

## **NSQF QUALIFICATION FILE FOR DIPLOMA COURSE IN AUTOMOBILE 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**)

## NSQF QUALIFICATION FILE FOR DIPLOMA COURSE IN AUTOMOBILE ENGINEERING

### SUMMARY

<b>Qualification Title</b>	3 year diploma course in Automobile 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 Automobile 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 carried out by the Punjab State Board of Technical Education &amp; Industrial Training, Chandigarh.</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. Supervisor in Automobile Manufacturing Unit</li><li>2. Maintenance Incharge</li><li>3. Quality Controller</li><li>4. Service Engineer</li><li>5. Workshop Instructor in Technical Institution.</li><li>6. As an entrepreneur</li></ol>
<b>Licensing requirements</b>	N.A.

## NSQ QUALIFICATION FILE FOR DIPLOMA COURSE IN AUTOMOBILE 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 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>Formal Structure of the Qualification</b>	As per Annexure II
<b>Date of planned review of the qualification.</b>	Year 2020

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

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

Assessment of learners is carried out 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 a committee constituted by PSBTE, Chandigarh 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

### **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 AUTOMOBILE 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 3000 students in Automobile Engineering 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 is carried out at regular intervals. Academics Committees have been 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 Automobile Engineering are eligible for admission (lateral entry) to bachelor's degree in Automobile Engineering. A sample copy of the Govt. Notification for admission to degree courses through lateral entry system is attached on **Annexure VII**

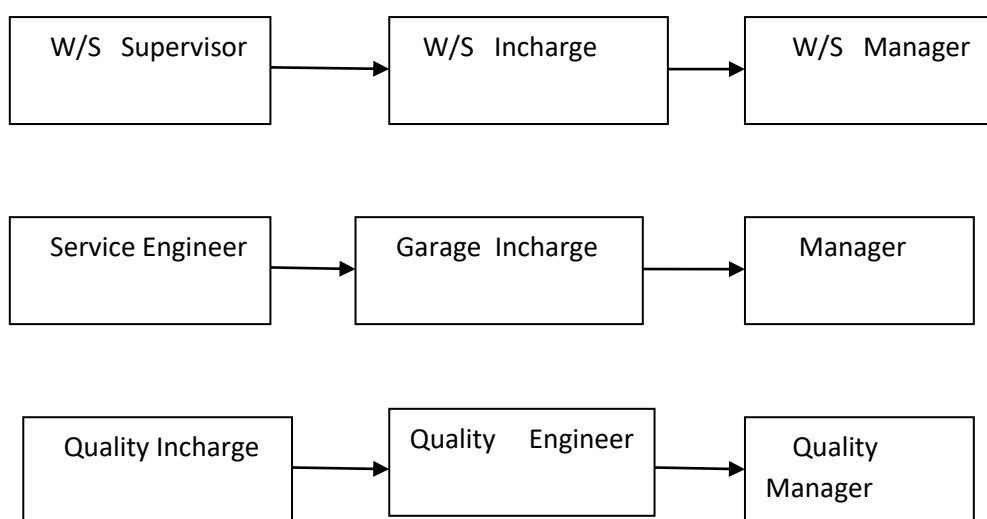
To ensure progression to other qualifications, the following points have been kept in mind while developing the curriculum :

- 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 Automobile Engineering :**

The qualifying student will be absorbed initially by the industry as Workshop Supervisor, Service Engineer, 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/garage incharge/quality engineer/maintenance incharge. After 7-8 years, he will work as manager.

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



## Annexure-II

## FORMAL STRUCTURE OF THE QUALIFICATIONS

Sr.	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	-	<b>48</b>		5	
1.6	Engineering Drawing – I	M	-	96		5	
1.7	General Workshop Practice – I	M	-	96		5	
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	Automotive 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	Basics of Thermodynamics, Hydraulics and Pneumatics	M	64	32		5	
3.5	Automobile Engineering Drawing	M	-	96		5	
3.6	**Workshop Technology – I	M	48	112		5	
Student Centred Activities including Energy Conservation Awareness Camp		M	-	48		5	
<b>Total</b>			256	384			

<b>FOURTH SEMESTER</b>							
4.1	Garage equipment	M	48	-		5	
4.2	Auto Engine – I	M	48	32		5	
4.3	** Strength of Materials	M	64	32		5	
4.4	Chassis, Body and Transmission-I	M	48	32		5	
4.5	Computer Aided Drafting in Automobile Engineering	M	-	96		5	
4.6	**Workshop Technology – II	M	48	112		5	
Student Centred Activities including Entrepreneurial Awareness Camp		M	-	64		5	
<b>Total</b>			272	384			

