.	Magnetic crack detector		1 no.
39.	Engineers Stethoscope		As required
40.	Stud Extractor		1 no.
41.	Tool picker	collate type	As required
42.	Tool picker	magnetic type	As required
43.	Magnifying Glass	75 mm	1 no.
44.	Pin spanner set		1set
45.	Hand keyway breacher		As required
46.	C.I. Surface plate	400 x 400 mm with stand and cover	As required
47.	Bearing and gear tester		As required
48.	Master test bars (Different sizes)		1 no.
49.	Spirit Level	150 mm, accuracy 0.02 mm / 1000 mm	2 nos.
50.	3 Cells Torch		2 nos.
51.	Gasket Hollow punches	5, 6, 8, 10, 12, 19, 25 mm dia.	1 each
52.	Bar type Torque Wrench		1 no.
53.	Cam lock type Screw Driver		1 no.
54.	Flaring tools		2 no.
55.	Tube Expander	up to 62 mm	2 set
56.	Circlip Pliers (inside, outside and straight)		1 each
57.	Hammer (Ball peen, cross peen, straight peen)	500 grms.	3 sets
58.	Viscometer		1 no.
59.	Vernier height gauge	300 mm	1 no.
60.	Maintenance tool kit	trolley of 1200 x 800 x1200 mm (L x W x H)	As required
61.	Steel lockers for 20 trainees		2 nos.

62.	Steel cupboard	180 cm x 60 cm x 45 cm	6 nos.
63.	Workbench	240 cm x 120 cm x 75 cm (Each bench fitted with 4 vices)	5 nos.
64.	Bench Vice	100 mm jaw	20 nos.
65.	Letter punch	5 mm set	1 set
66.	Number punch	5mm set	1 set
67.	Deep cutting hacksaw frame	300 mm	1 no.
68.	Bearing puller		1 no.
69.	Bolts, nuts & studs & washer	M6-M20	4 sets
70.	Prussian Blue		2 boxes
71.	Adhesives	1) Lock tight 2) Araldite	2 each
72.	Circlip external & internal	bore size (20-40mm)	2 sets
73.	Gasket sheet material		As required
74.	Lubricants oil	servo grade	1 barrel
75.	Hydraulic fluid		1 barrel
76.	Bearing fitting tool		1 set
77.	Multimeter		2 Nos.
78.	Tong tester		1 No.
79.	Megger		1 No.
80.	Wire stripper cum cutter		1 No.
81.	Crimping Tool		1 No.
C. PRECISION INSTRUMENTS			
82.	Vernier Bevel protractor	with 150 mm blade	1 no.
83.	Vernier caliper	200 mm with Inside and depth measurements	2 nos.
84.	Dial vernier caliper	200 mm, with 0.02 mm least count	1 no.
85.	Optical Bevel protractor		1 no.
86.	Outside micrometer	0 to 25mm	1 no.
87.	Outside micrometer	25 to 50 mm	1 no.
88.	Outside micrometer	50 to 75 mm	1 no.
89.	Combination set	300 mm blade centre head, square head and protector head.	1 no.
90.	Sine bar 200 mm		1 no.
91.	Slip Gauge Box (workshop grade) - 87 pieces per set		1 no.
92.	Inside micrometer	50 mm to 200mm, 0.01 mm least count with six extension rod.	1 no.
93.	Dial test indicator –stand)	Plunger type-Range 0-10 mm, Graduation 0.01 mm & 0.001mm Reading 0-10 with revolution counter (complete with clamping devices and magnetic Range 0-10	1 set

		mm, Graduation 0.01 mm & 0.001 mm. Reading 0-10 with revolution counter (complete with clamping devices and magnetic stand)	
94.	Dial test indicator – Puppitast type-		1 set
95.	Feeler gauge		1 no.
96.	Radius gauge	1 to 25 mm radius	1 no.
97.	Screw pitch gauge for metric, standard & fine pitches.	BSP & BSW pitches (0.25 to 6 mm)	1 no.
98.	Center gauge	55º x 47½º	1 no.
99.	Center gauge	60º	1 no.
100.	Plug gauge	Morse taper No.1, 2, 3, 4,	1 set
101.	Ring gauge	Morse taper No.1, 2, 3, 4,	1 set
102.	Ring gauge	Ø20mm (Go and No Go)	1 no.
103.	Limit plug gauges	Ø20mm	1 no.
104.	Wire gauges		1 no.
105.	Bore gauge	dial indicator (1 mm range, 0-0.01 mm graduation)-Range of bore gauge 18-150 mm)	1 no.
106.	Straight edge	Min 500mm- Max 1000mm	1 each
107.	Multimeter		2 Nos.
108.	Tong tester		1 No.
109.	Megger		1 No.
D. LATHE TOOL			
110.	Reduction sleeve and extension socket.		As required
111.	Centre drills	3, 4 and 5 mm (Consumable)	2 nos. each
112.	Revolving centre with arbor		As required
113.	Knurling tool with holder (straight, cross, diamond)		1 each
114.	Dog carrier		As required
115.	Oil can pressure feed		As required
116.	Tool holder (straight) to suit	6 & 8 mm sq. bit size	As required
117.	H.S.S. tool bits	6 mm, 8 mm sq. x100 mm length (consumable)	As required
118.	Carbide tip mechanically fastened tool set		1 set
E. MILLING MACHINE TOOLS			
119.	Cylindrical milling cutter	Ø 63 x 70 x Ø 27 mm	1 no.
120.	Side and face cutter	Ø 80 x 10 X Ø 27 mm	1 no
121.	Slitting Saw cutter	Ø 100 x 6 X Ø 27 mm	1 no.

