

## NSQF QUALIFICATION FILE FOR DIPLOMA COURSE IN MECHANICAL ENGINEERING

### CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

**Name and address of submitting body:**

Punjab State Board of Technical Education and Industrial Training  
Plot-I A, Sector-36 A, Chandigarh - 160036

**Name and contact details of individual dealing with the submission**

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**Position in the organisation:** Director Academics

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### List of documents submitted in support of the Qualifications File

Curriculum Document (**Annexure I**)

## NSQ QUALIFICATION FILE FOR DIPLOMA COURSE IN MECHANICAL ENGINEERING

### SUMMARY

<b>Qualification Title</b>	3 year diploma course in Mechanical Engineering
<b>Qualification Code</b>	-
<b>Nature and purpose of the qualification</b>	To provide skilled manpower required for middle level management at level V in the field of Mechanical Engineering
<b>Body/bodies which will award the qualification</b>	Punjab State Board of Technical Education and Industrial Training, Plot-I A Sector-36A, Chandigarh- 160036
<b>Body which will accredit providers to offer courses leading to the qualification</b>	AICTE/NBA
<b>Body/bodies which will carry out assessment of learners</b>	<p>Assessment of learners shall be regulated by the Punjab State Board of Technical Education &amp; Industrial Training.</p> <p>Knowledge aspect of learners will be assessed by the assessors from the Institute offering the programme whereas the Skill aspect will be assessed by appointing internal and external assessors. Internal Assessors will be from the Institute offering the programme whereas External Assessors will be appointed from the Institutes/Sector Skill Councils/Industry/Assessment Centres deputed and approved by the regulatory authority.</p>
<b>Occupation(s) to which the qualification gives access</b>	<ol style="list-style-type: none"><li>1. Shop Floor Incharge/Supervisor</li><li>2. Production Engineer/Supervisor</li><li>3. Maintenance Engineer/Supervisor/Incharge</li><li>4. Quality Control Incharge/Engineer</li><li>5. Junior Engineer in various State/Centre Govt. Departments</li><li>6. Lab Technician in Technical Institutes</li><li>7. Workshop Instructor in Technical Institute</li></ol>
<b>Licensing requirements</b>	N.A.

## NSQF QUALIFICATION FILE FOR DIPLOMA COURSE IN MECHANICAL ENGINEERING

<b>Level of the qualification in the NSQF</b>	Level V
<b>Anticipated volume of training/learning required to complete the qualification</b>	3840 hrs + 150 hrs for industrial training
<b>Entry requirements and/or recommendations</b>	10+
<b>Progression from the qualification</b>	The learner will either take up job in the industry or go for higher studies at level VI.
<b>Planned arrangements for the Recognition of Prior learning (RPL)</b>	Presently, there is no such arrangement
<b>International comparability where known</b>	Existence of any official document suggesting the comparability of the qualification with the qualifications in other countries is not known.
<b>Date of planned review of the qualification.</b>	Year 2020

## **SECTION 1** **ASSESSMENT**

### **Body/Bodies which will carry out assessment:**

**Assessment of learners shall be regulated by the Punjab State Board of Technical Education & Industrial Training.**

Knowledge aspect of learners will be assessed by the assessors from the Institute offering the programme whereas the Skill aspect will be assessed by appointing internal and external assessors. Internal Assessors will be from the Institute offering the programme whereas External Assessors will be appointed from the Institutes/Sector Skill Councils/Industry/Assessment Centres approved by the regulatory authority.

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

Presently there is no such arrangements. However, it is envisaged that RPL assessment will be managed by the authority specified by the NSDA by taking into account the following parameters:-

- Professional Knowledge
- Professional Skills
- Core Skills
- Responsibility
- Process/Type of Job handled

**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.**

### **ASSESSMENT GUIDELINES:**

- The assessment is carried out by conducting formative assessment and end-of-semester examinations.
- The internal assessments for theory subjects and practical are conducted by the concerned teachers/instructors for evaluating the knowledge, skill and attitudes acquired by students as per the specified learning outcomes.
- Assessment is carried out in various subject areas to ensure achievement of Learning Outcome.
- This assessment is primarily carried out by collecting evidence of competence gained by students to assess understanding and by evaluating records and reports, and sessional marks are awarded to them.
- The question papers for the theory examinations contain a combination of objective type questions, short answer type questions and descriptive type questions
- Assessment is mainly based on following criterion :  
Theory Test : Knowledge, comprehension, application, analysis and synthesis  
Practical Test : Manipulative Skills, Accuracy, finish, speed, sequence of performance, economical use of material, quality of workmanship, neatness

### **ELIGIBILITY TO APPEAR IN THE EXAM:**

75 % attendance is compulsory for students to appear for the assessment.

