LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE: AUTOMOTIVE IIOT APPLICATION TECHNICIAN

QUALIFICATION PACK: REF. ID. ASC/Q6413

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.

LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE: Automotive IIOT Application Technician

(QUALIFICATION PACK: ASC/Q6413)

SECTOR: Automotive

Grades 11 and 12

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
(a constituent unit of NCERT, under Ministry of Education, Government of India)
Shyamla Hills, Bhopal- 462 002, M.P., India

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Automotive IIOT

Application Technician

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PATRONS

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
Department of Engineering and Technology
PSS Central Institute of Vocational Education
Bhopal, MP - 462002, India

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 education 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 Qualification 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 education and training package for the job role/vocational subject of "Automotive IIOT Application 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 employers' 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 duly acknowledged. The utility of the curriculum will be judged 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.

DINESH PRASAD SAKLANI
Director
National Council of Education Research and 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, Government of India, introduced the revised Centrally Sponsored Scheme of Vocationalisation of School Education under Samagra Shiksha. 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 materials for the 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. In order to honour 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 and foster a conducive learning environment for effectively transacting the curriculum and to achieve the learning outcomes as per the content of the curriculum document.

DEEPAK PALIWAL
Joint Director
PSS Central Institute of Vocational Education

ACKNOLEDGEMENTS

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 *Samagra Shiksha* and the officials of the Ministry of Education (MoE), Government of India for the financial support to the project for development of learning outcome-based curricula.

We are grateful to the Director, National Council of Educational Research and Training (NCERT) for his support and guidance. We also acknowledge the contributions of our colleagues at the NCERT, National Council for Vocational Education and Training (NCVET), National Skill Development Corporation (NSDC) and Capital Goods Skill Council for their academic support and cooperation.

We are grateful to Dr. Saurabh Prakash, Head, Department of Engineering and Technology, PSS Central Institute of Vocational Education, Bhopal, for his consistent support. We are also thankful to Dr. Vinod Kumar Yadav, Associate Professor and Course Coordinator, for his untiring efforts and contribution to the development of this learning outcome-based curriculum.

The contributions of the experts and the editorial support provided by Dr. Kavita Kamerikar, Consultant (Contractual)in Electronics and Communication Engineering at PSSCIVE, are appreciated and acknowledged.

CONTENTS

1. COURSE OVERVIEW

COURSE TITLE: AUTOMOTIVE IIOT APPLICATION TECHNICIAN

An Automotive IIOT Application Technician is responsible for integrating, operating, and maintaining Industrial Internet of Things (IIOT) systems within the automotive sector. They work with sensors, controllers, and communication networks to enable smart monitoring, predictive maintenance, and automation in vehicles and manufacturing plants. Their role involves installing IIOT-enabled devices, configuring industrial protocols, analyzing real-time data, and ensuring connectivity between automotive systems and cloud platforms. Proficiency in IoT hardware, software tools, and cybersecurity practices is essential, along with a strong understanding of automotive processes and modern digital technologies.

COURSE OBJECTIVES:

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

- Understand the fundamentals and significance of IIOT in the automotive sector.
- Identify and operate key automotive sensors, actuators, and controllers.
- Configure and use industrial networking protocols for connected vehicle systems.
- Apply IIOT tools for real-time monitoring, diagnostics, and predictive maintenance.
- Integrate IIOT devices with automotive systems to enhance automation and efficiency.
- Troubleshoot common issues in IIOT networks, including connectivity and data flow.
- Implement essential cybersecurity and safety measures in IIOT applications.
- Interpret and analyze IIOT data for effective decision-making and system optimization.

COURSE REQUIREMENTS: The learner should be holding a 10th Grade pass certificate.

COURSE DURATION: 600 hrs

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

2. SCHEME OF UNITS

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	
	Total	**110**	**10**
Part B	**Vocational Skills**		
	Unit 1: Introduction to Automotive IIOT and Technician Role	15	**40**
	Unit 2: Building blocks of IIOT and its applications	70	
	Unit 3: Fundamentals of Industrial Networking	25	
	Unit 4: IIOT in automotives	45	
	Unit 5: Organize work and resources according to safety and conservational standards	10	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	Total	**15**	**15**
	Grand Total	**300**	**100**

The unit-wise distribution of hours and marks for Grade12 is as follows:

