NATIONAL SKILL QUALIFICATION FRAME WORK (NSQF)
QUALIFICATION FILE

SYLLABUS & CURRICULUM

DIPLOMA IN PLASTIC MOULD TECHNOLOGY (DPMT)

Implemented from Academic Year: 2018-19

Academic Cell
Central Institute of Plastics Engineering & Technology
(Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India)
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NATIONAL SKILL QUALIFICATION FRAMEWORK QUALIFICATION FILE

Version -: Draft of Syllabus for Diploma in Plastics Mold Technology (DPMT)

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Name and address of submitting body:

Central Institute of Plastics Engineering and Technology (CIPET), Ministry of Chemicals and Fertilizers, Department of Chemicals and Petrochemicals, Govt. of India, Head Office, Guindy, Chennai

Name and contact details of individual dealing with the submission

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List of documents submitted in support of the Qualifications File

1. Curriculum/ Syllabus
2. Evaluation (Marking)Scheme
3. Training Delivery Plan
4. Criteria for Assessment of Trainees

1. SUMMARY

Qualification Title	**Diploma in Plastic Mould Technology (DPMT)**
Qualification Code	**CIPET/DPMT/01**
Nature and purpose of the qualification	**Nature:** Diploma Course **Purpose:** Learners who attain this qualification are competent in understanding various mold parts, materials, mould steel & manufacturing & assembling of moulds. Qualifying learners attain skills to work in Tool room department to carry out machining of Mould parts, CNC machining & Inspection.
Body/bodies which will award the qualification	**Central Institute of Plastics Engineering & Technology (Dept. of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers)**
Body which will accredit providers to offer courses leading to the	**Central Institute of Plastics Engineering & Technology (Dept. of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers)**
Body/bodies which will carry out assessment of learners	**Academic Cell of Central Institute of Plastics Engineering & Technology**
Occupation(s) to which the qualification gives	**Mould maker or mould maintenance or CNC machinist**
Licensing requirements	**Not Applicable**
Level of the qualification in the NSQF	**Level 5**
Anticipated volume of training/learning required to complete the qualification	**3240 Hours in 6 Semesters with the duration of 03 years**.
Entry requirements and / or recommendations	**10th Standard Pass** **{Minimum marks percentage (all subjects together): 35%}**
Progression from the qualification	**Job Progression:** This qualification helps the trainee to work as mould makers and able to operate the machines used in the field of Mould manufacturing, able to programme and operate CNC Turning and CNC Milling & as Mould maintenance technician. Later using the experience in this profession, they can get good opportunities to work as CNC programmer or supervisor in above sector with better positions. They can also become entrepreneurs After completion of DPT course, the candidate can also take lateral entry in 2nd Year B.E. / B. Tech. in Chemical, Production and Mechanical discipline.
Planned arrangements for the Recognition of Prior learning (RPL)	RPL arrangements are being developed and will be informed in due course of time.
International comparability where known	**Not Known**
Date of planned review of the qualification.	**January 2018**

SEMESTER-I

Theory							
S. No.	Subject	CH	TH	EH	Marks INT	Marks EXT	Marks TOTAL
MMT 101	Communication English-I	43	11	03	40	60	100
MMT 102	Workshop Mathematics	43	11	03	40	60	100
MMT 103	Engineering Physics	43	11	03	40	60	100
MMT 104	Electrical & Electronics Engineering	43	11	03	40	60	100
MMT 105	Environmental Sciences	43	11	03	40	60	100
(18 weeks- 15 hrs a week)		215	55	15	200	300	500
		270					
Practical Work							
MMTL 101	Engineering Physics Lab (18 weeks- 3 hrs a week)	54		04	50	50	100
MMTL 102	Electrical & Electronics Lab (18 weeks- 3 hrs a week)	54		04	50	50	100
MMTL 103	Workshop Practice (18 weeks- 8 hrs a week)	144		08	100	100	200
	Library – (20 weeks 4 hrs a week) (18 weeks- 1 hr a week)	18		--	-	-	-
Total Hours (18 weeks- 15 hrs a week)		270		16	200	200	400

SEMSETER -II

Theory							
S. No.	Subject	CH	TH	EH	Marks INT	Marks EXT	Marks TOTAL
MMT 201	Communication English – II	43	11	03	40	60	100
MMT 202	Engineering Mathematics	43	11	03	40	60	100
MMT 203	Engineering Chemistry	43	11	03	40	60	100
MMT 204	Computer & Information Technology	43	11	03	40	60	100
MMT 205	Development of Life Skills	43	11	03	40	60	100
Total Theory Hours (18 weeks- 15 hrs a week)		215	55	15	200	300	500
		270					
Practical Work							
MMTL 201	Engineering Chemistry Lab (18 weeks- 3 hrs a week)	54		04	50	50	100
MMTL 202	Communication Lab (18 weeks- 4 hrs a week)	72		04	50	50	100
MMTL 203	Computer Engineering Lab (18 weeks- 7 hrs a week)	126		08	100	100	200
	Library – (18 weeks- 1 hr a week)	18		-	-	-	-
Total (18 weeks- 15 hrs a week)		270		16	200	200	400

SEMESTER-III

Theory							
S. No.	Subject	CH	TH	EH	Marks		
					INT	EXT	TOTAL
MMT 301	Applied Mechanics & Strength of Materials	43	11	03	40	60	100
MMT 302	Engineering Metrology	43	11	03	40	60	100
MMT 303	Machine Shop Technology-I	43	11	03	40	60	100
MMT 304	Engineering Drawing	43	11	03	40	60	100
MMT 305	Plastics Materials & Testing	43	11	03	40	60	100
(18 weeks- 15 hrs a week)		215	55	15	200	300	500
		270					
Practical Work							
MMTL 301	Machine Shop Practice-I (18 weeks- 8 hrs a week)	144		08	100	100	200
MMTL 302	Engineering Drawing Lab (18 weeks- 3 hrs a week)	54		04	50	50	100
MMTL 303	Plastics Testing Lab (18 weeks- 3 hrs a week)	54		04	50	50	100
	Library – (20 weeks 4 hrs a week) (18 weeks- 1 hr a week)	18		--	-	-	-
Total Hours (18 weeks- 15 hrs a week)		270		16	200	200	400

SEMSETER -IV

Theory							
S. No.	Subject	CH	TH	EH	Marks		
					INT	EXT	TOTAL
MMT 401	Engineering Materials & Heat Treatment	43	11	03	40	60	100
MMT 402	Plastics Product & Mould Design	43	11	03	40	60	100
MMT 403	Machine Shop Technology-II	43	11	03	40	60	100
MMT 404	Plastics Processing Techniques	43	11	03	40	60	100
Total Theory Hours (18 weeks- 15 hrs a week)		172	44	15	160	240	400
		216					
Practical Work							
MMTL 401	Machine Shop Practice-II (18 weeks- 10 hrs a week)	180		08	100	200	300
MMTL 402	Plastics Processing Lab (18 weeks- 4 hrs a week)	72		04	50	50	100
MMTL 403	CAD Lab-I (18 weeks- 3 hrs a week)	54		04	50	50	100
	Library – (18 weeks- 1 hr a week)	18		-	-	-	-
Total (18 weeks- 18 hrs a week)		324		16	200	300	500

SEMESTER-V

Theory							
S. No.	Subject	CH	TH	EH	Marks		
					INT	EXT	TOTAL
MMT 501	CNC Machining Techniques	43	11	03	40	60	100
MMT 502	Mould Manufacturing Technology	43	11	03	40	60	100
MMT 503	Process Planning & Cost Estimation	43	11	03	40	60	100
MMT 504	Industrial Management & Entrepreneurship	43	11	03	40	60	100
(18 weeks- 15 hrs a week)		172	44	15	160	240	400
		216					
Practical Work							
MMTL 501	Mould Manufacturing Practice-I (18 weeks- 8 hrs a week)	144		08	100	200	300
MMTL 502	CAM & CNC Lab (18 weeks- 6 hrs a week)	108		04	50	50	100
MMTL 503	CAD Lab-II (18 weeks- 3 hrs a week)	54		04	50	50	100
	Library (18 weeks- 1 hr a week)	18		--	-	-	-
Total Hours (18 weeks- 18 hrs a week)		324		16	200	300	500

SEMSETER –VI

S. No.	Subject	CH	TH	EH	Marks		
					INT	EXT	TOTAL
MMTP	Project Work/ In plant training in industry **	540	-	-		-	-
Total Hours (18 weeks 30 hours per week)		540	-		-	-	-
MMTP 601	Project Evaluation & Viva voce	-	-	8	400	400	800
MMTP 602	Industrial Training Report	-	-		100		100
	Total	540	-		1000		900

** Minimum of 6 weeks

CH-Contact Hours TH- Tutorial Hours EH-Examination Hours

Formal Structure of the Qualifications :