### **ASSESSORS:**

- The assessment papers are developed by Subject Experts appointed by Punjab State Board of Technical Education to ensure fair, valid and reliable assessment.
- The assessors are provided with assessors guide developed by the Subject Expert as per the assessment framework.
- To hire assessors with integrity, reliability and fairness. Each assessor signs a document by which they commit themselves to comply with the rules of confidentiality and conflict of interest, independence from commercial and other interests that would compromise impartiality of the assessment.

### **MARKING PATTERN:**

Marking Pattern and distribution of marks for various courses/subjects are given in study and evaluation scheme of the curriculum documents.

### **PASSING MARKS:**

Pass criteria for the qualification is that every student must score a minimum of 40 % both in Theory and Practical.

### **RESULTS AND CERTIFICATION:**

The assessment results are backed by evidences collected by assessors. Successful students are awarded certificates of three year diploma course by State Board of Technical Education, Punjab.

### **ASSESSMENT EVIDENCE:**

- Answer sheets of assessment
- Experiments performed in laboratories
- Jobs carried out in workshops
- Assignments
- Viva –voce
- Quiz test.
- Report Writing
- Presentation
- Record book/Practical Note book/Daily Diary
- Attendance and punctuality

## NSQF QUALIFICATION FILE FOR DIPLOMA COURSE IN MECHANICAL ENGINEERING

### ASSESSMENT EVIDENCE

In this section, you are asked to show how the assessment tools you will use will cover all the outcomes and criteria in the qualification.

Assessment evidence in tabular form describing the assessment tools to be used for assessing the learning outcomes is attached at **Annexure III**

## **NSQF QUALIFICATION FILE FOR DIPLOMA COURSE IN MECHANICAL ENGINEERING**

### **SECTION 2**

#### **EVIDENCE OF LEVEL**

**Awarding bodies will enter a proposed NSQF level for the qualification in the Qualification File Summary. This section asks for the evidence on which that proposal is based. The evidence must refer to the level descriptors of the NSQF.**

Evidence of the level describing the title of the subjects, corresponding NSQF level, learning outcome, relation of learning outcome with NSQF level is attached at **Annexure IV**



## SECTION 3

### EVIDENCE OF NEED

#### **What evidence is there that the qualification is needed?**

Samples of advertisement from the potential employers are attached at **Annexure V**

The pass out students get absorbed in different types of industries. A list of employers along with contact person details is attached at **Annexure VI**.

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

Around 18000 Students in Mechanical Engg are trained every year to acquire the qualifications. It has been found that at National Level there is an incremental gap between demand and supply of the Technical manpower at Level-V in this field. To bridge this gap and to match the needs of the industry the above estimated number of students will be trained.

This programme is being offered in various polytechnic colleges in Punjab State ( Refer website [punjabteched.com](http://punjabteched.com)) approved by AICTE, Delhi ([www.aicte-india.org/ApprovedInst16-17.php](http://www.aicte-india.org/ApprovedInst16-17.php))

#### **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?**

Inspections of the Institute offering this programme will be carried out at regular intervals. Academics Committees will be constituted for Periodical review of the curriculum.

Placement Data and Technological advancement related to the field will be used as the basis for revision and updation of the curriculum.

Such information will be collected from respective Sector Skill Councils and the Industry. The data so collected will be used as the basis for revision/updation of the Qualification.

Continuous monitoring of the curriculum will be carried out and comprehensive review of the curriculum will be undertaken in the year 2020.

