

LEARNING OUTCOME BASED VOCTIONAL CURRICULUM


**JOB ROLE: Four-Wheeler Service Technician
(Old: - Auto Service Technician L4)**

(QUALIFICATION PACK: Ref. Id. ASC/Q1402)

**SECTOR:
Automotive Classes
11 and 12**



**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: Four-Wheeler Service Technician
(Old: - Auto Service Technician L4)**

(QUALIFICATION PACK: Ref. Id. ASC/Q1402)

SECTOR: Automotive



**PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal- 462 013, M.P., India
<http://www.psscive.ac.in>**

**LEARNING OUTCOME BASED
CURRICULUM**

**Automotive Four-Wheeler Service
Technician**

September 2022

© PSSCIVE, 2022

<http://www.psscive.ac.in>

No part of this work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission from the Publisher, with the exception of any material supplied specifically for the purpose of being used by the purchaser of the work.

The views and opinions expressed in this publication are those of the contributors/ authors and do not necessarily reflect the views and policies PSS Central Institute of Vocational Education, Bhopal. The PSSCIVE does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

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

Prof. Saurabh Prakash. Head
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. It is a part of Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education (CSSVSHSE) launched by the Ministry of Education (MoE), Government of India in 2012. The PSS Central Institute of Vocational Education (PSSCIVE) is developing curricula under the project approved by the Project Approval Board (PAB) of Rashtriya Madhyamik Shiksha Abhiyan (RMSA). The main purpose of the learning outcome-based curricula is to bring about the improvement in teaching-learning process and working competences through learning outcomes embedded in the vocational subject.

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 Four-Wheeler Service Technician L4. The curriculum has been developed for the secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skill Qualification Framework (NSQF).

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 employers' immediate needs. The teaching process is to be performed through the interactive sessions in classrooms, practical activities in laboratories and workshops, projects, field visits, and professional experiences.

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.

Prof. 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 is 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 for a skilled human resource, the Ministry of Education (erstwhile, Ministry of Human Resource Development (MHRD), Government of India introduced the revised Centrally Sponsored Scheme of Vocationalisation of School 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 textbooks and e-learning material for job roles in various sectors.

The PSSCIVE firmly believes that the vocationalisation of education in the nation needs 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 society and the world of work. In order to honor its commitment to the nation, the PSSCIVE is developing learning outcome-based curricula with the involvement of faculty members and leading experts in the field. It is being done through the concerted efforts of leading academicians, professionals, policymakers, partner institutions, Vocational Education and Training (VET) 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. We extend our gratitude to all the contributors for selflessly sharing their precious knowledge, acclaimed expertise, and valuable time and positively responding to our request for development of 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 Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and the officials of the Ministry of Education (MoE), Government of India for the financial support to the project for 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 Technical Support Group of RMSA, MHRD, RMSA Cell at the National Council of Educational Research and Training (NCERT), National Skill Development Agency (NSDA) and National Skill Development Corporation (NSDC) and Automotive Skill Development Council (ASDC) for their academic support and cooperation.

We are grateful to the expert contributors and reviewers for their earnest effort and contributions in the development of this learning outcome-based curriculum. Their names are acknowledged in the list of contributors and reviewers.

The contributions made by Dr. Vinay Swarup Mehrotra, Professor and Head, Curriculum Development and Evaluation Centre (CDEC) and Vipin Kumar Jain, Associate Professor and Head, Programme Planning and Monitoring Cell (PPMC), PSSCIVE in development of the curriculum for the employability skills are duly acknowledged.

Mr. Nagendra Kore, RMSA, Goa and Mr. Sudhir Vishwakarma, CRISP, Bhopal for reviewing this document.

We are also grateful to the Course Coordinator Prof. Saurabh Prakash, Professor & Head, Department of Engineering & Technology for developing this curriculum.