GRADE 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	
	Total	**75**	**10**
Part B	**Vocational Skills**		
	Unit 1: Maintenance and Troubleshooting of Automotive IIOT systems	40	40
	Unit 2: Connectivity Protocols and Network Architecture in Automotive IIOT systems	30	
	Unit 3: Remote Monitoring and controlling in IIOT network	30	
	Unit 4: Integration, Security, and Documentation in IIOT Technologies	25	
	Unit 5: Industrial Automation	40	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	06	15
	Written Test	01	10
	Viva Voce	03	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/Student Portfolio	10	10
	Viva Voce	05	05
	Total	**15**	**15**
	Grand Total	**300**	**100**

3. TEACHING/TRAINING ACTIVITIES

The teaching and training activities must be conducted in classroom, laboratories/ workshops and field visits. Students should be taken on 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 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 aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, handouts, 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 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.

4. ASSESSMENT AND CERTIFICATION

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, and 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 blueprint for the question paper may be as follows:

Duration: 3 hrs **Max. Mark: 40 marks**

S.No.	Typology of Question	No. of Questions			
		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 the meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	2	3	2	14
3.	Application – (Use abstract information in a 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 and 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**

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills should be done by the assessors/examiners on the basis of practical demonstration of skills by students, 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 current experience in the industry and should have undergone effective training in assessment principles and practices. The Sector Skill Councils should ensure that the assessors are provided with training on the assessment of competencies.

Practical Examination: Practical examination allows candidates to demonstrate the knowledge and understanding of performing a task. This will include the performance of tasks and viva voce. Teachers/Examiner will clearly define the tasks that candidates are required to perform during the practical examination. These tasks should align with the learning objectives of the course. Students are to be evaluated based on their skills, technique, accuracy, and overall performance.
For the practical exam, 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. They will assess the candidates' skills, adherence to industry standards, and efficiency in task execution. Special emphasis should be on assessment of the candidate's ability to troubleshoot and solve problems related to the tasks. During the viva voce, focus should be on assessment of candidate's communication skills and understanding of the subject.

Project Work: Project work is a great way to assess practical skills on a certain period or timeline. Projects should simulate real-world scenarios, allowing students to solve problems or create something tangible using the skills and knowledge they've acquired. Projects should align with the curriculum's learning objectives, ensuring that students apply relevant concepts and skills. Clear and detailed guidelines, including project objectives, evaluation criteria, and deadlines should be provided by the teachers/assessors. Rubrics, which would include aspects like content, creativity, organization, presentation, and adherence to deadlines, should be used by the Assessors to establish specific criteria for marking or grading.

Field visits can be followed by the submission of reports by the students, based on checklist. Teachers will develop a detailed checklist of items or questions students need to address during the visit. This could include specific observations, data collection, interviews, etc. Teachers will assess the reports based on the completeness of checklist items, depth of observations, analysis, and overall presentation. After the visit, teachers will also encourage students to reflect on their field experience, for example what students learned, how they apply the knowledge gained through the field visit, etc.

Student Portfolio is a compilation of documents that supports the students' claim of competence. Documents may include reports, articles, and photos of products prepared by students in relation to the unit of competency. Copies of certificates and awards received for academic achievements, extracurricular activities, or competitions may also be included in the portfolio. Student's portfolio may also include personal reflections of the students on their learning journey, challenges faced, and lessons learned.

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.

5. UNIT CONTENTS

GRADE 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 the knowledge of communication	1. Introduction to the 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. 3. Importance of non-verbal communication. 4. Types of non- verbal communication. 5. Visual Communication	1. Role-play of a phone conversation. 2. Group activity on delivering a speech and practicing public 3. speaking.	02

3. Demonstrate non-verbal communication		4. Role-play on non-verbal communication. 5. Group exercise and discussion on Do's and Don'ts to avoid body language mistakes. 6. 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
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. Group discussion on 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 say 'No'?	02
7. Identify and use parts of speech in writing.	1. Capitalization. 2. Punctuation. 3. Basic parts of speech 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 objects. 3. Types of sentences Paragraph.	1. Activity on framing sentences. 2. Activity on active and passive voice. 3. Assignment on writing different types of sentences.	02
9. Communicate with people.	4. Greetings Introducing self and others.	1. Role-play on formal and informal greetings. 2. Role-play on introducing someone. 3. Practice and group discussion on how to greet different 4. people.	02

10. Introduce yourself to others and write about oneself.	1. Talking about self-Filling a form.	1. Practicing self- introduction and filling up forms. 2. Practicing 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 Relations.	1. Practice talking about family. 2. Role-play on talking about family members.	01
13. Describe habits and routines.	1. Concept of habits and routines.	2. Group discussion on habits and routines. 3. Group activity on describing routines.	01
14. Ask or give directions to others.	Asking for directions 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