## **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?**

While designing this qualification, extensive inputs were obtained by involving experts from Academic Institutions/Industry/Representatives of State Govt./NSDA and Faculty of National Institute of Technical Teachers' Training and Research (NITTTR), Chandigarh.

The students passing out from diploma programme in Mechanical Engineering are eligible for admission (lateral entry) to bachelor's degree in Mechanical Engineering. A sample copy of the Govt. Notification for admission to degree courses through lateral entry system is attached on **Annexure VII**

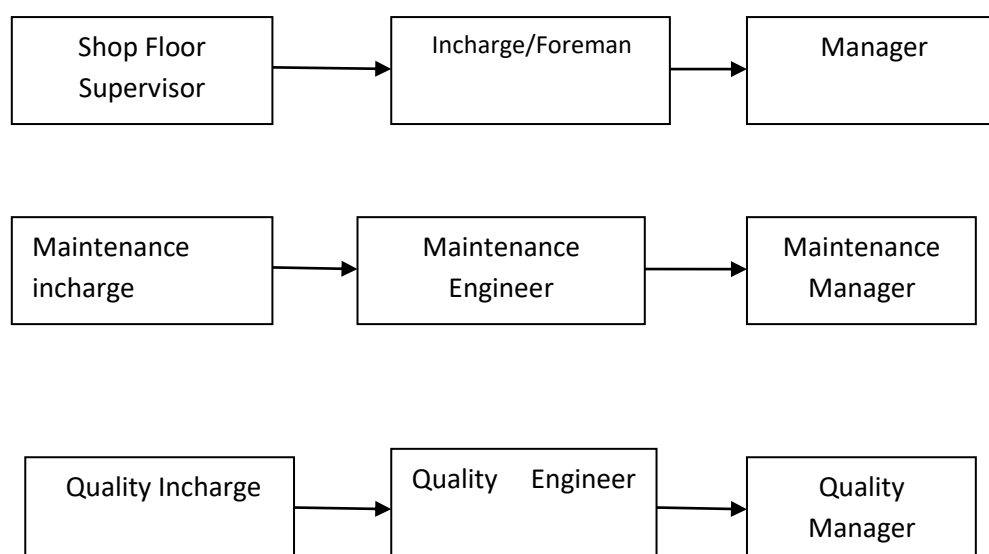
To ensure progression to other qualifications, the following points have been kept in mind while developing the curriculum :

- i) The learning outcomes have been spelled out keeping in mind professional knowledge, skills, life long learning, entrepreneurship development and self study.
- ii) The outcomes have been spelled out at programme level and course level and provide scope for higher learning opportunities.

### **Progression of Diploma holder in Mechanical Engineering :**

The qualifying student will be absorbed initially by the industry as Shop Floor Supervisor, Quality Incharge or Maintenance Incharge. He/She can also start his/her own business as an entrepreneur. After 3-4 years, he will be working as workshop incharge/foreman, quality engineer or maintenance incharge. After 7-8 years, he will manager.

The different progression pathways of diploma holder in Mechanical Engineering are given as follows.



## FORMAL STRUCTURE OF THE QUALIFICATIONS

Sr. No.	Title of Subject/Unit	Mandatory (M)/ Optional (O)	Estimated Size Learning Hours		NSQF Level		
			Theory	Practical	4	5	6
<b>FIRST SEMESTER</b>							
1.1	English and Communication Skills – I	M	48	32		5	
1.2	Applied Mathematics - I	M	80	-		5	
1.3	Applied Physics – I	M	64	32		5	
1.4	Applied Chemistry – I	M	64	32		5	
1.5	Basics of Information Technology	M	-	48		5	
1.6	Engineering Drawing – I	M	-	96		5	
1.7	General Workshop Practice – I	M	-	96			
Student Centred Activities		M	-	48		5	
<b>Total</b>			256	384			

<b>SECOND SEMESTER</b>							
2.1	English and Communication Skills - II	M	48	32		5	
2.2	Applied Mathematics – II	M	80	-		5	
2.3	Applied Physics-II	M	64	32		5	
2.4	Applied Chemistry - II	M	64	32		5	
2.5	Environmental Studies	M	-	48		5	
2.6	Engineering Drawing-II	M	-	96		5	
2.7	General Workshop Practice – II	M	-	96		5	
Student Centred Activities		M	-	48		5	
<b>Total</b>			304	336			

