ADVANCED ATTENDANT OPERATOR (PROCESS)

COMPETENCY BASED CURRICULUM

(Duration: 1 Yr. 3 Months)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL 5

SECTOR – Production & Manufacturing

सत्यमेव जयते

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

Directorate General of Training

Skill India
कौशल भारत-कुशल भारत

ADVANCED ATTENDANT OPERATOR (PROCESS)

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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1. Festo, Mumbai
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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 National Council for Vocational Training (NCVT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

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 NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders 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, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive 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 National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

Advanced Attendant Operator (Process) trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of one year three months (01 Block of 15 months duration including basic training). 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 NCVT 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.
- Document the technical parameters related to the task undertaken.

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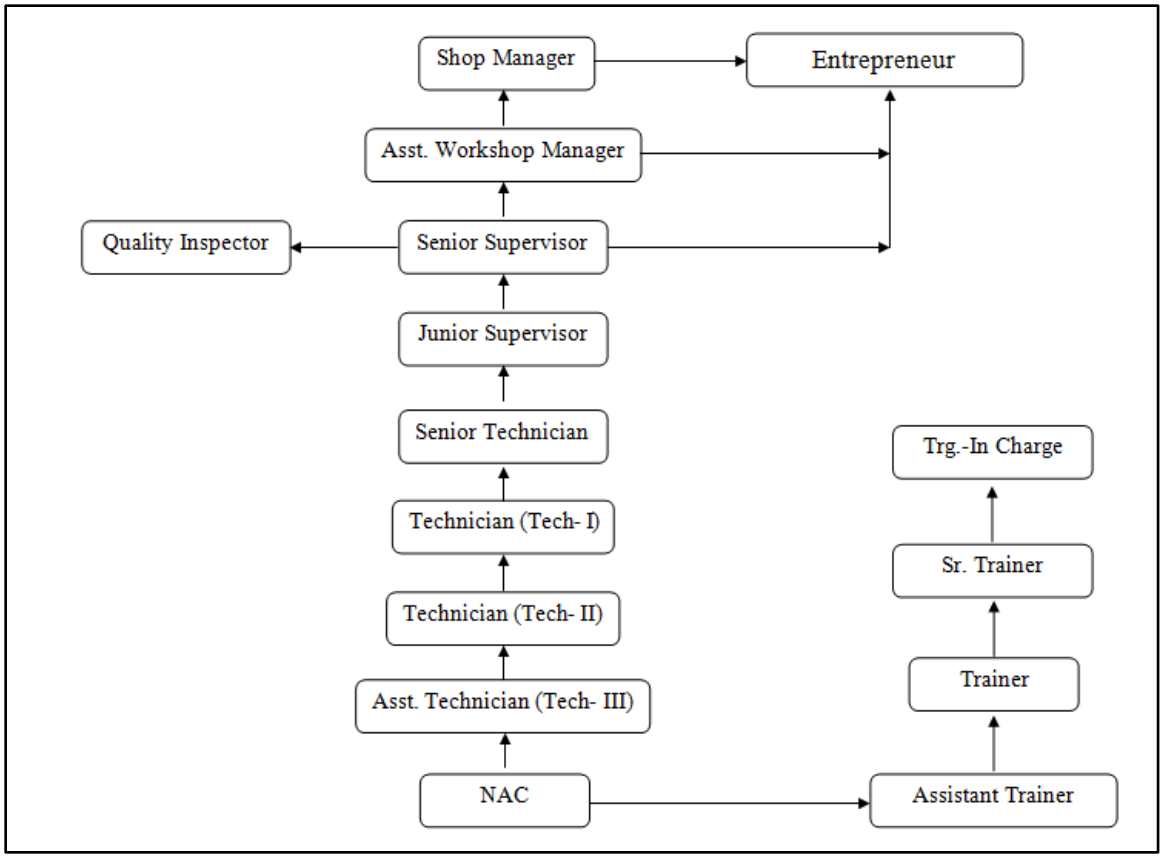
2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

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

Total Training Duration Details: -

Time (in months)	**1-3**	**4 - 15**
Basic Training	Block– I	-----
Practical Training (On - job training)	----	Block – I

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A. Basic Training

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

For 01 yr. course (Engg.) : (**Total 03 months:** 03 months in 1st yr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. Course	**For 01 Yr. Course**
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including Internal Assessment)	**1000**	**500**

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**.