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 Steps to building self-motivation.	1. Activity on staying motivated. Assignment on reasons hindering motivation.	03
7. Set goals.	1. Meaning of goals and purpose of goal 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: • Creating a new document • Typing text • Saving the text • Opening and saving a 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. Group activity on using basic user interface of LibreOffice writer. 2. Group activity on working with 3. Microsoft Word.	02
3. Save, close, open and print document.	1. Save a word document. 2. Close a word document. 3. Open an existing document. 4. Print.	1. Group activity on performing the functionsfor saving, closing and printing documents in LibreOffice Writer. 2. Group activity on performing the functions. 3. for saving, closing and printing documents in Microsoft Word	02

4.Format text in a word document.	1. Change style and size of text. 2. Align text. 3. Cut, Copy, and Paste, Find and replace.	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.	1. Use of spell checker Autocorrect.	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.	1. Insert bullet list. 2. Number list. 3. Tables. 4. Pictures Shapes.	1. Practical exercise of inserting lists and tables using LibreOffice Writer.	03
7. Insert header, footer and page number in a word document.	1. Insert header. 2. Insert footer. 3. Insert page number Page count.	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 changes by using the track change option in a word document.	1. Tracking option. 2. Manage option Compare documents.	1. Group activity on performing track changes in LibreOffice Writer. 2. Group activity on performing track changes in Microsoft Word.	04
		Total	**25**

UNIT 4: ENTREPRENEURSHIP 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 plays 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 Ways to think like an entrepreneur.	1. Group activity on identifying and solving problems.	04
5. Generate business ideas.	1. The business cycles. 2. Principles of idea creation. 3. Generating a business idea Case study.	1. Brainstorming on generating 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. 2. Preparing a business plan. 3. Principles to follow for growing a business 4. Case studies.	1. Group 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	1. Group discussion on sectors of green economy. 2. Poster making on	06

	economy- E-waste management, green transportation, renewal energy, green construction, and water management.	various sectors for promoting green economy.	
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 3. 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.	Unit 1: Introduction to Automotive IIOT and Technician Role	15
2.	Unit 2: Building blocks of IIOT and its applications	70
3.	Unit 3: Fundamentals of Industrial Networking	25
4.	Unit 4: IIOT in automotives	45
5.	Unit 5: Organize work and resources according to safety and conservational standards	10
	Total	**165 hrs**

UNIT 1: Introduction to Automotive IIOT and Technician Role			
Learning Outcome	**Theory** *(05 Hrs.)*	**Practical** *(10 Hrs.)*	**Duration** *(15 Hrs)*
1.Overview of the Automotive Industry and Automation	1. Overview of Indian automobile manufacturing market 2. Study of various automobile Original Equipment Manufacturers (OEMs) 3. Introduction to Automotive System 4. Basic Components of Automotive System 5. Emerging Technologies in Automotive Systems	1. To find the name of the manufacturers of the two wheelers and four wheelers standing in the parking area of your school. 2. how to identify EV and non-EV vehicles. 3. Name the parts of an automative system as given in the image.	6
2. Introduction to IIOT	1. Basic Concept of IIOT 2. Working of IIOT 3. Difference between IoT and IIOT 4. IIOT applications and examples 5. Applications of IIOT in the Automotives	1. List the applications with examples of IIOT. 2. Identify the applications of IoT, IIOT and non IoT in given images.	4
3. Role & Responsibilities of an Automotive IIOT Application Technician	1. Role and Responsibilities of an Automotive IIOT Application Technician 2. Skill Set Required for Automotive IIOT Application Technician 3. Job opportunities for an Automotive IIOT Application Technician 4. Manufacturing and Networking Standards and Procedures in an Organization	1. Explore the scope of automotive industry. 2. Visit the nearby bank ATM machine and observe the software, hardware, tools and equipment. 3. List the components of smart factories.	5
		Total	**15**