PSSCIVE Team

CONTENTS

S.No	Title	Page No.
	Foreword	(i)
	Preface	(ii)
	Acknowledgement	(iii)
1.	Course Overview	2
2.	Scheme of Units	3
3.	Teaching/Training Activities	4
4.	Assessment and Certification	5
5.	Unit Content	
	CLASS 11	
	Part A Employability Skills	8
	Unit 1: Communication Skills-III	9
	Unit 2: Self-management Skills-III	11
	Unit 3: Information and Communication Technology Skills-III	12
	Unit 4: Entrepreneurial Skills-III	14
	Unit 5: Green Skills-III	15
	Part B Vocational Skills	16
	Unit 1: Introduction to Engineering Geometrics and drawing	16
	Unit 2: Fasteners	16
	Unit 3: Materials for construction of automotive components	17
	Unit 4: Measuring instrument	17
	Unit 5: Regular maintenance of an engine	17
	Unit 6: Regular maintenance of transmission system	18
	Unit 7: Regular maintenance of Gear box	19
	Unit 8: Service of wheels	19
	Unit 9: Regular maintenance of tubes and tyres	19
	Unit 10: Regular Maintenance of Brakes	19
	CLASS 12	
	Part A Employability Skills	20
	Unit 1: Communication Skills-IV	20
	Unit 2: Self-management Skills-IV	21
	Unit 3: Information and Communication Technology Skills-IV	22
	Unit 4: Entrepreneurial Skills-IV	23
	Unit 5: Green Skills-IV	24
	Part B Vocational Skills	25
	Unit 1: Service Manual	26
	Unit 2: Serviceability, Replacement or Repair of Engine Components	26
	Unit 3: Transmission system	27
	Unit 4: Suspension system	27
	Unit 5: Auto Electrical System	28
6.	Organisation of Field Visits	28
7.	List of Equipment and Materials	29
8.	Vocational Teacher's/ Trainer's Qualification and Guidelines	31
9.	List of Contributors	34

1. COURSE OVERVIEW

COURSE TITLE: Automotive- Four-Wheeler Service Technician

The present curriculum Four-Wheeler Service Technician job role is related to Level L-3. This course fulfills the needs of the students willing to learn activities relating to the Four-Wheeler Service Technician job role. Any student/entrepreneur willing to start an Automobile Service Centre can acquire the desired competencies with the help of this curriculum. Automobile or Automotive Engineering has gained recognition and importance ever since motor vehicles capable for transporting passengers has been in vogue. Now due to the rapid growth of auto component manufacturers and automobile industries, there is a great demand for Automobile technicians. Automobile Engineering alias Automotive Engineering or Vehicle Engineering is one of the most challenging careers in the field of engineering with a wide scope.

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

- Identify the principal components of a computer system
- Identify and control hazards in the workplace that pose a danger or threat to their safety or health, or that of others.
- Demonstrate self-management skills.
- Demonstrate the ability to provide a self-analysis in context of entrepreneurial skills and abilities.
- Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection.
- Communicate effectively with the customers
- Greet, escort, seat the customers and offer refreshments (tea/ coffee)
- Enquire and understand customer queries related to vehicle type, model, specifications
- Identify features of different elements of Engineering such as mechanical, electrical, electronic, software and safety engineering
- Repairing and servicing automobiles such as cars, trucks, motorcycles, scooters etc.
- Understanding the mechanism of vehicle chassis, internal combustion engine, electrical systems, motor transport affairs, workshop technology

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

COURSE LEVEL: This is a course for class XI and XII. On completion of this course, a student can take up a higher-level course in the area of Automotive Sector.

COURSE DURATION: 600 hrs

Class 11 : 300 hrs

Class 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 Class 9 and 10 opting for vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Class 9 is as follows:

CLASS 11			
Units		No. of Hours for Theory and Practical	Max. Marks for Theory and Practical
		300	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: Introduction to Engineering Geometrics and drawing	20	40
	Unit2: Fasteners	15	
	Unit3: Materials for construction of automotive components	20	
	Unit 4: Measuring instrument	20	
	Unit 5: Regular maintenance of an engine	15	
	Unit 6: Regular maintenance of Transmission system	20	
	Unit7: Regular maintenance of Gear box	20	
	Unit 8: Service of wheels	15	
	Unit 9: Regular maintenance of Tubes and Tyres	10	
	Unit 10: Regular Maintenance of Brakes	10	
		165	40
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 Class 12 is as follows:

CLASS 12			
Units		No. of Hours for Theory and Practical 300	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	
		110	10
Part B	Vocational Skills		
	Unit 1: Service Manual	30	30
	Unit 2: Serviceability, Replacement or Repair of Engine Components	30	
	Unit 3: Transmission system	20	
	Unit 4: Suspension system	20	
	Unit5: Auto Electrical System	65	
		165	40
Part C	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

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 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 group of experts of academicians, experts from existing vocational subject experts/teachers, and subject experts from university/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

S.No.	Typology of Question	No. of Questions			Marks
		Very Short Answer (1 mark)	Short Answer (2 Marks)	Long Answer (3 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.	(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 on the basis of 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 organized 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