For 01 yr. Course (Engg.) : (**Total 12 months**)

Notional Training Hours for On-Job Training: **2080 Hrs**.

C. Total Training Hours: -

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs	3120 hrs	4120 hrs
For 01 yr. course (Engg.)	500 hrs	2080 hrs	2580 hrs

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge 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. The Employability skills will be tested in first two semesters only.

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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 NCVT 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%. 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 semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence

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(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. • Below 70% tolerance dimension/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% tolerance dimension/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% tolerance dimension/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:

- Operate and control compressors, reactors, and related chemical process equipment during rest periods or emergency.
- Perform duties of regular operators as directed by operators or supervisory personnel.
- Perform minor preventative maintenance of systems as designated.
- Assist in maintaining records of equipment operations.
- Perform tasks such as assisting operator in turning valves to control flow of materials, setting equipment controls.
- Adjust and mix required chemicals to maintain water systems within guidelines.
- Lines up, starts, stops and secures equipment as required by the plant operator.
- Practice safety rules and regulations set by the industry.
- Keep work area clean, neat and orderly.
- Perform TPM (Total Production Management), TQM (Total Quality Management) and record keeping system.

Plan and organize assigned work and detect & resolve issues during execution in his own work area within defined limit. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Reference NCO Code: –

8131.0400 - Mixing Machine man Attendant (Chemical).
8131.0200 - Miller/Mill Operator (Chemical).

4. NSQF LEVEL COMPLIANCE

NSQF level for Advanced Attendant Operator (Process) 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 Advanced Attendant Operator (process) trade under ATS mostly matches with the Level descriptor at Level 5.

The NSQF Level 5 descriptor is given below: -

Level	Process	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	**ADVANCED ATTENDANT OPERATOR (PROCESS)**
NCO -2015	8131.0400, 8131.0200
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	3 months+ One year (01 Block of 15 months duration including basic training).
Duration of Basic Training	a) Block – I : 3 months **Total duration of Basic Training: 3 months.**
Duration of On-Job Training	a) Block – I : 12 months **Total duration of Practical Training: 12 months.**
Entry Qualification	Passed B. Sc with Physics and Chemistry as compulsory and Mathematics as desirable subject.
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 block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	NA
CTS trades eligible for Advanced Attendant operator (Process) Apprenticeship.	NA

Note:

- *Industry may impart training as per above time schedule for different block, 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 NCVT.*
- *Tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Advanced Attendant Operator (Process) course of one year & three months duration (01 Block of 15 months duration including basic training) under ATS.

Block I:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.

2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science - Unit, Basic Mathematics, Percentage, Geometry & Mensuration, graph, Statistics, Mass, Weight and Density, Levers & Simple machine, Centre of gravity, Power transmission, Pressure, Heat & Temperature, Basic Electricity and Material Science].*

3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing - Lines, Free hand drawing, Drawing of Geometrical Figures, Sizes and Layout of Drawing Sheets, Method of presentation of Engineering Drawing, Drawing of Solid figures, Free hand Drawing of Solid figures, Free Hand sketch, Different Projections, Sectional views, Estimation of material, Drawing of Orthographic projection in 3rd angle, line diagram of process layout with fittings symbol].*