UNIT 2: Building blocks of IIOT and its applications

Learning Outcome	Theory *(20 Hrs.)*	Practical *(50 Hrs.)*	Duration *(70 Hrs)*
1.Overview of Key components	1. Introduction to Sensors 2. Introduction to Actuators 3. Basic electronics components	1. Dipper using IC 555 2. Horn control using push button	10
2. Tools & Accessories	1. Software tools 2. Hardware Tools	1. Design the circuit for Torch 2. Measure the voltage of 9V battery	10
3. Basics of Microcontrollers	1. What is a Microcontroller (MCU)? 2. Introduction to Arduino 3. Arduino-based applications -Ex. Blinking LED 4. Introduction to Node MCU 5. Node MCU-based applications- Dancing LEDs	1. button switch 2. Fading LEDs	10
4. Interfacing with Microcontroller	1. Analog and digital Signals 2. Arduino uno Pin description 3. Motion Detection using Arduino Uno	1. Counting Of Cars. 2. Attendance and monitoring 3. Differentiate between Analog and digital Signals	10
5. Connecting Node MCU with sensors	1. Role of cloud in accessing IIOT data 2. Interfacing of Node MCU with temperature sensor	1. Voltage monitoring system 2. Fault detection Alert System	10
6. Applications of IIOT	1. Pick and place 2. Fuel Monitoring 3. Line following	1. Robo Arm	20
		Total	**70**

UNIT 3: Fundamentals of Industrial Networking			
Learning Outcome	**Theory** *(10 Hrs.)*	**Practical** *(15 Hrs.)*	**Duration** *(25 Hrs)*
1. Basic Concepts of Networking	1. Wired vs. Wireless Networking 2. IP addresses, MAC addresses 3. Data Flow in a network 4. Devices and Systems Connected in an IIOT Network	1. Connecting your appliances using wireless technology (e.g. Coffee maker)	10
2. Network Topologies	1. Different Types of Network Topologies 2. Connecting devices using network topologies	1. Automated Pathway	15
		Total	**25**

UNIT 4: IIOT in automotives			
Learning Outcome	**Theory** *(10 Hrs.)*	**Practical** *(35 Hrs.)*	**Duration** *(45 Hrs)*
1. Role of IIOT in Monitoring and material handling in Industries	1. Clean room monitoring system-(Air monitoring system) 2. Temperature Controlled Clean room -using DHT 11 3. Automated material handling system-(Example-Load monitoring and Forklift)	1.Working model of Forklift	20
2. Smart Transportation	1. Defining Intelligent Transportation 2. Devices for Smart Transportation 3. Smart traffic control system 4. Smart wiper system 5. Smart Fuel Monitoring system for automobiles.	1. Design of smart truck 2. Design of smart traffic lights. 3. Design of Smart headlights	25
		Total	**45**

UNIT 5: Organize work and resources according to safety and conservational standards			
Learning Outcome	**Theory** *(05 Hrs.)*	**Practical** *(05 Hrs.)*	**Duration** *(10 Hrs)*
1. Maintain personal health and safety.	1. Modes of Infection Transmission. 2. Importance of Hygiene in Infection Prevention. 3. Risk Assessment and Workplace Safety Measures. 4. Personal Protective Equipment (PPE) Selection 5. Safe Handling of Machines and Tools. 6. Consequences of Inadequate Training and Improper Handling.	1. Practice the use of hand sanitizer frequently, especially after touching shared surfaces. 2. Practice wearing a face mask in high- risk environments or crowded places. 3. Practice maintaining physical distance and avoid unnecessary contact. 4. Inspect work areas daily to identify potential risks. 5. Report unsafe conditions to the supervisor and take corrective actions. 6. Follow signage and safety protocols.	2
2. Assist in hazard management.	1. Understanding various hazards. 2. Physical hazards that include machinery and poor lighting. 3. Chemical hazards that include fumes, chemicals and biological items that may have bacteria and viruses. 4. Coordinating with Supervisors. 5. Reporting hazards and unsafe practices. 6. Collaborative approach for hazard minimization. 7. Handling Hazardous Materials. 8. Use of PPE (Personal Protective Equipment). 9. Procedures for handling and storing.	1. Walk through the workplace to identify hazards (physical, chemical, biological, ergonomic, psychosocial). 2. Conduct a risk assessment using a risk matrix. 3. Prioritize hazards and propose control measures. 4. Write a report on identified hazards, risks, and proposed solutions. 5. Role-play safety meeting.	**2**