<b>FIFTH SEMESTER</b>							
-	Industrial Training	M	-	-		5	
5.1	Basics of Management	M	48	-		5	
5.2	Auto Engine-II	M	48	32		5	
5.3	Chassis, Body and Transmission-II	M	48	32		5	
5.4	Auto Electrical and Electronics Equipment	M	64	32		5	
5.5	Elements of Design	M	64	-		5	
5.6	Auto Repair, Maintenance and Driving Practice-I	M	-	192		5	
Student Centred Activities including Personality Development Camp		M	-	80		5	
<b>Total</b>			272	384			

<b>SIXTH SEMESTER</b>						5	
6.1	Generic Skills and Entrepreneurship Development	M	48			5	
6.2	Tractor and Heavy Earth Moving Equipment	M	64			5	
6.3	Production Planning and Costing	M	48			5	
6.4	Motor Vehicle Act and Transport Management	M	48			5	
6.5	Auto Repair, Maintenance and Driving Practice-II	M	-	128		5	
6.6	Project Work			256		5	
	<b>Student Centred Activities</b>	M	-	48		5	
Total			208	432			

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

## ASSESSMENT OF EVIDENCE

## Annexure-III

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 per the Annexure	<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, 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 engineering components		<ul style="list-style-type: none"> <li>• Drawing</li> <li>• Sketching</li> </ul>		5	
7.	General Workshop Practice	Prepare simple jobs as per specification Use suitable cutting tools and tooling during production/maintenance.		<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.	Automotive Material	Select material as per desired application		<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	

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> <li>• Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce</li> </ul>		5	
11	Elements of Electrical and Electronics Engineering	Diagnose and rectify faults in automobile electrical and electronic system		<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	Basics of Thermodynamics, Hydraulics and Pneumatics	Interpret basic hydraulic and thermodynamics processes / cycles.		<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	
13	Automobile Engineering Drawing	Prepare and interpret drawings of engineering components		<ul style="list-style-type: none"> <li>• Drawing</li> <li>• Sketching</li> </ul>		5	
14	Workshop Technology	Use suitable cutting tools and tooling during production/maintenance.		<ul style="list-style-type: none"> <li>• Workshop job</li> <li>• Report writing, presentation and viva-voce</li> </ul>		5	

15	Garage equipment	Use auto shop tools and equipment safely		<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	
16	Auto Engine	<p>Diagnose and rectify common faults in automobile engine</p> <p>Evaluate and optimize automobile engine performance</p> <p>Interpret different characteristics of fuels and lubricants.</p>		<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	
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, assembly and disassembly exercises and viva-voce</li> </ul>		5	
18	Chassis, Body and Transmission	Diagnose and rectify common faults in automobile transmission system and mechanism		<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	

19	Computer Aided Drafting in Automobile Engineering	Use design software like AutoCAD, Solid Works and Pro-E for simple applications		<ul style="list-style-type: none"> <li>Drawing</li> </ul>		5	
20	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	
21	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	
22	Auto Electrical and Electronics Equipment	Diagnose and rectify faults in automobile electrical and electronic system		<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	
23	Elements of Design	Design and modify simple machine elements		<ul style="list-style-type: none"> <li>Design and drawing</li> </ul>		5	
24	Auto Repair, Maintenance and Driving Practice	Diagnose and rectify common faults in automobile transmission system and mechanism Carry out wheel balancing and alignment		<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	
25	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

26	Tractor and Heavy Earth Moving Equipment	Maintain tractor and earth moving equipment		<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	
27	Production Planning and Costing	<p>Manage activities related to procurement, stacking, storage and preservation of materials.</p> <p>Apply inventory control techniques to reduce production cost</p> <p>Check the quality of the incoming/in-process/finished parts</p>		<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	
28	Motor Vehicle Act and Transport Management	<p>Apply salient features of Motor Vehicle Act and Central Motor Vehicle Rules.</p> <p>Inspect and prepare estimate of accidental vehicle as per insurance policy and rules</p> <p>Manage fleet of vehicles</p>		<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	
29	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%

