PLASTIC PROCESSING OPERATOR

NSQF LEVEL- 5

SECTOR- CHEMICAL & PETROCHEMICALS

COMPETENCY BASED CURRICULUM

CRAFT INSTRUCTOR TRAINING SCHEME (CITS)

GOVERNMENT OF INDIA
Ministry of Skill Development & Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City, Kolkata – 700091

PLASTIC PROCESSING OPERATOR

(Engineering Trade)

SECTOR –CHEMICALS&PETROCHEMICALS

(Designed in 2023)

Version 2.0

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Developed By
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Kolkata – 700 091
www.cstaricalcutta.gov.in

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1. COURSEOVERVIEW

The Craft Instructor Training Scheme is operational since inception of the Craftsmen Training Scheme. The first Craft Instructor Training Institute was established in 1948. Subsequently, 6 more institutes namely, Central Training Institute for Instructors (now called as National Skill Training Institute (NSTI)), NSTI at Ludhiana, Kanpur, Howrah, Mumbai, Chennai and Hyderabad were established in 1960's by DGT. Since then the CITS course is successfully running in all the NSTIs across India as well as in DGT affiliated institutes viz. Institutes for Training of Trainers (IToT). This is a competency based course for instructors of one year duration. "Plastic Processing Operator" CITS trade is applicable for Instructors of "Plastic Processing Operator" CTS Trade.

The main objective of Craft Instructor training programme is to enable Instructors explore different aspects of the techniques in pedagogy and transferring of hands-on skills so as to develop a pool of skilled manpower for industries, also leading to their career growth & benefiting society at large. Thus promoting a holistic learning experience where trainee acquires specialized knowledge, skills & develops attitude towards learning & contributing in vocational training ecosystem.

This course also enables the instructors to develop instructional skills for mentoring the trainees, engaging all trainees in learning process and managing effective utilization of resources. It emphasizes on the importance of collaborative learning & innovative ways of doing things. All trainees will be able to understand and interpret the course content in right perspective, so that they are engaged in & empowered by their learning experiences and above all, ensure quality delivery.

2. TRAINING SYSTEM

2.1 GENERAL

CITS courses are delivered in National Skill Training Institutes (NSTIs) & DGT affiliated institutes viz., Institutes for Training of Trainers (IToT). For detailed guidelines regarding admission on CITS, instructions issued by DGT from time to time are to be observed. Further complete admission details are made available on NIMI web portal http://www.nimionlineadmission.in. The course is of one-year duration. It consists of Trade Technology (Professional skills and Professional knowledge), Training Methodology and Engineering Technology/ Soft skills. After successful completion of the training programme, the trainees appear in All India Trade Test for Craft Instructor. The successful trainee is awarded NCIC certificate by DGT.

2.2 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one year:

S No.	Course Element	Notional Training Hours
1.	**Trade Technology**	
	Professional Skill (Trade Practical)	480
	Professional Knowledge (Trade Theory)	270
2.	**Training Methodology**	
	TM Practical	270
	TM Theory	180
	Total	**1200**

Every year 150 hours of mandatory OJT (On the Job Training) at nearby industry, wherever not available then group project is mandatory.

3	On the Job Training (OJT)/ Group Project	150
4	Optional Course	240

Trainees can also opt for optional courses of 240 hours duration.

2.3 PROGRESSION PATHWAYS

- Can join as Instructor in Vocation Training Institute/ Technical Institute.
- Can join as a supervisor in Industries.

2.4 ASSESSMENT & CERTIFICATION

The CITS trainee will be assessed for his/her Instructional skills, knowledge and attitude towards learning throughout the course span and also at the end of the training program.

a) The Continuous Assessment(Internal) during the period of training will be done by **Formative Assessment Method** to test competency of instructor with respect to assessment criteria set against each learning outcomes. The training institute has to maintain an individual trainee portfolio in line with assessment guidelines. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in.

b) The **Final Assessment** will be in the form of **Summative Assessment Method**. The All India Trade Test for awarding National Craft Instructor Certificate will be conducted by DGT at the end of the yearas per the guidelines of DGT. The learning outcome and assessment criteria will be the basis for setting question papers for final assessment**.** The external examiner during final examination will also check the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS CRITERIA

Allotment of Marks among the subjects for Examination:
The minimum pass percent for Trade Practical, TM practical Examinations and Formative assessment is 60% & for all other subjects is 40%.There will be no Grace marks.

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 the assessment. While assessing, the major factors to be considered are approaches to generate solutions to specific problems by involving standard/non-standard practices.

Due consideration should also be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the 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 of the following:

- Demonstration of Instructional Skills (Lesson Plan, Demonstration Plan)
- Record book/daily diary
- Assessment Sheet
- Progress chart
- Video Recording
- Attendance and punctuality
- Viva-voce
- Practical work done/Models

- Assignments
- Project work

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming yearly examination for audit and verification by examining 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 should be well versed with instructional design, implement learning programme and assess learners which demonstrates attainment of an ***acceptable standard*** of crafts instructorship with ***occasional* guidance** and engage students by demonstrating good attributes of a trainer.	• Demonstration of ***fairly good*** skill to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field. • Average engagement of students for learning and achievement of goals while undertaking the training on specific topic. • A fairly good level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Occasional support in imparting effective training.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For performance in this grade, the candidate should be well versed with instructional design, implement learning programme and assess learners which demonstrates attainment of a***reasonablestandard*** of crafts instructorship with ***little* guidance** and engage students by demonstrating good attributes of a trainer.	• Demonstration of ***good*** skill to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field. • Above average engagement of students for learning and achievement of goals while undertaking the training on specific topic. • A***good*** level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Little support in imparting effective training.
(c) Weightage in the range of more than 90% to be allotted during assessment	
For performance in this grade, the candidate should be well versed with instructional design, implement learning programme and assess	• Demonstration of ***high*** skill level to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field.

learners which demonstrates attainment of a***high standard*** of crafts instructorship with ***minimal or no support*** and engage students by demonstrating good attributes of a trainer.	• Good engagement of students for learning and achievement of goals while undertaking the training on specific topic. • A ***high*** level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Minimal or no support in imparting effective training.

