LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE: AUTO ELECTRICAL DESIGN TECHNICIAN
(QP: 2022/AUT/KSDC/05919)

SECTOR: AUTOMOTIVE
Grade: 11th and 12th

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal- 462 002, M.P., India
http://www.psscive.ac.in

Gandhiji's Talisman

I will give you a talisman. Whenever you are in doubt or when the self becomes too much with you, apply the following test:

Recall the face of the poorest and the weakest man whom you may have seen and ask yourself if the step you contemplate is going to be of any use to him. Will he gain anything by it? Will it restore him to a control over his own life and destiny? In other words, will it lead to Swaraj for the hungry and spiritually starving millions?

Then you will find your doubts and your self melting away.

M K Gandhi

LEARNING OUTCOME

BASED

VOCATIONAL CURRICULUM

JOB ROLE: AUTO ELECTRICAL DESIGN TECHNICIAN

(QUALIFICATION PACK: 2022/AUT/KSDC/05919)

SECTOR: AUTOMOTIVE

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal- 462 002, M.P., India
http://www.psscive.ac.in

LEARNING OUTCOME-BASED CURRICULUM

Automotive- AUTO ELECTRICAL DESIGN TECHNICIAN

FEBRUARY, 2025

http://www.psscive.ac.in

Published by:
Joint Director
PSS Central Institute of Vocational Education, NCERT, Shyamla Hills, Bhopal

PATRON

Dr. DINESH PRASAD SAKLANI,

Director, National Council of Educational Research and Training (NCERT), New Delhi

Dr. DEEPAK PALIWAL

Joint Director
PSS Central Institute of Vocational Education,
Bhopal

COURSE COORDINATOR

Dr. Vinod Kumar Yadav

Associate Professor
Engineering and Technology Department,
PSSCIVE, Bhopal

FOREWORD

The Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE) a constituent of the National Council of Educational Research and Training (NCERT) is spearheading the efforts of developing learning outcome-based curricula and courseware aimed at integrating both vocational and general qualifications to open pathways of career progression for students. The curriculum has been developed for the vocational education programme introduced under the Centrally Sponsored Scheme of Samagra Shiksha of the Ministry of Education (erstwhile, Ministry of Human Resource Development) and is aligned to the National Skill Qualifications Framework (NSQF). The curricula for vocational courses are being developed under the project approved by the Project Approval Board (PAB) of 'Samagra Shiksha', which is an overarching programme for the school education sector extending from pre-school to Grade 12

It is a matter of great pleasure to introduce this learning outcome-based curriculum as part of the vocational training packages for the job role of Auto Electrical Design Technician. The curriculum has been developed for the secondary students of Grades 11 and 12 and is aligned to the National Occupation Standards (NOSs) for the job role. The curriculum aims to provide children with employability and vocational skills to support occupational mobility and lifelong learning. It will help them to acquire specific occupational skills that meet employer's immediate skill needs. The teaching-learning is to be done through interactive sessions in classrooms, practical activities in laboratories or workshops, projects, field visits, etc. and professional experience is to be provided through on-the-job training.

The curriculum has been developed and reviewed by a group of experts and their contributions are greatly acknowledged. The utility of the curriculum will be adjudged by the qualitative improvement that it brings about in teaching-learning. The feedback and suggestions on the content by the teachers and other stakeholders will be of immense value to us in bringing about further improvement in this document.

Dr. Dinesh Prasad Saklani
Director
National Council of Education Research & Training

PREFACE

India today stands poised at a very exciting juncture in its saga. The potential for achieving inclusive growth are immense and the possibilities are equally exciting. The world is looking at us to deliver sustainable growth and progress. To meet the growing expectations, India will largely depend upon its young workforce. In order to fulfil the growing aspirations of our youth and the demand of skilled human resources, the Ministry of Education (MoE), Government of India introduced the revised Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education that aims to provide for the diversification of educational opportunities so as to enhance individual employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education. For spearheading the scheme, the PSS Central Institute of Vocational Education (PSSCIVE) was entrusted with the responsibility to develop learning outcome-based curricula, student workbooks, teacher handbooks and e-learning materials for the job roles in various sectors.

The PSSCIVE firmly believes that the Vocationalisation of education in the nation need to be established on a strong footing of philosophical, cultural and sociological traditions and it should aptly address the needs and aspirations of the students besides meeting the skill demands of the industry. The curriculum, therefore, aims at developing the desired professional, managerial and communication skills to fulfil the needs of the society and the world of work. In order to honour its commitment to the nation, the PSSCIVE has initiated the work on developing learning outcome-based curricula with the involvement of faculty members and leading experts in respective fields. It is being done through the concerted efforts of leading academicians, professionals, policy makers, partner institutions, Vocational Education and Training experts, industry representatives, and teachers. The expert group through a series of consultations, working group meetings and use of reference materials develops a National Curriculum.

The success of this curriculum depends upon its effective implementation, and it is expected that the managers of vocational education programme, vocational educators, vocational teachers/trainers, and other stakeholders will make earnest efforts to provide better facilities, develop linkages with the industry or world of work and foster a conducive learning environment for the students for effectively transacting the curriculum and to achieve the learning outcomes as per the content of the curriculum document.

Dr. DEEPAK PALIWAL
Joint Director
PSS Central Institute of Vocational Education

ACKNOWLEDGEMENTS

On behalf of the team at the PSS Central Institute of Vocational Education (PSSCIVE) we are grateful to the members of the Project Approval Board (PAB) of *Samagrah Shiksha* and the officials of the Ministry of Education (MoE), Government of India for the financial support to the project for the development of curricula.

We are grateful to the Director, NCERT for his support and guidance. We also acknowledge the contributions of our colleagues at the National Council of Educational Research and Training (NCERT), National Skill Development Corporation (NSDC), Automotive Skill Development Council (ASDC) and Sector Skill Council for Management and Entrepreneurship and Professional Skills for their academic support and cooperation in the development of Qualification file and curriculum.

We are grateful to Dr. Saurabh Prakash, Professor and Head Department of Engineering and Technology, for his untiring efforts and contribution to the development of this learning outcome-based curriculum. We also acknowledge the valuable contributions of Dr. Vinod Kumar Yadav, Associate Professor and Course Co-Coordinator, Department of Engineering and Technology for his role in this process.

The suggestions and editorial support provided by Mr. Ankit Singh Chauhan, Assistant Professor, Department of Engineering Technology are also duly appreciated and acknowledged.