CLASS 11

Part A: Employability Skills

S.No.	Units	Duration (hrs)
1.	Communication Skills- III	25
2.	Self-management Skills – III	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 process 2. Importance of communication 3. Elements of communication 4. Perspectives in communication 5. Effective communication	1. Role play on the communication process 2. Group discussion on the importance of communication and factors affecting perspectives in communication 3. Charts preparation on elements of communication 4. Classroom discussion on the 7Cs (i.e. Clear, Concise, Concrete, Correct, Coherent, Courteous and Complete) for effective communication	03
2. Demonstrate verbal communication	1. Verbal communication 2. Public Speaking	1. Role-play of a phone conversation. 2. Group activity on delivering a speech and practicing 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 and discussion on Do's and Don'ts to avoid body language mistakes 3. Group activity on methods of communication	02
4. Demonstrate speech using correct pronunciation	1. Pronunciation basics 2. Speaking properly 3. Phonetics 4. Types of sounds	1. Group activities on practicing pronunciation	01

1. Apply an assertive communication style	<ol style="list-style-type: none"> 1. Important communication styles 2. Assertive communication 3. Advantages of assertive communication 4. Practicing assertive communication 	<ol style="list-style-type: none"> 1. Group discussion on communication styles 2. Group discussion on observing and sharing communication styles 	03
2. Demonstrate the knowledge of saying no	<ol style="list-style-type: none"> 1. Steps for saying 'No' 2. Connecting words 	<ol style="list-style-type: none"> 1. Group discussion on how to say 'No' 	02
3. Identify and use parts of speech in writing	<ol style="list-style-type: none"> 1. Capitalisation 2. Punctuation 3. Basic parts of speech 4. Supporting parts of speech 	<ol style="list-style-type: none"> 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
4. Write correct sentences and paragraphs	<ol style="list-style-type: none"> 1. Parts of a sentence 2. Types of object 3. Types of sentences 4. Paragraph 	<ol style="list-style-type: none"> 1. Activity on framing sentences 2. Activity on active and passive voice 3. Assignment on writing different types of sentences 	02
5. Communicate with people	<ol style="list-style-type: none"> 1. Greetings 2. Introducing self and others 	<ol style="list-style-type: none"> 1. Role-play on formal and informal greetings 2. Role-play on introducing someone 3. Practice and group discussion on how to greet different people? 	02
6. Introduce yourself to others and write about oneself	<ol style="list-style-type: none"> 1. Talking about self 2. Filling a form 	<ol style="list-style-type: none"> 1. Practicing self-introduction and filling up forms 2. Practicing self-introduction to others 	01

7. 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
8. Communicate information about family to others	1. Names of relatives 2. Relations	1. Practice talking about family 2. Role-play on talking about family members.	01
9. Describe habits and routines	1. Concept of habits and routines	1. Group discussion on habits and routines 2. Group activity on describing routines	01
10. Ask or give directions to others	1. Asking for directions 2. Using landmarks	1. Role-play on asking and giving directions 2. Identifying symbols used for giving directions	01
Total			25

UNIT 2: SELF-MANAGEMENT–III

Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 hrs)
1. Identify and analyse 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. Preparing 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. Role-play on dressing and grooming standards 2. Self-reflection activity on various aspects of personal grooming	04
3. Maintaining 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	1. Describe the benefits of teamwork 2. Working in a team	1. Assignment on working in a team 2. Self-reflection on teamwork	03

participating in group activities			
5. Develop networking skills	1. Benefits of networking skills 2. Steps to build networking skills	1. Group activity on networking in action 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 using SMART method	03
8. Apply time management strategies and techniques	1. Meaning and importance of time management 2. Steps for effective time management	1. Preparing a checklist of daily activities	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: <ul style="list-style-type: none"> • 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	1. Group activity on using basic user interface of LibreOffice writer 2. Group activity on	02

	perform a function	working with Microsoft Word	
3. Save, close, open and print document	<ol style="list-style-type: none"> 1. Save a word document 2. Close a word document 3. Open an existing document 4. Print 	<ol style="list-style-type: none"> 1. Group activity on performing the functions for saving, closing and printing documents in LibreOffice Writer 2. Group activity on performing the functions for saving, closing and printing documents in Microsoft Word 	02
4. Format text in a word document	<ol style="list-style-type: none"> 1. Change style and size of text 2. Align text 3. Cut, Copy, Paste 4. Find and replace 	<ol style="list-style-type: none"> 1. Group activity on formatting text in LibreOffice Writer 2. Group activity on formatting text in Microsoft Word 	02
5. Check spelling and grammar in a word document	<ol style="list-style-type: none"> 1. Use of spell checker 2. Autocorrect 	<ol style="list-style-type: none"> 1. Group activity on checking spellings and grammar using LibreOffice Writer 2. Group activity on checking spellings and grammar using Microsoft Word 	02
6. Insert lists, tables, pictures, and shapes in a word document	<ol style="list-style-type: none"> 1. Insert bullet list 2. Number list 3. Tables 4. Pictures 5. Shapes 	<ol style="list-style-type: none"> 1. Practical exercise of inserting lists and tables using LibreOffice Writer 	03
7. Insert header, footer and page number in a word document	<ol style="list-style-type: none"> 1. Insert header 2. Insert footer 3. Insert page number 4. Page count 	<ol style="list-style-type: none"> 1. Practical exercise of inserting header, footer and page numbers in LibreOffice Writer 2. Practical exercise of inserting header, footer and page numbers in Microsoft Word 	03
8. Make	<ol style="list-style-type: none"> 1. Tracking option 	<ol style="list-style-type: none"> 1. Group activity on 	