122.	Slitting Saw cutter	Ø 75 x 3 X Ø 27 mm	1 no.
123.	'T' slot cutter with parallel shank-	Ø 17.5 x 8 mm width x dia. of shank 8 mm	1 no.
124.	Woodruff key seating cutters	A 13.5x3, A16x4	1 each
125.	Parallel shank	end mill Ø 5 mm, Ø 6 mm, Ø 8mm, Ø 10 mm and Ø 12 mm	1 each
126.	Scribing block universal	300mm	As required
127.	V-Block	Approx 65x65x80 mm with clamping capacity of 50 mm with clamps	1 set each
128.	D.E spanners	3-4 , 6-8, 10-12, 13-14, 15-16, 18-19, 20-22, 24-26 (8 spanners)	1 set
129.	Angle plate-adjustable	250x250x300 mm	1 no.
130.	Twist Drill	Parallel Shank Ø 4 mm to Ø 12 mm in steps of 0.5 mm	1 each
131.	Grinding wheel dresser	(diamond dresser) with holder 1.5 carat diamond	2 nos.
132.	C – clamp	50 mm & 75 mm	1 each
133.	Hand reamer	6 to 16 mm in steps of 1 mm	1 each
134.	Machine reamer	6 to 16 in steps of 1 mm	1 each
F. GENERAL MACHINERY			
135.	Lathe all gear head type	Centre height of 150 mm, Gap bed, between centers 1000 mm (with 3 jaw and 4 jaw chuck, coolant equipments).	2 nos.
136.	Universal Milling machine		1no.
137.	Surface grinding machine	wheel dia 180 mm (or near) reciprocating table, longitudinal table traverse 200mm (or near) full motorized supplied with magnetic chuck 250 X120mm and necessary accessories.	1no.
138.	Drilling machine	Pillar type 20mm capacity	1 no.
139.	Double ended Pedestal Grinder	178 mm wheels(one fine and one rough)- motorized with twist drill grinding attachment	1 no.
140.	Flexible Hand Grinder	100 mm dia – light duty	1 no.
141.	Portable Drilling machine	6 mm capacity.	1 no.
142.	Shaping Machine	450 mm stroke (motorized) with all attachments	1 no.
143.	Pipe bending machine	Manual/ Hydraulic	1 no.
144.	Hydraulic trainer with necessary		1 set

	elements for different machine circuit with all types of transparent valves and pressure gauge, reservoir etc.		
145.	Pneumatic trainer with necessary elements for demonstration different machine circuit with all types of valves, pressure gauge and compressor etc.		1 set
146.	Universal Cylindrical grinder	External & Internal	1 No.
147.	Muffle Furnace (Electric)	Capacity 20kgs.	1 no.
148.	Multimedia based simulator for CNC technology and interactive CNC part programming software for turning & milling with virtual machine operation and simulation using popular operation control system such as Fanuc, Siemens, etc. (Web-based or licensed based) (12 trainees + 1faculty) ***With help of this software the trainees should be able to Write, Edit, Verify & Simulate***	Software	13 nos.
149.	Desktop Computers compatible to run simulation software with LAN facility	Machine	13 nos.
G. OLD MACHINES FOR JOB WORK (REPAIR & RECONDITIONING)			
150.	Old Centre lathe		1 no.
151.	Old Milling Machine (Universal)		1 no.
152.	Old Grinding Machine (Universal)		1 no.
153.	Old Shaping Machine		1 no.
154.	Old Gear Box (any type)		1 no.
155.	Revolving Centre		1 no.
156.	Old hydraulic power pack with hydraulic cylinder		1 no.
157.	Old Centrifugal Pump		1 no.
158.	Old Gear pump		1 no.
159.	Old Vane pump fixed and variable delivery		1each