3. GENERAL INFORMATION

Name of the Trade	**PLASTIC PROCESSING OPERATOR-CITS**
Trade Code	DGT/4055
NCO – 2015	2356.0100, 8142.1301, 8142.1400, 8142.9900
NOS Covered	CP/N9425, CP/N9426, CP/N9427, CP/N9428, CP/N9429, CP/N9430, CP/N9431, CP/N9432, CP/N9433, CP/N9434, CP/N9435, CP/N9436, CP/N9437, CP/N9438, CP/N9439, ASC/N9410, ASC/N9411
NSQF Level	Level- 4.5
Duration of Craft Instructor Training	One Year
Unit Strength (No. Of Student)	25
Entry Qualification	Degree in Plastic Technology/ Engineering from AICTE/UGC recognized Engineering College/ university. OR Ex-serviceman from Indian Armed forces with 15 years of service in related field as per equivalency through DGR OR 03 years Diploma in Plastic Technology/ Engineering after class 10th from AICTE/ recognized board of technical education. OR 10th class with 01 year NTC/ NAC passed in the Plastic Processing Operator + 2 year of related experience.
Minimum Age	18 years as on first day of academic session.
Space Norms	500 Sq. m
Power Norms	15.6 KW
Instructors Qualification for	
1. Plastic Processing Operator -CITS Trade	B.Voc/Degree in Plastic Technology/ Engineering from AICTE/UGCrecognized Engineering College/ university with two-year experience in the relevant field. OR 03 years Diploma in Plastic Technology/ Engineering from AICTE/ recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with five years' experience in the relevant field. OR Ex-serviceman from Indian Armed forces with 15 years of service in related filed as per equivalency through DGR. Candidate should have undergone methods of instruction course or minimum 02 years of experience in technical training institute of Indian armed forces. OR NTC/NAC passed in the Trade of "Plastic Processing Operator" With seven years experience in the relevant field.

	Essential Qualification: Relevant National Craft Instructor Certificate (NCIC) in any of the variants under DGT.
2. Workshop Calculation & Science	B.Voc/Degree in any Engineering from AICTE/ UGC recognized Engineering College/ university with two years experience in relevant field. OR 03 years Diploma in Engineering from AICTE /recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with five years' experience in the relevant field. OR NTC/ NAC in any Engineering trade with seven years experience in relevant field. **Essential:** National Craft Instructor Certificate (NCIC) in relevant trade OR NCIC in RoDA or any of its variants under DGT.
3. Engineering Drawing	B.Voc/Degree in Engineering from AICTE/ UGC recognized Engineering College/ university with two years experience in relevant field. OR 03 years Diploma in Engineering from AICTE /recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with five years' experience in the relevant field. OR NTC/ NAC in any one of the 'Mechanical group (Gr-I) trades categorized under Engg. Drawing'/ D'man Mechanical / D'man Civil' with seven years experience. **Essential Qualification:** National Craft Instructor Certificate (NCIC) in relevant trade OR NCIC in RoDA / D'man (Mech /civil) or any of its variants under DGT
4. Training Methodology	B.Voc/Degree in any discipline from AICTE/ UGC recognized College/ university with two years experience in training/ teaching field. OR Diploma in any discipline from recognized board / University with five years experience in training/teaching field. OR NTC/ NAC passed in any trade with seven yearsexperience in training/ teaching field. **Essential Qualification:** National Craft Instructor Certificate (NCIC) in any of the variants under DGT / B.Ed /ToT from NITTTR or equivalent.

5. Minimum Age for Instructor	21 Years

4. JOB ROLE

Brief description of job roles:

Manual Training Teacher/Craft Instructor; instructs students in ITIs/VocationalTraining Institutes in respective trades as per defined job role. Imparts theoretical instructions for the use of tools&equipment of related trades and related subjects. Demonstrate process and operations related to the trade in the workshop; supervises, assesses and evaluates students in their practical work. Ensures availability & proper functioning of equipment and tools in stores.

Plastic Moulding Technician or Operator; manages the specifications of the plastic and its granules, setting up and operating the moulding machinery and forming and finishing the output.

Moulder, Hand (Plastic); moulds plastics sheets into desired shapes in hand moulding press. Studies specifications for moulded product and assembles mould. Determines weight of charge, pressure, temperature and curing time for moulding; collects plastic sheets, cuts them to required size and heats them on electrically operated heater to soften for moulding; removes sheet when sufficiently heated and places it in female of wooden mould, fixes wooden slab ofmould to keep sheet in position and inserts male block of mould; sets mould in hand press and manipulates controls to compress material and form material to shape of mould; removes moulded plastics object after specified time-interval by opening mould; examines and gaugesproduct for conformity to plant or customer standards. May make minor adjustments in moulding procedure to eliminate defects, and remould product.

Plastic Products MakingOperatives, Other; perform number of routine and low skilled tasks in manufacturing plastics products, such as arranging and loading plastics or plastics impregnated sheets, assisting Printing Machine Operator, cleaning and finishing moulded plastics products etc. and are designated as: Laminating Press Helper (Plastics) if assists Laminating Press Operator by counting sheets of resin impregnated wood, fabric, paper, or other materials, by wiping surface of metal plates with cloth and special solution to prevent sticking, and by stacking sheets between plain or engraved plates.

Reference NCO 2015:

a) 2356.0100 – Manual Training Teacher/ Craft Instructor.
b) 8142.1301 – Plastic Moulding Technician or Operator
c) 8142.1400 – Moulder, Hand (Plastic)
d) 8142.9900 – Plastic Products Making Operatives, Other

Reference NOS:

a) CP/N9425
b) CP/N9426
c) CP/N9427
d) CP/N9428
e) CP/N9429
f) CP/N9430
g) CP/N9431
h) CP/N9432
i) CP/N9433
j) CP/N9434
k) CP/N9435
l) CP/N9436
m) CP/N9437
n) CP/N9438
o) CP/N9439
p) ASC/N9410
q) ASC/N9411