PSSCIVE Team

CONTENTS

S.No.	Title			Page No.
	Foreword			(i)
	Preface			(ii)
	Acknowledgement			(iii)
1.	Course Overview			1
2.	Scheme of Units			2
3.	Teaching/Training Activities			4
4.	Assessment and Certification			4
5.	**Unit Content**	**Grade 11**		
		Part A	**Employability Skills**	**8**
			Unit 1: Communication Skills-III	8
			Unit 2: Self-management Skills-III	10
			Unit 3: Information and Communication Technology Skills-III	11
			Unit 4: Entrepreneurial Skills-III	13
			Unit 5: Green Skills-III	14
		Part B	**Vocational Skills**	**15**
			Unit 1: Automotive Systems and Components	15
			Unit 2: Auto Electrical System	15
			Unit 3: Structure of Automotive Electrical System	16
			Unit 4: 2D Drawings of Automotive Electrical Systems	17
			Unit 5: Introduction to CAD for Electrical Component Design	18
		Grade 12		
		Part A	**Employability Skills**	**19**
			Unit 1: Communication Skills-IV	19
			Unit 2: Self-management Skills-IV	20
			Unit 3: Information and Communication Technology Skills-IV	21
			Unit 4: Entrepreneurial Skills-IV	23
			Unit 5: Green Skills-IV	24
		Part B	**Vocational Skills**	**24**
			Unit 1: 2D CAD Drawings of Electrical Components	25
			Unit 2: Sheet Metal Brackets in Automotive	25
			Unit 3: Design Principles of Sheet Metal Brackets	26
			Unit 4: Advancements in Automotive Electrical Systems	26
			Unit 5: Health and Safety in Automotive Electrical Systems	26
6.	Organisation of Field Visits			27
7.	List of Equipment and Materials			27
8.	Vocational Teacher's/ Trainer's Qualification and Guidelines			29
9.	List of Contributors			32

1. COURSE OVERVIEW

COURSE TITLE: Auto Electrical Design Technician (AEDT): 2022/AUT/KSDC/05919

The present curriculum for the Auto Electrical Design Technician job role is aligned with Level L-4. This course is designed to meet the needs of students and professionals aspiring to develop expertise in the field of automotive electrical systems and design. It is particularly beneficial for individuals aiming to work in the automotive industry or those who wish to start their own auto-electrical service and design ventures. The demand for skilled Auto Electrical Design Technicians has significantly increased with the rapid advancement in automotive technology, especially in electric and hybrid vehicles. This course equips learners with the necessary technical knowledge, practical skills, and competencies to excel in this dynamic and evolving field. Automotive electrical systems are at the core of modern vehicles, encompassing everything from basic wiring and lighting to advanced electronic control units (ECUs), battery management systems, and electric vehicle (EV) technologies. This course provides a comprehensive understanding of these systems, preparing students to 2D drawing, design of Auto Electrical components, Designing of electrical and electronic components in automobiles.

COURSE OBJECTIVES: On completion of the course, students should be able to:

- Understand the fundamental principles of automotive electrical and electronic systems.
- Identify and analyse the key components of vehicle electrical systems, including wiring harnesses, sensors, actuators, and control modules.
- Design and interpret electrical circuit diagrams for automotive applications.
- Apply safety protocols and standards while working with automotive electrical systems.
- Understand the role of software (CAD) in modern automotive electrical systems.
- Communicate effectively with customers to understand their requirements and provide technical solutions.
- Demonstrate awareness of environmental sustainability and the importance of green technologies in the automotive industry.
- Use diagnostic tools and software to analyse and resolve electrical system issues.
- Develop entrepreneurial skills to establish and manage an auto electrical service or design business.

COURSE REQUIREMENTS: The learner should have a basic knowledge of science.

COURSE LEVEL: By the end of the program, learners will be equipped with the technical expertise and practical skills required to excel as Auto Electrical Design Technicians in a rapidly evolving automotive landscape.

COURSE DURATION: 600 hrs

Grade 11	: 300 hrs
Grade 12	: 300 hrs
TOTAL	**: 600 hrs**

2. SCHEME OF UNITS

This course is a planned sequence of instructions consisting of Units meant for developing employability and vocational competencies of students of Grade 11 and 12 opting for vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Grade 11 is as follows:

Grade 11			
Units		**No. of Hours for Theory and Practical 300**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	Unit 1: Communication Skills-III	25	10
	Unit 2: Self-management Skills-III	25	
	Unit 3: Information and Communication Technology Skills-III	20	
	Unit 4: Entrepreneurial Skills-III	25	
	Unit 5: Green Skills-III	15	
		110	**10**
Part B	**Vocational Skills**		
	Unit 1: Automotive Systems and Components	10	30
	Unit 2: Auto Electrical System	25	
	Unit 3: Structure of Automotive Electrical System	40	
	Unit 4: 2D Drawings of Automotive Electrical Systems	45	
	Unit 5: Introduction to CAD for Electrical Component Design	45	
		165	**30**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
		10	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
		15	**15**
	Grand Total	**300**	**100**

The unit-wise distribution of hours and marks for Grade 12 is as follows:

Grade 12			
Units		**No. of Hours for Theory and Practical 200**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
	Unit 1: Communication Skills-IV	20	10
	Unit 2: Self-management Skills-IV	10	
	Unit 3: Information and Communication Technology Skills-IV	20	
	Unit 4: Entrepreneurial Skills-IV	15	
	Unit 5: Green Skills-IV	10	
		75	**10**
Part B	**Vocational Skills**		
	Unit 1: 2D CAD Drawings of Electrical Components	45	30
	Unit 2: Sheet Metal Brackets in Automotive	45	
	Unit 3: Design Principles of Sheet Metal Brackets	45	
	Unit 4: Advancements in Automotive Electrical Systems	24	
	Unit 5: Health and Safety in Automotive Electrical Systems	06	
		165	**30**
Part C	**Practical Examination**	06	15
	Written Test	01	10
	Viva Voice	03	10
		10	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
		15	**15**
	Grand Total	**300**	**100**

3. TEACHING/TRAINING ACTIVITIES

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace. Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

CLASSROOM ACTIVITIES

Classroom activities are an integral part of this course and interactive lecture sessions, followed by discussions should be conducted by trained vocational teachers. Vocational teachers should make effective use of a variety of instructional or teaching aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

PRACTICAL WORK IN LABORATORY/WORKSHOP

Practical work may include but not limited to hands-on-training, simulated training, role play, case-based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skills and activities to be performed by the students should be submitted by the vocational teacher to the Head of the Institution.

FIELD VISITS/ EDUCATIONAL TOUR

In field visits, children will go outside the classroom to obtain specific information from experts or to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Vocational Teachers for systematic collection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for field visits within a short distance from the school and make necessary arrangements for the visits. At least three field visits should be conducted in a year.

4. ASSESSMENT AND CERTIFICATION

Upon successful completion of the course by the candidate, the Central/ State Examination Board for Secondary Education and the respective Sector Skill Council will certify the competencies.

The National Skills Qualifications Framework (NSQF) is based on outcomes referenced to the National Occupation Standards (NOSs), rather than inputs. The NSQF level descriptors, which are the learning outcomes for each level, include the process, professional knowledge, professional skills, core skills and

responsibility. The assessment is to be undertaken to verify that individuals have the knowledge and skills needed to perform a particular job and that the learning programme undertaken has delivered education at a given standard. It should be closely linked to certification so that the individual and the employer could come to know the competencies acquired through the vocational subject or course. The assessment should be reliable, valid, flexible, convenient, cost effective and above all it should be fair and transparent. Standardized assessment tools should be used for assessment of knowledge of students. Necessary arrangements should be made for using technology in assessment of students.

KNOWLEDGE ASSESSMENT (THEORY)

Knowledge Assessment should include two components: one comprising of internal assessment and second an external examination, including theory examination to be conducted by the Board. The assessment tools shall contain components for testing the knowledge and application of knowledge. The knowledge test can be an objective paper-based test or short structured questions based on the content of the curriculum.

WRITTEN TEST

It allows candidates to demonstrate that they have the knowledge and understanding of a given topic. Theory question paper for the vocational subject should be prepared by the subject experts comprising a group of experts of academicians, experts from existing vocational subject experts/teachers, and subject experts from universities/colleges or industry. The respective Sector Skill Council should be consulted by the Central/State Board for preparing the panel of experts for question paper setting and conducting the examinations.