Sl. No	Title & Identification code of Components	Mandatory / Optional	Estimated size (Learning hours)	Level
	I Semester			
1.	Communication English-I	Mandatory	54	
2.	Workshop Mathematics	Mandatory	54	
3.	Engineering Physics	Mandatory	54	
4.	Electrical and Electronics Engineering	Mandatory	54	
5.	Environmental Sciences	Mandatory	54	
6	Engineering Physics Lab	Mandatory	54	
7	Electrical and Electronics Engineering Lab	Mandatory	54	
8	Workshop Practice	Mandatory	144	
	II Semester			
1.	Communication English-II	Mandatory	54	
2.	Engineering Mathematics	Mandatory	54	
3.	Engineering Chemistry	Mandatory	54	
4.	Computer & Information Technology	Mandatory	54	
5	Development of Life Skills	Mandatory	54	
6.	Engineering Chemistry Lab	Mandatory	54	
7.	Communication Lab	Mandatory	72	
8.	Computer Engineering Lab	Mandatory	126	
	III Semester			
1.	Applied Mechanics & Strength of Materials	Mandatory	54	
2.	Engineering Metrology	Mandatory	54	
3.	Machine Shop Technology-I	Mandatory	54	
4	Engineering Drawing	Mandatory	54	
5.	Plastics Materials & Testing	Mandatory	54	
6.	Machine Shop Practice-I	Mandatory	144	
7.	Engineering Drawing Lab	Mandatory	54	
8.	Plastics Testing Lab	Mandatory	54	
	IV Semester			
1.	Engineering Materials & Heat Treatment	Mandatory	54	
2.	Plastics Product & Mould Design	Mandatory	54	
3.	Machine Shop Technology-II	Mandatory	54	
4.	Plastics Processing Techniques	Mandatory	54	
5.	Machine Shop Practice – II	Mandatory	180	
6.	Plastics Processing Lab	Mandatory	72	
7.	CAD Lab-I	Mandatory	54	

V Semester				
1.	CNC Machining Techniques	Mandatory	54	
2.	Mould Manufacturing Technology	Mandatory	54	
3.	Process Planning and Cost Estimation	Mandatory	54	
4.	Industrial Management and Entrepreneurship	Mandatory	54	
5.	Mould Manufacturing Practice	Mandatory	144	
6.	CAM & CNC Lab	Mandatory	108	
7.	CAD Lab-II	Mandatory	54	
VI Semester				
1	Project work	Mandatory	540	

SECTION 1

ASSESSMENT

Body/Bodies which will carry out assessment:

Academic Cell, CIPET Head Office, Chennai

How will RPL assessment be managed and who will carry it out?

YES. Learners who have met the requirements of any Unit Standard that forms part of this qualification may apply for recognition of prior learning to the relevant Education body. The applicant must be assessed against the specific outcomes and with the assessment criteria for the relevant Unit Standards.

Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.

1. ASSESSMENT GUIDELINE:

- Criteria for assessment based on each learning outcomes, will be assigned marks proportional to its importance.
- The assessment for the theory & practical part is based on knowledge bank of questions created by trainers and approved by Examination cell (CIPET)
- For each Individual batch, Examination cell will create unique question papers for theory part as well as practical for each candidate at each examination.
- To pass the Qualification, every trainee should score a minimum of 40% in each Theory and 50% in Practical subject.
- Assessment comprises the following components:
  > Job carried out in labs/workshop
  > Record book/ daily diary
  > Answer sheet of assessment
  > Viva –voce
  > Progress chart
  > Attendance and punctuality

2. ASSESSORS:

   CIPET faculty teaching the Diploma in Plastic mould Technology course, also assesses the students as per guidelines set by Academic cell of CIPET. Faculties are been trained from time to time to upgrade their skills on various aspects such as conduction of assessments, teaching methodology etc.

3. ELIGIBILITY TO APPEAR IN THE EXAM:

   Minimum 80% attendance is compulsory for the students to appear for the assessments.

4. MARKING SCHEME:

   Please refer Annexure - I for marking / evaluation scheme.

5. PASSING MARKS:

Passing criteria is based on marks obtain in attendance record, term work, assignments, performance in practical, viva or oral exam, module test, class test, practical exam and final exam
Minimum Marks to pass theory exam – 40% Minimum Marks to pass practical exam – 50%
Minimum Marks to pass final practical exam – 50% Minimum Marks to class test – 40%
Minimum Marks to pass viva / oral exam – 50%
Minimum Marks to pass Project report and presentation exam – 50%

6. RESULTS AND CERTIFICATION:

The assessment results are backed by evidences collected by assessors. Successful trainees are awarded the certificates by CIPET

ASSESSMENT EVIDENCE

ASSESSMENT EVIDENCE

- Assessment evidence comprises the following components document in the form of records: Job carried out in labs/workshop
- Internal assessment book for both Theory and Practical subjects
- Theory & Practical Examination – Answer Sheet
- Answer sheet of assessment Viva –voce
- Progress chart
- Attendance and punctuality

Title of Component		Diploma in Plastic Mould Technology	
S No	**Outcomes to be assessed**	**Assessment criteria for the outcome**	**No. of Hours**
1	**Communication English-I** *(Describes key types of communication and common road blocks to communication, as well as how to use effective communication as a tool)*	1.1 Understanding parts of Speech, tenses. 1.2 Understanding visual charts 1.3 Read and interpret information correctly. 1.4 Write and read essay and letters for communication purpose. 1.5 Answering the verbal questions, dialogues writing and note making etc.	
2	**Workshop Mathematics** *(Describes basic elementary mathematics, trigonometric, binomial theorem, complex numbers and analytical geometry to understand simple quadratic equations, trigonometric angles pair of straight line and equation circles to solve simple problems)*	2.1 Understating of simple fraction, addition, subtraction, multiplication, percentage and quadratic equation. 2.2 Find unknown angles in any triangles, trigonometric ratios of multiple angles (2A & 3A) and problem solving the expansions. 2.3 Remember the formula for the Binomial Theorem according to the equations. 2.4 Understand pair of line passes through origin using second degree equations – simple problems. 2.5 Illustrate and name the parts of a circle, radius, diameter & circumference and using General equations of a Circle able to find center, radius and equation of the circle. 2.6 Can use Trigonometric ratio and its table. Sine & cosine rule, Solutions of triangle, compound angles and multiple angles –able to solve simple problems	
3	**Engineering Physics** *(Overview of key concepts of units, dynamics, force, motion, elasticity, surface tension, temperature measurement and light)*	3.1 To understand different systems of units & dimensions, dimensional formula and derivation of expression of period of simple pendulum. 3.2 Knowledge on scalar & vector qualities. 3.3 Ability to understand different types of Forces and motion including linear angular circular and parabolic motions. 3.4 Knowledge on elasticity & its related modulus. 3.5 Understanding the properties of surface tension & viscosity. 3.6 Modes of heat transfer & their examples. 3.7 Understanding of applications of optics using basic fundamentals of Physics. 3.8 Understand working principle of a LASER, components and working of different laser system and their engineering applications.	
4	**Electrical and Electronics Engineering** *(Overview of concept of AC & DC Current, DC generator & Motor, transformer, single phase capacitor, servo motor, and basic electronics and logical gates)*	4.1 Describe the characteristics of AC & DC circuits. 4.2 Describe how generators use magnetic induction. 4.3 Describe the DC generator, DC Motor & its construction, principle of operation, types & its Applications 4.4 Distinguish between single and three-phase power. 4.5 Describe voltage transformers. 4.6 Describe the basic types of transformer cores. 4.7 Describe transformer connections. 4.8 Describe common power distribution systems. 4.9 Describe the process of converting AC to DC. 4.10 Describe ways to reduce electrical safety risks. 4.11 Describe semiconductor materials 4.12 Describe the basic electronic & logic gates and their	

		basic applications	
5	**Environmental Science** *(Overview of basic environmental science, natural resources, environmental pollution, social issues and environmental protection)*	5.1 Scope and importance of environmental science, effect human of activities on environment 5.2 Know the concept of eco system, structure and function. 5.3 Awareness about natural resources, forest resources, exploitation, deforestation 5.4 Awareness about water resources, food resources, mineral resources land resources and energy resources. 5.5 Awareness about environmental pollution such as air, water, land, thermal, and water conservation, global warming, ozone layer depletion. 5.6 Knowledge about environmental protection acts and disaster management system types and policy.	
6	**Engineering Physics Lab** *(The experiments start with an initial discussion with a demonstrator about the physics involved, the aim of the experiment, and the experimental method. For this reason it is essential that students prepare for the experiment in advance. The student is not allowed to start the experiment until a satisfactory discussion has taken place.)*	6.1 Determination of thickness of a metal wire using screw gauge 6.2 Determination of diameter of a cylindrical bar using vernier Caliper 6.3 Determination of time period of simple pendulum. 6.4 Experiment to verify Hooke's law 6.5 Experiment to verify Lami's law 6.6 Determination of focal length of convex lens 6.7 Determination of focal length of concave lens 6.8 Determination of Young's modulus using non-uniform bending method 6.9 Determination of moment of inertia and rigidity modulus using torsional pendulum **6.10 Thermal conductivity of bad conductor by Lee's disc method** **6.11 Viscosity of given liquid by Stroke's method.**	04 Hours 04 Hours 06 Hours 04 Hours 04 Hours 04 Hours 04 Hours 06 Hours 06 Hours 08 Hours 04 Hours
7	**Electrical and Electronics Engineering Lab** *(Understands and handling of electrical equipment, electronic measurements which helps the trainees for basic maintenance of shop floor)*	A - Electrical Engineering Lab: 7..1A Study of measuring instruments – Ammeter – Volt meter – Watt meter etc. 7..2A Determination of unknown resistance by Ohm's law. 7..3A Energy measurement in a single phase circuit using lamp Load. 7..4A Power measurement in a single phase circuit. 7..5A Load test on a single phase transformer. 7..6A Load test on a single phase induction motor. 7..7A Verification of series and parallel circuit. 7..8A Study of DC & AC machine starters. B - Electronics Engineering Lab : 7..1B Characteristics of PN junction diode. 7..2B Characteristics of transistor. 7.3B Construction of bridge rectifier. 7.4B Verification of Logic gates. 7.5B Character tics of Photo Diode, LED and thermistor & Zener diode. 7.6B Measurement using CRO and Megger. 7.7B Study of microprocessor, microcontroller & drives.	**[27 Hours]** 02 Hours 03 Hours 03 Hours 03 Hours 04 Hours 04 Hours 04 Hours 04 Hours **[27 Hours]** 04 Hours 04 Hours 04 Hours 04 Hours 04 Hours 03 Hours 04 Hours
8	**Workshop practice** *(Familiarization and practice on workshop tools and instruments used for fitting practice.)*	8.1 Familiarization of Workshop Tools 8.2 State the purpose / use of Hand tools, marking tools 8.3 Explain the purpose of Holding tools, cutting and striking tools 8.4 Study and Practice on Measuring	08 Hours 10 Hours 10 Hours 10 Hours