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.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Identify processes of manufacture in details.
2. Study in detail about normal process including sequential and smooth start up and shut down procedures.
3. Review working principles, function, construction and operation of all important chemical plant equipments.
4. Carry out plant maintenance system and troubleshooting.
5. Operate computers for basic operations.
6. Work on process logic and instrumentation for process control and plant safety including trips and interlock process plants.
7. Study of cipsets and handling of emergency conditions during plant operation.
8. Operate effluent control system.
9. Identify catalytically &, non-catalytically reactions.
10. Carry out quality control analysis and analyze process control.
11. Operate & maintain fluid flew equipments/measuring device like Pumps, Compressors/Blowers, Valves, Orificematter, Venturimeter, Rotameter, Other flew measuring devices, Pressure & level measuring devices.
12. Use, Operate & maintain Mechanical (Operation) equipments like Mixer, Conveyers, Size reduction equipments.
13. operate and maintain Heart transfer equipments like Shell & Tube type Heat Exchanger, Double path shell 4 Tube heat, exchanger, Plate type heat exchanger, Extended surface heat exchanger, Condensers, coolers & reboilers ,Steam traps & Injectors ,Furnaces, evens & heaters, Evaporators.
14. Operate and maintain mass transfer (operation) equipments like Distillers, Absorbers, Extractors Driers, Crystalligers, Cooling Towers, A.C. Machines & Refrigerators, Ion exchangers.
15. Practice operation involving Oxidation, Reduction, Nitration, Sulplonation, Chlorination, Polymerization, Reforming, Thermal cracking, Catalytic cracking, Alkilation.

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16. Practice on General safety & precautions, Safety requirements under Factories Act, House Keeping, Properties of hazardous Chemicals used at Plant location.
17. Use and Operate Personal protective equipments like Fire lighting equipments, First Aids.
18. Practice environmental control by Liquid effluent & its treatment/ disposal, Solid waste & its treatment/ disposal, Gaseous effluent & its' treatment/ disposal, Pollutants & Hygiene.
19. Operate and maintain the Process Instrumentation & control items for Sensing elements for temperature, pressure, flew, level PH & On-line analyzers , Close loop Control, Function of various elements in a closed coop control viz. Feedback & sensing elements, transmitters, controller control valves etc.
20. Operate and maintain the process control systems like pneumatic system, Electronic control system, Computer (hardware & software) system, Distributed control system (DCS), Programmable logic control system (PLC).
21. Carry out the Quality Control by sampling techniques, usage of testing equipment, inspecting the specification of raw materials, inspecting the intermediate products and finished products.

Note: *Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.*

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

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 and explain different mathematical calculation & science in the	2.1 Explain concept - Unit, Basic Mathematics, Percentage, Material Science, Mass, Weight and Density, Mensuration, Elasticity, Heat &

field of study including basic electrical. *[Different mathematical calculation & science - Unit, Basic Mathematics, Percentage, Geometry & Mensuration, graph, Statistics, Mass, Weight and Density, Levers & Simple machine, Centre of gravity, Power transmission, Pressure, Heat & Temperature, Basic Electricity and Material Science]*		Temperature, Basic Electricity.
	2.2	Measure dimensions as per drawing.
	2.3	Use scale/ tapes to measure for fitting to specification.
	2.4	Comply given tolerance.
	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.
	2.7	Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing - Lines, Free hand drawing, Drawing of Geometrical Figures, Sizes and Layout of Drawing Sheets, Method of presentation of Engineering Drawing, Drawing of Solid figures, Free hand Drawing of Solid figures, Free Hand sketch, Different Projections, Sectional views, Estimation of material, Drawing of Orthographic projection in 3rd angle, line diagram of process layout with fittings symbol.]*	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.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1	Select appropriate measuring instruments such as micrometers, verniercalipers, dial gauge, bevel protector and height gauge (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 given drawing/measurement.
5. Explain the concept in productivity, quality tools, and	5.1	Explain the concept of productivity and quality tools and apply during execution of job.

labour welfare legislation and apply such in day to day work to improve productivity & quality.	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.
SPECIFIC OUTCOME	
Block-I (Section:10 in the competency based curriculum)	
*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I &II** (section: 10) must ensure that 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 a 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 must also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*	