The blue print for the question paper may be as follows:

Duration: 3 hrs Max. Mark: 30

		No. of Questions			
S.No.	**Typology of Question**	**Very Short Answer (1 mark)**	**Short Answer (2 Marks)**	**Long Answer (3 Marks)**	**Marks**
1.	Remembering – (Knowledge based simple recall questions, to know specific facts, terms, concepts, principles, or theories; identify, define or recite, information)	**3**	**2**	**2**	**13**

2.	Understanding – (Comprehension – to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	**2**	**3**	**2**	**14**
3.	Application – (Use abstract information in concrete situation, to apply knowledge to new situations: Use given content to interpret a situation, private an example, or solve a problem)	**0**	**2**	**1**	**07**
4.	High Order Thinking Skills – (Analysis & Synthesis – Classify, compare, contrast, or differentiate between different pieces of information; Organize and/ or integrate unique pieces of information from a variety of sources)	**0**	**2**	**0**	**04**
5.	Evaluation – (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	**0**	**1**	**0**	**02**
	Total	**5x1=5**	**10x2=20**	**5x3=15**	**40 (20 questions)**

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners based on practical demonstration of skills by the candidate, using a competency checklist. The competency checklist should be developed as per the National Occupation Standards (NOSs) given in the Qualification Pack for the Job Role to bring about necessary consistency in the quality of assessment across different sectors and Institutions. The student has to demonstrate competency against the performance criteria defined in the National Occupation Standards and the assessment will indicate that they are

'competent', or are 'not yet competent'. The assessors assessing the skills of the students should possess a current experience in the industry and should have undergone an effective training in assessment principles and practices. The Sector Skill Councils should ensure that the assessors are provided with the training on the assessment of competencies.

Practical examination allows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam and viva voce. For practical, there should be a team of two evaluators – the subject teacher and the expert from the relevant industry certified by the Board or concerned Sector Skill Council. The same team of examiners will conduct the viva voce.

Project Work (individual or group project) is a great way to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organised as part of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio.

Student Portfolio is a compilation of documents that supports the candidate's claim of competence. Documents may include reports, articles, photos of products prepared by students in relation to the unit of competency.

Viva voce allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted as per the specific requirements of the vocational subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

CONTINUOUS AND COMPREHENSIVE EVALUATION

Continuous and Comprehensive Evaluation (CCE) refers to a system of school-based evaluation of students that covers all aspects of student's development. In this scheme, the term `continuous' is meant to emphasize that evaluation of identified aspects of students `growth and development' is a continuous process rather than an event, built into the total teaching-learning process and spread over the entire span of academic session. The second term `comprehensive' means that the scheme attempts to cover both the scholastic and the co-scholastic aspects of students' growth and development. For details, the CCE manual of Central Board of Secondary

Education (CBSE) or the guidelines issued by the State Boards on the procedure for CCE should be followed by the Institutions.

5. UNIT CONTENTS

Grade 11

Part A: Employability Skills

S.No.	Units	Duration (hrs)
1.	Communication Skills - III	**25**
2.	Self-management Skills - IIII	**25**
3.	Information and Communication Technology Skills- III	**20**
4.	Entrepreneurial Skills - III	**25**
5.	Green Skills - III	**15**
	Total	**110**

UNIT 1: COMMUNICATION SKILLS – III

Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 hrs)
1. **Demonstrate knowledge of communication**	1. Introduction to communication 2. Importance of communication 3. Elements of communication 4. Perspectives in communication 5. Effective communication	1. Role-play on the communication process 2. Group exercise on factors affecting perspectives in communication 3. Classroom discussion on the 7Cs of effective communication 4. Chart making on elements of communication	**03**
2. **Demonstrate verbal communication**	1. Verbal communication 2. Public Speaking	1. Role-play of a phone conversation. 2. Group exercise on public speaking	**02**

3. Demonstrate non-verbal communication	1. Importance of non-verbal communication 2. Types of non-verbal communication 3. Visual communication	1. Role-play on non-verbal communication 2. Group exercise on body language 3. Group activity on methods of communication	**02**
4. Speak using correct pronunciation	1. Pronunciation basics 2. Speaking properly 3. Phonetics 4. Types of sounds	1. Group activities on practicing pronunciation	**01**
5. Apply an assertive communication style	1. Important communication styles 2. Assertive communication 3. Advantages of assertive communication 4. Practicing assertive communication	1. Group discussion on communication styles 2. Observing and sharing communication styles	**03**
6. Demonstrate the knowledge of saying no	1. Steps for saying 'No' 2. Connecting words	1. Group discussion on how to respond 2. Group activity on saying 'No'	**02**
7. Identify and use parts of speech in writing	1. Capitalisation 2. Punctuation 3. Basic parts of speech 4. Supporting parts of speech	1. Group activity on identifying parts of speech 2. Writing a paragraph with punctuation marks 3. Group activity on constructing sentences 4. Group activity on identifying parts of speech	**03**
8. Write correct sentences and paragraphs	1. Parts of a sentence 2. Types of object 3. Types of sentences 4. Paragraph	1. Activity on writing sentences 2. Activity on active and passive voice 3. Assignment on types of	**02**

		sentences	
9. Communicate with people	1. Greetings 2. Introducing self and others	1. Role-play on formal and informal greetings 2. Role-play on introducing someone 3. Practice greetings	**02**
10. Introduce yourself to others and write about oneself	1. Talking about self 2. Filling a form	1. Practice self-introduction and filling up forms 2. Practice self-introduction to others	**01**
11. Develop questioning skill	1. Main types of questions 2. Forming closed and open-ended questions	1. Practice exercise on forming questions 2. Group activity on framing questions	**01**
12. Communicate information about family to others	1. Names of relatives 2. Relations	1. Practice talking about family 2. Role-play on relations	**01**
13. Describe habits and routines	1. Concept of habits and routines	1. Discuss habits and routines 2. Group activity on describing routines	**01**
14. Ask or give directions to others	1. Asking for directions 2. Using landmarks	1. Role-play on asking and giving directions 2. Identifying symbols	**01**
Total			25

UNIT 2: SELF-MANAGEMENT–III

Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 hrs)
1. **Identify and analyze own strengths and weaknesses**	1. Understanding self 2. Techniques for identifying strengths and weaknesses 3. Difference between interests and abilities	1. Activity on writing aims in life 2. Prepare a worksheet on interests and abilities	**03**

2. Demonstrate personal grooming skills	1. Guidelines for dressing and grooming 2. Preparing a personal grooming checklist	1. Activity on dressing and grooming standards 2. Self-reflection on dressing and grooming	**04**
3. Maintain personal hygiene	1. Importance of personal hygiene 2. Three steps to personal hygiene 3. Essential steps of hand washing	1. Role-play on personal hygiene 2. Assignment on personal hygiene	**03**
4. Demonstrate the knowledge of working in a team and participating in group activities	1. Describe the benefits of teamwork 2. Working in a team	1. Assignment on working in a team 2. Self-reflection on teamwork	**03**
5. Develop networking skills	1. Benefits of networking skills 2. Steps to build networking skills	1. Activity on networking 2. Assignment on networking skills	**03**
6. Describe the meaning and importance of self-motivation	1. Meaning of self-motivation 2. Types of motivation 3. Steps to building self-motivation	1. Activity on staying motivated 2. Assignment on reasons hindering motivation	**03**
7. Set goals	1. Meaning of goals and purpose of goal-setting 2. Setting SMART goals	1. Assignment on setting SMART goals 2. Activity on developing long-term and short-term goals	**03**
8. Apply time management strategies and techniques	1. Meaning and importance of time management 2. Steps for effective time management	1. Checklist for making preparation for daily activities 2. Preparing To-do-list	**03**
Total			25