## Annexure-IV

## EVIDENCE OF LEVEL

Title/Name of qualification/component: Diploma in Automobile Engineering		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
Process	<p>The learner is able to carry out diagnosis and rectification of faults in engine, transmission system, electrical and electronic systems of automobiles. In addition, he carries out maintenance of vehicles using diagnostic tools. The job holder must understand standard operating procedures for carrying out fault diagnosis, repair and maintenance. He must also understand about safety, health and environment policies at the workplace.</p>	<p>The learner is required to select appropriate tools, instruments, equipment and procedures for fault diagnosis, repair and maintenance of automobiles. The job however will be done with well-defined procedures in a familiar context to achieve the desired accuracy</p> <p>Thus the learner requires to demonstrate skill with clear choice of procedure in a familiar setup.</p> <p>Hence the NSQF level as per this descriptor will be 5.</p>	5

Title/Name of qualification/component: Diploma in Automobile Engineering		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
Professional knowledge	<p><b>Knowledge about :</b></p> <ul style="list-style-type: none"> <li>• Classification, properties and uses of materials</li> <li>• Objectives of heat treatment</li> <li>• Description and Uses of Heat Treatment Processes</li> <li>• Basic Principles of Science</li> <li>• Theory of orthographic projections</li> <li>• Isometric views</li> <li>• Different systems of Units</li> <li>• Different types of forces acting on a body</li> <li>• Concept of moment, couple</li> <li>• Concept of friction, coefficient of friction</li> <li>• Determining centroid/centre of gravity of plain and composite laminar and solid bodies.</li> <li>• Determining velocity ratio, mechanical advantage and efficiency of simple machines.</li> <li>• Basic electrical quantities</li> <li>• Construction and working of Transformer, Motor</li> <li>• Characteristics of diodes, transistors and thyristor</li> <li>• Principles of Thermal Engineering</li> <li>• Gas Laws and Laws of Thermodynamics</li> </ul>	<p>The job holder needs to have knowledge about various types of materials and various machining processes. He needs to be well conversant with welding, casting and metal forming operations.</p> <p>Further,</p> <p>The job holder should have basic knowledge about principle of operation of IC engines, function and working of fuel supply system, cooling and lubrication system, transmission system, steering system, electrical system and their components.</p> <p>This cognitive knowledge will help him to undertake fault diagnosis and repair of vehicles.</p> <p>As the knowledge of facts, principles and concepts is desired in the field of Automobile Engineering so it is pegged at level 5.</p>	5

Title/Name of qualification/component: Diploma in Automobile Engineering		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none"> <li>• Different modes of heat transfer</li> <li>• Components of Hydraulic and pneumatic system</li> <li>• Working of air compressor</li> <li>• Principles of Refrigeration and Air conditioning, their components and functions.</li> <li>• Limits , Fits and Tolerances</li> <li>• Principle of welding , operation of gas welding, arc welding, Modern Welding and other welding processes</li> <li>• Moulding and Casting</li> <li>• Metal Forming Processes</li> <li>• Plastic Processes</li> <li>• Specifications and application of General Tools, General Equipment, Tuning and Testing Equipment, Engine Repair Tools, Electrical Repair Equipment, Reconditioning and Testing Equipment</li> <li>• Principle of operation of IC engine</li> <li>• Principle of operation of fuel supply system, engine cooling and lubrication system</li> <li>• Concept of terms related to strength of materials</li> <li>• Calculate moment of inertia of different sections</li> <li>• Concept of bending and torsion</li> </ul>		



Title/Name of qualification/component: Diploma in Automobile Engineering		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none"> <li>• Function and working of clutch, manual and automatic transmission, final drive, steering system</li> <li>• Cutting tools and cutting tool material</li> <li>• Description and function of various parts of a lathe</li> <li>• Classification of drilling machines and their description</li> <li>• Classification of boring machines and their description</li> <li>• Working principle of shaper and planer, types of shapers and planer</li> <li>• Features of various types of broaching machines</li> <li>• Uses and features of jigs and fixtures</li> <li>• Cutting tools for different materials and operations</li> <li>• Phenomenon of combustion in I.C. engine</li> <li>• Working of fuel supply system in diesel engine</li> <li>• Various components of fuel supply system in diesel engine.</li> <li>• Function and constructional features of various types of automobile suspension system</li> <li>• Constructional detail and nomenclature of various types of tyres</li> <li>• Functions, constructional features and working</li> </ul>		