changes by using the track change option in a word document	2. Manage option 3. Compare documents	performing track changes in LibreOffice Writer 2. Group activity on performing track changes in 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 around us	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. Brainstorming on generating a 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. Group activity to conduct a customer survey	04
7. Create a business plan	1. Importance of business planning	1. Group activity on developing a	04

	2. Preparing a business plan 3. Principles to follow for growing a business 4. Case studies	business plan	
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. Group discussion on sectors of green economy 2. Poster making on various sectors for promoting green economy	06
2. Describe the main recommendations of policies for the green economy	1. Policies for a green economy	1. Group discussion on initiatives for promoting the green economy 2. Writing an essay or a short note on the important initiatives for promoting 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. 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. Group discussion on the role of Government and Private Agencies in promoting a green economy. 2. Poster making on green sectors.	03
Total			15

Part B: Vocational Skills

S. No.	Units	Duration (Hrs.)
1	Introduction to Engineering Geometrics and drawing	20
2	Fastener	15
3	Materials for construction of automotive components	20
4	Measuring instruments and health and hygiene	20
5	Regular maintenance of an engine	15
6	Regular maintenance of Transmission system	20
7	Regular maintenance of Gear box	20
8	Service of wheels	15
9	Regular maintenance of tubes and tyre	10
10	Regular Maintenance of brakes	10
	Total	165

Unit 1: Introduction to Engineering Geometrics and drawing

Learning Outcome	Theory	Practical	Duration (20 Hrs)
Draw engineering geometric and drawings	Drawing tools Engineering drawing Different types of projections Dimensioning technique	Identify and describe drawing tools Draw geometric construction Identify and describe various simple engineering drawing Draw engineering drawing Draw various projections Measure and draw dimensioning	
Total			20

Unit 2: Fastener

Learning Outcome	Theory	Practical	Duration (15 Hrs)
Identify different type of fasteners used in a vehicle	Fasteners and their type and use Various procedure used for removal of fasteners in a vehicle Various special tools for handling of fasteners Importance of specified torque values for tightening the fastener	Identify various fasteners used in a vehicle. Handle rusty, broken, spoiled threaded fasteners Use of special tools for removal of defected/affected fasteners Selection of appropriate fasteners and tightening at appropriate torque.	15
Total			15

Unit 3: Materials for construction of automotive components

Learning Outcome	Theory	Practical	Duration (20 Hrs)
Selection and identification of material used in automobiles and their basic manufacturing process	Engineering materials and its type Manufacturing process used in manufacturing the component	Identification of engineering material used in automobiles Selection and describing engineering material Making of a list of basic manufacturing process used in fabrication of a part of automobile Writing of list of process used in manufacturing	20
Total			20

Unit 4: Measuring instrument and health and hygiene

Learning Outcome	Theory	Practical	Duration (20 Hrs)
Handle and use the various measuring equipment's Sanitize workstation and equipment regularly clean hands with soap, alcohol-based sanitizer regularly	Dial gauge, telescopic gauge and bore gauge and their least count, Vernier caliper and tyre depth gauge Micrometer Hydrometer and bevel gauge Torque wrench and filler gauge Dashboard and indicators in a vehicle Avoid contact with ill people and self-isolate in a similar situation Wear and dispose PPEs regularly and appropriately Report advanced hygiene and sanitation issues to appropriate authority Follow stress and anxiety management techniques	Handling and Use of Vernier caliper and tyre depth gauge Setting and uses of micrometer Handling and Use of hydrometer and bevel gauge Handling and Use of torque wrench and filler gauge Identification of various symbolic (gauges) information on dashboard in a vehicle	20
Total			20