UNIT 3: INFORMATION AND COMMUNICATION TECHNOLOGY-III

Learning Outcome	Theory (08 hrs)	Practical (12 hrs)	Duration (20 hrs)

1.Create a document on the word processor	1. Introduction to ICT 2. Advantages of using a word processor. 3. Work with Libre Office Writer	1. Demonstration and practice of the following: • Creating a new document • Typing text • Saving the text • Opening and saving file on Microsoft word/Libre Office Writer.	**02**
2.Identify icons on the toolbar	1. Status bar 2. Menu bar 3. Icons on the Menu bar 4. Multiple ways to perform a function	1. Work with a basic user interface of LibreOffice writer 2. Working with Libre Office Writer or Microsoft Word	**02**
3.Save, close, open and print document	1. Save a word document 2. Close 3. Open an existing document 4. Print	1. Perform the functions for saving, closing and printing documents on LibreOffice Writer 2. Perform the functions on Microsoft Word	**02**
4.Format text in a word document	1. Change style and size of text 2. Align text 3. Cut, Copy, Paste 4. Find and replace	1. Perform the functions of formatting on LibreOffice Writer 2. Perform the functions of formatting on Microsoft Word	**02**
5.Check spelling and grammar in a word document	1. Use of spell checker 2. Autocorrect	1. Perform the functions of checking spellings on LibreOffice Writer 2. Perform the functions of checking the spelling on Microsoft Word	**02**
6.Insert lists, tables, pictures, and shapes in a word document	1. Insert bullet list 2. Number list 3. Tables 4. Pictures 5. Shapes	1. Perform the functions on LibreOffice Writer	**03**

7. Insert header, footer and page number in a word document	1. Insert header 2. Insert footer 3. Insert page number 4. Page count	1. Perform the functions on LibreOffice Writer 2. Perform the functions on Microsoft Word	**03**
8. Make changes by using the track change option in a Word document	1. Tracking option 2. Manage option 3. Compare documents	1. Perform the functions on LibreOffice Writer 2. Perform the functions on Microsoft Word	**04**
Total			**20**

UNIT 4: ENTREPRENEURIAL SKILLS – III

Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 hrs)
1. **Differentiate between different kinds of businesses**	1. Introduction to entrepreneurship 2. Types of business activities	1. Role-play on different kinds of businesses	**03**
2. Describe the significance of entrepreneurial values	1. Meaning of value 2. Values of an Entrepreneur 3. Case study on qualities of an entrepreneur	1. Role-play on qualities of an entrepreneur	**03**
3. Demonstrate the attitudinal changes required to become an entrepreneur	1. Difference between the attitude of entrepreneur and employee	1. Interviewing employees and entrepreneurs	**03**
4. Develop thinking skills like an entrepreneur	1. Problems of entrepreneurs 2. Problem-solving 3. Ways to think like an entrepreneur	1. Group activity on identifying and solving problems	**04**
5. Generate business ideas	1. The business cycle 2. Principles of idea creation 3. Generating a business idea 4. Case studies	1. Group activity to create business ideas	**04**
6. Describe customer needs and the importance of conducting a customer survey	1. Understanding customer needs 2. Conducting a customer survey	1. Conducting a customer survey	**04**

7. Create a business plan	1. Importance of business planning 2. Preparing a business plan 3. Principles to follow for growing a business 4. Case studies	1. Activity on developing a business plan	**04**
Total			**25**

UNIT 5: GREEN SKILLS – III

Learning Outcome	Theory (07 hrs)	Practical (08 hrs)	Duration (15 hrs)
1. Describe the importance of the main sector of the green economy	1. Meaning of ecosystem, food chain and sustainable development 2. Main sectors of the green economy- E-waste management, green transportation, renewal energy, green construction, and water management	1. Discussion on sectors of the green economy 2. Preparing posters on various sectors for promoting the green economy 3. Writing an essay or a short note on the important initiatives for promoting green economy.	**06**
2. Describe the main recommendations of policies for the green economy	1. Policies for a green economy	1. Discussion on initiatives for promoting the green economy	**03**
3. Describe the major green sectors/ areas and the role of various stakeholders in the green economy	1. Stakeholders in the green economy	1. Group discussion on the role of stakeholders in the green economy 2. Preparation of posters on green sectors and their stakeholders 3. Making solar bulbs.	**03**
4. Identify the role of government and private agencies in the green economy	1. Role of the government in promoting a green economy 2. Role of private agencies in promoting green economy	1. Discussion on the role of Government and Private Agencies in promoting a green economy. 2. Posters on green sectors.	**03**
Total			**15**

PART B: Vocational Skills

S. No.	Units	Duration (Hrs.)
1.	Unit 1: Automotive Systems and Components	10
2.	Unit 2: Auto Electrical System	25
3.	Unit 3: Structure of Automotive Electrical System	40
4.	Unit 4: 2D Drawings of Automotive Electrical Systems	45
5.	Unit 5: Introduction to CAD for Electrical Component Design	45
	Total	**165**

Unit 1: Automotive Systems and Components

Learning outcomes	Theory (05 hrs)	Practical (05 hrs)	Duration (10 hrs)
1. **Knowledge of automotive systems and components**	1. Introduction of automotive Systems and its components.	• Demonstration of automotive cut sections (2-stroke and 4-stroke).	04
2. Understanding of auto electrical systems and their components	1. Introduction – • Automobile electrical architecture • Power supply systems • Nomenclature of auto electrical systems 2. Automobile Layout	• Study and analyse automobile electrical systems.	04
3. Understand the role and duties of Auto Electrical Design Technician	1. Define the role and duties of Auto Electrical Design Technician		02
Total			**10**

Unit 2: Systems of Auto Electricals

Learning outcomes	Theory (15 hrs)	Practical (10 hrs)	Duration (25 hrs)
1. Understanding of battery technologies, testing and their limitations	1. Starting-Charging system, Battery types, Capacity & Rating methods, Battery testing and limitations	• Test and evaluate battery performance • Analyse and suggest improvements in battery technologies.	**05**
2. Understanding of ignition and charging systems	1. Starter motor, Alternator, Ignition system & its types	• Study and analysis of starter motors, alternators, and ignition systems	**06**

3. Knowledge of instrument cluster components and gauge importance	1. Types of instrument clusters and Dashboard indicators. 2. Gauges & Meters	• Study and analyse of instrument clusters. • Study and analyse of o gauges and meters o Engine temperature gauge o Fuel gauge o Oil pressure gauges o Charging gauges o Speedometers and Tachometer	**03**
4. Knowledge of electrical components and accessories	1. Electrical Components and their functions: Horn, Clock, Flasher unit, LCD Displays, Beeper, Power sockets	• Study and analysis of electrical components.	**03**
5. **Understanding of charging system diagnostics and improvements**	1. Investigate and test the operation of a charging system on a vehicle	• Test and evaluate the vehicle's charging system.	**03**
6. **Understanding vehicle lighting systems, technologies and their classifications**	1. Introduction of Vehicle lightning systems and its classification 2. Types of bulbs, Halogens, HID, LED 3. Functions and standards of Lighting in Exterior (e.g. Headlamps, Tail lamps, Fog lamps, Side repeater lamps) and Interior (e.g. Roof lamps, Courtesy lamps, Vanity lamps, Mood lighting, etc.)	• Study and analyse exterior and interior lighting systems and their components.	**05**
Total			**25**