5. LEARNING OUTCOME

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

5.1 TRADE TECHNOLOGY

1. Show discipline and safety compliance in shop floor, hazards, risk and its mitigation. (NOS: CP/N9425)
2. Demonstrate knowledge of basic tools used in plastic processing during workshop induction. (NOS: CP/N9426)
3. Illustrate fundamental information of polymeric morphology (Basic polymer science, Polymers, Elastomer, Additives, Compounding Agents) (NOS: CP/N9427)
4. Illustrate plastic properties by testing, analysis and predrying. (NOS: CP/N9428)
5. Demonstrate maintenance work for running ability of Processing machines. (NOS: CP/N9429)
6. Exhibit good quality of finished product by primary plastic processing techniques. (A-INJECTION MOULDING, B-COMPRESSION MOULDING, C, BLOW MOULDING, D-FRPE-EXTRUSION) –PLANT LAYOUT, PROCESSING, MACHINERY, GENERAL MAINTENANCE, PRODUCTS, APPLICATION, DEFECTS, TESTING AND QUALITY CONTROL) (NOS: CP/N9430)
7. Demonstrate good quality of finished product by secondary plastic processing techniques.(A-THERMOFORMING, B-ROTATIONAL MOULDING, C-COATING, D-CASTING, CALENDARING) –PLANT LAYOUT, PROCESSING, MACHINERY, GENERAL MAINTENANCE, PRODUCTS, APPLICATION, DEFECTS, TESTING AND QUALITY CONTROL) (NOS: CP/N9431)
8. Illustrate good quality of finished product by Tertiary plastic processing techniques. (CUTTING, DRILLING, BENDING, WELDING) (NOS: CP/N9432)
9. Exhibit reprocessing of plastics by the help of plastic waste management system. (NOS: CP/N9433)
10. Demonstrate synthesis of polymer by polymer synthesis processes. (NOS: CP/N9434)
11. Illustrate advance plastic processing techniques. (NOS: CP/N9435)
12. Demonstrate packaging of product by plastic packaging technology. (NOS: CP/N9436)
13. Exhibit a simple plastic product on designed mouldusing CAD/CAM software. (NOS: CP/N9437)
14. Apply knowledge of Nano-technology for new product development. (NOS: CP/N9438)
15. Organize a seminar on certification and standards for plastic processing plants. (NOS: CP/N9439)
16. Read and apply engineering drawing for different application in the field of work. (NOS: ASC/N9410)
17. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: ASC/N9411)

6. COURSE CONTENT

SYLLABUS FOR PLASTIC PROCESSING OPERATOR –CITS TRADE			
TRADE TECHNOLOGY			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
Practical 12Hrs Theory6 Hrs	Show discipline and safety compliance in shop floor, hazards, risk and its mitigation.	1. Demonstrate equipment used in the trade, types of work done by the individual in the trade. 2. Demonstrate safety equipment and their uses, first aid, operation of Electrical mains, Occupational health and hygiene,Different water reactive substances. 3. Demonstrate Organic flammable liquids and commonly used industrial chemicals, Acids, Alkalis & Gases. 4. Video demonstration on fire fighting in different premises. 5. Illustrate Case studies of various major fires. 6. DemonstrateHousekeeping. 7. Demonstrate PPE and other lifesaving equipments. 8. Illustrate Safety Slogans, Safety Precautions adopted in the Plant.	**Discipline**: Importance and General Principles of discipline in plant, essentials for discipline and outward Signs. **Introduction to Safety Management,** Safety Policy, Safety Committee,Standards, Practices and Performances. General safety precautions while working in plastic processing section **Electricity:** Common causes of electrical fire and its remedial measures, electrical hazards including static electricity, electrocution and protective measures. **Anatomy of Fire:**Definition of Combustion, Heat of reaction and calorific value, Flash point, Fire point, Ignition temperature Fire Triangle, Tetrahedron and Pyramid, source of heat, Classification of fire, Oxygen and its effects on combustion, Mode of heat transfer. **Fire & Extinguishers**: Classification of Fire and types of extinguishers. Techniques of fire extinction - Smothering cooling, starvation and breaking of chain radicals. Types of fire extinguishers **First-Aid** **Personal Protective**

			Equipment;Need, Selection, Use, Care & Maintenance Respiratory and Non-respiratory PPE, Head, Ear, Face, Eye, Hand, Foot and Body Protection. Workshop safety Factories act and Accidents
Practical 12 Hrs Theory 6 Hrs	Demonstrate knowledge of basic tools used in plastic processing during workshop induction.	9. Orientation in institute's workshops. 10. Demonstrate knowledge ofbasic tools and their operations during induction in Institute's workshop.	Basic Workshops (Fiting, Turning, Sheetmetal, Plumbing, welding, electrical, electronics, Instrumentation, Painting) And requirement of operations in various shops during plastic processing processes. Various tool (holding, Marking and measuring, Cutting, Finishing, plaining, drilling, Tapping, Dieing) • Linear measuring Tools (steal rule) • Holding and supporting Tools • Marking Tools • Punching Tools • Cutting Tools • Finishing tools • Drilling, tapping, dieing Tools material
Practical 38 Hrs Theory 14 Hrs	Illustrate fundamental information of polymeric morphology (Basic polymer science, Polymers, Elastomer, Additives, Compounding Agents).	11. Demonstrate available polymeric Granules. 12. Illustrate available Elastomeric Granules. 13. Demonstrate available various Additives. 14. Exhibit compounding systems. 15. Demonstrate Single screw extruder, Twing screw extruder.	**MATERIAL STRUCTURE** Properties of material,Solid structure(amorphous, Quasicrystals, Rational approximants, crystals) ,7 Crystal systems, Crystal defects(0D,1D,2D,3D) Bravais lattices Common types of material (metal,ceramics and polymers), Grain boundary **Chemical bonds** 1, strong or primary bonds (ionic, covalent and coordinate), 2.weak or secondary bonds (Dipole dipole and hydrogen bond)

			History, Definitions, Monomers & its requirement, polymerization techniques, Classifications of Polymers, Polymer types based on Structure, Processing and Applications, Molecular Force and Chemical Bonding in Polymers, Polymer structure, Homo Polymers and Copolymers, Nomenclature, Molecular Weight and Distribution and its effect on Properties and Processing of Polymers, Thermal Transition Tg, Ts and Tm. **Understanding of basic chemistry of polymers**,theirnomenclature - Sources of Raw Materials - Methods of Manufacture – GeneralCharacteristics& Properties, Knowledge of Commodity Plastics, EngineeringPlastics, Engineering Plastics & SpecialtyPlastics - Sources of Raw Materials- Method ofManufacture,General Characteristics Structure &Properties-Processing Behavior andapplications sector. Processing technology of elastomers – processing of natural and synthetic rubbers,vulcanization, mastication and cyclisation Definition, Application and effect of various additives ie; Antioxidants, Stabilizers (Heat & UV), Plasticizers,Fillers and reinforcements ,ImpactModifiers, Lubricants,Slip and Anti-block

			agents, Processing aids, Blowing agents, Flame Retardants,Anti-static and Conductive additives , Nucleating agents, Colorants Additives for Recycling, Selection of Polymers and Compounding ingredients, possibilities andlimitations of mixing and compounding Equipments Batch mixers and continuous mixers, High speed mixer Two roll mill, Banbury Mixer,Ribbon blender,Planetary mixers, Single Screw extruder,Twin Screw extruders.
Practical 38 Hrs Theory 14 Hrs	Illustrate plastic properties by testing, analysis and predrying.	16. Demonstrate plastic (Thermoplastic/Thermoset) 17. Illustrate MFI Test. 18. Show Tensile Testing. 19. Demonstrate Compression Test. 20. Illustrate Shear test. 21. Demonstrate Hardness Test. 22. Show Melting point Test. 23. Illustrate Impact Test. 24. Demonstrate Cup flow Testing. 25. Execute Water absorption Testing. 26. Demonstrate Haze, gloss, opacity testing. 27. Illustrate Dart impact Testing.	Knowledge of basics of testing Specification, Standards, test specimen, Pre-conditioning and test atmosphere Understanding of Identification of plastics by simple tests, Visual examination, Density, Melting point, Solubility test, Flametestand burning characteristics. Understanding of tests for determining Short term Mechanical Properties - Tensile, Flexural, Compressive, Shear, Impact, Tear resistance, Hardness tests, Abrasion resistance, Friction properties along with long-term mechanical properties like creep and stress relaxation. Understanding of tests for determining thermal Properties - Heat Distortion Temperature, Vicat Softening Temperature, Long Term Heat Resistant Tests, Thermal Conductivity, Thermal Expansion, Brittleness Temp.,