8. SYLLABUS

BASIC TRAINING (Block – I) Duration: (03) Three Months		
Week No.	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
1	Safety: - its importance, classification, personal, general, workshop and job safety. Occupational health and safety. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Importance of housekeeping & good shop floor practices. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Fire& safety: Use of Fire extinguishers. Safety regarding working with different types of steam and its First-Aid.	Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Institute system including stores procedures. Introduction of First aid. Safety attitude development of the trainee by educating him to use Personal Protective Equipment (PPE). Response to emergencies e.g.; power failure, fire, and system failure. Accidents- Definition types and causes. First-Aid, nature and causes of injury and utilization of first-aid. Introduction to 5S concept & its application. Fire: - Types, causes and prevention methods. Fire Extinguisher, its types. Define environment, environment Pollution, Pollutants, type of Pollution (Air pollution, water pollution, soil pollution noise pollution, thermal pollution, radiation. Global warming its causes and remedies. Industrial Waste its types, sources and waste Management.
2	Separation of binary liquid mixture by distillation. Find out the rate of drying curve by tray-drier.	<u>Unit Operation</u> • Distillation • Batch • Continuous fractionators • Drying • Spray drier • Rotary drier • Tunnel drier

		• Evaporation • Open pan • Multiple effects • Extraction • Liquid to liquid • Solid to solid (Laching)
3	Pipe Fitting Gasket fitting Operation of plate & frame filter press.	• Fluid -solid Contacting • Fixed bed • Fluid bed • Continuous bed • Fluid Flow/handling • Centrifugal pump • Reciprocating pump or Compressor • Jet Elector • Fluid Solid Operation • Centrifugation • Settling tank • Wet scrubbers • Crystallizer • Filter (rotary) • Filter (Gross) • Cyclone separation • Electrostatic Precipitator • Bag Filter • Thickner - classifier
4	Use & maintenance of lagging materials Dismantling & assembling of different types of valves. Fitting and assembling of different gears	• Gas - liquid contacting • Absorption • Stripping Heat Exchanger • Furnace • Reboiler • Condenser • Shel & Tube Exchanger • Jacicet Kettle • Direct Mixing • Steam traps • Mixing • Agitation • Solid blending
5	Studies of different types of pumps, compressors etc. their assembly and maintenance . Checking of the alignment of shafts and couplings	• Solid - solid separation • Screening • Elutriation • Froth flotation • Jigging

		• Magnetic separation. • Storage Vessels • Fixed roof tank • Floating roof tank • Sphere
6	Fitting of bearings. Welding (Arc) a) installation of venturimeter, orifice meter & rota-meter b) Finding out of viscosity of a liquid by viscometer (Different types)	• Alkylation • Amination by amine analysis • Amination by reduction • Ammonoxidation • Calcination • Carbonulation • Condensation • Cracking or pyrolysis • Dehydration
7	Study of head against capacity curve of a centrifugal pump. Study of head vs. capacity curve of a gear pump Determination of Reynold's number of different velocities	• Hydration • Hydrolysis • Isomerisation • Nitration • Oxidation • Polymerization • Reduction • Sulfonation
8	Determination of friction losses in a straight pipe & pipe fitting valve. Calculation of overall heat transfer Co-efficient for a shell and tube heat exchanger. Finding out rate of evaporation of a vertical tube evaporator	• Mechanism of Heat Transfer in solid, liquid and gases and their application in industries • Different types of transfer equipment - Heat exchangers, coolers, condenser and chillers • Different types of boiler, steam traps, Reboilers, heaters, vaporizers, Furnace Kilns.
9	Separation of a liquid Mixer by distillation using packed Carrying out flooding velocity experiment using a packed tower made of glass.	• Process Instrumentation & control • Sensing elements for temperature, pressure, flow, level FH & On-line analyzer • Closed loop control • Function of Various elements in closed loop control (sensing elements, transmitters, controllers & control valves)
10	Operation of – Top driven centrifuge – Rotary vacuum filter	• Method of process control • Pneumatic system. • Electronic control system