Unit 3: Structure of Auto Electricals System

Learning outcomes	Theory (20 hrs)	Practical (20 hrs)	Duration (40 hrs)
1. Understanding of switch classifications and their applications	1. Classification & functions of switches in vehicles	• Study and analyse different types of switches.	04

2. Knowledge of washer and wiper system functionality and improvements	1. Operation & maintenance of washer and wiper system	Calculate the efficiency of the washer and wiper system.	04
3. Understanding of Heating Ventilation & Air Conditioning (HVAC) system assembly and their function	1. HVAC system components and their function	Assemble and analyse the HVAC system and its components.	12
4. **Knowledge of electrical distribution system design and analysis**	1. Electrical Distribution System: Wire, Fuse, Relay, Voltage Drop Analysis, Grounding	• Study and analyse electrical distribution systems.	08
5. **Design of wiring harness design and its component**	1. Design of Wiring Harness: Harness Topology, Typical Layout, Harness Components	• Conceptual Design and analysis of wiring harness.	08
6. Understanding of variations in auto electrical components		• Comparative analysis in auto electrical components. • Prepare a report comparing the electrical components of two vehicles.	04
Total			**40**

Unit 4: 2D Drawings of Auto Electrical Systems

Learning outcomes	Theory (12 hrs)	Practical (33 hrs)	Duration (45 hrs)
1. **Understanding the basics of 2D drawing modelling for Auto electrical systems**	1. Introduction to fundamentals of 2D drawing 2. Drawing format and Elements 3. Projection & views, Dimensions & scaling.	• Prepare schematic 2D drawings of different wiring systems of automobiles. • Schematic 2D drawing of all auto electrical systems. • Prepare a bill of materials for different Auto electrical systems.	**20**
		• Create sketches to illustrate electrical component functions. • Prepare sketches of the different auto electrical	**25**

		systems showing their structure and different components with their applications. • Prepare a 2D layout for the Auto electrical systems which indicates all its subcomponents. • Wiring connection for the vehicle starting system & charging System. • Study of lighting system wiring harness and 2D drawing.	
Total			**45**

Unit 5: Introduction of CAD for Electrical System			
Learning outcomes	**Theory (12 hrs)**	**Practical (33 hrs)**	**Duration (45 hrs)**
1. Knowledge of CAD applications in auto-electrical design	1. Introduction to Computer-Aided Design (CAD) for Auto-electricals.	• Use CAD tools to design auto-electrical components.	**05**
2. Introduction to AutoCAD	1. Introduction to AutoCAD and its features 2. Introduction to Advanced 2D Commands 3. Introduction to Advanced 3D Commands 4. Introduction to 3D Interface, visualization and animation	• Editing in AutoCAD Drawing: Visualizing Multiview drawings, rotating 3D models, mirroring and arraying 3D models, editing solids, creating 2D drawings from solid models, helix loft, solid modelling, viewing 3D models, basic draw command, display command, editing command. • Plot of 2D and 3D Drawing: Plot scales and paper sizes, construction line, boundary command, mass properties, region command, design center blocks,	**25**

		measure, 3D wireframe modelling, revolved surfaces, generate 2D and 3D sections.	
3. 2D models of electrical vehicle system using CAD	Drawing of a 2D model of an electrical vehicle system and its components using CAD	• Prepare schematic 2D drawings of different wiring systems of automobiles. • Schematic 2D drawing of auto electrical systems. • Prepare a bill of materials for different electrical systems.	**15**
Total			**45**

Grade 12

Part A - Employability Skills

S.No.	Units	Duration (hrs)
1.	Unit 1: Communication Skills – IV	**25**
2.	Unit 2: Self-management Skills – IV	**25**
3.	Unit 3: Basic ICT Skills – IV	**20**
4.	Unit 4: Entrepreneurial Skills – IV	**25**
5.	Unit 5: Green Skills – IV	**15**
	Total	**110**

UNIT 1: COMMUNICATION SKILLS – IV

Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 hrs)
1. Demonstrate active listening skills	1. Active listening - listening skill, stages of active listening 2. Overcoming barriers to active listening	1. Demonstration of the factors affecting active listening 2. Preparing posters of steps for active listening 3. Role-play on negative effects of not listening actively	**10**

2. Identify the parts of speech	1. Parts of speech – using capitals, punctuation, basic parts of speech, supporting parts of speech	1. Group practice on identifying parts of speech 2. Group practice on constructing sentences	**10**
3. Write sentences	1. Writing skills to the following: • Simple sentence • Complex sentence • Types of object 2. Types of sentences - Active and Passive sentences - Statement/ Declarative sentence - Question/ Interrogative sentence - Emotion/ Reaction or Exclamatory sentence - Order or Imperative sentence 3. Paragraph writing	1. Group work on writing sentences and paragraphs 2. Practice writing sentences in the active or passive voice 3. Writing different types of sentence	**5**
Total			**25**

UNIT 2: SELF-MANAGEMENT SKILLS – IV

Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 hrs)
1. Describe the various factors influencing motivation and positive attitude	1. Motivation and positive attitude 2. Intrinsic and extrinsic motivation 3. Positive attitude – ways to maintain positive attitude 4. Stress and stress management - ways to manage stress	1. Role-play on avoiding stressful situations 2. Activity on self-reflection	**10**

2. Describe how to become result oriented	1. How to become result oriented? 2. Goal setting – examples of result-oriented goals	1. Pair and share activities on the aim of life	**5**
3. Describe the importance of self-awareness and the basic personality traits, types and disorders	1. Steps towards self-awareness 2. Personality and basic personality traits 3. Common personality disorders- • Suspicious • Emotional and impulsive • Anxious 4. Steps to overcome personality disorders	1. Group discussion on self-awareness	**10**
Total			**25**

UNIT 3: INFORMATION AND COMMUNICATION TECHNOLOGY SKILLS – IV

Learning Outcome	Theory (06 hrs)	Practical (14 hrs)	Duration (20 hrs)
1. Identify the components of a spreadsheet application	1. Introduction to spreadsheet application - types of a spreadsheet, creating a new worksheet, components of a worksheet.	1. Group practice on working with LibreOffice	**02**
2. Perform basic operations in a spreadsheet	1. Opening workbook and entering data – types of data, steps to enter data, editing and deleting data in a cell 2. Selecting multiple cells 3. Saving the spreadsheet in various formats 4. Closing the spreadsheet 5. Opening the spreadsheet. 6. Printing the spreadsheet.	1. Group practice on working with data on LibreOffice Calc.	**03**

3. Demonstrate the knowledge of working with data and formatting text	1. Using a spreadsheet for addition – adding value directly, adding by using cell address, using a mouse to select values in a formula, using sum function, copying and moving formula 2. Need to format cell and content 3. Changing text style and font size 4. Align text in a cell 5. Highlight text	1. Demonstration of basic calculations in LibreOffice Calc. 2. Group practice on formatting a spreadsheet in LibreOffice Calc.	**02**
4. Demonstrate the knowledge of using advanced features in spreadsheet	1. Sorting data 2. Filtering data 3. Protecting spreadsheet with password	1. Group practice on sorting data in LibreOffice Calc	**03**
5. Make use of the software used for making slide presentations	1. Available software presentation 2. Stapes to start LibreOffice Impress 3. Adding text to a presentation	1. Group practice on working with LibreOffice Impress tools 2. Group practice on creating a presentation in LibreOffice Impress	**02**
6. Open, close and save slide presentations	1. Open, Close, Save and Print a slide presentation	1. Practice exercises on steps to save, close, open and save a presentation	**01**
7. Demonstrate the operations related to slides and texts in the presentation	1. Working with slides and text in a presentation- adding slides to a presentation, deleting slides, adding and formatting text, highlighting text, aligning text, changing text colour	1. Group practice on working with font styles and types in LibreOffice Impress	**04**
8. Demonstrate the use of advanced features in a presentation	1. Advanced features used in a presentation 2. Inserting shapes in the presentation 3. Inserting clipart and images in a presentation 4. Changing slide layout	1. Group practice on working with slides in LibreOffice Impress	**03**
Total			20