Unit 5: Regular maintenance of an engine

Learning Outcome	Theory	Practical	Duration (15 Hrs)
Describe regular maintenance procedures for an engine	Inspection of an engine Washing of the engine Tuning fuel system of an engine Tuning of an ignition system of an engine Tuning of engine lubrication system	Tracing different leakages like oil, coolant and combustion gases Washing of an engine externally Handling of the washing equipment Listing the precautions during washing of engine Tracing the fuel system in a given vehicle engine Checking of the fuel line for leakage Conducting fuel pump test and compare its reading with the service manual Practice of setting of carburettor for ideal speed	15

	<p>Tuning of engine cooling system Tightening of fastener (Nuts/Bolts/Screws) Engine Timing</p>	<p>Testing of nozzle for pressure Do tracing of the primary and secondary circuit(s) Checking the terminals for loose connection Cleaning spark plug and distributor Checking the level and quality of lubricating oil Replacing the oil and Changing the oil filter check the oil pressure Reading temperature gauge Checking circulation of water in cooling system Tracing for coolant leakage Tightening the fasteners with specified torque and with sequence in the following components: cylinder head, induction manifold, exhaust manifold and engine foundation nuts and bolt. Checking and observing importance of engine timing Observing the sound change after tuning process</p>	
Total			15

Unit 6: Regular maintenance of Transmission system			
Learning Outcome	Theory	Practical	Duration (20 Hrs)
<p>Maintenance procedure on the transmission system of a vehicle</p>	<p>Transmission system Clutch maintenance Clutch adjustments</p>	<p>Explain the function of different units used to transmit engine power identify the different units of the transmission system clean motor cycle drive chain Lubricate the drive chain Adjust the drive chain Able to inspect the functioning of clutch linkage for free movement Lubricate the clutch linkage Tighten the fasteners as per need Doing of setting of free play adjustment of clutch Setting of pedal travel adjustment of clutch pedal Inspecting the power transmission from clutch assembly</p>	20
Total			20

Unit 7: Regular maintenance of Gear Box

Learning Outcome	Theory	Practical	Duration (20 Hrs)
Maintenance of gears	Lubrication of gear box Setting of gears	Checking the level of lubricating oil and quality of oil in the gear box Changing of the lubricating oil from the gearbox Checking the various combination of gears Setting of gear lever and selecting mechanism Check the power transmission through respective gears	20
Total			20

Unit 8: Service of wheels

Learning Outcome	Theory	Practical	Duration (15 Hrs)
Identify the components of service of wheels	Importance of wheels Importance of hub greasing and bearing play adjustments	Identify different types of wheels Make a list the functions of wheels Practice of removing the wheel from axle Practice of removing the hub Practice of removing and replacing wheel stud Cleaning the wheel bearing Greasing of hub and wheel bearing Do adjust wheel play (Bearing) adjustment	15
Total			15

Unit 9: Regular maintenance of tubes and tyres

Learning Outcome	Theory	Practical	Duration (25 Hrs)
1.Repairing puncture in tyres and their maintenance	Tyres and their maintenance Tyre puncture	Measuring air pressure in tyres as per specifications Doing rotation of tyres for normal wear Do the repairing practice of punctured tubes with hot patch, and cold patch Do repairing practice of a puncture of tubeless tyres	10
Total			10

Unit 10: Regular Maintenance of Brakes

Learning Outcome	Theory	Practical	Duration (10 Hrs)
Brakes and its maintenance	Brake and its maintenance Brake and its adjustment	Identify the different components of different types of brakes Inspect and lubricate the controls of the braking system Carry out Free pedal/lever adjustment Carry out Checking efficiency of brake Able to carry out adjustments of rear brake Do the adjustments of front brake	10
Total			10

CLASS 12

Part A: Employability Skills

S.No.	Units	Duration (hrs)
1.	Communication Skills- IV	25
2.	Self-management Skills - IV	25
3.	Information and Communication Technology Skills - IV	20
4.	Entrepreneurial Skills - IV	25
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. Group discussion on factors affecting active listening 2. Poster making on 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 practice the following: <ul style="list-style-type: none"> • Simple sentence • Complex sentence • Types of object 2. Identify the types of sentences <ul style="list-style-type: none"> • Active and Passive sentences • Statement/ • Declarative sentence • Question/ • Interrogative 	1. Group activity on writing sentences and paragraphs 2. Group activity on practicing writing sentences in active or passive voice 3. Group activity on writing different types of sentences (i.e., declarative, exclamatory, interrogative and imperative)	05