<b>THIRD SEMESTER</b>							
3.1	Engineering Materials	M	48	32		5	
3.2	Applied Mechanics	M	48	32		5	
3.3	Elements of Electrical and Electronics Engineering	M	48	32		5	
3.4	Metrology and Instrumentation	M	64	32		5	
3.5	Mechanical Engineering Drawing-I	M	-	112		5	
3.6	Workshop Technology – I	M	48	112		5	
Student Centred Activities including Energy Conservation Awareness Camp		M	-	32		5	
<b>Total</b>			256	384			

<b>FOURTH SEMESTER</b>							
4.1	Generic Skills and Entrepreneurship Development	M	48	-			6
4.2	Hydraulics and Pneumatics	M	64	32		5	
4.3	Strength of Materials	M	64	32		5	
4.4	Thermodynamics-I	M	64	32		5	
4.5	Mechanical Engineering Drawing - II	M	-	112		5	
4.6	Workshop Technology – II	M	48	112		5	
Student Centred Activities including Entrepreneurial Awareness Camp		M	-	32		5	
<b>Total</b>			288	352			

<b>FIFTH SEMESTER</b>							
-	Industrial Training	M	-	-		5	
5.1	Basics of Management	M	48	-		5	
5.2	Refrigeration and Air-conditioning	M	64	32		5	
5.3	Thermodynamics-II	M	64	32		5	
5.4	Theory of Machines	M	64	-		5	
5.5	Computer Aided Drafting and Modelling	M	-	128		5	
5.6	Workshop Technology - III	M	64	112		5	
Student Centred Activities including Personality Development Camp		M	-	32		5	
<b>Total</b>			304	336			

<b>SIXTH SEMESTER</b>							
6.1	Production Management	M	64	-		5	
6.2	Machine Design	M	64	-		5	
6.3	Automobile Engineering	M	64	48		5	
6.4	CNC Machines and Automation	M	64	48		5	
6.5	Project Work	M	-	240		5	
-	Student Centred Activities	M	-	48		5	
Total			256	384			

**Grand Total Number of Education & Training (excluding examination) = 3840 Hrs**



## ASSESSMENT OF EVIDENCE

Sr.	Title of Subject/Unit	Learning Outcomes to be Assessed	Assessment Criteria	Means of Assessment	NSQF Level		
					4	5	6
1.	English and Communication Skills	Communicate effectively in English with others	As explained in the curriculum document	<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> <li>• Report writing, presentation and viva-voce</li> </ul>		5	
2.	Applied Mathematics	Apply basic principles of mathematics to solve engineering problems		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>		5	
3.	Applied Physics	Apply basic principles of science to solve engineering problems		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul>		5	
4.	Applied Chemistry	Apply basic principles of science to solve engineering problems		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul>		5	

5.	Basics of Information Technology	Use computer and IT tools for creating document, making spread sheet and making presentation		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> <li>• Software installation, operation, development and viva-voce</li> </ul>		5	
6.	Engineering Drawing	Prepare and interpret drawings of components		<ul style="list-style-type: none"> <li>• Design and drawing</li> </ul>		5	
7.	General Workshop Practice	Use cutting tools, equipment and tooling for fabrication of jobs by following safe practices at the workplace		<ul style="list-style-type: none"> <li>• Workshop job</li> <li>• Report writing, presentation and viva-voce</li> </ul>		5	
8.	Environmental Studies	Use appropriate procedures for energy conservation and preventing environmental pollution		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>		5	
9.	Engineering Material	Select material as per desired application Use heat treatment processes		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>		5	
10.	Applied Mechanics	Apply concepts of mechanics to solve engineering problems		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>		5	
11	Elements of Electrical and Electronics Engineering	Measure parameters of basic electrical engineering		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul>		5	