UNIT 4: ENTREPRENEURIAL SKILLS-IV			
Learning Outcome	**Theory (10 hrs)**	**Practical (15 hrs)**	**Duration (25 hrs)**
1. Describe the concept of entrepreneurship and the types and roles and functions entrepreneur	1. Entrepreneurship and entrepreneur 2. Characteristics of entrepreneurship 3. Entrepreneurship-art and science 4. Qualities of a successful entrepreneur 5. Types of entrepreneurs 6. Roles and functions of an entrepreneur 7. What motivates an entrepreneur 8. Identifying opportunities and risk-taking 9. Startups	1. Group discussion on the topic "An entrepreneur is not born but created". 2. Quiz on various aspects of entrepreneurship.	**10**
2. Identify the barriers to entrepreneurship	1. Barriers to entrepreneurship 2. Environmental barriers 3. No or faulty business plan 4. Personal barriers	1. Fishbowl of fears-group discussion about what we fear about entrepreneurship 2. Facing an Interview.	**05**
3. Demonstrate the knowledge of entrepreneurial attitude and competencies	1. Entrepreneurial attitude 2. Entrepreneurial competencies 3. Decisiveness, 4. Initiative 5. Interpersonal skills-positive attitude, stress management 6. Perseverance 7. Organisational skills-time management, goal setting, efficiency, managing quality.	1. Group discussion on business ideas 2. Group practice on best out of waste 3. Group discussion on the topic of lets grow together 4. Group practice on a snowball fight. 5. Activity on rating friends and self for entrepreneurial qualities. 6. Playing games, such as "Who am I".	**10**
Total			**25**

UNIT 5: GREEN SKILLS-IV			
Learning Outcome	**Theory (05 hrs)**	**Practical (10 hrs)**	**Duration (15 hrs)**
1. Identify the benefits of the green jobs	1. Green jobs 2. Benefits of green jobs 3. Green jobs in different sectors: • Agriculture • Transportation • Water conservation • Solar and wind energy • Eco-tourism • Building and construction • Solid waste management • Appropriate technology	1. Group discussion on the importance of green job.	**8**
2. State the importance of green jobs	1. Importance of green jobs in • Limiting greenhouse gas emissions • Minimizing waste and pollution • Protecting and restoring ecosystems • Adapting to the effects of climate change	1. Preparing posters on green jobs. 2. Activities on tree plantation.	**7**
Total			**15**

Part B: Vocational Course

S. No.	Units	Duration (Hrs.)
1.	Unit 1: Sheet Metal Brackets in Auto Electrical Components	45
2.	Unit 2: 2D CAD Drawings of Auto Electrical Components	45
3.	Unit 3: Design Principles of Sheet Metal Brackets	45
4.	Unit 4: Advancements in Automobile Electrical Systems	24
5.	Unit 5: Health and Safety in Automotive Electrical System	06
	Total	**165**

Unit 1: Sheet Metal Brackets in Auto Electrical Components

Learning outcomes	Theory (10 hrs)	Practical (35 hrs)	Duration (45 hrs)
1. **Understanding the material behaviour of Sheet Metal Brackets**	1. Definition, use, and importance of electrical components 2. Materials, Types of metals and their mechanical and electrical properties 3. Industrial Standards and Compliance: Relevant standards and regulations	• Creating 2D drawings of bracket design of Auto electrical components. • Material selection or bracket design in auto electrical components.	30
	4. Sheet metal brackets like different types of clips, splices, and grommets in auto electrical components & wiring systems	• Design of different types of clips, splices, and grommets in auto electrical components & wiring systems.	15
Total			**45**

Unit 2: 2D CAD Drawings of Electrical Components

Learning outcomes	Theory (12 hrs)	Practical (33 hrs)	Duration (45 hrs)
1. **Identify the Auto electrical components and their applications**	1. Overview of Computer Graphics, Application and Software (AutoCAD) 2. Description of some graphics devices, Input Devices for Operator Interaction 3. Active and Passive Graphics Devices	• Create sketches to illustrate electrical components & their functions. • Prepare sketches of the different auto electrical systems showing their structure and different components with their applications. • Prepare a 2D layout for the electrical vehicle indicating all its sub-components. • Prepare 2D CAD model of the Wiring connection for the vehicle starting system and charging system. • Preparation of Lighting System, Wiring Harness, and 2D CAD Modelling.	45
Total			**45**

Unit 3: Design Principles of Sheet Metal Brackets

Learning outcomes	Theory (15 hrs)	Practical (30 hrs)	Duration (45 hrs)

1. **Understanding the Design Principles of Sheet Metal Brackets**	1. Basic principles of sheet metal Bracket design 2. Introduction of 3D CAD tools and features used in designing brackets 3. Design Considerations and Factors for Sheet Metal Brackets with Dimensions	• Creating 3D CAD models of basic bracket designs. • Applying constraints and dimensions in sheet metal bracket design. • Practical on physical assembly of HVAC in the auto electrical system. • Prepare information fitment (assembly) drawings for body harness, chassis harness, engine harness, lighting harness, etc with their packaging study.	45
Total			**45**

Unit 4: Advancements in Automobile Electrical Systems

Learning outcomes	Theory (10 hrs)	Practical (14 hrs)	Duration (24hrs)
1. **Understanding of emerging trends and innovations in automotive electrical systems**	1. Schematic Drawings of Automotive Electrical Systems with Geometric Dimensioning & Tolerancing (GD&T) Symbols and Related Technical Terms. 2. Overview of cutting-edge technologies in automobile electrical systems	• Case Study on the Latest Tools and Features in Automotive Electrical Systems.	**24**
			24

Unit 5: Health and Safety in Auto Electrical System

Learning outcomes	Theory (02)	Practical (04)	Duration (06)
1. **Understanding of fire safety protocols and emergency response**	1. Fire Fighting in Workplace & Precautions 2. Fire safety principles, fire hazards, and prevention measures 3. Fire Extinguishers & its Types 4. Applications of fire extinguishers	• Demonstrate the use of fire extinguishers and fire safety drills. • Identify and use appropriate fire extinguishers for different fire types.	**02**
2. **Knowledge of safe tool handling and**	1. Safety guidelines for using tools and equipment	• Safely handle tools and	**03**

equipment maintenance	2. Use of proper Tool kit & Equipment and its maintenance	equipment in a workshop setting • Perform maintenance on tools and equipment.	
3. Understanding of Occupational Safety and Health (OSH) regulations and their importance in the workplace	1. Awareness of OSH related to the job 2. OSH standards and practices	• Apply OSH practices in real-world scenarios.	**01**
Total			**06**

6. ORGANISATION OF FIELD VISITS

In a year, at least **3 field visits/educational tours** should be organised for students to expose them to real-world workplace activities related to auto electrical systems and design. These visits will provide hands-on learning experiences and insights into the functioning of various automotive setups. The following are recommended sites for field visits:

1. Automobile Showroom
2. Automobile Service Centre
3. Electric Vehicle (EV) Design Centre
4. Automobile Fair/Exhibition
5. Auto Electrical Component Manufacturing Facility

7. LIST OF EQUIPMENT AND MATERIALS

The list provided below serves as a preliminary guide; a comprehensive inventory should be developed by the vocational instructor. The institution should limit its procurement to essential tools, equipment, and accessories to facilitate students in performing routine tasks consistently. This approach will enable students to engage in practical activities regularly and acquire the necessary hands-on experience.