			DSC, TGA, DMA. Understanding of tests for determining various material characterization properties like Melt Flow index, Introduction of plastic.
		28. Illustrate pre-drying equipments. Set the temperature. 29. Demonstrate Loading of the material in tray. 30. Set the parameters and pre-dry the material. 31. Demonstrate overall maintenance of pre-drying equipment.	Importance of pre-drying. Various pre-drying equipments. Pre-drying temperature and time for various materials. Safety observed while operating pre-drying equipment.
Practical 38 Hrs Theory 14Hrs	Demonstrate maintenance work for running ability of Processing machines.	32. Demonstrate Maintenance drive on any of plastic processing machinery with safety. 33. Get inducted in Electrical, electronics and instrumentation branch for identifying various components of panel circuits. 34. Illustrate Pneumatic Valves, Actuators and output devices, pneumatic elements,power components & Pneumatic Systems. 35. Demonstrate pneumatic circuits of available plastic processing machines. 36. Illustrate Sectioned model of Hydraulics Equipments like Valves, Pressure control valves, metering and flow control valves, directionalcontrol valves.	**Maintenance**Understanding of Maintenance and itsobjectives, Types of maintenance-PreventiveMaintenance, Breakdown Maintenance,Predictive Maintenance, Schedule Maintenance and Maintenance Planning. Knowledge of Factors to be considered forInstallation, Erection and Commissioning ofPlastics Processing & Testing Machinery – methods of Alignments and Leveling. **Electrical/Instrumentation system**Definition of Electrical Quantities and its Units • Ohm's law • Types of circuits and its connections, SCADA • Types of Fuses, Circuit Breaker, • Types of Earthing • Wire & cable,PLC

		37. Getfamiliar with hydraulic circuits of available plastic processing machines.	• Electric Symbol's **Pneumatic system** • Introduction about pneumatic system. • Different pneumatic component and its function. • Pneumatics symbols of component. **Hydraulic system** • Introduction about hydraulic system. • Pascal's law. • Different hydraulic component and it function. • Hydraulic symbol's of component.
Practical 76 Hrs Theory 30 Hrs	Exhibit good quality of finished product by primary plastic processing techniques. (A-INJECTION MOULDING, B-COMPRESSION MOULDING, C, BLOW MOULDING, D-FRP E-EXTRUSION) – PLANT LAYOUT, PROCESSING, MACHINERY, GENERAL MAINTENANCE, PRODUCTS, APPLICATION, DEFECTS, TESTING AND QUALITY CONTROL)	**MICROPROCESSOR CONTROL & PLC INJECTION MOULDING MACHINE.** 38. Select and list out microprocessor control process parameters. 39. Illustrate process parameters. 40. Demonstrate mould setting. • Mould loading • Cooling / MTC • Hot runner system • Purging of screw and bearing • Ejection 41. Exhibit Injection unit setting. 42. Perform different pressure setting. 43. Set the temperature. 44. Illustrate IRO. 45. Set the shot weight. 46. Illustrate TRO. 47. Shoot out troubles of processing. 48. Perform mould unloading - loading.	**PLASTIC PROCESSING** • Various methods of processing plastics **INJECTION MOULDING** • Different processing techniques • Classification of Injection moulding machine • Plant layout,Processing, Machinery, General maintenance, Products, Application, Defects, Testing and Quality control, Advancement Introduction about microprocessor control and PLC. • Advantage of Microprocessor and PLC • Electrical injection mounding machines. • Basic principles and feature of thermo set injection mounding process • Comparison between conventional injection mounding machine and PLC

		49. Demonstrate Housekeeping of mould. 50. Demonstrate Trouble shooting of machine.	& microprocessor control injection moulding machine.
		Preventive maintenance of injection mounding machine 51. Demonstrate overall cleaning. 52. Illustrate PM of electrical accessories 53. Demonstrate PM of hydraulic accessories	• Importance of preventive maintenance • Schedule wise preventive maintenance of injection mounding machine
		54. Illustrate different parts of semi- auto compression moulding machine. 55. Operate Pneumatic & hydraulic system of compression mounding machine. 56. Demonstrate Loading of the mould & setting. 57. Set the temperature. 58. Demonstrate IO. 59. Illustrate TRO. 60. Determine cycle time. 61. Demonstrate preventive maintenance of compression mounding machine.	**Compression Moulding** • Introducing about compression mounding process. • Plant layout , Processing, Machinery, General maintenance, Products, Application , Defects, Testing and Quality control • Hand compression mounding machine parts and function • Faults causes and remedies of product. • Introduction about semi-auto compression mounding machine. • Parts and function. • Heating system used for mould. • Different types of compression mould • Faults, causes, remedies of processing • Trouble shooting • Introduction about transfer mounding process • Comparison of compression mounding & transfer mounding
		62. Distinguish mould and	**FIBER REINFORCED PLASTICS**

		pattern. 63. Illustrate different glass fibres. 64. List out different raw materials (chemicals). 65. Demonstrate TRO – FRP hand layup process. 66. Exhibit Trimming and cutting / finishing of product. 67. Decorate the product. 68. Demonstrate housekeeping of mould.	• Introduction of FRP • Advantage of FRP • Materials used in FRP • Plant layout , Processing, Machinery, General maintenance , Products, Application , Defects, Testing and Quality control • Process used for FRP • Details of hand layup process • Spray up process • Vaccum bag. • Pressure bag. • Hot press / matched metal mounding • Faults,causes remedies • Health hazard associated with processing and fabrication.
		69. Demonstrate different parts of the Auto blow molding machine. 70. Execute Loading of the mould and set. 71. Set the temperature. 72. Demonstrate IRO – auto blow. 73. Set the parison. 74. Set the parison wall thickness. 75. Demonstrate TRO – auto blows and unloading moulds. 76. Demonstrate preventive maintenance of auto blow moulding. 77. Inspect air compressor. 78. Blend required materials as per recipe. Assess material requirement and plan for material.	**BLOW MOULDING PROCESS** • Introduction to blow moulding process. • List the blow moulding techniques. • Explain parts and functions of hand blow moulding machine. • Auto blow moulding machine parts and functions. List the blow moulding techniques. • Cycle of Auto blow moulding process. • Different types of blow moulds and its nomenclature. • Plant layout , Processing, Machinery, General maintenance , Products, Application , Defects, Testing and Quality control • Stretch blow moulding process.