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	– Hammer Mill (Multi Mill) – Ball Mill – Blake Jaw Crusher	• Introduction to computer(hardware & software) • Distributed control system (DCS) • Programmable logic control system (PIC)
11	Calibration of:- – Pressure measuring Instruments. – Vacuum resourcing Instruments. – Temperature measuring Instruments – Level measuring Instruments. – P. H. Meter Study of diaphragm control valves and Transmitters.	• Quality control • Introduction to sampling technique • Familiarisation with the testing equipments. • Knowledge of specification of raw materials, intermediate and finished products.
12	Study of Recorders and Controllers. Observation/demonstration on: (a) Computer aided process control simulators with electronically, Pneumatically & hydraulically actuated panels. (b) Programmable logic control (PLC) trainer. (c) Instrumentation tutor.	• Environmental control • Method of treatment/disposal of liquid effluents. • Method of treatment/disposal of solid waste • Method of treatment/disposal of gaseous effluents. • Introduction to pollutants & Hygiene • Introduction to ISO norms & codes as applicable to the trade.
13	**Revision & Internal Assessment**	

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.*

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – 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. **Material Science**: Properties -Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and non-Ferrous metals.	**Engineering Drawing: Introduction and its importance** - 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. **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.
2.	**Fractions**: Fractions, Decimal fraction, Addition, Subtraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Calculator. **Ratio & Proportion:** Simple calculation on related problems. **Mass, Weight and Density:** Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.	**Drawing of Geometrical Figures**: Definition, nomenclature and practice of - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram, polygons. - Circle and its elements. **Lettering Numbering and Title Block** as per BIS SP46-2003: **Dimensioning practice**: - Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance.
3.	**Percentage** : Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa. **Speed and Velocity**: Rest and motion,	**Drawing of Solid figures** (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.

	speed, velocity, difference between speed and velocity, acceleration, retardation. **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	**Free Hand sketch** of hand tools and measuring tools used in respective trades. **ISI symbols** of Generator, Voltmeter, Ammeter, Watt- meter. Resister, inductor, Capacitor, Transformer, AC & DC motors.etc.
4.	**Mensuration :** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere **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. Latent heat, sensible heat, saturated steam, wet steam, superheated steam.	**Drawing sketches of different types of valves and Symbolic representation**, such as gate valve, globe valve, ball valve, Plug Valve, diaphragm valve, control valve, non-return valve, and needle valve. etc.
5.	Archimedes's principle, principle of floatation hydrometers. Centre of gravity and Equilibrium condition. Definition - viscosity, flash point, fire point, flash points of standard lubricating oils, octane number. **Flow of fluids:** Flow measurement by orifice meter, venturimeter, Rotameter, U-tube manometer. Reynolds's number, at different velocities.	**Drawing of pressure, Level, flow and temperature control system.** **Free hand sketches** of steam jet ejector, steam trap **Diagram of distillation column** with all accessories Free hand sketches of process instrument- such as temperature indicator, level indicator, LIC, TIC, PI, PIC, FI, FIC **.**

9.2 EMPLOYABILITY SKILLS

(Duration: - 55 Hrs.)

Topic No.	Topic	Duration (in hours)
	English Literacy	**7**
1.	**Reading** Reading and understanding simple sentences about self, work and environment.	
2.	**Writing** Construction of simple sentences Writing simple English.	
3.	**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. 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.	
	I.T. Literacy	**10**
1.	**Basics of Computer** Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2.	**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. Use of External memory like pen drive, CD, DVD etc,	
3.	**Computer Networking and INTERNET** 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.	
	Communication Skill	**18**
1.	**Introduction to Communication Skills** Communication and its importance, Principles of Effective communication, Types of communication - verbal, nonverbal, written, email, talking on phone. Nonverbal communication - components-Para-language Body – language,	