Tools and Equipment and Training materials

S.No	Item	Qty.	Price
1.	Working model of EV Vehicle	1	35000.00
2.	Electric Vehicle Training Kit	1	95000.00
3.	Transmission / Gearbox Demonstration Kit	1	35000.00
4.	TATA ACE – Chassis with Axle and wheels	1	25000.00
5.	Car lift -4Ton	1	1,75,000.00
6.	Automotive Cooling System	1	8000.00

7.	Fuel supply System & Urea Handling (Diesel)	1	5000.00
8.	Suspension Steering Wheel and Tyre Systems	1	22000.00
9.	Brakes & Controls	1	8000.00
10.	HVAC Demonstration Kit	1	
11.	Electronic Ignition System of An Automobile 4-Wheeler	1	5000.00
12.	Demonstration Board of Working Model MPFI System with Motorized Control	1	7000.00
13.	Instruction Kit for Charging and Starting System	1	2000.00
14.	Lighting and Wiring System (two-wheeler)	1	15000.00
15.	Computer System with Auto CAD Software	As per student (minimum 5)	Required as Software Specification
16.	Dashboard with indicators	01	15000.00
17.	Washer and wiper demonstration kit	01	8000.00
18.	Different types of sheet metal brackets	10	1000.00
19.	Tachometer	01	2500.00
20.	Four-wheeler Electric vehicle model	1	10,00,000.00
21.	Old second-hand cut section leads to acid battery	1	2000.00
22.	Old second-hand pressure cap	1	150.00
23.	Old second-hand thermostat	1	2000.00
24.	Old second-hand disc brake	1	1000.00
25.	Four wheelers old second-hand Electric vehicle	1	5,50,000.00
26.	Old second hand Electric two-wheeler	1	30000.00
27.	Cut a section of 2-stroke/ 4-Stroke Engine	01	35000.00
28.	Oil Pressure Gauges	02	400.00
29.	Tire Pressure Gauges	02	500.00
30.	Measuring equipment: Vernier, calipers, Micrometer, feeler gauges, multi-metre, flow meter, temp gauge, dial gauge etc.	1 each	15000
Total			**19,94,050.00**

- **Other tools:** hand tools, power tools, lifting and jacking equipment, tensioning equipment, brake roller tester, chassis dynamometer, suspension activation, security activator etc.
- Tools for other tasks such as cleaning of vehicles, tools, equipment and workshop
- Personal Protection Equipment: Gloves, dielectric safety gloves, leather over gloves, Safety Shoes, goggles, ear plugs, boiler suit, insulated rescue pole,
- Workshop Safety: Fire extinguishers,
- First Aid

Consumable items: cotton waste, petrol/diesel, lubricant, grease, storage containers, air filters, oil filters, spark plugs, glow plugs etc.

- Worn out/ defective/ spurious samples: seal, gaskets, clutch plate, brake shoes, brake pads, oil filter, air cleaner etc.

Teaching Aids:

- Charts, CBTs, LCD Projector and Videos.
- Cleaning equipment and solutions
- SOP Charts on safety norms and drills
- Charts of do's and Don'ts in work area.
- Audio/video on English, Hindi or local language course
- Reference books
- Work books
- Study for Soft Skills
- CBTs on working on computer
- Computer system with UPS
- Vehicle service manuals, vehicle hand book, job card, work order, completion material requests, Technical reference books.

8. VOCATIONAL TEACHER'S/ TRAINER'S QUALIFICATION AND GUIDELINES

Qualification and other requirements for the appointment of vocational teachers/trainers on a contractual basis should be decided by the State/UT. The suggestive qualifications and minimum competencies for the vocational teacher should be as follows:

S.No.	Qualification	Minimum Competencies	Age Limit
1.	Degree in Automobile Engineering /Mechanical Engineering from a recognized Institute /University, with at least 1-year work/teaching experience in CAD modelling **OR** Diploma in Automobile Engineering /Mechanical Engineering from a recognized Institute /University, with at least 2 years of work/teaching experience in CAD modelling **OR** B.Voc in Automotive Engineering/ Mechanical Engineering from a recognized Institute /University, with at least 1 year of work/teaching experience in CAD modelling	Effective communication skills (oral and written) Basic computing skills.	18-37 years (as on Jan. 01 (year)) Age relaxation is to be provided as per Govt. rules.

Vocational Teachers/Trainers form the backbone of Vocational Education being imparted as an integral part of Samagrah Shiksha. They are directly involved in teaching vocational subjects and also serve as a link between the

industry and the schools for arranging industry visits, On-the-Job Training (OJT) and placement.

These guidelines have been prepared with an aim to help and guide the States in engaging quality Vocational Teachers/Trainers in the schools. Various parameters that need to be looked into while engaging the Vocational Teachers/Trainers are the mode and procedure of selection of Vocational Teachers/Trainers, Educational Qualifications, Industry Experience, and Certification/Accreditation.

The State may engage Vocational Teachers/Trainers in schools approved under the component of Vocationalisation of Secondary and Higher Secondary Education under Samagrah Shiksha in the following ways:

(i) Directly as per the prescribed qualifications and industry experience suggested by the PSS Central Institute of Vocational Education (PSSCIVE), NCERT or the respective Sector Skill Council (SSC)

OR

Through accredited Vocational Training Providers accredited under the National Quality Assurance Framework (NQAF*) approved by the National Skill Qualification Committee on 21.07.2016. If the State is engaging Vocational Teachers/Trainers through the Vocational Training Provider (VTP), it should ensure that VTP should have been accredited at NQAF Level 2 or higher.

* The National Quality Assurance Framework (NQAF) provides the benchmarks or quality criteria which the different organisations involved in education and training must meet in order to be accredited by competent bodies to provide government-funded education and training/skills activities. This is applicable to all organizations offering NSQF-compliant qualifications.

The educational qualifications required for being a Vocational Teacher/Trainer for a particular job role are mentioned in the curriculum for the particular NSQF-compliant job role. The State should ensure that teachers/trainers deployed in the schools have relevant technical competencies for the NSQF qualification being delivered. The Vocational Teachers/Trainers preferably should be certified by the concerned Sector Skill Council for the particular Qualification Pack/Job role which they will be teaching. Copies of relevant certificates and/or records of experience of the teacher/trainer in the industry should be kept as records.

To ensure the quality of the Vocational Teachers/Trainers, the State should ensure that a standardized procedure for selection of Vocational Teachers/Trainers is followed. The selection procedure should consist of the following:

(i) Written test for the technical/domain-specific knowledge related to the sector;

(ii) Interview for assessing the knowledge, interests and aptitude of the trainer through a panel of experts from the field and state representatives; and

(iii) Practical test/mock test in classroom/workshop/laboratory.

In case of appointment through VTPs, the selection may be done based on the above procedure by a committee having representatives of both the State Government and the VTP.

The State should ensure that the Vocational Teachers/ Trainers who are recruited should undergo induction training of 20 days to understand the scheme, NSQF framework and Vocational Pedagogy before being deployed in the schools.