		Instruments/Equipment 8.5 Filing and Fitting Practice 8.6 Pedestal grinding 8.7 Safety precautions – Sharpening of cutting tools - single point, knife tools, Form tools.	 72 Hours 10 Hours 24 Hours
9	**Communication English-II** *(Describes key types of communication and common roadblocks to communication, as well as how to use effective communication as a tool)*	9.1 Understand homophones, homonyms, articles and compound words, dialogue writing, question tags, vocabulary learning 9.2 Learn to write simple and complex sentences. 9.3 Understand Active and Passive voices 9.4 Usage of Idioms and phrases. 9.5 Knowledge of Synonyms and Antonyms. 9.6 Write and read process chart and Technical letters. 9.7 Ensure communicate with people in respectful form and manner in line with organizational protocol. 9.8 Finding out common errors in a sentence & corrections. 9.9 Knowledge on filling up of forms and writing technical report.	
10	**Engineering Mathematics** *(Describes basic types of analytical and trigonometric function as well as calculus and integration and its application. Helps them to understand Probability and statistics to solve simple problems)*	10.1 Recognize all the types of matrices. 10.2 Using matrix algebra and determinants able to solve up to third order of Simultaneous equations using Cramer's rule. 10.3 Remember the formula for the Binomial Theorem according to the equations. 10.4 Investigate what it is happening geometrically when z is multiplied by i to get iz 10.5 Understand the properties of the Cartesian representation of a complex number, how to draw an Argand diagram, De Moivre's theorems. - Simple problems 10.6 Competence in calculating derivatives, integrals, using vectors and other tools fundamental to multivariable calculus. 10.7 Understand the behavior of multivariable functions graphically. And analytically, by examining level surfaces, partial derivatives, etc. 10.8 Apply probability concepts, using relational thinking, in solving problems involves: selecting and carrying out a logical sequence of steps, connecting different concepts or representations demonstrating understanding the concepts of and also relating findings to a context or communicating thinking using appropriate statements. 10.9 Ability to apply techniques of calculus to set up and solve problems involving product rule, successive differentiation & formation of differential equation up to second order. 10.10 Describe 2D, 3D shapes using given dimensions & angle.	
11	**Engineering Chemistry** *(Overview of key concepts of Chemistry. To provide the students with a fundamental understanding of structure*	11.1 Able to understand basic concepts of atomic structure and chemical bonding and electronic configuration. 11.2 Knowledge on acid, bases, solutions & electro chemistry. 11.3 To acquire knowledge about water chemistry. 11.4 To provide an overview of preparation and	

	& bonding, organic chemistry, water chemistry, organic chemistry and fuels, Electro chemistry) basic concepts of thermodynamics)	identification of organic compounds. 11.5 Understand different types of fuels & its extractions. 11.6 Knowledge on electro chemistry & its application 11.7 Understand basic concepts and terms of thermodynamics, processes, Heat & work concept with expressions.	
12	**Computer & Information Technology** *(Able to use the computer, understand basics of operations and parts operating systems and MS office. Able to make PowerPoint presentation and use Computer communication and internet for daily activities)*	12.1 Describe different parts of computers & its operating systems 12.2 Understanding of windows operating system & its functions. Knowledge on MS office. 12.3 Application of computer & communication for technical Work. 12.4 Power point presentation making 12.5 Computer communication learning like LAN, MAN, WAN, Bluetooth 12.6 Understanding uses of Internet for day to day activities.	
13	**Development of Life Skills** *(Understands importance of ethics, morals and professional values, motivation and teamwork for improving personality)*	13.1 Study of personality development, ethics, moral & professional values and critical thinking. 13.2 Study of time management, stress & conflict management, problem solving and decision making. 13.3 Understanding of Theory of motivation, attitude and aptitude 13.4 Knowing the importance of body languages. 13.5 Discussion of interview techniques and group discussion. 13.6 Importance and necessity of working in a team.	
14	**Engineering Chemistry Lab** *(Understand the basic laboratory techniques and preparation of standard solutions, titration and volumetric analysis)*	14.1 Volumetric Analysis 14.2 Acidimetry – Alkalimetry 14.3 Estimation of Hydrochloric acid 14.4 Estimation of Sulphuric acid 14.5 Estimation of Sodium hydroxide given standard sodium carbonate solution & Hydrochloric acid as a link solution) 14.6 Permanganometry - Estimation of potassium permanganate & Estimation of strength of Oxalic acid 14.7 EDTA Titration - Estimation of total hardness of water for the water sample 14.8 pH Determination using pH meter 14.9 Preparation of Standard Solutions - Preparation of 1N, 0.5N & 0.1N solution of sodium carbonates and Preparation of 1N Solution of oxalic acid.	06 Hours 05 Hours 04 Hours 03 Hours 04 Hours 04 Hours 07 Hours 10 Hours 11 Hours
15	**Communication Lab** *(Learn to communicate-listen, speak, read and write in English-so as to use it as a tool to aid professional advancement)*	15.1 LISTENING practical to develop comprehension 15.2 SPEAKING practical to learn voice modulation and situational conversation/role-playing 15.3 To develop READING comprehension, vocabulary enrichment 15.4 To learn art of writing both official and Business correspondence 15.5 Learn how to participate in group discussions, mock interviews.	10 Hours 15 Hours 15 Hours 20 Hours 12 Hours
16	**Computer Engineering Lab**	16.1 Study of Computer Components 16.2 Practice of Computer Booting Process in XP	08 Hours 10 Hours

	(Demonstration & practice on computers and operating system to train the students on preparation of documents, statements, presentation and creating mail and web search which helps the trainees to work in the organization)	16.3 16.4 16.5 16.6 16.7 16.8 16.9 16.10 16.11 16.12 16.13 16.14 16.15	Demonstration of Windows Environment Practice - using My Computer, Windows Explorer Practice - using Control Panel Practice - My Network Places Practice - CD and DVD Writing Practice - Paint Installation of Windows XP by using NTFS File System. Demonstration of Network Creating e-mail Account, Sending & Receiving e-mails. Searching Web Page/ Site using Search Engine: (eg. google.com, yahoo.com, altavista.com etc Exercise Based on MS-Word - Document Preparation, Printing Document, Mail Merge usage, Draw Table. Exercise Based on Ms-Excel - Work Book Preparation, Printing Workbook, Data-base usage, Draw Charts. Exercise Based on Power Point - Creating Slide, Adding, Animations in Slide, Presentation	04 Hours 10 Hours 06 Hours 06 Hours 04 Hours 06 Hours 12 Hours 04 Hours 08 Hours 06 Hours 14 Hours 14 Hours 14 Hours
17	**Applied Mechanics & Strength of Materials** *(Understand basics of forces, moment of inertia and center of gravity. Knowledge on stress and bending moments)*	17.1 17.2 17.3 17.4 17.5 17.6 17.7 17.8 17.9 17.10 17.11	Understand Principles of Equilibrium of Forces Knowledge of Lami's theorem Understand the Converse of the law of triangle of forces, Law of polygon of forces and Conditions of equilibrium. Understand Centroid. Methods of center of gravity of simple figures Knowledge of Centre of gravity by geometrical Understand Moment of Inertia Understand Methods for finding out moment of inertia Knowledge of Types of friction and Laws of friction Knowledge of Simple Lifting Machines Understand Simple Stresses and Strains17.12 Understand Shear Force and Bending Moment and solve simple problems	
18	**Engineering Metrology** *(Describe the function of different Measuring Instrument & Inspection equipment Metrology)*	18.1 18.2 18.3 18.4 18.5 18.6 18.7 18.8 18.9 18.10 18.11 18.12 18.14	State the purpose of metrology, understand errors and their sources Study of limit, fit and tolerances. Understanding geometric dimensioning & tolerances Describe Standards of Measurements Uses of comparators for checking the machined parts. Explain Angular & Taper measurements, Geometrical Measurements. Describe the marking tools Study on different measuring instruments and its applications. Methods of measuring surface finish Knowledge on surface roughness symbols. Inspect the given job using CMM. Use advanced measuring equipment's like profile projector, toolmakers microscope etc, for the measurement. Explain Gauges (standard gauge: feeler gauge, radius gauge, screw pitch gauge etc.)	