3. Understanding first aid box, firefighting, and safety equipment.	1. Understanding the First Aid Box and Its Purpose in Workplace Safety. 2. Essential Supplies: Bandages, antiseptic wipes, gauze pads. Adhesive tape, burn cream, scissors, tweezers, Pain relievers, gloves, and specific medications (e.g., epinephrine). 3. Importance of expiry dates. 4. Replenishing Supplies.	1. Visual Inspection of first aid box and prepare a list of items that are available in the box. 2. Replace Expired Items from the first aid box.	**2**
4. Assist in waste management.	1. Explain the Types of Waste: Hazardous (chemicals, sharps), recyclable, and general waste. 2. Segregation: Learn to separate waste materials for proper disposal. 3. Safe Disposal: Understand the safe disposal of hazardous materials, ensuring proper labeling and containers. 4. Environmental Compliance: Follow regulations regarding waste management to avoid environmental hazards.	1. Waste Segregation. 2. Safe Disposal. 3. Regular Cleaning.	**1**
5. Follow the fire safety guidelines.	1. Fire Fighting in Workplace & Precautions. 2. Fire safety principles, fire hazards, and prevention measures. 3. Fire Extinguishers & their Types. 4. Applications of fire extinguishers.	1. Demonstrate the use of fire extinguishers and conduct fire safety drills 2. Identify and use appropriate fire extinguishers for different fire types.	**1**
6. Follow emergency and first aid procedure.	1. Understanding of the following processes: 2. Assess the Situation: Ensure safety and check the victim's condition. 3. Call for Help: Contact emergency services with detailed information. 4. Provide First Aid: Perform necessary first-aid measures	Emergency and First- Aid Procedures: Assessment, Response, and Reporting: Follow the emergency and first-aid procedures by assessing the situation for safety, calling for help, providing appropriate first aid, reassuring the victim, following evacuation procedures if necessary, and	**1**

	based on the injury (bleeding, burns, fractures, etc.). 5. Stay Calm and Reassure the Victim: Offer comfort and monitor vital signs. 6. Follow Emergency Procedures: Evacuate if necessary and assist others in need. 7. Post-Emergency Actions: Report the incident, ensure follow-up care, and review the response.	completing an incident report afterwar	
7. Carry out relevant documentation and review.	1. Maintain work-related notes and records. 2. Communicate clearly and politely with co- workers and clients. 3. Read the relevant literature to get the latest updates about the field of work. 4. Listen attentively to understand the information being shared. 5. Plan and priorities tasks to ensure timely completion. 6. Take quick decisions to deal with workplace emergencies and accidents. 7. Identify possible disruptions to work and take appropriate preventive measures	1. Maintain Work- Related Notes and Records. 2. Communicate Clearly and Politely with Co-Workers and Clients. 3. Read the Relevant Literature to Get the Latest Updates About the Field of Work. 4. Listen Attentively to Understand the Information Being Shared.	**1**
		Total	**10**

GRADE XII

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: • Simple sentence • Complex sentence • Types of objects 2. Identify the types of sentences: • Active and Passive sentences • Statement/Declarative sentences • Question/Interrogative sentences	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

	• Emotion/Reaction or Exclamatory sentences • 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)**
4. 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 5. 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 – 3. examples of result-oriented goals.	1. Group activity on listing aims 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-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 LibreOffice 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. Stapes 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.	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 of 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.	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

	7. What motivates an entrepreneur. 8. Identifying opportunities and risk-taking. 9. Startups.		
2. Identify the barriers to entrepreneurship.	1. Barriers to entrepreneurship. 2. Environmental barriers. 3. No or faulty business plan. 4. Personal barriers.	1. Group discussion about "What we fear about entrepreneurship". 2. Activity on taking an interview of an entrepreneur.	05
3. Identify the attitude that makes an entrepreneur successful.	1. Entrepreneurial attitude.	1. Group activity on identifying entrepreneurial attitude.	05
4. Demonstrate the knowledge of entrepreneurial attitude and competencies.	1. Entrepreneurial competencies. 2. Decisiveness. 3. Initiative. 4. Interpersonal skills- positive attitude, stress management. 5. Perseverance. 6. Organizational skills- time management, goal setting, efficiency, managing quality.	1. Playing games, such as "Who am I". 2. Brainstorming a business idea. 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.	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 jobs. 2. Chart preparation on green jobs in different sectors.	08
2. State the importance of green jobs.	1. Importance of green jobs in 2. Limiting greenhouse gas emissions 3. Minimizing waste and pollution 4. Protecting and restoring ecosystems 5. 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
	Unit 1: Maintenance and Troubleshooting of Automotive IIOT systems	**40**
2	Unit 2: Connectivity Protocols and Network Architecture in Automotive IIOT systems	**30**
3	Unit 3: Remote Monitoring and controlling in IIOT network	**30**
4	Unit 4: Integration, Security, and Documentation in IIOT Technologies	**25**
5	Unit 5: Industrial Automation	**40**
	Total	**165**