	Barriers to communication and dealing with barriers.	
2.	**Listening Skills** Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.	
3.	**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.	
4.	**Facing Interviews** Manners, Etiquettes, Dress code for an interview. Do's & Don'ts for an interview.	
Entrepreneurship skill		**8**
1.	**Concept of Entrepreneurship** Entrepreneurship- Entrepreneurship - Enterprises:-Conceptual issue. Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2.	**Institutions Support** 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.	
Productivity		
1.	**Productivity** Definition, Necessity.	
2.	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3.	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
Occupational Safety, Health & Environment Education		**6**
1.	**Safety & Health** Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2.	**Occupational Hazards** Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical	

	Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention**.**	
3.	**Accident & safety** Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.	
4.	**First Aid** Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
Labour Welfare Legislation		
1.	**Welfare Acts** Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.	
Quality Tools		**6**
1.	**Quality Consciousness :** Meaning of quality, Quality Characteristic	
2.	**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.	
3.	**House Keeping :** Purpose of Housekeeping, Practice of good Housekeeping.	
4.	**Quality Tools** Basic quality tools with a few examples	

10. DETAILS OF COMPETENCIES (ON-JOBTRAINING)

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

Block – I

1. Study of processes of manufacture in details.
2. Study in detail about normal process including sequential and smooth start up and shut down procedures.
3. Study of working principles, function, construction and operation of all important chemical plant equipments.
4. Study of plant maintenance system and troubleshooting.
5. Study of Basic of computers.
6. Study of process logic and instrumentation for process control and plant safety including trips and interlock process plants.
7. Study of cipsets and handling of emergency conditions during plant operation.
8. Study of effluent control system.
9. Study of catalytically &, non-catalytically reactions.
10. Study of process control based on quality control analysis.
11. Use, Operate & maintain fluid flew equipments / measuring device like Pumps, Compressors/Blowers, Valves, Orificematter, Venturimeter, Rotameter and other flow measuring devices, Pressure & level measuring devices.
12. Use, Operate & maintain Mechanical (Operation) equipments like Mixer, Conveyers , Size reduction equipments.
13. Use, operate and maintain Heart transfer equipments like Shell & Tube type Heat Exchanger, Double path shell 4 Tube heat, exchanger, Plate type heat exchanger, Extended surface heat exchanger, Condensers, coolers & reboilers, Steam traps & Injectors, Furnaces, evens & heaters, Evaporators.
14. Use, Operate and maintain mass transfer (operation) equipments like Distillers ,Absorbers, Extractors Driers, Crystallizers , Cooling Towers, A.C. Machines & Refrigerators , Ion exchangers.
15. Study & practical knowledge of Unit Process, Oxidation, Reduction, Nitration, Sulphonation, Chlorination, Polymerization, Reforming, Thermal cracking, Catalytic cracking, Alkalization.
16. Study & practice on General safety & precautions, Safety requirements under Factories Act, House Keeping, Properties of hazardous Chemicals used at Plant location.

Advanced Attendant Operator (Process)

17. Use and Operate Personal protective equipments like Fire lighting equipments , First Aids.
18. Practice environmental control by Liquid effluent & its treatment / disposal, Solid waste & its treatment/ disposal, Gaseous effluent & its' treatment / disposal, Pollutants & Hygiene.
19. Operate and maintain the Process Instrumentation & control items for Sensing elements for temperature, pressure, flew, level PH & On-line analyzers , Close loop Control, Function of various elements in a closed coop control viz. Feedback & sensing elements, transmitters, controller control valves etc.
20. Operate and maintain the process control systems like pneumatic system, Electronic control system, Computer (hardware & software) system, Distributed control system (DCS), Programmable logic control system (PLC).
21. Carry out the Quality Control by sampling techniques, usage of testing equipment, inspecting the specification of raw materials, inspecting the intermediate products and finished products.