Title/Name of qualification/component: Diploma in Automobile Engineering		Level: 5	
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<p>of various types of brakes</p> <ul style="list-style-type: none"> <li>• Function of various automotive safety system</li> <li>• Functions of various electrical and electronic equipment components in Automobile</li> <li>• Construction and working of Batteries</li> <li>• Battery Testing, Battery charging, Battery Defects</li> <li>• Function of various components of charging system</li> <li>• Function of various components of Starting system</li> <li>• Lighting systems and wiring</li> <li>• Electrical Accessories and electronic devices in Automobile</li> <li>• Design consideration, design procedure</li> <li>• Principles of good economic design</li> <li>• Designing for strength</li> <li>• Classifications and function of tractors</li> <li>• Functions of hydraulic system and supplementary system</li> <li>• Features and specifications of tractor wheels and tyres</li> <li>• Working principles of earth moving machinery</li> <li>• Function and advantages of production planning and control</li> <li>• Need and planning for Inspection</li> </ul>		

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	<ul style="list-style-type: none"> <li>• Meaning and need for quality control and Quality Assurance</li> <li>• Various elements of Cost</li> <li>• Importance of estimating and costing</li> <li>• Salient features of motor vehicle act</li> <li>• Various types of insurance used in vehicle.</li> </ul>		
Professional skill	<ul style="list-style-type: none"> <li>• Selection of Material</li> <li>• Perform material testing.</li> <li>• Measure basic electrical quantity</li> <li>• Select and operate single phase and three phase motors.</li> <li>• Prepare drawings of automotive components</li> <li>• Interpret various drawing used in automobile engineering</li> <li>• Free hand sketching of automotive systems</li> <li>• Use computer and IT tools for creating documents and presentations</li> <li>• Select proper tools and materials to make a job</li> <li>• Take measurements using basic measuring tools</li> <li>• Prepare simple jobs in welding, fitting, sheet metal, carpentry and smithy shop.</li> <li>• Fabricate welding joints</li> <li>• Select electrodes and various parameters for a</li> </ul>	<p>The job holder needs to recall and demonstrate the ability to carry out diagnosis of the operational fault responsible for the root cause of the vehicle trouble, analyse information and evaluate results and subsequently undertake repair. It is important to note that a range of skills of auto service work are needed</p> <p>As the job holder is engaged in a range of practical skills selecting and using tools, instruments, machines, materials and methods to perform the tasks as per specifications and accuracy. Hence, this is pegged at Level 5.</p>	5

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	welding job <ul style="list-style-type: none"> <li>• Inspect various welding joints</li> <li>• Prepare pattern for given job</li> <li>• Prepare sand moulds</li> <li>• Cast a mould</li> <li>• Operate forging machine, press, spinning machine</li> <li>• Use general tool, tuning and testing equipment, engine repair tools, electrical repair equipment and re-conditioning equipment</li> <li>• Test IC engine</li> <li>• Servicing of parts of transmission system</li> <li>• Prepare drawings of screw threads, nuts, bolts, locking devices, keys and cotters, riveted joints and couplings.</li> <li>• Prepare drawings of automatic components using AutoCAD and other software.</li> <li>• Perform operations on Lathe machine</li> <li>• Perform operations on drilling machine</li> <li>• Perform operations on shaper</li> <li>• Testing of fuel injector(diesel)</li> <li>• Phasing of calibration of fuel injection pump</li> <li>• Diagnose and rectify faults in automobile</li> </ul>		

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	<p>suspension system</p> <ul style="list-style-type: none"> <li>• Diagnose and rectify the faults in disc and drum brakes</li> <li>• Testing of alternator rotor and stator winding for short circuit, ground and broken circuit</li> <li>• Testing and setting of horn and relay</li> <li>• Testing and fault tracing of field winding, armature and magnetic switch for short circuit, grounding of a starter</li> <li>• Testing dipper switch, flasher unit and indicator circuits and fault tracing</li> <li>• Testing and fault tracing of different components of transistorized ignition system</li> </ul> <ul style="list-style-type: none"> <li>• Design various machine elements(flange coupling, clutches, flywheel, joints and pulleys, spur gear)</li> <li>• Diagnose and rectify electrical system faults</li> <li>• Carryout servicing of vehicles</li> <li>• Overhaul petrol engine, gear box and differential</li> <li>• Perform emission test on automobile</li> </ul>		