UNIT 1: Maintenance and Troubleshooting of Automotive IIOT systems

Learning Outcome	Theory (10 Hrs.)	Practical *(30 Hrs.)*	Duration (40 Hrs.)
1. Predictive Maintenance of IIOT Components	1. Introduction to Predictive Maintenance 2. Conditional Monitoring Techniques 3. Sensors and Data Collection for Maintenance	1. Design a Chimney cleaning machine 2. Design floor cleaning robot	10
2. Troubleshooting of IIOT Components	1. Common Failures in IIOT Devices and Networks 2. Diagnostic Tools and Techniques 3. Hardware vs. Software Troubleshooting 4. Preventive vs. Corrective Actions	1. Solar panel Cleaning Machine	10
3. Automated Firefighting System	1. Introduction to Industrial Fire Safety Systems 2. Gas Sensors and Fire Detection 3. Accelerometers and Motion Sensing in Fire Safety 4. Flow, LiDAR, and Proximity Sensors for Hazard Detection 5. Temperature and Pressure Sensors for Firefighting Systems	1. Making of Automated Firefighting Machine	20
		TOTAL	**40**

UNIT 2: Connectivity Protocols and Network Architecture in Automotive IIOT systems			
Learning Outcome	**Theory (15 Hrs.)**	**Practical *(15 Hrs.)***	**Duration (30 Hrs.)**
1. Connectivity protocols in IIOT	1. Introduction to Industrial Communication Protocols 2. Wired vs. Wireless Connectivity in IIOT 3. Standard Protocols – MQTT, CoAP, OPC-UA, Modbus, Profibus 4. Real-Time Data Communication in IIOT Systems 5. Protocol Selection Criteria	1. Firewall installation 2. Smart Helmet	15
2. IIOT Network Architecture and Devices	1. Basics of IIOT Network Architecture 2. Edge Devices, Gateways, and Controllers 3. Role of Routers, Switches, and Firewalls in IIOT 4. Cloud, Fog, and Edge Computing in IIOT Networks	1. Identify the devices 2. Browse internet to search different types of clouds and list them.	15
		Total	**30**

UNIT 3: Remote Monitoring and controlling in IIOT network			
Learning Outcome	**Theory (15 Hrs.)**	**Practical *(15 Hrs.)***	**Duration (30 Hrs.)**
1.Sorting Robot	1. Introduction to Sorting Robots in Industry 2. Role of Sensors and Actuators in Sorting Systems 3. Control Logic and Programming for Sorting Applications 4. Integration of Sorting Robots with IIOT Networks 5. Real-Time Monitoring and Performance Optimization	1. Design a robot to separate things	15
2.Detection of Network blind spot	1. Understanding Blind Spots in IIOT Networks 2. Causes of Connectivity Gaps and Failures 3. Tools and Techniques for Network Monitoring 4. Methods for Blind Spot Detection and Analysis	1. To check for Faulty router in the network 2. To check faulty gateway in the network 3. To check for break in ethernet wire 2. To check the IP address	15
		Total	**30**

UNIT 4: Integration, Security, and Documentation in IIOT Technologies			
Learning Outcome	**Theory (10 Hrs.)**	**Practical *(15 Hrs.)***	**Duration (25 Hrs.)**
1.Integration of Machines, Robots, and IIOT Systems	1. Introduction to System Integration in IIOT 2. Interoperability Between Machines, Robots, and IIOT Devices 3. Edge, Cloud, and Hybrid Integration Approaches	1. Give five examples of interoperability between Machines, Robots, and IIOT Devices from internet. 2. Relationship between cloud and edge.	10
2.Methods for Physical Security in IIOT Systems	1. Cybersecurity Challenges in IIOT Networks 2. Security Frameworks, Standards, and Regulations 3. Device Authentication, Data Encryption, and Access Control 4. Intrusion Detection, Prevention, and Incident Response 5. Best Practices for Securing IIOT Systems	1. Blindspot Monitoring system using Arduino Uno	10
3.Documentation and Reporting Standards	1. Importance of Documentation in IIOT Projects 2. Types of Documentation – Technical, Operational, and Maintenance 3. Industry Standards and Templates for Reporting	Creation and organization of required documentation	5
		Total	**25**

UNIT 5: Industrial Automation			
Learning Outcome	**Theory (20 Hrs.)**	**Practical *(20 Hrs.)***	**Duration (40 Hrs.)**
1.Worker's Monitoring system	Implementation of Worker's Monitoring system	Development of project on Worker's Monitoring system	10