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

ADVANCDED ATTENDANT OPERATOR(PROCESS)			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT			
Sl. no.	**Name of the Tool & Equipments**	**Specification**	**Quantity**
1.	Ear Plug		20 Nos.
2.	Nose Mask		20 Nos.
3.	Specific Gravity bottle	25 cc	6 Nos.
4.	Bunsen Burners		10 Nos.
5.	Tripods Stand		10 Nos.
6.	Asbestos wire gauge	8”	20 Nos.
7.	Burettes	25ml boroflow type borosilicate Glass.	10 Nos.
8.	Measuring Pipettes	10ml borosilicate glass	5 Nos.
9.	Clamp holders		20 Nos.
10.	Stands with clamps for burette		10 Nos.
11.	Measuring cylinder	500 ml borosilicate glass	5 Nos.
12.	Measuring cylinder	100 ml borosilicate glass	10 Nos.
13.	Volumetric flask	100 ml borosilicate glass	10 Nos.
14.	Volumetric flask	250 ml borosilicate glass	5 Nos.
15.	Funnels	Dia 7.5cms borosilicate glass	5 Nos.
16.	Beaker	100ml corning	10 Nos.
17.	Beaker	250ml corning	10 Nos.
18.	Beaker	500ml corning	5 Nos.
19.	Bottles for solutions	1000 ml borosilicate glass	4 Nos.
20.	Conical flask	100 ml borosilicate glass	10 Nos.
21.	Conical flask	250 ml borosilicate glass	10 Nos.
22.	Tong – Flat	300 mm	20 Nos.

23.	Spatula	8”	5 Nos.
24.	Round Bottom Distillation flask with side neck	250ml borosilicate glass	5 Nos.
25.	Round Bottom Distillation flask with side neck	500ml borosilicate glass	5 Nos.
26.	Water Condenser for distillation lebig	30 cm long borosilicate glass	5 Nos.
27.	Rubber cork of (2.5 cm, 3cm) size	Various size	10 Nos.
28.	Wooden cork of (2.5 cm, 3cm) size	Various size	10 Nos.
29.	Rubber Tubing Heavy Duty (ID- 5mm)	10 meter	As required
30.	Rubber Bulbs for pipettes (Teat)		2 Nos.
31.	Hydrometer 0-1200 with measuring Cylinder	1000 ml	2 Nos.
B : TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS			
32.	Safety Goggles		20 Nos.
33.	Safety hand gloves leather	Regular size	20 Nos.
34.	Fire Extinguishers	Dry Chemical powder	01 No.
35.	Fire bucket		05 Nos.
36.	Pipe wrench	12”	01 No.
37.	Pipe wrench	18”	01 No.
38.	Double Ended Spanner set	Metric 6x7 to 30x32	01 No.
39.	Combination Plier		05 Nos.
40.	Screw Driver	9 X 300 mm	05 Nos.
41.	Hammer – Ball Pein	500 grams	05 Nos.
42.	Chisel – Cold – Flat	20 mm X 150 mm	05 Nos.
43.	Hollow punch		05 Nos.
44.	Snip for gasket cutting		02 Nos.
45.	Instrument for determining ‘**g’**	Simple Pendulum complete set	02 Nos.
46.	Mechanical board for testing triangle and parallelogram of forces including all accessories		02 Nos.
47.	Inclined plane with pulley, pan, weights etc.		02 Nos.
48.	Calorimeter for determining Joule’s mechanical Equivalent of heat by electric method		As Required
49.	Apparatus for measurement of co-efficient of expansion(thermal) of solid (plunger‟s apparatus)		02 Nos.
50.	Apparatus for measurement of thermal conductivity of good and bad conductors complete set		02 Nos.
51.	Thermometers of different range as per		01 No.