		18.15 Explain Taylor's principle for gauge, gauge material, and its application.	
19	**Machine Shop Technology-I** *(Identify and understand the different machining operation involved in manufacturing of metal part and its related functions)*	19.1 Overview of metal cutting theory and chip formation. 19.2 Distinguish between single-point multi-point cutting tools. 19.3 Describe how tool angles affect cutting processes. 19.4 Describe the functions and methods of chip control. 19.5 Describe the occurrence of built-up edge. 19.6 Describe reasons for using cutting fluids. 19.7 Identify the major categories of cutting fluids, cutting variables and their significance 19.8 Explain the parts of lathe 19.9 Draw the sketch of lathe and write the functions of each part 19.10 Identify and demonstrate different parts of lathe. 19.11 Grind the lathe tool by pedestal grinding machine 19.12 Explain lathe operation perform various operations in lathe like turning, facing, grooving, threading, etc. 19.13 Describe the cutting variables for the lathe. 19.14 Understanding different work holding and tool holding Devices. 19.15 Describe the Shaping, Planning & Slotting Machines and working mechanism and its functions 19.16 Describe types of drilling machines 19.17 Describe drill holding devices. 19.18 Describe drill geometry. 19.19 Describe twist drills. 19.20 Identify important components of a drill. 19.21 Understanding different types of boring operation 19.22 Understanding various Drilling operations and specifications of the machine	
20	**Engineering drawing** *(Practicing on the drawing concepts which help them to read different view/sections/projection of solids. Knowledge on assembly and detail drawings of Part.)*	20.1 Explanation of the scope and objective of Engineering Drawing 20.2 Study of drawing standard, size of drawing sheet, layout of drawing sheet. 20.3 Do the drawing with the help of drawing tools like, drawing Board, mini drafter, pencil etc. 20.3 Use scale and put dimension with the help of drawing tools. On different mechanical objects using dimensioning methods. 20.4 Different geometric construction methods 20.5 Practice on Orthographic and isometric views 20.6 Projection of Points, Lines and Planes and solids. 20.7 Different sectional views, development of surfaces 20.8 Understanding perspective projection 20.9 Interpretation of fastening devices while drawing 20.10 Exposure the need of assembly and detailing of machine parts. 20.11 Different types of couplings used for assembly and its uses.	
21	**Plastics Materials & Testing** *(Study on polymers, understands different plastics and its behaviors. Knowledge on Testing of plastics)*	21.1 Introduction to polymers 21.2 Study of fundamental terminology of polymers 21.3 Classification of polymers, polymer structure and Morphology, etc. 21.4 Study Commodity plastics, engineering plastics, specialty plastics, 21.5 Study of thermoset plastics and their behavior.	

		21.6	Introduction & importance of testing	
		21.7	Significance of Identification of plastics	
		21.8	National and International standards - BIS, ASTM, ISO & NABL	
		21.9	Testing of Mechanical, Thermal, Optical, Electrical, Permeability and Rheological properties.	
22	**Machine Shop Practice- I** *(Safety precaution and operation on using Pedestal Grinding Shaper, Drilling Machine, Lathe Work)*	22.1	Pedestal Grinding - Safety precautions, Sharpening of cutting tools- parting and grooving tools, thread cutting Tools.	12Hours
		22.2	Knowledge of Shapers, their applications, set up and Procedures for use.	06 Hours
		22.3	Be able to operate Shaping machine in a safe and competent manner	20 Hours
		22.4	Knowledge of drills and drill, their applications, Maintenance and procedures for use.	06 Hours
		22.5	Understanding of basic principles of Drilling machines	06 Hours
		22.6	Describe principle, construction and working various kinds of drill machines	06 Hours
		22.7	Study of cutting tools and machining operations carried out on Drilling machine	06 Hours
		22.8	Be able to operate Drilling machines in a safe and Competent manner – perform marking and punching, drilling and tapping and reaming, counter-boring and counter sinking operations	20 Hours
		22.9	Knowledge of conventional lathes, their accessories, attachments and applications.	08 Hours
		22.10	Knowledge of lathe tools and their applications.	08 Hours
		22.11	Knowledge of conventional lathes, maintenance and procedures for use.	08 Hours
		22.12	Knowledge of tapers, their attachments and applications.	06Hours
		22.13	Knowledge of conventional lathe drilling, boring, reaming, tapping and threading operations.	08 Hours
		22.14	Be able to operate Lathe machine in a safe and competent manner	24 Hours
23	**Engineering Drawing LAB** *(Practical Exposure on Engineering drawing, study of assembly drawings)*	23.1	Projection of points in different quadrants	02 Hours
		23.2	Projection of straight lines parallel to one or both planes, parallel to one plane, perpendicular to other, inclined to one plane and parallel to other line inclined to both planes (in first quadrant) and finding the true length	06 Hours
		23.3	Projection of planes and polygonal surface – parallel to one plane and perpendicular to other plane (in first quadrant).	06 Hours
		23.4	Projection of simple solids for prism, pyramid, cylinder and cone when the axis is parallel to one plane and perpendicular to other plane in first quadrant	08 Hours
		23.5	Sectioning of solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other, obtaining true shape of section	06 Hours
		23.6	Development of lateral surfaces of simple and truncated solids- prisms, pyramids, cylinders & cones	06 Hours
		23.7	Development of lateral surfaces of solids with cylindrical cut-outs, perpendicular to the axis.	06 Hours

		23.8	Isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones	10 Hours
		23.9	Study of Assembly Drawing	04 Hours
24	**Plastics Testing Lab** *(Understand the standards used and procedure for testing of plastics materials and plastic products)*	24.1	Determination of density of plastics.	06 Hours
		24.2	Determination of melt flow index of plastics.	05 Hours
		24.3	Determination of moisture contents.	03 Hours
		24.4	Determination of carbon contents.	04 Hours
		24.5	Determination of filler content.	04 Hours
		24.6	Identification of plastics by simple methods.	08 Hours
		24.7	Determination of water absorption.	06 Hours
		24.8	Determination of Hardness (Rockwell, Shore A&D, Barcol).	04 Hours
		24.9	Specimen preparation methods.	06 Hours
		24.10	Introduction to product testing - Pipe testing.	08 Hours
25	**Engineering materials and Heat Treatment** *(Overview of key concepts of structure and properties of the metals and alloys. Role of heat treatment to suit specific requirement and testing of the properties for ascertaining)*	25.1	Understanding different structure, Unit cell and calculation of atoms/Coordination number/packing factor	
		25.2	Describe different types of cast iron and steel application in Engineering field. Identify cast iron, steel, and alloys steel as-per their uses.	
		25.3	Select nonferrous metals and understand their uses	
		25.4	Study of nonferrous alloys and its applications	
		25.5	Describe phase transformation stages in iron with respect to the temperature and effect of heat treatment on properties of iron.	
		25.6	Draw the iron-carbon equilibrium and TTT diagram and explain briefly the effect of temperature on microstructure of steel and iron.	
		25.7	Explain different types of microstructure with neat sketch.	
		25.8	Explain the significance of heat treatment in the Manufacturing process.	
		25.9	Explain the different types of heat treatment process.	
		25.10	Study on Advanced Heat treatment techniques	
		25.11	escribe Mechanical Properties and its Testing	
26	**Plastics Product and Mould Design** *(Describe the concepts product design for plastic parts. Study of various mold designs based on materials and applications)*	26.1	Knowledge of product design features and its application while designing for plastic parts.	
		26.2	To study injection mold machine specification	
		26.3	General injection mold construction and its design features	
		26.4	Exposure on different mold parts and its functions	
		26.5	Study of external undercut molds, spilt molds, cam track molds	
		26.6	Study of internal undercut-form pin-collapsible core - loose cores, threaded inserts - internal and external threads	
		26.7	Describe the blow mold and extrusion die design & its considerations	
		26.8	Understanding Compression and transfer mold design and Its considerations.	
27	**Machine Shop Technology-II** *(Role of milling machines and Grinding machines on shop floor)*	27.1	Identifying milling machine parts, cutters and work holding/tool holding devices and their purposes	
		27.2	Cutting parameters	
		27.3	Study on different milling operation	
		27.4	Different milling methods and its applications	

		27.5 Knowledge on coolants and lubricants used 27.6 Maintenance and Safety precaution while working on the machine 27.7 Identifying surface grinding parts, Types of Grinding and working principle 27.8 Selection of grinding wheels 27.9 Knowledge on balancing, glazing and loading of wheels 27.10 Speed and feed parameters 27.11 Study on attachments used 27.12 Maintenance and Safety precaution while working on the machine 27.13 Identifying surface and cylindrical grinding parts, Types and working principle 27.14 Selection of grinding wheels and its shapes/ sizes for different operations 27.15 Knowledge on balancing, glazing and loading of wheels 27.16 Speed and feed parameters 27.17 Study on attachments used 27.18 Maintenance and Safety precaution while working on the machine 27.19 Identifying Pedestal and Tool and cutter grinding machine parts, Types and working principle 27.20 Selection of grinding wheels for different materials 27.21 Knowledge on single and multi-point cutter and drill bits 27.22 Study on accessories and attachments used 27.23 Maintenance and Safety precaution while working on the machine	
28	**Plastics Processing Techniques** *(Study of different processing method, understands related operations, monitor process parameters and troubleshoot the process/product)*	28.1 Introduction to Injection Molding – machine specifications - parts and their functions. 28.2 Process variables. Influence of processing parameters on the quality of the moulding - Setting of moulding conditions for a particular job 28.3 Causes & remedies of common moulding faults. 28.4 Operator safety aspects and routine quality control involved Safety procedures to be adopted to complete mould removal process 28.5 Introduction to advanced injection molding - gas assisted, reaction injection and multi-colour 28.6 Knowledge of Blow Molding –types, parison programming, setting and operation –quality control and operator safety 28.7 Knowledge of Extrusion process- machine parts and their functions 28.8 Study of processing parameters and their effect on product quality 28.9 Understanding of Causes and remedies of the common extrusion faults 28.10 Knowledge of film, pipe, sheet, profile and coating-dies for different processes, process control systems-process variables- quality control and operator safety 28.11 Knowledge of Compression And Transfer Molding Process – principles- effect of molding pressure, mold temperature, defects and their causes- quality control 28.12 Knowledge of Thermoforming methods,	