			• Other blow moulding techniques. (Extrusion stretch blow (injection stretch blow extrusion blow, intermittent blow, injection blow). • Faults, causes remedies of blow moulding. • Preventive maintenance of low moulding machine. • Required PPE
		79. Recognize the extruder. 80. Demonstrate different parts of the control panels. 81. Set the processing temperature. 82. Demonstrate Change of the screw PVC to PE. 83. Demonstrate cleaning of the breaker plate and change screen packs. 84. Demonstrate Loading of the Blown film Die. 85. Connect the heaters of Blown film Die. 86. Adjust the screw speed Nip rollers & winding rollers. 87. Demonstrate TRO –(Blown film). 88. Demonstrate cleaning and freezing of die.	**Extrusion Process** • Introduction to extrusion process. • Materials used for extrusion. • Latest extrusion techniques – (multilayer co-extruder, corrugated pipes.) • Extrusion machine its description use different parts & function. • Blown film extrusion. • Flat film extrusion • Plant layout , Processing, Machinery, General maintenance , Products, Application , Defects, Testing and Quality control • Fault, causes Remedies of Blown film.
		89. Demonstrate unloading of blown film die. 90. Illustrate loading of pipe die. 91. Set the pipe plantChange the screw (PE to PVC). 92. Set the temperature for pipe processing. 93. Demonstrate TRO– (pipe). 94. Demonstrate cleaning and freezing of die.	• PVC compounding and its chemical ingredients • Pipe plant extrusion its units and function • Fault, causes, Remedies of pipe.
Practical 55	Demonstrate good	95. Demonstrate the	**THERMOFORMING**

Hrs Theory 22 Hrs	quality of finished product by secondary plastic processing techniques.*(A-THERMOFORMING , B-ROTATIONAL MOULDING, C-COATING, D-CASTING, CALENDARING) – PLANT LAYOUT, PROCESSING, MACHINERY, GENERAL MAINTENANCE, PRODUCTS, APPLICATION, DEFECTS, TESTING AND QUALITY CONTROL)*	thermoforming machine. 96. Set the mould. Set the parameters of the thermoforming machine. (heat timer temperature, cooling system etc). Demonstrate cleaning and freezing of die. 97. Demonstrate IRO – thermoforming machine.	• Introduction thermoforming process. • Thermoforming cycle. • Materials for thermoforming. • Mould materials. • Heating systems. • Plant layout, Processing, Machinery, General maintenance, Products, Application, Defects, Testing and Quality control**.**
		98. Show preparation of the raw material as per mould. (Sheet cutting clamping). **Straight vacuum forming.** 99. Demonstrate operation and preparation of product. 100. Finish the thermoformed product. **Drape Forming** 101. Show changing of the mould for drape forming. 102. DemonstrateOperation and preparation of product. **Matched mould forming** 103. Execute changing and settingof the mould for matched mould forming. 104. Demonstrate Operation and preparation of product. 105. Demonstratepreventive maintenance of thermoforming machine.	• List of different forming process. • Straight vacuum forming. • Drape forming. • Match mould forming. • Pressure bubble plug assist forming. • Inline thermoforming process • Comparison thermoforming and injection molding process. • Faults, causes & its remedies of thermoforming process. • Importance of preventive maintenance.
		106. Identify different types of Rotomoulding machine. 107. Illustrate the mould. Set the mould. 108. Demonstrate preparation of the raw material for rotomoulding.	**ROTATIONAL MOULDING** • Introduction Rotational moulding process. • Advantage and Disadvantage & limitations of roto modulding. • Cycle of Rotomoulding.

		109. Illustrate arrangement of heating system. 110. Demonstrate TRO – Rotomoulding. 111. Finish and Decorate product. 112. Demonstrate preventive maintenance of machine.	• Rotational moulding equipments. • Faults causes Ramedies of Roto moulding • Materials of Rotational moulding. • Plant layout, Processing, Machinery, General maintenance, Products, Application, Defects, Testing and Quality control.
		Chemical coating on PET Cast sheet by chemical coating M/C 113. Illustrate the chemical coating roll arrangement. 114. Demonstrate preparation of chemical for coating. 115. Show arrangement of cooling /heating system. 116. Demonstrate TRO – Chemical coater. 117. Finish and Decorate product. 118. Demonstrate visual aid and presentation via small model of casting and calendaring process. 119. Demonstrate Housekeeping Activity.	**COATING , CASTING & CALENDARING** • Knowledge of Principles • Equipment Required • Process-method, • Type of material used • Sequence of Operation • Plant layout , Processing, Machinery, General maintenance , Products, Application , Defects, **Testing and Quality control**
Practical 38 Hrs Theory 14 Hrs	Illustrate good quality of finished product by Tertiary plastic processing techniques. (CUTTING, DRILLING, BENDING, WELDING)	120. Illustrate Plastic Specimen Preparation by Cutting (Acrylic Sheet/plexiglass). 121. Get Familiar with Drilling Machine and drilling on Plastic specimen(Acrylic Sheet/plexiglass). 122. Show Bending of Designed Plastic specimen(Acrylic Sheet/plexiglass. 123. Get familiar with Welding Machine and welding of	**CUTTING of Plastic** • Cutting process , • cutting parameters (cutting speed, feed,Depth of cut) • cutting edge, cutting pressure , • Various cutting tool • Cutting fluid and it's function **DRILLING of Plastic** • Drilling process , • Drilling parameters (Rotation