160.	Old Piston pump (Radial & Axial)		1each
161.	Old Reciprocating Compressor		1 no.
H. WELDING WORK			
(i) GAS WELDING			
162.	Oxy-acetylene welding Cylinder Trolley		1 no.
163.	Welding hose P.V.C. flexible	Internal dia. 6 mm (Blue and red)	5m
164.	Hose coupling Nipples		2 nos.
165.	Hose Protractor		2 nos.
166.	Double stage Pressure regulator for Oxygen and Acetylene		1no. each
167.	High Pressure blow pipe with tips		1 no.
168.	Gas cutting torch with cutting tips		1 no.
169.	Welding gloves pair (Leather)		1 pair
170.	Goggles	(4A) for Gas. Welding	4 nos.
171.	Spark lighter		2 nos.
172.	Spindle key		1 no.
173.	Gas Welding table with fire bricks.		1 no.
(ii) ARC WELDING			
174.	Welding Machine DC or AC,	(Single phase / 3 phase), 150 – 300 Amps capacity with all accessories	1 no.
175.	Arc welding electrode	Ø4 mild steel	3 boxes
176.	Brass brazing rod	Ø3	3 boxes
177.	Gas welding flux (Borax)		As required
178.	Gas cylinder (Acetylene & Oxygen)		2 pair
(iii) ERECTION TOOLS			
179.	Foundation bolts (different types)		1each.
180.	Plumb bob		1 no.
181.	Square Box Wrenches		1 no.
182.	Square T Wrenches		1 no.
183.	Engineers square	700 mm	1 no.
184.	Threaded Fastener B Type		1 no.
185.	Threaded Fastener C Type		1 no.
186.	Threaded Fastener F Type		1 no.
187.	Hoisting Equipment: chain pulley,		1 set

	steel slings, rope, belt, tackles		
188.	Slings		2 Nos.
189.	Hydraulic trolley		1 No.
190.	Screw jack		2 Nos.
191.	Hydraulic jack		2 Nos.
FURNITURE:			
192.	Instructor table	1200x760x760mm	1 No.
193.	Instructor chair with arm		1 No.
194.	Steel stools	300x300x450mm	16 Nos.
195.	Work bench	3000x1500x760mm	4 Nos.
196.	Discuss table	3000x1200x760mm	1 No.
197.	Steel locker with eight compartments		4 Nos.
198.	Steel almirah	1980x900x450mm	4 Nos.
199.	Bookshelf 4 drawer		1 No.
200.	Steel rack 4shelf		3 Nos.
201.	Black board with stand		1 No.
202.	Fire extinguisher CO2		2 Nos.
203.	Fire bucket with stand		4 Nos.
204.	Artificial respiration chart		4 Nos.
205.	First aid box		1 No.

Note:

a) **For units less than 8 (4+4), the ITI can enter into MoU with Facilitator who will provide the CNC Training to Trainees admitted and undergoing training in above Trade.** The Facilitator should be Government ITI, Engineering/ Polytechnic College, Recognized Training Institute, Industry, Private ITI (Facilitators are arranged in descending preference order). The Facilitator should have training infrastructure for providing CNC training. The facilities of CNC should be made available to ITI trainees at the time of examination. This clause should be part of MoU to be signed. The training provider must be within the range of 15 Km or within city whichever is less.

b) Infrastructure of Electrician trade may be utilized for imparting training on basic electrical and electronics components.

c) Infrastructure of computer lab of the institute to be utilized for imparting practical training on CNC simulation.

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: MECHANIC ADVANCED MACHINE TOOL MAINTENANCE

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) Infrastructure:

A : TRAINEES TOOL KIT:-			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Draughtsman drawing instrument box		21
2.	Set square celluloid 45^o	(250 X 1.5 mm)	21
3.	Set square celluloid 30^o-60^o	(250 X 1.5 mm)	21
4.	Mini drafter		21
5.	Drawing board IS: 1444	(700mm x500 mm)	21
B : Furniture Required			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Drawing Board		20
2.	Models : Solid & cut section		as required
3.	Drawing Table for trainees		as required
4.	Stool for trainees		as required
5.	Cupboard (big)		01
6.	White Board	(size: 8ft. x 4ft.)	01
7.	Trainer's Table		01
8.	Trainer's Chair		01

Tools & Equipments for Employability Skills		
Sl. No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMATIVE ASSESSMENT

Name & Address of the Assessor :			**Year of Enrollment :**
Name & Address of ITI (Govt./Pvt.) :			**Date of Assessment :**
Name & Address of the Industry :			**Assessment location: Industry / ITI**
Trade Name :	**1st Year/ 2nd Year:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	Candidate Name	Father's/Mother's Name	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA	Total formative assessment Marks	Result (Y/N)
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														