			Thermoforming moulds, Thermoforming equipment description	
		28.13	Rotational moulding working principle, process requirement for the moulding - water tank, Dust Bin, faults and remedies, operator safety	
		28.14	Automation – use of robots in part handling, application of robotics in molding process, material handling, conveying	
		28.15	Introduction to Secondary processes – electroplating, various printing techniques, and different welding techniques	
29	**Machine Shop Practice-II** *(Demonstration and Practice on Milling/Grinding/Lathe machines to acquire skill on operation of Tool room machines)*	29.1	Knowledge of milling machines and their parts and accessories, Attachments and applications.	06 Hours
		29.2	Knowledge of milling cutting tools and tool holding devices	06 Hours
		29.3	Understand safety precautions	04 Hours
		29.4	Learn to do Plain surface milling, slot –plain and angular milling	06 Hours
		29.5	Learn to do different types of milling -Pocket, Indexing and rotary.	06 Hours
		29.6	Be able to operate Milling machines in a safe and competent manner.	26 Hours
		29.7	Knowledge of Surface grinders, work holding device, grinding wheels and their set up, maintenance and procedures for use.	06 Hours
		29.8	Types of surface grinders and accessories used for surface grinding operations and describe their applications	06 Hours
		29.9	Considerations used to determine feed, speed and depth of Cut for grinding operations.	04 Hours
		29.10	Procedures used to set up grinders and align the work piece	06 Hours
		29.11	Demonstrate ability to do plain surface, slot, angular surface and form grinding	18 Hours
		29.12	Demonstrate knowledge of cylindrical grinders, , work holding device, grinding wheels and their set up, maintenance and procedures for use.	06Hours
		29.13	Ability to operate cylindrical Grinding machines to produce precision parts by executing different types of grinding operations	14 Hours
		29.14	Be able to operate Cylindrical Grinding machine in a safe and competent manner.	12 Hours
		29.15	Demonstrate knowledge of Tool and cutter grinders, their set up procedures for use.	06 Hours
		29.16	Ability to operate Grinding of single point, Form Tool, Drill, Reamer and Milling Cutters.	18Hours
		29.17	Ability to operate lathe machines to produce precision mold parts – guide pillar and bush, sprue bush, support pillar and bush, ejector pins and push back pins	30 Hours
30	**Plastics Processing Lab** *(Demonstration and practice on various plastic processing machine operation and its maintenance)*	30.1	Familiarization with basic concepts, job requirements & Basic related process.	08 Hours
		30.2	To know safety precautions to be taken on the shop floor	06 Hours
		30.3	Knowledge of semi-automatic injection molding machine parts and their functions	06 Hours
		30.4	Operate semi-automatic injection molding machine	18 Hours

		both pneumatic and hydraulic types	
		30.5 Demonstrate ability to determine cycle time and adjust process parameters	06 Hours
		30.6 Knowledge of automatic injection molding machine parts and their functions – clamping system, locating ring, machine daylight, dimensions, ejector stroke, tie-bar distance etc.	06 Hours
		30.7 Understanding of process parameters and study of controls in machines	04 Hours
		30.8 Knowledge of semi-automatic and automatic blow molding machine parts and their functions	04 Hours
		30.9 Operate semi-automatic and automatic blow molding machines, familiar with control switches, cycle-time analysis.	18 Hours
		30.10 Knowledge of compression and transfer molding machine parts and their functions	05 Hours
		30.11 Demonstrate ability to perform compression an d transfer molding	03 Hours
		30.12 Knowledge of extruder machine parts and their functions	04 Hours
		30.13 Operate the extrusion machine & its trouble shooting	18 Hours
		30.14 Have basic knowledge of maintenance – hydraulic and pneumatic systems-viscosity, directional valves, hydraulic pump- types and functions, electrical system, electrical heating systems, timers and motors	06 Hours
31	**CAD Lab I** *(Hands on experience on using AutoCAD software to draw product and mold design)*	31.1 Basic knowledge of Computer Aided Drafting and its advantages over manual drafting, Hardware and Software requirements	02 Hours
		31.2 Understanding CAD basics –main menu, starting a new drawing, drawing editor, entering commands using mouse, pull down menu, getting help, data entry, entity selection, error correction.	12 Hours
		31.3 Develop ability to use CAD- Set limits of Drawing, grid, snap, co-ordinates, orthomode, zooming, drawing lines, arcs, circles, erase, undo, oops – commands, save and end commands- Editing,	12 Hours
		31.4 Ability to add dimensions and text, Edit drawings using various modified commands.	06 Hours
		31.5 Ability to add dimensions and text on drawings, copy, mirror, array, fillet, chamfer, hatching the sectional views.	08 Hours
		31.6 Demonstrate ability to Develop simple orthographic views and dimension it with text.	08 Hours
		31.7 Demonstrate ability to Develop detailed orthographic views with all features.	06 Hours
32	**CNC Machining Techniques** *(Understanding on manufacturing molds using CNC machines)*	32.1 Understanding Basic components NC machine and its evolution	
		32.2 CNC machine tools – Principles, open loop and closed control system,	
		32.3 Structural configuration of CNC machines	
		32.4 Knowledge on DNC and its components	
		32.5 Knowledge on CNC machines – Programming – Controls -G & M Codes, CAM programming, manufacturing of mold elements with CAD.CAM – CNC controls	
		32.6 Study of CNC machining Centres –classification-parts and operations	

		32.7 Concept of 3, 4 and 5 axis machines 32.8 Study of CNC milling operation –simple programming, cutting tools, work holding devices, work piece alignment and datum setting. Applications in mold making 32.9 Study of CNC turning Centre classification-parts and operations- concept of 2-axis- simple programming- cutting tools, work holding devices, work piece alignment and datum setting, Applications in mold making 32.10 Knowledge of CNC EDM Die Sinking EDM- Principal parts and their function , Advantages , disadvantages and applications - Axis designations - Simple programming for CNC EDM operation for making mould elements. 32.11 CNC Wire EDM- Principal parts and their function , Advantages , disadvantages and applications - Axis designations Simple programming for CNC EDM operation for making mould elements	
33	**Mold Manufacturing Technology** *(Knowledge on mold steel and different techniques used for cavity machining, Inspection and assembly of molds and polishing / Texturing the mold surfaces)*	33.1 Material selection for different molds – mold steels and non-ferrous materials 33.2 Knowledge of Conventional Techniques -Procedure for manufacturing of moulds –Significance of traditional machines like Shaper, Lathe , Milling and Drilling machines for machining of Mould parts 33.3 Understanding signification of Pantograph Engraving machine in mould making - Finishing of core & cavity using CNC machines. 33.4 Introduction to Electrical Discharge Machining (EDM): principle- Process - Types of EDM- Construction, Principal parts, Advantages and applications of Die Sinking EDM & Wire EDM in mold making 33.5 Understanding Technological Parameters of EDM- Spark gap calculations - Electrodes – Materials and Design- 33.6 Study of Die electric fluids – Purpose, Types and properties and Applications 33.7 Study of Electroforming : Process, Design, Materials and Machining for electroformed blanks and mould cavities 33.8 Preparing Check list for mould assembly- Fitting and assembly of various mould elements - core insert, cavity insert, sprue bush- ejection system assembly- Blue matching and die spotting-venting -Final inspection-Fitting of locating ring and carrier bar- Mould trial. 33.9 Understanding Concept and symbols of Surface Roughness, terminology – 33.10 Knowledge of Surface finish of various mould elements- Surface Texturing of Moulds – Process of Etching. 33.11 Understanding Polishing Technology in Mould Making: Basics of polishing technology - Effect of mould materials on polishability- Types of polishing tools 33.12 Knowledge of Methods of polishing -Basic information on ultra sonic polishing – Principles of	

		Electro deposition in damaged moulding surfaces/ Protective Coating.	
34	**Process Planning and Cost Estimation** *(Knowledge on process planning, estimation and budgeting)*	34.1 Introduction to concept of Process Planning Information required to do process planning - factors process planning procedure - Make (or) Buy decision using Break Even Analysis - simple problems. 34.2 Manual process planning - Automated process planning and generator process planning - Advantage of computer aided process planning 34.3 Understanding of Value Engineering – Definition - cost control Vs cost reduction - value analysis, selection of product. 34.4 Knowledge of Process - technological, specific component, Process flow requirements. Factors affecting process selection - machine capacity – analysis of machine capacity - process and equipment selection procedure 34.5 Determination of man, machine and material requirements - simple problems - selection of material – jigs - fixtures –elements – types – applications- principles of location & clamping-jig bushes 34.6 Study of Factors influencing choice of machinery - simple problems - preparation of operation planning sheet for simple mould components. 34.7 Knowledge of work study Concept, Techniques to	

			reduce work content - method study – Procedure – Recording techniques used in method study - Micro motion study - Principles of motion economy - Therbligs - Simo chart - cycle graph - Chrono cycle graph - work measurement –	
		34.8	Basic Procedures for the conduct of time study - calculation of standard time - simple problems – Ergonomics – definition – objectives – applications - working environment - work place layout - other areas.	
		34.9	Basic understanding of Cost estimation - components of cost – direct cost - indirect cost - overhead expenses - estimation of cost elements - set up time and economic lot size - tool change time - Inspection time - performance factor –	
		34.10	Elements of metal machining - cutting speed - feed - depth of cut - procedure for assigning cutting variables - basic formulae for calculation of machining times for the machining operation, use of standard tables for feeds and cutting speeds – exercises in calculating the machine times for the above mentioned operations – simple problems based on DFM (Design For Machine) & DFA (Design For Assembly)	
35	**Industrial Management and Entrepreneurship** *(Study the requirement of management & implementation of ISO and safety norms)*	35.1	Describe principles of management	
		35.2	Describe functions of management	
		35.3	Understanding organization structure and human resource management	
		35.4	Understanding Quality Planning and Control	
		35.5	Quality Assurance concept, introduction of ISO 9000	
		35.6	Understanding the Concept of TQM and Organizational Excellence, Techniques of TQM-PDCA, TEI, POKA-YOKE- Failure proofing, JIT manufacturing	
		35.7	Knowledge on steps to start small scale industries	
		35.8	Knowledge on Taxes.	
36	**Mould Manufacturing Practice** *(Development of Automatic injection, compression, transfer and blow moulds)*	36.1	Familiarization of cylindrical grinding operation to maintain functional dimensions of hardened guide pillar, guide bush, core and cavity and other elements of mould.	08 Hours
		36.2	Rough machining using shaping machine (Bolster/Mould plates).	08 Hours
		36.3	Surface grinding of mould plates and mould elements.	16 Hours
		36.4	Drilling, reaming and tapping of mould plates and mould element.	08 Hours
		36.5	Precision machining of guide pillar & guide bush holes in mould plates using Jig boring machine and CNC milling machine.	12Hours
		36.6	Rough machining of Core and Cavity of moulds using Lathe/milling machine.	10 Hours
		36.7	Precision machining of Core and Cavity of moulds using CNC machine tools.	16 Hours
		36.8	Machining of intricate shapes of Core and Cavity (soft/hardened) using CNC EDM & CNC Wire EDM.	20 Hours
		36.9	Polishing of core, cavity, sprue bush, runner, gate etc	10 Hours