	requirement		
52.	Rheostat	100 ohms	02 Nos.
53.	Resistance box	0 to 1000 ohms	02 Nos.
54.	Nicrome Wire Resistance	50cm long 2 ohm,3 ohm,5 ohm	02 Nos. each
55.	Battery eliminator		02 Nos.
56.	Copper voltmeter for Electrochemical equivalent		02 Nos.
57.	Ammeter	0 to 1000 mA. (DC)	02 Nos.
58.	Voltmeter	0 to 15 volt (DC)	02 Nos.
59.	pH Meter digital		01 No.
60.	Steam generator (copper)	Cap. 1000ml	06 Nos.
61.	Vernier caliper	0 – 200 mm with least count 0.02mm	02 Nos.
62.	Micrometer	0 – 25 mm	02 Nos.
63.	Water bath	6 places	02 Nos.
64.	Wheatstone bridge apparatus	with 1m long wire	02 Nos.
65.	Different types of pipe fittings		01 set
66.	Different types of valves		01 set
67.	Different types of pumps		01 set
68.	Stop watch 1/10 sec Racer make		02 Nos.
69.	Digital balance	0.1 mg to 200 gms.	01 No.
C : GENERAL MACHINERY INSTALLATIONS:-			
70.	Reynold's equipment		01 No.
71.	Shell and Tube heat exchanger		01 No.
72.	Packed distillation tower.		01 No.
73.	Mixer-settler type extractor		01 No.
74.	Spray extraction column		01 No.
75.	Cooling Tower		01 No.
76.	Plate and frame filter press and Rotary vacuum Filter		01 No. each
77.	Top driven centrifuge		01 No.
78.	Tray dryer		01 No.
79.	Blake jaw crusher		01 No.
80.	Ball mill		01 No.
81.	Sieve shaker and sieves		01 No.
82.	Different types of pipe fittings and joints		2 sets
83.	PLC and DCS Training Kit		01 No. each
84.	Different types of pumps(Centrifugal pump, Reciprocating and Gear pump test rigs)		01 No. each

85.	Digital Viscometer		01 No.
86.	Flow meter Test rig (Rotameter- Venturimeter-Orifice meter – Pitot Tube-water meter)		01 No.
87.	Air Compressor Test Rig 1		01 No.
88.	Vertical Tube Evaporator 1		01 No.
89.	Plant for Operator having various operations like heat exchanger, condenser, evaporator, distillation, pumps, valves and instrumentation controls etc		01 No.
D: ADDITIONAL TOOLS			
90.	Computer aided process control simulator and Data acquisition system consisting of control panel with all accessories & fittings required for control of process parameters of modern Genera ting/manufacturing system		1 No.
91.	Mini 3 oiler plant simulator complex with all accessories and control panel		1 No.
92.	Electric /Electronics control panel with PLC required for instrumentation system and process control operation related to power plant, Refineries, fertilizer units, steel melting and chemical plants.		1 No.
93.	Various types of valves complete with / actuating' system (like gate valve, globe valve, etc.)used in chemical and effulgent pipe lines		1 No. each
94.	Hydraulically/ pneumatically operated valve Test Rig Complete will all accessories required for various physical tests on valves.		1 No.

Advanced Attendant operator (Process)

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: Advanced Attendant Operator (Process)

LIST OF TOOLS& EQUIPMENTS FOR -20 APPRENTICES

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	As per standard	20 Nos.
2.	Set square celluloid 45°	(250 X 1.5 mm)	20 Nos.
3.	Set square celluloid 30° - 60°	(250 X 1.5 mm)	20 Nos.
4.	Mini drafter	As per standard	20 Nos.
5.	Drawing board IS: 1444	(700mm x500 mm)	20 Nos.
B : Furniture Required			
6.	Drawing Board	As per standard	20 Nos.
7.	Models : Solid & cut section	As per standard	As required
8.	Drawing Table for trainees	As per standard	As required
9.	Stool for trainees	As per standard	As required
10.	Cupboard (big)	As per standard	01 No.
11.	White Board	(Size: 8ft. x 4ft.)	01 No.
12.	Trainer's Table	As per standard	01 No.
13.	Trainer's Chair	As per standard	01 No.

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

FORMAT FOR INTERNAL 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 :	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

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