12	Metrology and Instrumentation	Use various measuring and gauging instruments		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, and viva-voce</li> </ul>		5	
13	Mechanical Engineering Drawing	Prepare and interpret drawings of engineering components		<ul style="list-style-type: none"> <li>• Sketching</li> <li>• Drawing</li> </ul>		5	
14	Workshop Technology	<p>Operate conventional machine for machining of components as per specifications</p> <p>Use cutting tools for machines and machine tools.</p> <p>Use modern machining methods for machining of components</p> <p>Carry out metal forming by rolling and forging processes to produce parts</p> <p>Use press and press tools.</p> <p>Prepare simple jigs, fixtures, pattern, mould and press tools for production purposes.</p> <p>Use surface coating and protection methods.</p>		<ul style="list-style-type: none"> <li>• Workshop job</li> <li>• Report writing, presentation and viva-voce</li> </ul>		5	
15	Generic Skills and Entrepreneurship Development	Plan and execute given task and project as a team member or a leader		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>			6

16	Hydraulics and Pneumatics	Use hydraulic and pneumatic equipment		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, and viva-voce</li> </ul>		5	
17	Strength of Materials	Perform material testing for its properties		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, and viva-voce</li> </ul>		5	
18	Thermodynamics	Use boilers, steam turbines, air compressors, IC engines, refrigeration and air-conditioning equipment		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, and viva-voce</li> </ul>		5	
19	Industrial Training	Solve real life problems by application of acquired knowledge and skills		<ul style="list-style-type: none"> <li>• Report writing, presentation and viva-voce</li> </ul>		5	
20	Basics of Management	Manage resources effectively at the workplace		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>		5	
21	Refrigeration and Air-conditioning	Use various instruments to measure heat/air related parameters.		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, and viva-voce</li> </ul>		5	

22	Theory of Machines	Use principles of kinematics and dynamics in operation of various mechanisms.		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, and viva-voce</li> </ul>		5	
23	Computer Aided Drafting and Modelling	Use software like AutoCAD and SolidWorks to prepare and analyze solid models.		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> <li>• Software installation, operation, development and viva-voce</li> </ul>		5	
24	Production Management	Carry out estimation and costing of production cost for budgeting and analysis. Prepare process plan for given part. Carry out work measurement and method study to improve productivity		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> </ul>		5	
25	Machine Design	Design and modify simple machine elements		<ul style="list-style-type: none"> <li>• Design and drawing</li> </ul>		5	
26	Automobile Engineering	Identify and rectify simple and common troubles in automotive vehicles.		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, model/prototype making, and viva-voce</li> </ul>		5	

27	CNC Machines and Automation	Prepare CNC part programmes and use CNC machines to make simple jobs.		<ul style="list-style-type: none"> <li>• Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making</li> <li>• Actual laboratory and practical work, and viva-voce</li> </ul>		5	
28	Project Work	Solve real life problems by application of acquired knowledge and skills		<ul style="list-style-type: none"> <li>• Report writing, presentation and viva-voce</li> </ul>		5	

Minimum passing marks for Practical is 40%  
Minimum pass marks for theory is 40%

## EVIDENCE OF LEVEL

Sr.	Title of Subject /Unit	Learning Outcome	Relation of Learning Outcome with NSQF Level	NSQF Level		
				4	5	6
1.	English and Communication Skills	Communicate effectively in English with others	<ul style="list-style-type: none"> <li>Desired understanding of skills of communication</li> </ul>		5	
2.	Applied Mathematics	Apply basic principles of mathematics to solve engineering problems	<ul style="list-style-type: none"> <li>Desired cognitive and mathematical skills to solve problems</li> </ul>		5	
3.	Applied Physics	Apply basic principles of science to solve engineering problems	<ul style="list-style-type: none"> <li>Desired cognitive and applied skills to solve problems</li> </ul>		5	
4.	Applied Chemistry	Apply basic principles of science to solve engineering problems	<ul style="list-style-type: none"> <li>Desired cognitive and applied skills to solve problems</li> </ul>		5	
5.	Basics of Information Technology	Use computer and IT tools for creating document, making spread sheet and making presentation	<ul style="list-style-type: none"> <li>Knowledge of facts, principles, processes and general concepts, in a field of work or study</li> <li>A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> <li>Collecting and organising information and communication</li> <li>Responsibility for own work and learning and some responsibility for others' works and learning</li> </ul>		5	
6.	Engineering Drawing	Prepare and interpret drawings of engineering components.	<ul style="list-style-type: none"> <li>A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	