			to mirror finish.	
		36.10	Engraving and embossing of script & monograms.	08 Hours
		36.11	Mould assembly practice.	16 Hours
		36.12	Inspection of various systems of mould (Aligning system / core / cavity / cooling system / ejector system / feeding system / venting system / clamping system / moulding surface polishing etc.).	12 Hours
37	**CAM & CNC Lab** *(Knowledge on programming and operation of CNC machines)*	37.1	Familiarization of NC & CNC machine tools.	08 Hours
		37.2	Familiarization of cutting tools and cutting fluids.	08 Hours
		37.3	Programming and operating of CNC lathe machine.	20 Hours
		37.4	Programming and operating of CNC milling machine.	24 Hours
		37.5	Programming and operating of CNC EDM.	24 Hours
		37.6	Programming and operating of CNC Wire-EDM.	24 Hours
38	**CAD Lab II** *(Hands on experience on using AutoCAD software to draw product and mold design)*	38.1	Production drawing development for various mould elements and mould base design in CAD	16 Hours
		38.2	Provide dimension on the geometry by using AUTO-CAD Software.	04 Hours
		38.3	Prepare the solid model by using the commands in auto-CAD and do the editing whenever it is necessary to modify.	12 Hours
		38.4	Knowledge on 3D part design-core and cavity design, electrode design	20 Hours
		38.5	Plot the drawing with the help of AUTOCAD software	02 Hours
39	**Project Work** *(identify different design options which will meet requirements and design specification, Develop mold according to the design from material planning, process plan and inspection using various machines and prepare the report to develop entrepreneurial skills)*	39.1	Gather accurate information on project concept and requirements	
		39.2	Identification and selection of a product that has a demand in the market.	
		39.3	The scope of the project work should be Design and development of any one mould (Injection, transfer, Compression, blow)	
		39.4	Preparation of production / process drawing.	
		39.5	Procure the raw materials, equipment's (if reqd.) and tools needed for manufacturing fully assembled mould with good Quality.	
		39.6	Manufacture the mold with available facilities in the institute	
		39.7	Checking the finished product with original drawings of design and manufacturing with suitable modification if necessary.	
		39.8	Preparing project report consisting of production / process planning, plant layout needed for raw materials, equipment, tools, cost of manufacturing and all other details.	
		39.9	Project work presented for review once in month by using Power point to improve the Presentation skills and utilization of CAD & CAM Software to communicate clearly about the project progress and requirement to the group members.	

DPMT

I Semester

List of text books/Reference books

1. Communication English - I

a. Viswamohan, Aysha. English for Technical Communication. Tata McGraw –Hill, New Delhi.2008.
b. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi.2006.
c. A.S. Hornby, “The Advanced Learners dictionary of Current English” Oxford University Press,2004.
d. Wren and Martin,“High school English Grammar and Composition”. S.Chand & ., Ltd.
e. Glennis Pye, ‘Vocabulary in Practice – Part 1 to4’, Cambridge University Press,2004.
f. Raymond Murphy, “ Essential English Grammar”, Cambridge University Press, 1990.
g. Michael Swan “Basic English Usage’’, EBS/OUP, 1989.
h. Mishra , “Communication Skills for Engineers ” 1 st Edition Pearson Longman.
i. M.Thomas, “Common Errors in English”, Lotus Press, New Delhi,2006.
j. Shiv K Kumar & Hemalatha Nagarajan, “ Learn Correct English”, Pearson Longman.

2. Workshop Mathematics

a. ITI Workshop Calculations by B R Das
b. Applied workshop calculations by W A J Chapman
c. Workshop calculations, tables by H A Camm Formulae
d. Senior Workshop calculation by W A J Chapman
e. Mathematics of the shop by J Mcmackin & Others

3. Engineering Physics

a. R.K.Gaur and S.L.Gupta “Engineering Physics’, Dhanpat Rai Publications (All Units)
b. “Engineering Physics”,, P.Mani, Dhanam Publications
c. “Physics Part I & II”, Halliday and Resnick
d. “Engineering Physics- I”, R.Elangovan, M.Vijay Amirthraj and N.Karikalan, Mercury sun publications

4. Electrical and Electronics Engineering

a. Muthusubramanian R, Salivahanan S and Muraleedharan K A, BasicElectrical, Electronics and Computer Engineering",Tata McGraw Hill, Second Edition, (2006).
b. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
c. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, (1994).
d. B.L. Theraja, Fundamentals of Electrical and Electronics Engineering, S.Chand & Co.
e. T. Thiyagarajan, Fundamentals of Electrical and Electronics Engineering, Scitech a. Publicatiuons (India) Pvt.ltd.
f. Mikell P. Groover, Automation, Production System and Computer Integrated Manufacturing, Edn. 2 Published by Pearson Education (Singapore) Pte. Ltd., Indian Branch, 2842 F.I.E., Patparganj, Delhi 110 002, India.
g. KB Raina & S.K.Battachariya, Electrical Design Estimating and Costing, Edn. 6, Tata McGraw Hill Publishing Co., 7, West Patel Nagar, New Delhi 110 008.
h. Gary Dummy, Introduction to Programmable logic controls, Thomson Debnar learning second edition second reprint 2003.
i. B.L.Theraja & A.K. Theraja, Electrical Technology Vol. I & II, Edn. 23, published by S.Chand & Co. Ltd., Ram Nagar, New Delhi 110 055.

5. Environmental Sciences

a. Introduction to environmental engineering and science – Gilbert M Masters 2nd edition, prentice hall 2003.
b. Environmental Science and engineering – Benny Joseph, Tata McGraw-Hill, New Delhi 2006
c. Environmental Science, Cengage Learning India 2014 – G.Tyler Miller and Scott.
d. Environmental studies from crisis to cure, Oxford University third edition
e. A text book of environment studies – Shashi Chawla

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II Semester

List of text books/Reference books

1. Communication English - II

a. Viswamohan, Aysha. English for Technical Communication. Tata McGraw –Hill, New Delhi.2008.
b. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi.2006.
c. A.S. Hornby, "The Advanced Learners dictionary of Current English" Oxford University Press,2004.
d. Wren and Martin,"High school English Grammar and Composition". S.Chand & ., Ltd.
e. Glennis Pye, 'Vocabulary in Practice – Part 1 to4', Cambridge University Press,2004.
f. Raymond Murphy, " Essential English Grammar", Cambridge University Press, 1990.
g. Michael Swan "Basic English Usage'', EBS/OUP, 1989.
h. Mishra , "Communication Skills for Engineers " 1 st Edition Pearson Longman.
i. M.Thomas, "Common Errors in English", Lotus Press, New Delhi,2006.
j. Shiv K Kumar & Hemalatha Nagarajan, " Learn Correct English", Pearson Longman.

2. Engineering Mathematics

a. Mathematics for Polytechnic Colleges (First Semester) - P.Krishnamurthy, N.Thangasamy.
b. Higher Secondary Mathematics - First Year - Tamil Nadu Text Book Cooperative Society.
c. Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai.
d. Engineering Mathematics - Dr.P. Kandasamy& Others, schand& co Ltd., New Delhi.

3. Engineering Chemistry

a. Text book of Engineering Chemistry - Jain & Jain, Dhanpat Rai & Co. New Delhi.
b.. Text book of Organic Chemistry - Bahl - Arun Bahl.
c. Text book of Inorganic Chemistry - P.L. Soni, Sultan Chand & Co., Delhi.
d. Essential topics in Physical Chemistry - Bhal, Tuli & Madan, Sultan Chand & Co., New Delhi.
e. A Text book of engineering chemistry – M.M. Uppal , Khanna publishers Delhi.

4. Computer & Information Technology

a. Fundamentals of computers – 4th edition – V Rajaraman
b. Computer Fundament – 6th edition – Pradeep K Sinha, Priti sinha
c. Fundamentals of Computer Engineering – V Sivaraman

5. Development of Life skills

a. Soft skills for every one, Cengage learning, New Delhi 2015 – Butterfield Jeff
a. Introduction of engineering ethics, second edition - Mike W Martin and a Roland Schinzinger

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III Semester

List of text books/Reference books

1. Applied Mechanics & Strength of Materials

a. Strength of Materials – R.K. Rajput.
b. Strength of Materials – Dr. R.K.Bansal.
c. Strength of Materials – R.S. Khurmi.
d. Applied Mechanics – R.S. Khurmi.

2. Engineering Metrology

a. M.Mahajan, Engineering Metrology, 2005, Dhanpatrai & Co,.New Delhi.
b. Garg.H.P, Industrial Maintenance, Reprint 2002, S.Chand & Co. Ltd., New Delhi
c. R.K.Jain, Engineering Metrology, 2002, Khanna Publisher, New Delhi.
d. R.K.Rajput, Engineering Metrology & Instrumentation, 4th Edition 2004, S.K.Kataria & Sons, New Delhi.