2.Raw Material Management	1. Inquiry Generation 2. Quotation Comparative Statement Preparation 3. Release of Purchase order	Development and compilation of official documents	10
3.Prototyping	Design of Product	Development of the Product	10
4. Prototyping Testing	1. Parameters checking 2. Troubleshooting	Troubleshooting of prototype	10
		Total	**40**

6. ORGANISATION OF FIELD VISITS

In a year, at least 3 field visits/educational tours should be organized for the students to expose them to the activities in the workplace. Visit an Automotive Industry/IIOT-enabled facility and observe the following:

- Location: Describe the location and accessibility of the automotive plant or IIOT facility.
- Factory Layout: Note the layout and size of the production area, assembly line, and testing zones.
- IIOT Infrastructure: Observe the setup of IIOT-enabled networks, including sensors, controllers, and gateways.
- Sensors & Actuators: Identify the types of automotive sensors (temperature, pressure, proximity, vibration) and actuators used in automation.
- Industrial Networking: Observe the use of communication protocols such as CAN, Modbus, Ethernet/IP, or OPC-UA in the facility.
- Data Monitoring Systems: Check the dashboards, HMIs, or cloud platforms used for real-time monitoring and predictive maintenance.
- Robotics & Automation: Observe integration of IIOT with robots, robotic arms, and automated guided vehicles (AGVs).
- Cybersecurity Measures: Note the practices adopted for network safety, data protection, and system reliability.
- Energy Management: Observe IIOT-based systems for power monitoring, smart grids, or energy optimization.
- Safety Systems: Verify the presence of alarms, interlocks, grounding, and safety protocols followed on-site.

In addition to the technical and detailed observations mentioned earlier, some key additional observations are:

1. Type of project (Manufacturing plant, R&D facility, Connected Vehicle Workshop, or Smart Factory).
2. Technology adopted for IIOT integration (Edge computing, Cloud monitoring, AI/ML analytics).
3. Manpower engaged (Number of engineers, technicians, and operators with their roles).
4. Approximate project or setup cost for IIOT infrastructure.
5. Expected benefits such as reduced downtime, predictive maintenance savings, and improved productivity.

7. LIST OF EQUIPMENTS 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 in drawing. Following are the basic list of equipment and materials required:

S.No.	Equipment & Materials	Quantity
1.	Arduino Boards (UNO/Nano)	5
2.	Basic Sensors (Temperature, Ultrasonic, IR, Light, Vibration)	2 sets each
3.	Small DC Motors and Servo Motors	5 each
4.	Breadboards and Jumper Wires	10 sets
5.	Power Supply Adapters (5V/12V DC)	5
6.	LED, Resistors, Capacitors (Basic Electronic Components kits)	5 sets
7.	Relays and Switch Modules	3 sets
8.	Wi-Fi Module (ESP8266/ESP32)	5
9.	Multimeter	2
10.	Soldering Kit with Accessories	1 set
11.	Tool Kit (Small screwdrivers, pliers, wire stripper)	2 sets
12.	Laptops/PCs with Arduino IDE & Free IoT Platforms (like ThingSpeak)	As per users
13.	Safety Kit (Gloves, Safety Glasses)	1 set per batch
14.	Mini Project Kits (Smart parking, smart car light system, IoT switch demo)	3–4 kits

Note: This list provides a general idea of basic quantities required.

8. VOCATIONAL TEACHER'S AND TRAINERS' QUALIFICATION AND GUIDELINES

Qualification and other requirements for appointments 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:

Qualification	Minimum Competencies	Age Limit
Graduation in Electronics/Electrical & Electronics/Mechatronics Engineering from a recognized Institute /University, with at least 1-year work / teaching experience	Effective communication skills (oral and written)	18-37 years (as on Jan. 01 (mention the year))

OR Diploma in Electronics/Electrical & Electronics/Mechatronics/Mechanical Engineering with 2- year work / teaching experience **OR** B.Voc in Electronics/Electrical & Electronics/Mechatronics/ Mechanical Engineering field with at least 1 year's work/ Teaching experience.	Basic computing skills.	Age relaxation to be provided as per Govt. rules.

These guidelines have been prepared with the aim of helping and guiding the States in engaging qualified Vocational Teachers/Trainers in schools. Various parameters that need to be considered while engaging Vocational Teachers/Trainers include the mode and procedure of selection, 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 Samagra Shiksha 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 organizations 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:

i. Written test for the technical/domain specific knowledge related to the sector.
ii. Interview for assessing the knowledge, interests and aptitude of trainers through a panel of experts from the field and state representatives; and
iii. Practical test/mock test in classroom/workshop/laboratory.