7	General Workshop Practice	Prepare simple jobs as per specifications	<ul style="list-style-type: none"> <li>A range of cognitive and practical skills required to draw, read and interpret drawings and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
8	Environmental Studies	Use appropriate procedures for energy conservation and preventing environmental pollution	<ul style="list-style-type: none"> <li>Knowledge of facts, principles, processes and general concepts in a field of work or study</li> </ul>		5	
9	Engineering Materials	Select material as per desired application Use heat treatment processes	<ul style="list-style-type: none"> <li>Knowledge of facts, principles, processes and general concepts in a field of work or study</li> </ul>		5	
10	Applied Mechanics	Apply concepts of mechanics to solve engineering problems	<ul style="list-style-type: none"> <li>Knowledge of facts, principles, processes and general concepts in a field of work or study</li> </ul>		5	
11	Elements of Electrical and Electronics Engineering	Use electrical and electronic instruments to measure various engineering parameters	<ul style="list-style-type: none"> <li>Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
12	Metrology and Instrumentation	Use various measuring and gauging instruments	<ul style="list-style-type: none"> <li>Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
13	Mechanical Engineering Drawing	Prepare and interpret drawings of engineering components	<ul style="list-style-type: none"> <li>A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	



14	Workshop Technology	<p>Operate conventional machine for machining of components as per specifications</p> <p>Use cutting tools for machines and machine tools.</p> <p>Use modern machining methods for machining of components</p> <p>Carry out metal forming by rolling and forging processes to produce parts</p> <p>Use presses and press tools.</p> <p>Prepare simple jigs, fixtures, pattern, mould and press tools for production purposes.</p> <p>Use surface coating and protection methods.</p>	<ul style="list-style-type: none"> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
15	Generic Skills and Entrepreneurship Development	Plan and execute given task and project as a team member or a leader	<ul style="list-style-type: none"> <li>• Responsibility for own work and learning and full responsibility for other's works and learning</li> </ul>			6
16	Hydraulics and Pneumatics	Use hydraulic and pneumatic equipment	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
17	Strength of Materials	Perform material testing for its properties	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	

18	Thermodynamics	Use boilers, steam turbines, air compressors, IC engines, refrigeration and air-conditioning equipment	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
19	Industrial Training	Solve real life problems by application of acquired knowledge and skills	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> <li>• Desired mathematical skill; understanding and some skill of collecting and organising information, communication</li> <li>• Responsibility for own work and learning and some responsibility for others' works and learning</li> </ul>		5	
20	Basics of Management	Manage resources effectively at the workplace	<ul style="list-style-type: none"> <li>• Responsibility for own work and learning and some responsibility for others' works and learning</li> </ul>		5	
21	Refrigeration and Air-conditioning	Use various instruments to measure heat/air related parameters.	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> </ul>		5	

22	Theory of Machines	Use principles of kinematics and dynamics in operation of various mechanisms.	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> </ul>		5	
23	Computer Aided Drafting and Modelling	Use software like AutoCAD and SolidWorks to prepare and analyze solid models.	<ul style="list-style-type: none"> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
24	Production Management	<p>Carry out estimation and costing of production cost for budgeting and analysis.</p> <p>Prepare process plan for given part.</p> <p>Carry out work measurement and method study to improve productivity</p>	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
25	Machine Design	Design and modify simple machine elements	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> </ul>		5	
26	Automobile Engineering	Identify and rectify simple and common troubles in automotive vehicles.	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	

27	CNC Machines and Automation	Prepare CNC part programmes and use CNC machines to make simple jobs.	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> </ul>		5	
28	Project Work	Solve real life problems by application of acquired knowledge and skills	<ul style="list-style-type: none"> <li>• Knowledge of facts, principles, processes and general concepts in a field of work or study</li> <li>• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information</li> <li>• Desired mathematical skill; understanding and some skill of collecting and organising information, communication</li> <li>• Responsibility for own work and learning and some responsibility for others' works and learning</li> </ul>		5	