3. Machine Shop Technology - I

a. Workshop Technology, Volume I & II - B.S. Raghuwanshi.
b. Production Technology - Dr. R.K. Jain.
c. Mechanical & Industrial Measurements - R. K. Jain, Khanna Publishers.
d. Production Technology - P.C. Sharma Pub: S. Chand and Co.
e. Workshop Technology, Volume I & II – W.A.J Chapman.
f. Elements of workshop Technology, Volume – II – S.K.Hajra Choudhury & A.K Hajra Choudhury.

4. Engineering Drawing

a. Engineering Graphics, Julyes Jaisingh.
b. Engineering Drawing – K.V. Natarajan.
c. Engineering Graphics – K. C. John.
d. Engineering Graphics – P. I. Varghese.
e. Engineering Drawing – Venugopal.
f. Engineering Drawing – M.B. Shah & B.C.Rama.
g. Engineering Drawing – N.D. Bhatt , Charotar Publishing House.
h. Machine Drawing – Lakshminarayan & Mathur , Jain Brothers .

5. Plastics Materials & Testing

a. Plastics Materials, Brydson, J.A.
b. Text book of polymer science,Fred W Billmeyer.
c. Polymer Science V.R. Gowariker.
d. Principles Polymer Science P.Bahaabur & N.V. Sastry,Narosa Publishing House.
e. Text Book on Fundamentals of Plastics Testing - Prof. (Dr.) S.K..Nayak.

DPMT

IV Semester

List of text books/Reference books

1. Engineering Materials & Heat Treatment

a. Avner,, S.H., “Introduction to Physical Metallurgy”, McGraw Hill Book Company,1994.
b. Williams D Callister, “Material Science and Engineering” Wiley India Pvt Ltd, Revised Indian Edition 2007
c. Raghavan.V, “Materials Science and Engineering”, Prentice Hall of India Pvt.Ltd., 1999.
d. Kenneth G.Budinski and Michael K. Budinski, “Engineering Materials”, Prentice Hall of India Private Limited, 4th Indian Reprint 2002.
e. Upadhyay. G.S. and Anish Upadhyay, “Materials Science and Engineering”, Viva Books Pvt.Ltd., New Delhi, 2006.
f. George Dieter , “Mechanical Metallurgy “,McGraw Hill Book Company,2017.
g. R K Rajput , “ Engineering Materials and Metallurgy “, S Chand Publication, 2006
h. O P Khanna, Dhanpat Raj Publication, Material Science & Metallurgy, 2010

2. Plastics Product & Mould Design

a. Plastics Product Design Beck, R
b. Injection Mould Design – Pye R.G.W
c. Injection Moulds 130 Proven Design Gastrow

3. Machine Shop Technology - II

a. Workshop Technology, Volume–II - B.S. Raghuwanshi.
b. Production technology - Er. R.K. Jain.
c. Mechanical & Industrial Measurements - R. K. Jain, Khanna Publishers.
d. Production Technology - P.C. Sharma Pub: S. Chand and Co.
e. Workshop Technology, Volume I & II – W.A.J Chapman.
f. Elements of workshop Technology, Volume-II - S.K.Hajra Choudhury & A.K Hajra Choudhury.

4. Plastics Processing Techniques

a. Injection Moulding Theory & Practice – Rubin, Irvin.
b. Plastics Engineering Hand Book – Socity of Plastic Industry Inc.
c. Plastics Processing Data Hand Book – D.V. Rosato.
d. Plastics Materials & Processing – Brent Strong.

DPMT

V Semester

List of text books/Reference books

1. Mould Manufacturing Technology

a. Mould Making Hand Book, Stoeckert.
b. Plastics Moulds and Dies, Sors.
c. Injection Moulds, V.D.I.

2. CNC Machining Techniques

a. Warren S.Seamers, “Computer Numeric Control”, Fourth Edition, Thomson Delmar, 2002.
b. James Madison, “CNC Machining Hand Book”, Industrial Press Inc., 1996.
c. Ken Evans, John Polywka & Stanley Gabrel, “Programming of CNC Machines”, Second Edition, Industrial Press Inc, New York, 2002
c. Peter Smid, “CNC Programming Hand book”, Industrial Press Inc., 2000
d. Berry Leathan – Jones, “Introduction to Computer Numerical Control”, Pitman, London, 1987.
e. Radhakrishnan P, “Computer Numerical Control Machines”, New Central Book Agency, 2002.
f. Rao P N, Tiwari N K, Kundra T, “Computer Aided Manufacturing” Tata McGraw Hill 2014.
g. B. S. Pabla- M. Adithan, “CNC Machines” , New Age International (P), 2005
h. CNC Programming Basics – Steve Krar Arthur Gill

3. Process planning & cost estimation

a. T.R Banga and S.C Sharma , “Mechanical Estimating and Costing”.
b. Sinha.B.P. “Mechanical Estimating and Costing”, Tata McGraw-Hill, Publishing Co., 1995.
c. Phillip. F Ostwalal and Jairo Munez, “Manufacturing Processes and systems”, John Wiley, 9th Edition, 1998.
d. Russell R.S. and Tailor, B.W, “Operations Management”, PHI, 4th Edition, 2003.
e. Chitale.A.V. and Gupta.R.C., “Product Design and Manufacturing”, PHI , 2nd Edition, 2002.

4. Industrial Management & Entrepreneurship

a. Industrial Engineering Management – Khanna O. P.
b. Personal Management & Industrial Relations – Davar R. S.

	Means of assessment 1 and 2 Skill performance is assess by conducting i) Assignment for each module ii) Two written mid-term tests in each semester iii) Final exam after completion of all modules iv) Practical exam for each module v) Final practical exam after completion of all module vi) Viva / Oral Exam vii) Project report and presentation
	Pass/Fail Passing criteria is based on marks obtain in attendance record, term works , assignments, practical's performance, viva or oral exam, module test, practical exam and final exam i. Minimum Marks to pass theory exam – 40% ii. Minimum Marks to pass practical exam – 50% iii. Minimum Marks to pass final exam – 40% iv. Minimum Marks to pass class test–40% v. Minimum Marks to pass viva / oral exam –50% vi. Minimum Marks to pass Project report and presentation exam – 50%

SECTION 2: EVIDENCE OF LEVEL

Title/Name of qualification/component: Diploma in Plastics Mold Technology

NSQF Domain	Outcomes of the Qualification/ Component	How the job role relates to the NSQF level descriptors	NSQF Level
Process	• Can determine which type of machining is required and set-up conventional machines such as Lathe, milling. drilling and grinding to make molds or do machining of components. Can undertake simple CNC programming and execute CNC Machining to produce components. Knows how to evaluate quality of the machining.	In this qualification Job Holder has to carry out the specific operations required to produce component, understand standards. Job holder is aware of safety aspects and ensures compliance with health and safety measures as laid down by safety department. Job Holder can set-up and operate conventional machines. Job Holder can identify defective equipment and take action as per SOP Job holder shall execute the work under supervision. He is aware of the maintenance schedules and he ensures maintenance is carried out as per schedule Job holder shall release bill of material (BOM). Job holder shall prepare mould base / die set by doing the machining as per the given work plan. Job holder shall assess the quality and rectify the machined part as required. Job holder shall also prepare and submit report	Level 5

Title/Name of qualification/component: Diploma in Plastics Mold Technology			
NSQF Domain	**Outcomes of the Qualification/ Component**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
Professional knowledge .	• Describe general Tool Construction • Describe elements of tool with their functions, material and heat treatment processes • Describe tooling procedure • Describe Manufacturing Processes and process plan • Set-up process parameters • Ascertain quality of machining	• As job holder is dealing with tooling which is to be used for mass production of the product, it is required that job holder should possess overall knowledge in the field of tooling, Mould and Die Casting. • Job Holder shall apply his/her comprehensive knowledge on types of Jigs & fixture, Mould and Die Casting Die, locating principle and methods in jigs & fixture, Mold, fundamental knowledge of Jigs & Fixture, Mould tool and Die casting Die. • Job Holder shall have detail knowledge of elements of tool, material and Heat treatment, Mould, Jigs and fixture and Die Casting Die, application of each part and importance, manufacturing operations of each element, accuracy criteria for tooling elements, various materials of tool elements, concept of hardenability, Properties of tool elements material, various heat treatment processes used in press tool, Mould., tool elements. • Job holder shall have knowledge of the techniques to obtain correct dimensions of the machined products. • Job holder knows how to respond to emergencies such as power failures, fires and system failures and manual intervention to avoid disaster.	Level 5