		above Plastic specimen(PP,HDPE). 124. Demonstrate Housekeeping activity.	speed, weight on bit,Bit type and size) • Cutting fluid and it's function **BENDING of Plastic** • Bending stress • Prediction of deflection • Failure strength • Brake bending, Cold bending **WELDING of Plastic** • Introduction to plastic welding • Types of plastic welding(Hot gas, Hot plastic, Spin, Vibration) • Plant layout, Processing, Machinery, General maintenance, Application, Defects, Testing and Quality control**.**
Practical 12 Hrs Theory 6 Hrs	Exhibit reprocessing of plastics by the help of plastic waste management system.	125. Demonstrate Group Discussion Activity on Environmental Toll of Plastic. 126. Execute Classroom Cleaning Drive for Plastic waste management 127. Demonstrate Loading of the reprocessing die on extruder. 128. Illustrate preparation of raw material for reprocessing. 129. Illustrate the scrap grinder and Grinding of the scrap. 130. Set the processing temperature for reprocessing. 131. Demonstrate TRO (reprocessing of plastic). 132. Illustrate Housekeeping	**ENVIRONMENTAL TOLL OF PLASTIC** • Plastic pollution • Causes • Effects • Solutions **WASTE MANAGEMENT** Knowledge of Plastics waste management, Basic principles • mechanical recycling • chemicalrecycling • incineration • Pyrolysis • mixed waste recycling • -value addition, application anddevelopment for recycled materials • Need for recycling • Source of Plastic waste • Life cycle analysis

		activity.	• Legislations related to polymer recycling • Depolymerization,Ceiling temperature and its importance • Degradation,Biodegradation, • Primary, Secondary, Tertiary recycling and Quaternary recycling **Reprocessing of plastic.** • Scrap grinder parts & function & its specification. • Identification code Number for different plastics and its use. • Description about extrusion dies & its parts. • Trouble shooting of extruder. • Preventive maintenance of extruder.
Practical 25 Hrs Theory 12 Hrs	Demonstrate synthesis of polymer by polymer synthesis processes.	133. Demonstrate synthesis of polymeric material in LAB by the help of monomer.	**RAW MATERIALS**: Petroleum, natural gas, biogas and coal sources of monomers. **POLYMERIZATION TECHNIQUES**Condensation, Bulk, Dispersion, solution, suspension and emulsion. **POLYMER PROCESSING**:Processing of thermoplastics and thermosetting plastics.
Practical 42 Hrs Theory 10 Hrs	Illustrate advance plastic processing techniques.	134. Show processing of defect less product by various advance machines.	**ADVANCE INJECTION MOULDING** PROCESS: Reaction injection moulding, non-conventional injection moulding. **ADVANCE EXTRUSION TECHNIQUES**Twin screw extrusion, Co-extrusion **ADVANCE BLOW MOULDING PROCESS** Stretch blow moulding, Coextrusion blow moulding,

			Miscellaneous blow moulding.
Practical 12 Hrs Theory 6 Hrs	Demonstrate packaging of product by plastic packaging technology.	135. Conduct a packaging process for given product preservation by available product packaging m/c.	**BASICS OF PACKAGING PROCESS**Introduction,functions and objectives **PLASTIC PACKAGING MATERIAL:** BOPP, HDPE, LDPE,LLDPE, PVC,PE, PET **PACKAGING MACHINERY:** Factors influencing design of package, aspetic packaging, flexible pouch forming (thermoform/ fill /seal) machines
Practical 45 Hrs Theory 18 Hrs	Exhibit a simple plastic product on designed mould using CAD/CAM software.	136. Demonstrate 2D drafting on CAD software. 137. Illustrate 3D Modeling using Creo/UG/CATIA software 138. Design standard Mould Base. 139. Design Hand Injection mold for single impression. 140. Design Injection Mould for internal undercut components.	Introduction of 2D drafting on CAD software Introduction of 3D Modeling using Pro-E/Creo/UG/CATIA software
Practical 12 Hrs Theory 6 Hrs	Apply knowledge of Nano-technology for new product development.	141. Conduct Workshop for application of Nano technique in product manufacturing.	Nano composites Nono coating Surface biocides Active packaging Intelligent packaging Bio plastics
Practical 25 Hrs Theory 12 Hrs	Organize a seminar on certification and standards for plastic processing plants.	142. Organise Seminar on certifications and standards used in Plastic processing industries.	Basic knowledge of various standards and certification used in plastic processing industries (ISO, FSSAI,ASTM, DNV,NSF,GRS)
Engineering Drawing: 40 Hrs.			
Professional Knowledge ED- 40 Hrs.	Read and apply engineering drawing for different application in the	**Engineering Drawing:** • Readingofdrawingof nuts,bolt,screwthread,differenttypesoflockingdevicese.g., Doublenut,Castlenut,Pin,etc. • Readingoffoundationdrawing	

	field of work.	• Readingof Rivetsandrivettedjoints,weldedjoints • Reading of drawingof pipesandpipejoints • Reading ofJobDrawing, SectionalView&Assemblyview
WORKSHOP CALCULATION & SCIENCE: 40 Hrs.		
Professional Knowledge WCS- 40 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study.	**<u>WORKSHOP CALCULATION & SCIENCE:</u>** **Friction** Friction - Advantages and disadvantages, Laws of friction, co-efficient of friction, angle of friction, simple problems related to friction Friction - Lubrication Friction - Co- efficient of friction, application and effects of friction in workshop practice **Centre of Gravity** Centre of gravity - Centre of gravity and its practical application **Area of cut out regular surfaces and area of irregular surfaces** Area of cut out regular surfaces - circle, segment and sector of circle Related problems of area of cut out regular surfaces - circle, segment and sector of circle Area of irregular surfaces and application related to shop problems **Elasticity** Elasticity - Elastic, plastic materials, stress, strain and their units and young's modulus Elasticity - Ultimate stress and working stress **Heat Treatment** Heat treatment and advantages Heat treatment - Different heat treatment process – Hardening, tempering, annealing, normalising and case hardening **Estimation and Costing** Estimation and costing - Simple estimation of the requirement of material etc., as applicable to the trade Estimation and costing - Problems on estimation and costing
Project Work		

SYLLABUS FORCORE SKILLS
1. Training Methodology (Common for all trades) (270Hrs + 180Hrs)

Learning outcomes, assessment criteria, syllabus and Tool List of above Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in