	sentence - Emotion/ Reaction or Exclamatory sentence - Order or Imperative sentence 3. Paragraph writing		
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 listing negative situations and ways to turn it positive	10
2. Describe how to become result oriented	1. How to become result oriented? 2. Goal setting – examples of result-oriented goals	1. Group activity on listing aim in life	05
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- <ul style="list-style-type: none"> • Suspicious • Emotional and impulsive • Anxious 4. Steps to overcome personality disorders	1. Group discussion on self-awareness 2. Group discussion on common personality disorders 3. Brainstorming steps to overcome personality disorder	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. Getting started with spreadsheet - types of a spreadsheet, steps to start LibreOffice Calc., components of a worksheet.	1. Group activity on identifying components of spreadsheet in Libre Office Calc.	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 activity 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. Group activity on formatting a spreadsheet in LibreOffice Calc 2. Group activity on performing basic calculations 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 activity on sorting data in LibreOffice Calc	03
5. Make use of the software used for making slide presentations	1. Presentation software available 2. Steps to start LibreOffice Impress 3. Adding text to a presentation	1. Group practice on working with LibreOffice Impress tools	02

6. Demonstrate the knowledge to open, close and save slide presentations	1. Open, Close, Save and Print a slide presentation	1. Group activity on saving, closing and opening a presentation in LibreOffice Impress	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 activity on working with font styles 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 activity on changing slide layout on 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. Conducting a classroom quiz on various aspects of entrepreneurship. 3. Chart preparation on types of entrepreneurs 4. Brainstorming activity on What motivates an entrepreneur	10

2. Identify the barriers to entrepreneurship	<ol style="list-style-type: none"> 1. Barriers to entrepreneurship 2. Environmental barriers 3. No or faulty business plan 4. Personal barriers 	<ol style="list-style-type: none"> 1. Group discussion about "What we fear about entrepreneurship" 2. Activity on taking an interview of an entrepreneur. 	05
3. Identify the attitude that make an entrepreneur successful	<ol style="list-style-type: none"> 1. Entrepreneurial attitude 	<ol style="list-style-type: none"> 1. Group activity on identifying entrepreneurial attitude. 	05
4. Demonstrate the knowledge of entrepreneurial attitude and competencies	<ol style="list-style-type: none"> 1. Entrepreneurial competencies 2. Decisiveness 3. Initiative 4. Interpersonal skills- positive attitude, stress management 5. Perseverance 6. Organisational skills- time management, goal setting, efficiency, managing quality. 	<ol style="list-style-type: none"> 1. Playing games, such as "Who am I". 2. Brainstorming a business ideas 3. Group practice on "Best out of Waste" 4. Group discussion on the topic of "Let's grow together" 5. Group activity on listing stress and methods to deal with it like Yoga, deep breathing exercises, etc. 6. Group activity on time management 	05
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	<ol style="list-style-type: none"> 1. Green jobs 2. Benefits of green jobs 3. Green jobs in different sectors: <ul style="list-style-type: none"> • Agriculture • Transportation • Water conservation • Solar and wind energy • Eco-tourism 	<ol style="list-style-type: none"> 1. Group discussion on the importance of green job. 2. Chart preparation on green jobs in different sectors. 	08

	<ul style="list-style-type: none"> • Building and construction • Solid waste management • Appropriate technology 		
3. State the importance of green jobs	1. Importance of green jobs in <ul style="list-style-type: none"> • 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. Group activity on tree plantation. 3. Brainstorming different ways of minimizing waste and pollution	07
Total			15

Part B: Vocational Skills

S.No.	Units	Duration (Hrs)
1.	Unit 1: Service Manual and material conservation	30
2.	Unit 2 : Serviceability, Replacement or Repair of Engine Components	30
3.	Unit 3: Transmission system	20
4.	Unit 4: Suspension system	20
5.	Unit 5: Auto Electrical System	65
	Total	165

Unit 1: Service Manual and material conservation

Learning Outcome	Theory	Practical	Duration (30 Hrs)
Use of service manual Check for spill and leakage	Service manual and its use in workshop Check for spills/leakages in various tasks/ activities/ processes Plug spills/ leakages and escalate to appropriate authority if unable to rectify Carry out routine cleaning of tools, machines and equipment Check if the equipment/ machine is functioning normally before commencing work and rectify wherever required Report malfunctioning (fumes/sparks/ emission/vibration/noise) and lapse in maintenance of equipment Ensure electrical equipment and appliances are properly connected and turned off when not in use	Reading and understanding of service manual Report malfunctioning (fumes/sparks/ emission/vibration/ noise) and lapse in maintenance of equipment	30
Total			30