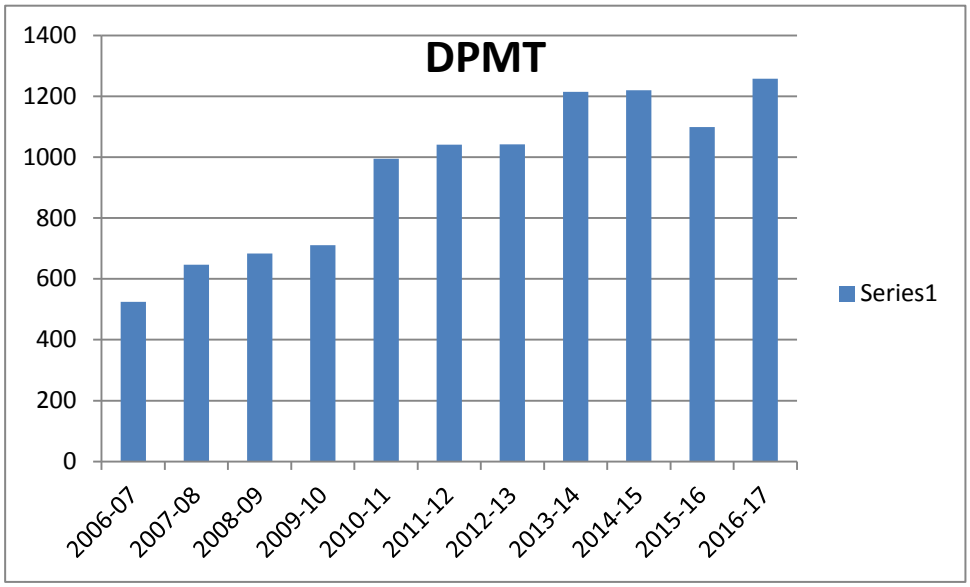
Title/Name of qualification/component: Diploma in Plastics Mold Technology			
NSQF Domain	**Outcomes of the Qualification/ Component**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
Professional Skills	• Identify machining process requirement • Develop plan for Tooling • Evaluate and develop Jigs and Fixtures, Mould, Die Casting Dies • Perform the machining operations • Develop and execute CNC Machining programme using CAM software • Develop quality consciousness concept • Troubleshoot the problems	• Job Holder shall use tooling procedure as per SOP. He should be able to craft precision tools to cut shape and form metal and other materials. • He should be able to develop and design new tools and dies • He should be able to craft precision tools to cut shape and form metal and other materials. • He should be able to develop and design new tools and dies • Job Holder shall handle tools and equipment for tooling on different types of tool room machines • Job Holder shall handle the machines • Job Holder shall be capable of Fitting and putting together mold & machines parts and assembling. • Job Holder shall handle the coordination among team members and report team members issues to HR department that is beyond his control • Job Holder shall diagnose common problems in the material, machines and equipments based on visual inspection and quality checks • Job Holder shall suggest improvements(if any) in process based on experience • Job Holder shall manage time and human resource effectively • Job Holder shall Ability to provide proper training to team members • Job Holder shall. handle Emergency situations effectively during operations	Level 5

Title/Name of qualification/component: Diploma in Plastics Mold Technology			
NSQF Domain	**Outcomes of the Qualification/ Component**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
Core skill	• Safety practices at the workplace • Work on project • Develop entrepreneurship skills • Communicate effectively	• The Trainee should be technically skilled in the area of design, tool room. The Trainee should be able to decide the machines on which the job has to be carried out. • He should be able to identify the specification of the machine. • Trainee should be aware of system and procedures and accordingly work on it. • He should be aware of maintenance of mould and machineries. • He should be able to read and understand manuals, health and safety instructions memos, reports, job cards, iamges, graphs, diagrams, technical drawings etc. • He should be capable of maintaining records • He should be able to communicate effectively with team members and with management • He needs to know and understand how to practice honesty with respect to company property and time. • He shall communicate with people in a form and manner and using language that is open and respectful. • He shall resolve any difficulties in relationships with colleagues , or get help from an appropriate person, in a way that preserves goodwill and trust	**Level 5**

Title/Name of qualification/component: Diploma in Plastics Mold Technology			
NSQF Domain	**Outcomes of the Qualification/ Component**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
Responsibility	Work under guidance with responsibility of output	• Job holder shall prepare work plan with time line and accept job responsibilities as part of a team • Job holder shall strive for continuous learning and development by time to time discussing with them various issues of project like tool / die suitability to specified machine, new development in machines, selection of material, new development in the materials and manufacturing processes. • Job holder shall follow work standard, specific norms and procedures laid down by the organization. Job holder shall develop moral, values and ethical practices in business operation. • Trainee should avoid absenteeism, be punctual and work in a disciplined factory environment • Trainee shall take responsibility for completing one's own work assignment and the work under supervision • He shall take initiative to enhance/learn skills in one's area of work	**Level 5**

SECTION 3 EVIDENCE OF NEED

What evidence is there that the qualification is needed?



The qualification, **Diploma in Plastics Mold Technology (DPMT)** is there from 1979 and CIPET has trained more than 10,500 trainees in the last 10 years. All trainees are placed in Industries through campus placement.

What is the estimated uptake of this qualification and what is the basis of this estimate?

Skills Gap analysis Reports for industry demand and secondary research data, though these do not lend to accurate demand projection. The link to NSDC Human Resource & Skills Requirement in Capital Goods Sector is http://cgsc.in/Humanresource_skill_requirement.pdf

What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF?

- The qualification is originally designed by curriculum committee comprising the training head, industrial expert, academic professional experts.
- The work group under the guidance of curriculum development committee already conducted desk search as well as refers the qualification packs for as a supporting document for the mapping of curriculum.
- As per the search it is found that, the Diploma in Plastics Mold Technology for the skill development of the candidates in Capital Goods Sector Skill Council.

What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated?

- The curriculum committee meeting for review will be in the month of Jan 2018 which comprising industrial expert, university professors with subject specialization.
- The data used for revision or update will be impact analysis (student and industries) and new subject area opportunities, multiple entry and exits incorporated or RPL strategy implementations.
- The curriculum review and updates, in consultation with industries and expert of respective domain, NOS approved by NSDA will also be referred to from time to time.

SECTION 4
EVIDENCE OF PROGRESSION

What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?

Excellent job opportunities in manufacturing industries, especially outside India in Countries like Singapore, Malaysia, China, Japan, Indonesia, Korea, US, etc. A qualified tool and die maker can easily get an immediate job after his Diploma in India or Abroad. Once a tool and die maker gains good experience, he can increase his rank and get into senior positions like inspector, supervisor, technical advisor, designer, programmer.

Qualifying trainee will obtain a CIPET Diploma in Plastics Mold Technology (DPMT). After completion of course and after 3 years of field experience the trainee can work as a Senior Mold maker or supervisor and after that 5 years of experience, the person can work as a Manager (Tool room). Also he/she can become an entrepreneur in this sector.

The diagram shown below represent the vertical mobility for the job holder as a job progression in capital goods Sector.

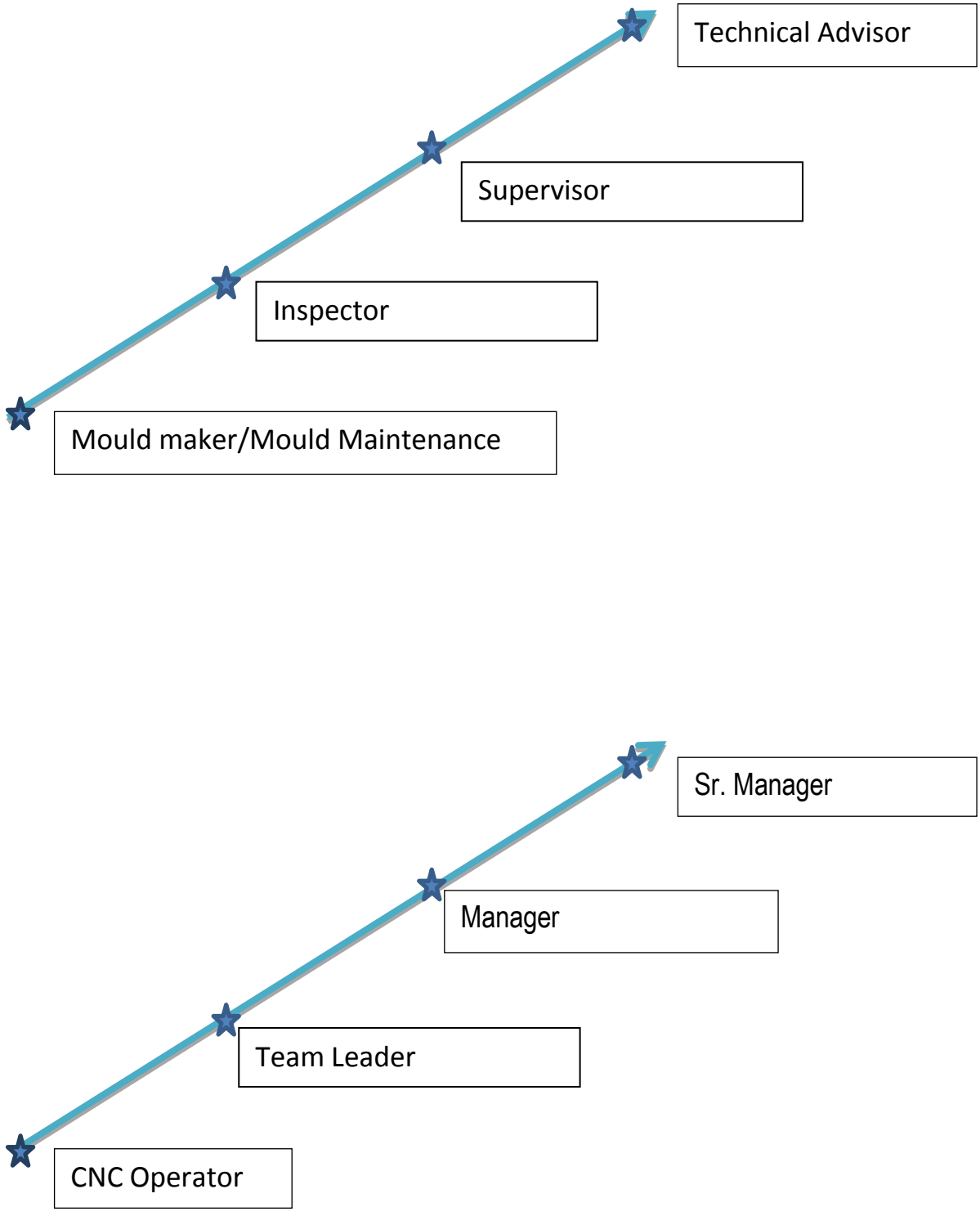


Figure- 1 Career Progression Path