In case of appointments 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.

In case of appointments 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 Headmaster/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 which have a clear and relevant purpose, and which 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, teamwork, practical and simulation-based learning experiences.
v. Work with the institution's management to organize skill demonstrations, site visits, on-job training, 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. Following parameters may be considered during the appraisal process:

1. Participation in guidance and counseling activities conducted at Institutional, District and State level.
2. Adoption of innovative teaching and training methods.

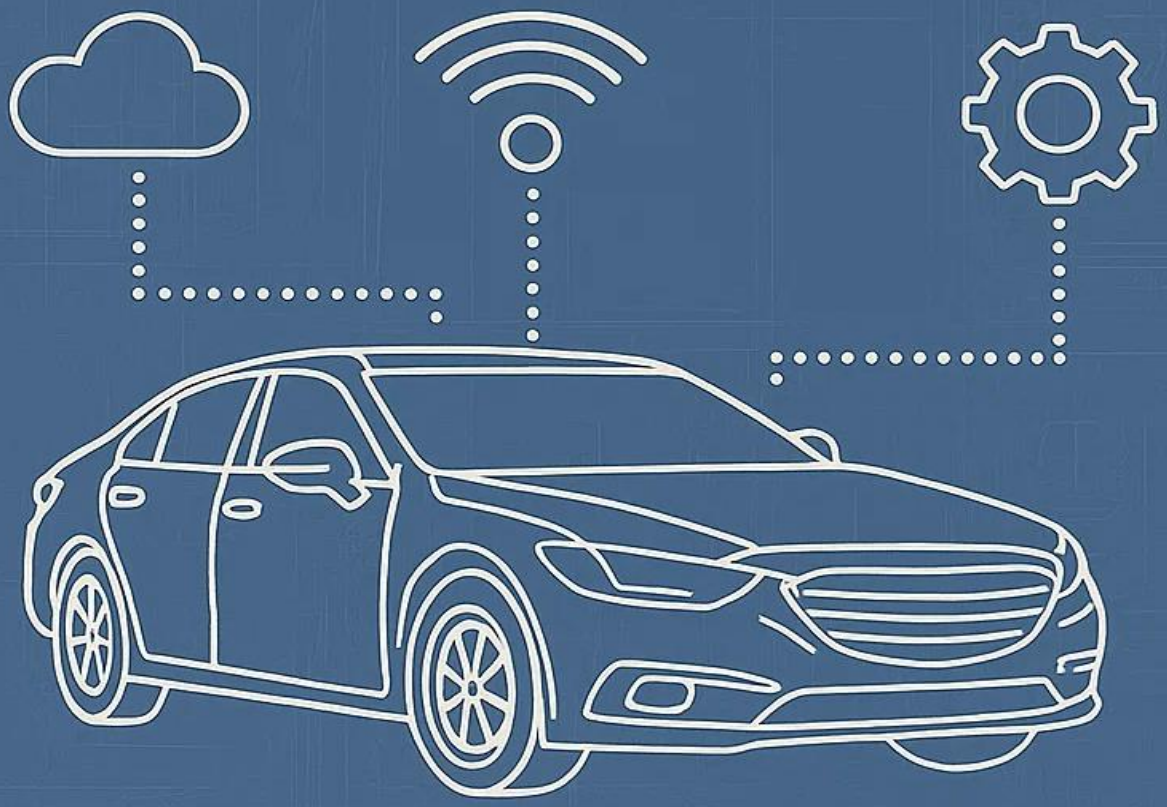
3. Improvement in result of vocational students of Class X or Class XII.
4. Continuous upgradation of knowledge and skills related to the vocational pedagogy, communication skills and vocational subjects.
5. Membership of professional society at District, State, Regional, National and International level.
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. Organization of activities for 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, Bhopal, M.P-462002, India.

2. Dr. Saurabh Prakash
Professor and Head
Engineering and Technology Department, PSS Central Institute of Vocational Education, Bhopal, M.P-462002, India.

3. Dr. Kavita Kamerikar
Consultant (Electronics & Communication Engineering)
Department of Engineering and Technology
PSS Central Institute of Vocational Education, Bhopal, M.P-462002, India.



PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
(a constituent unit of NCERT, under Ministry of Education, Government of India)
Shyamla Hills, Bhopal- 462 002, M.P., India