Unit 2: Serviceability, replacement or repair of engine components

Learning Outcome	Theory	Practical	Duration (30 Hrs)
Do test and replace/repair of components in an auto engine	Valve mechanism, reasons for leakage Importance of reface valve, cutting of the valve seat, and valve lapping operations Use of valve spring, valve seat and valve guide Piston ring and gapes with piston clearance in cylinder bore Connecting rod Engine bearing Cooling System functions Importance, advantages and use of MPFI Loose connection and reasons Nozzel pressure Throttle chamber Importance and use of CRDI Reasons for loose connection and rectification Faulty nozzle, sensors Turbo charger	Test for leakage from the valve mechanism Do the reface valve, cut the valve seat, valve lapping operations Inspecting valve spring, valve seat and valve guide Inspecting and replace piston ring Inspecting the piston clearance in cylinder bore Inspect and do replacement of connecting rod Checking and doing replacement of engine bearings with appropriate clearance Identify and locate faults in the cooling system Replace defective component in the cooling system Able to trace and inspect the components of MPFI systems with fuel and air intake Able to trace for the loose connection Replace faulty nozzle, sensors Servicing throttle body	30

		To do trace connection and inspect the components of CRDI systems with fuel and air intake Checking of loose connection Replacing faulty nozzle, sensors Do servicing of turbo charger	
TOTAL			30

Unit 3: Transmission system

Learning Outcome	Theory	Practical	Duration (20 Hrs)
Explain working of transmission system	Clutch adjustment and overhaul procedure Importance of propeller shaft, universal and slip joints Differential unit and its adjustment Introduction to automatic power transmission	Do adjustment in Clutch Overhauling practices clutch assembly used in vehicle and inspection of components Servicing/overhauling of propeller shaft, universal and slip joints Servicing and adjustment of differential unit Identify and understand automatic transmission system used in power transmission	20
Total			20

Unit 4: Suspension system

Learning Outcome	Theory	Practical	Duration (20 Hrs)
Test working of suspension system	Suspension system in a vehicle with introductory air suspension Cambering of leaf springs, shackle, shackle pin and centre bolt Strut/shock absorbers, steering linkages Manual steering systems Power steering systems Power steering system with EPS and Hydraulic Wheel balancing Wheel alignment 1. Steering adjustment	Inspect and identify the faulty suspension system, Carry out the maintenance Trace trouble in suspension system Replace the defective components of suspension system Tracing and test working of strut, shock, absorber and steering linkage Replace the defective components Check working of the manual steering system Check the working of power steering system Check and handle power steering system with EPS and Hydraulic Do wheel balancing Carryout the wheel alignment Do steering adjustment	20
Total			20

Unit 5: Auto Electrical			
Learning Outcome	Theory	Practical	Duration (65 Hrs)
Auto electrical application in a vehicle	Use of electrical symbol and circuit diagram Multimeter and oscilloscope and its uses Battery and its maintenance Electrical connection, lights and their uses Fuse Amperage Horn assembly, electrical fuel gauge and fuel pump Battery charging system Self-starter circuit diagram and its components Circuit diagram for ignition system and its components Wiper and its servicing method Heater Ventilator Air Condition system in a Vehicle and its use	Practice of reading electrical symbol and circuit diagram, colour code and specification of cables and wiring harness Checking multi meter, timing light (stroboscope) and oscilloscope for resistance, ampere rage and voltage Regular maintenance of the battery Identify the components of earthling Practice of topping Up of battery electrolyte Do the replacement of positive / negative battery cable Checking electrical Connection, test and replace of head Light / indicator/brake Bulbs Practice of replacement of fuses and do continuity test Practice of replacement of Horn assembly, electrical fuel gauge and fuel pump their application and maintenance Draw and check the circuit for battery charging system with alternator Draw and check self-starter circuit and its component Draw and check circuit diagram for ignition system Do the servicing of the wiper system Identify the components of HVAC system in	65
Total			65

6. ORGANISATION OF FIELD VISITS

In a year, at least 3 field visits/educational tours should be organised for the students to expose them to the activities in the workplace like. Automobile show room, Automobile Fair, Different section of show room and service centre, Tele-caller centre, Service centre

Visit an Automobile showroom and service centre and observe the following:
During the visit, students should obtain the following information from the owner or the supervisor of the showroom:

- Activity of Automobile show room
- Different section of show room and service centre

- Service centre activity
- Automobile Fair
- Different section of showroom
- Number of Vehicle sold annually
- Power transmission
- section of engine
- Type of engine and technology
- Automation system
- Denting and painting section
- Electrical section
- Auto electrical system

7. LIST OF EQUIPMENT AND MATERIALS

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

- Tools and Equipment's and Training materials Compressor
- Spark plug cleaning machine Screw driver (Star & minus) Double End Ring Spanner Open and Close (Fix) spanner Socket (Goti) spanner
- Plier
- Monkey plier
- Outer and inner plier Tool box
- T spanner (tommy) set Allen key set
- Tappet puller Tappet gauge Multimeter Tachometer Hammer Compressor gauge
- Oil measure container, funnel Oil can
- Tools trolley Magnetic bar Basic Tool Box
- Workshop tool/equipment: drain pan, oil can, jack hydraulic, bench vice, ramp, pneumatic tool, equipment stands, etc.
- Pressure indicators: oil pressure gauges, tire pressure gauges etc.
- Specialty wrenches: alignment wrenches, chain wrenches, locking wrenches, lug wrenches etc.
- Trim or moulding tools: carbon scrapers, gasket scrapers, scrapers, spoons etc.