The State should ensure that the existing trainers undergo in-service training of 5 days every year to make them aware of the relevant and new techniques/approaches in their sector and understand the latest trends and policy reforms in vocational education.

The Head Master/Principal of the school where the scheme is being implemented should facilitate and ensure that the Vocational Teachers/Trainers:

(i) Prepare session plans and deliver sessions that have a clear and relevant purpose and that engage the students;

(ii) Deliver education and training activities to students, based on the curriculum to achieve the learning outcomes;

(iii) Make effective use of learning aids and ICT tools during the classroom sessions;

(iv) Engage students in learning activities, which include a mix of different methodologies, such as project-based work, team work, practical and simulation-based learning experiences;

(v) Work with the institution's management to organise skill demonstrations, site visits, on job trainings, and presentations for students in cooperation with industry, enterprises and other workplaces;

(vi) Identify the weaknesses of students and assist them in up-gradation of competency;

(vii) Cater to different learning styles and level of ability of students;

(viii) Assess the learning needs and abilities, when working with students with different
abilities

(ix) Identify any additional support the student may need and help to make special arrangements for that support;

(x) Provide placement assistance

Assessment and evaluation of Vocational Teachers/Trainers is very critical for making them aware of their performance and for suggesting corrective actions. The States/UTs should ensure that the performance of the Vocational Teachers/Trainers is appraised annually. Performance based appraisal in relation to certain pre-established criteria and objectives should be done

periodically to ensure the quality of the Vocational Teachers/Trainers. The following parameters may be considered during the appraisal process:

1. Participation in guidance and counselling activities conducted at Institutional, District and State level;
2. Adoption of innovative teaching and training methods;
3. Improvement in results of vocational students of Class X or Class XII;
4. Continuous up-gradation of knowledge and skills related to the vocational pedagogy, communication skills and vocational subject;
5. Membership in professional society at the District, State, Regional, National and International levels;
6. Development of teaching-learning materials in the subject area;
7. Efforts made in developing linkages with the Industry/Establishments;
8. Efforts made towards involving the local community in Vocational Education
9. Publication of papers in National and International Journals;
10. Organisation of activities for the promotion of vocational subjects;
11. Involvement in placement of students/student support services.

9. LIST OF CONTRIBUTORS

1. **Dr. Vinod Kumar Yadav**
   Associate Professor
   Department of Engineering and Technology, PSS Central Institute of Vocational Education (PSSCIVE), NCERT, Shyamla Hills, Bhopal – 462 002, Madhya Pradesh, India.

2. **Dr. Saurabh Prakash**,
   Professor and Head
   Department of Engineering and Technology, PSS Central Institute of Vocational Education (PSSCIVE), NCERT, Shyamla Hills, Bhopal – 462 002, Madhya Pradesh, India

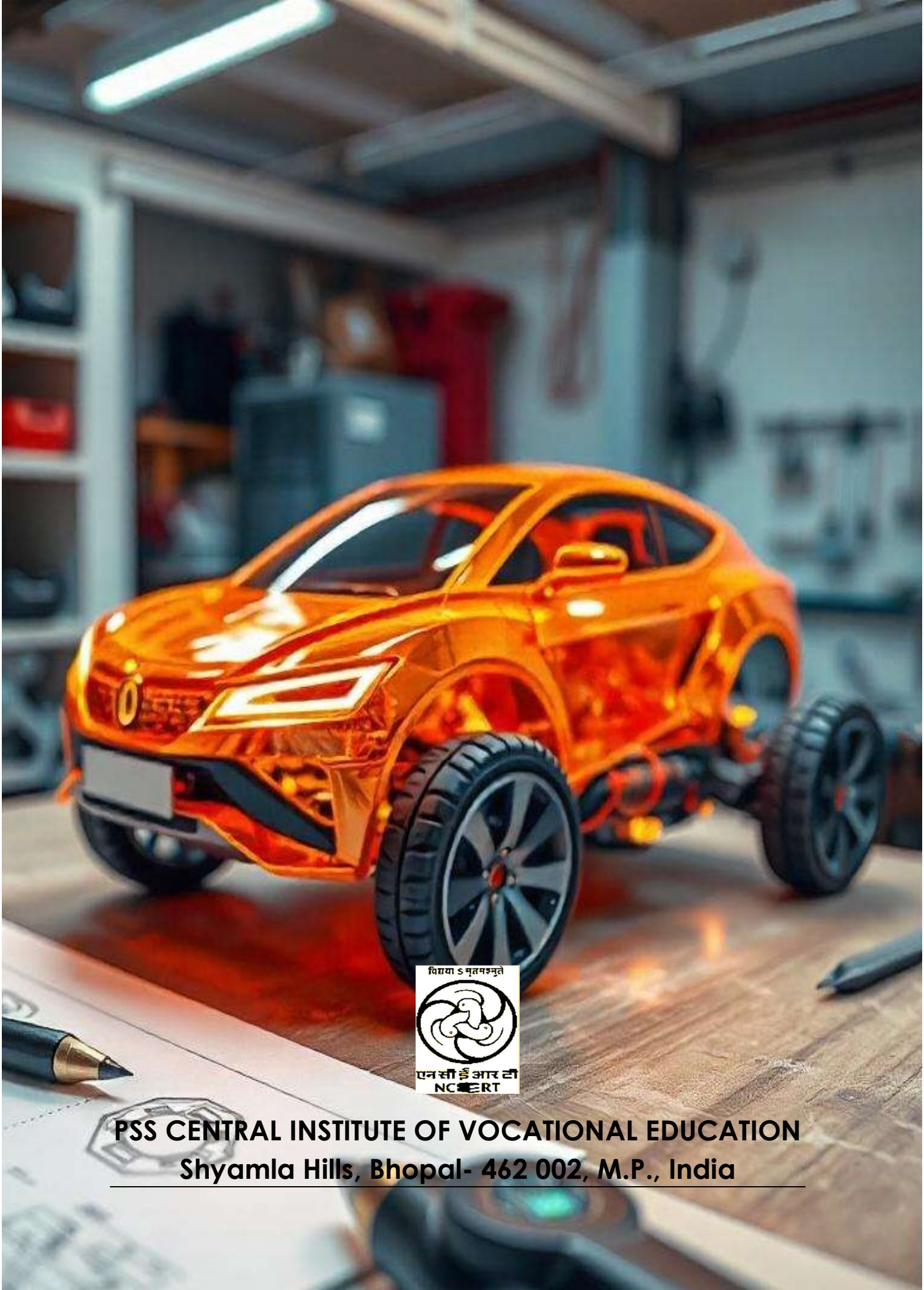
3. **Mr. Ankit Singh Chauhan**
   Assistant Professor (Contractual),
   Automotive, Department of Engineering & Technology, PSS Central Institute of Vocational Education (PSSCIVE), NCERT, Shyamla Hills, Bhopal, MP-462002.

4. **Dr. Gaurav Dwivedi**
   Assistant Professor,
   Energy Centre, MANIT Bhopal, MP-462003.

5. **Dr. Manoja Kumar Behra**
Assistant Professor
Department of Electrical Engineering, MANIT Bhopal, MP-462003.

6. **Dr. Tikendra Nath Verma**
Associate Professor
Department of Mechanical Engineering, MANIT Bhopal, MP-462003.

7. **Dr. Vinod Yadav**
Assistant Professor
Department of Mechanical Engineering, MANIT Bhopal, MP-462003.



विद्ययाऽमृतमश्नुते

एन सी ई आर टी
NCERT

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

Shyamla Hills, Bhopal- 462 002, M.P., India