7. ASSESSMENT CRITERIA

LEARNING OUTCOME	ASSESSMENT CRITERIA
TRADE TECHNOLOGY	
1. Show discipline and safety compliance in shop floor, hazards, risk and its mitigation. (NOS: CP/N9425)	Demonstrate various Personal Protective / life saving Equipment.
	Observe importance of PPE.
	Select and use Respiratory / Non-respiratory Personal Protective Equipment.
	Identify Cause/evaluate& Control of hazard and risk.
	Explain Dangerous Properties of Chemicals, Dust, Gases, Fumes, Mist, Vapours, Smoke and Aerosols.
	Demonstrate use of protective devices.
	Apply knowledge of various types of fire and use of fire fighting systems.
2. Demonstrate knowledge of basic tools used in plastic processing during workshop induction. (NOS: CP/N9426)	Demonstrate use of various hand tools and equipments in different shops.
	Demonstrate skills in basic engineering practice.
	Demonstrate the hand tools and other instruments.
	Show practical skills in various shops.
	Show measuring skills.
	Demonstrate skills of application oriented task.
3. Illustrate fundamental information of polymeric morphology (Basic polymer science, Polymers, Elastomer, Additives, Compounding Agents). (NOS: CP/N9427)	Analyse in detail the structure and bonding to explain physical and chemical properties.
	Demonstrate available polymeric Granules/ Elastomeric Granules/various Additives.
	Design and engineer new material with desirable properties.
	Explain Chemical bonding and molecular structure and their properties.
	Demonstrate Knowledge of basic polymer.
4. Illustrate plastic properties by testing, analysis and predrying. (NOS: CP/N9428)	Plan preparation of tools/ instruments / equipments for testing.
	Demonstrate MFI Test/Tensile Testing/ Compression Test/ Shear test.
	IllustrateHardness Test/ Melting point Test/ Impact Test/ Cup flow Testing/ Water absorption Testing/ Haze, gloss testing/ Dart impact Testing.
	Conduct tensile/ compressive/ hardness test on universaltesting machine.
	Demonstrate maintenance of log books and records as per requirement.
	Avoid waste, ascertain unused materials and components for disposal.
	Show storage ofunused materials in an environmentally appropriate manner and preparation for disposal.

5. Demonstrate maintenance work for running ability of Processing machines. (NOS: CP/N9429)	Conduct maintenance drive on any of plastic processing machinery.
	Demonstrate various components of panel circuits.
	Carry out maintenance of Pneumatic Valves/ Actuators /output devices.
	Illustrate pneumatic elements/ power components / Pneumatic Systems.
	Demonstrate pneumatic circuits of available plastic processing machines.
	Demonstrate hydraulic circuits of available plastic processing machines.
6. Exhibit good quality of finished product by primary plastic processing techniques. *(A-INJECTION MOULDING, B-COMPRESSION MOULDING, C, BLOW MOULDING, D-FRP E-EXTRUSION) –PLANT LAYOUT, PROCESSING, MACHINERY, GENERAL MAINTENANCE, PRODUCTS, APPLICATION, DEFECTS, TESTING AND QUALITY CONTROL)* (NOS: CP/N9430)	Plan &Recognise tools, instruments and equipments for marking and make this available for use in a timely manner.
	Show starting of water circulation pump and confirm the cooling as required.
	Set the processing temperature as per material used.
	Demonstrate preparation of raw material and feeding it in hopper.
	Select cycle operation mode (hand /semi auto/auto)
	Show Operation of the Injection Mouldingmachine.
	Set the parameters (shotweight, temp., pressure, speed, cooling time)
	Demonstrate production of good quality product and check it.
	Rectify defects, If any.
	Complete logs and records as required.
	Demonstrate shutting down the machine and cleaning the machine area.
	Illustrate loading the mould.
	Select cycle operation mode (hand /semi auto/auto).
	Operate the Compression Moulding machine.
	Set the parameters (as per PLC/microprocessor).
	Demonstrate production of good quality product and check it.
	Rectify defects, If any.
	Demonstrate PM of electrical accessories.
	Illustrate PM of hydraulic components.
	Demonstrate PM of mechanical components.
	Exhibit Trial of machine.
	Show maintenance of log books and records as required.
	Demonstrate unloading of the mould.
	Complete logs and records as required.
	Demonstrate shutting down the machine and cleaning the machine area.
	Plan and recognise tools, instruments and equipments for marking and make this available for use in a timely manner.
	Set the temperature.
	Show preparation of the material (preheat if required)
	Select the operating mode(hand/semiauto)

	Demonstrate production of good quality product as per specification.
	Check accuracy/ correctness of the product.
	Rectify defects, If any.
	Finish the product.
	Complete logs and records as required.
	Demonstrate shutting down the machine.
	Plan &recognise tools, instruments and equipments for marking and make this available for use in a timely manner.
	Demonstrate cleaning the given mould.
	Illustrate preparation of the raw material.
	Demonstrate preparation of laminate.
	Keep for curing.
	Show ejection of the laminate from mould.
	Check and finish the product.
	Demonstrate maintenance of log books and records as required.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
7. Demonstrate good quality of finished product by secondary plastic processing techniques. *(A-THERMOFORMING, B-ROTATIONAL MOULDING, C-COATING, D-CASTING, CALENDARING) –PLANT LAYOUT, PROCESSING, MACHINERY, GENERAL MAINTENANCE, PRODUCTS, APPLICATION, DEFECTS, TESTING AND QUALITY CONTROL) (NOS:* CP/N9431*)*	Plan &Recognise tools, instruments and equipments for marking and make this available for use in a timely manner.
	Set the temperature.
	Set the mould.
	Set the parameters.
	Keep ready ancillary equipments.
	Demonstrate preparation of raw material.
	Operate the thermoformingmachine.
	Finish and trim the product.
	Complete logs and records as required.
	Demonstrate Shutdown of the machine.
	Plan the preventive maintenance as per standards
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal
	Plan &recognise tools, instruments and equipments for marking and make this available for use in a timely manner.
	Set the temperature.
	Set the mould.
	Set the parameters.
	Keep ready ancillary equipments.
	Demonstrate preparationof raw material.
	Illustrate operation of the Rotational Mouldingmachine.
	Finish and trim the product.
	Complete logs and records as required.
	Demonstrate shutdown of the machine.
	Plan the preventive maintenance as per standards.
	Avoid waste, ascertain unused materials and components for

	disposal, store these in an environmentally appropriate manner and prepare for disposal.
8. Illustrate good quality of finished product by Tertiary plastic processing techniques. (CUTTING, DRILLING, BENDING, WELDING) (NOS: CP/N9432)	Ascertain tools and materials for the job and make this available for use in a timely manner.
	Plan work in compliance with standard safety norms.
	Show production of components by observing standard procedure.
	Check the dimensions of the produced components to ensure dimensions are within prescribed limit.
	Avoid waste, ascertain unused materials and components for disposal, store these in an environmentally appropriate manner and prepare for disposal.
	Demonstrate preparation of the job by cutting,Drilling,bending and welding.
9. Exhibit reprocessing of plastics by the help of plastic waste management system. (NOS: CP/N9433)	Check for operation of recycling apparatus like hopper, heaters etc. as per check list provided.
	Fix the desired Die to the recycling machine in order to achieve the desired operation as per work instructions.
	Ensure that the grinded plastic waste are mixed with additives before being fed in to the hopper.
	Ensure that the dimensions of the output product are measured as per the process given in the work.
	Demonstrate feeding of the required operation code in the apparatus for heaters to melt the grinded plastic waste at the pre defined temperature.
	Check list procedure to ensure quality of final product.
	Complete logs and records as required.
	Demonstrate shutdown of the machine.
10. Demonstrate synthesis of polymer by polymer synthesis processes. (NOS: CP/N9434)	Demonstrate the fundamentals types and properties of polymers.
	Apply the step growth polymerization, its kinetics andcrosslinking.
	Apply the chain growth polymerization and it's kinetics.
	Analyze polymerization components of polymers & copolymers,
	Demonstrate running of polymerization reaction in controlled way.
	Apply knowledge of chemistry for analyzing polymerization components
11. Illustrate advance plastic processing techniques. (NOS: CP/N9435)	Demonstrate processing requirement.
	Develop plan for processing.
	Set-up the process parameters and evaluate cycle time.
	Illustrate the processing operations.
	Troubleshoot the problems.
12. Demonstrate packaging of	Demonstrate basic understanding of Plastics Packaging.