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	<ul style="list-style-type: none"> <li>• Identify common faults in tractor</li> <li>• Apply the principles of costing in product costing</li> <li>• Apply the principle and techniques in production planning and control of a production system</li> <li>• Drive vehicle in different road conditions</li> <li>• Manage an auto workshop related to storage of different parts</li> <li>• Carryout trouble shooting of engine</li> <li>• Analyze engine performance data</li> <li>• Overhaul wheel, axle and brakes</li> <li>• Prepare preventive maintenance schedule</li> <li>• Apply the knowledge and skill in finding the solution of particular problem in industry</li> </ul>		
Core skill	<p><b>Communication Skills</b></p> <ul style="list-style-type: none"> <li>• Write legibly and effectively</li> <li>• Listen in proper prospective</li> <li>• Read various genres adopting different reading techniques.</li> <li>• Make oral presentation</li> <li>• Speak confidently</li> </ul>	<p>The job holder needs to have mathematical skills which will be helpful in problem solving.</p> <p>The individual must be skilled in documenting with desired clarity regarding the diagnosis and identification of faults of automobiles. Complete record also needs to be maintained about repair and inspection of vehicles.</p>	5

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	<p><b>Mathematical Skills</b></p> <ul style="list-style-type: none"> <li>• Demonstrate basic mathematical concept and principles to perform practical operations.</li> <li>• Basic skills in Algebra, Trigonometry, Coordinate Geometry and apply the knowledge in problem solving</li> <li>• Concept of differential Calculus, Integral Calculus, Operations Research, Differential Equations and their application in engineering field.</li> </ul> <p><b>Social, Political and Natural environment</b></p> <ul style="list-style-type: none"> <li>• Comprehend the importance of ecosystem and sustainable development</li> <li>• Identify different types of environmental pollution and control measures</li> <li>• Practice energy efficient techniques in day-to-day life and industrial processes</li> <li>• Identify the role of non-conventional energy resources in environmental protection</li> <li>• Analyze the impact of human activities on the environment</li> <li>• Follow safety rules and regulations</li> <li>• Demonstrate self development</li> <li>• Manage himself/herself physically, intellectually and psychologically</li> <li>• Work effectively as a team member</li> </ul>	<p>The jobholder needs to have good communication skills as he will be communicating with workers and gathering inputs/requirements.</p> <p>He should be aware about various types of environmental pollution and methods to control them.</p> <p>He should exhibit entrepreneurial traits and should work effectively as a team member.</p> <p>Therefore, it is pegged at Level 5.</p>	

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	<ul style="list-style-type: none"> <li>• Manage tasks effectively</li> <li>• Demonstrate how to launch an individual's entrepreneurial career</li> <li>• Demonstrate leadership qualities to motivate self and others</li> <li>• Manage human resources at the shop-floor</li> <li>• Maintain and be a part of healthy work culture in an organisation</li> <li>• Use modern concepts like TQM, TPM and CRM for improved quality and productivity.</li> <li>• Manage stress</li> <li>• Manage time effectively</li> <li>• Maintain interpersonal Relationship</li> <li>• Maintain Healthy and Hygienic environment</li> <li>• Use QC Tools</li> <li>• Adopt 5S and Kaizan techniques</li> <li>• Concept and elements of ISO 9000 and ISO 14000</li> <li>• Concept of Quality Circles</li> <li>• Production, productivity</li> </ul>		
Responsibility	<ul style="list-style-type: none"> <li>• Follow safety procedures and measures</li> <li>• Maintain good housekeeping practices.</li> <li>• Follow traffic rules and road signals for safety</li> <li>• Practice energy efficient techniques in industrial processes</li> </ul>	A diploma holder in Automobile Engineering is independently responsible to perform the fault diagnosis, repair and maintenance work of automobiles as per the laid procedures and specifications. This is also reflected in the learning outcomes. He is responsible for his own work and	5



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	<ul style="list-style-type: none"> <li>• Adopt cleaner technologies</li> <li>• Ensure compliance of products with specified requirements</li> <li>• Follow environmental legislation</li> <li>• Motivate self and others</li> <li>• Manage human resources at the shop floor</li> <li>• Work effectively as a team member</li> <li>• Demonstrate self development</li> <li>• Recognize a business opportunity</li> <li>• Manage tasks effectively.</li> <li>• Prevent drug abuse</li> </ul>	<p>learning and to some extent for other's work also.</p> <p>Hence NSQF Level is 5 for this descriptor</p>	