- Measuring equipment: Vernier, calipers, micrometer, feeler gauges, multi- metre, flow meter, temp gauge, dial gauge etc.
- 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, Safety Shoes, goggles, ear plugs, boiler suit
- 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, spark plug, 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 dos 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 system
 - UPS
 - Vehicle service manuals, vehicle hand book, job card, work order, completion material requests, Technical reference books.

List of cut section working model

S.No.	Name of working automotive model	Quantity	Price
1.	Four stroke working petrol engines or diesel engines model	1	30,000
3	Old second hand Radiator	1	2000
4	Old second hand pressure cap	1	150
5	Old second hand thermostat	1	2000
6	Old second hand disc brake	1	1000
8	Four-wheeler old second-hand Vehicle	1	50000
9	MPFI working model system	1	5000
10	Old second hand motor cycle	1	10000

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

Qualification and other requirements for appointment of vocational teachers/trainers on 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 Or Diploma in Automobile Engineering/Mechanical Engineering from a recognized Institute /University, with at least 1-year work / teaching experience.	Effective communication skills (oral and written) Basic computing skills.	18-37 years (as on Jan. 01 (year)) Age relaxation to be provided as per Govt. rules.

Vocational Teachers/Trainers form the backbone of Vocational Education being imparted as an integral part of Rashtriya Madhyamik Shiksha Abhiyan (RMSA). They are directly involved in teaching of 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 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 RMSA in the following ways:

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 clearly 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 he will be teaching. Copies of relevant certificates and/or record of experience of the teacher/trainer in the industry should be kept as record.

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:

Written test for the technical/domain specific knowledge related to the sector;
Interview for assessing the knowledge, interests and aptitude of trainer through a panel of experts from the field and state representatives; and
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 for understanding 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:

Prepare session plans and deliver sessions which have a clear and relevant purpose and which engage the students;

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

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

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;

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;

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

Cater to different learning styles and level of ability of students;

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

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

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. 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 result 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 of professional society at District, State, Regional, National and International level;
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 promotion of vocational subjects;
11. Involvement in placement of students/student support services.

9. LIST OF CONTRIBUTORS

1. Mr. Sunil K. Chaturvedi, CEO, Automotive Skills Development Council, Core 4-B 5th Floor India Habitat Centre, Lodhi Road, New Delhi – 110003
2. Mr. Sudhir Vishwakarma, Coordinator, Automobile Division, CRISP, Shyamla Hills, Bhopal, MP-462013
3. Mr. Nagendra D. Kore, Vice Principal and HOD Automobile Technology Section,
4. P.W Higher Secondary School, Khorlim- Mapusa, Goa,
5. Mr. Dhirender C. Srivastava, Retd Divisional Manager (Technical) UTC, 2046-A Anand Bagh, Opp State Bank of India, Haldwani, U.K. 263139
6. Sh. Deepak Shudhalwar, Assistant Professor, E & T Division, PSSCIVE, Bhopal, M.P. 462 013
7. Mr. A.C. Deb, Sr. Lecturer, (Auto) – HOD, PUSA Polytechnic PUSA, New Delhi -12
8. Mr. Vikas Gautam, Vocational Trainer, S.B.V. NO.1, Morigate, Delhi – 06.
9. Er. Kuber Singh, Assistant Professor, Mechanical, DET PSSCIVE, Bhopal, MP 462002.
10. Mr. Ankit Singh Chauhan, Assistant Professor Automotive, DET, PSSCIVE, Bhopal M.P-462002.
11. Dr. Saurabh Prakash, Head, E & T Division, PSSCIVE, Bhopal, M.P. 462002 Programme Coordinator

Reviewer:

1. Mr. Sudhir Vishwakarma, Coordinator, Automobile Division, CRISP, Shyamla Hills, Bhopal, MP-462013
2. Mr. Nagendra D. Kore, Vice Principal and HOD Automobile Technology Section, P.W Higher Secondary School, Khorlim- Mapusa, Goa.



PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal- 462 002, M.P., India