product by plastic packaging technology. (NOS: CP/N9436)	Show how Packaging Supply Chain works.
	Illustrate Strengths & Weaknesses of plastic packaging.
	Illustrate Advantages & Disadvantages in plastic packaging.
	Demonstrate Current State of the Plastic Packaging Lifecycle.
13. Exhibit a simple plastic product on designed mould using CAD/CAM software. (NOS: CP/N9437)	Check whether stream line design process achieved.
	Demonstrate product designing made by manufacturing system.
	Illustrate Smaller or larger prototype of mould design by software.
	Show Perfection in 2D and 3D design.
	Realise extent of computer integrated manufacturing.
14. Apply knowledge of Nano-technology for new product development. (NOS: CP/N9438)	Illustrate the concept of Nanoscience and the process to produced new product.
	Show observation level of matter at nanoscale.
	Demonstrate awareness level of challenges in new product development.
	Demonstrate coordination level among trainees.
	Demonstrate Specifics learnt after this modular course.
15. Organize a seminar on certification and standards for plastic processing plants. (NOS: CP/N9439)	Determine criteria & methods to ensure effective &efficient Operation& monitoring of these processes.
	Ensure the availability of resources & information.
	Organize and assist internal and external Audits.
	Issue and control industrial Manuals.
	Liaison with external bodies like Consulting Organization & Certification Bodies.
	Ensure conformity of Quality, Environmental& food safety Management System.
16. Read and apply engineering drawing for different application in the field of work. (NOS: ASC/N9410)	Read & interpret the information on drawings and apply in executing practical work.
	Read &analyze the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
17. Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: ASC/N9411)	Solve different mathematical problems
	Explain concept of basic science related to the field of study

8. INFRASTRUCTURE

LIST OF TOOLS AND EQUIPMENT			
PLASTIC PROCESSING OPERATOR (For batch of 20 candidates)			
S No.	**Name of the Tools & Equipment**	**Specification**	**Qty**
A. TRAINEES TOOL KIT			
1.	Calliper	Inside Spring - 150 mm	5 Nos.
2.	Divider	spring type – 150 mm	5 Nos.
3.	Odd leg calliper	firm joint 0- 150 mm	5 Nos.
4.	Screw Driver	10 X 200 mm	5 Nos.
5.	File card		2 Nos.
6.	Hammer	Ball Peen - 500 grams	5 Nos.
7.	Steel Rule	300 mm, Graduated both in Metric and English Unit	5 Nos.
8.	Engineer's Square	150 mm Blade	5 Nos.
9.	Hacksaw Frame - Adjustable	300 mm	5 Nos.
10.	Centre Punch	Diameter - 10 mm and Length - 100 mm	5 Nos.
11.	File - Flat - Bastard	300 mm	5 Nos.
12.	File - Flat - Second Cut	250 mm	5 Nos.
13.	File - Flat - Safe Edge	200 mm	5 Nos.
14.	File - Triangular	Smooth - 200 mm	5 Nos.
B. INSTRUMENTS AND GENERAL SHOP OUTFIT			
15.	Bench Vice	150 mm	5 Nos.
16.	Micrometer - Outside	Digital- 0 - 25 mm	1 Nos.
17.	Vernier Calliper	Digital - 0 - 200 mm	1 Nos.
18.	Surface Plate - Granite	300 x 300 mm with Stand and Cover	1 No.
19.	Drill Twist Set	1.5 mm to 15 mm by 0.5 mm	1 No.
20.	Cooling tower	10TR	1 No.
21.	Vernier Height Gauge	0 - 300 mm with least count = 0.02 mm	1 No.
C. GENERAL MACHINERY			
22.	Hand Drilling Machine	13 mm Electric with Hammer Action	1 Nos.
23.	Test Equipment for plastic –MFI		1 No.
24.	Universal Testing machine for Plastic		1 No.
25.	Impact tester.		1 No.
26.	Plastic scrap grinder		1 No.
27.	Pre heater	12 trays of 25 kgs. Of 20 minutes capacity.	1 No.
28.	Automatic screw type Injection Moulding Machine	with moulds and accessories as required 80 to 85 T capacity	1 No.

		(with PLC controlled)	
29.	Automatic compression moulding machine	with moulds and accessories as required – 100 T capacity (with Microprocessor/PLC controller)	1 No.
30.	Automatic Extrusion Blow Moulding Machine	with set of moulds and accessories - 1 to 2 liter capacity (with PLC controlled)	1 No.
31.	Extruder of 40 kg/hr. Plasticizing capacity For recyclying	with re-processing die including granulator/cutter for all thermoplastics.	1 No.
32.	Extruderof40 kg/hr. Plasticizing capacity	For single layer Blown film plant including die (18 inch LFW) & accessories.& pipe die (1/2 inch & 1 inch diameter) to process PE & PP.	1 No.
33.	Thermo/Vacuum forming Machine with Mould		1 No.
34.	Rotational moulding Machine with Mould		1 No.
35.	Strech Blow Moulding Machine- 1 liter with mould		1 No.
36.	Air compressor with air treatment accessories 5 HP		1 No.
D. FURNITURE			
37.	White Board with Stand		1 No.
38.	Discussion Table/ Working Table = L:W:H = 8:4:3 Feet - Heavy Wooden Top		1 No.
39.	Instructor/ Office Chair		2 Nos.
40.	Instructor/ Office Table		1 No.
41.	Notice Board	2 x 3 Feet	1 No.
42.	Steel Almirah	Large	2 Nos.
43.	Steel Locker	12 Pigeon Hole	2 Nos.
44.	Steel Rack		1 No.
45.	Steel Stool	Height 450 mm	20 Nos.

Note: -

1. Internet facility is desired to be provided in the class room.

2. Advance module will be implemented primarily with guest faculty, lectures


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