

LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE: Drone Service Technician

(QUALIFICATION PACK: Ref. Id. ELE/Q7003)



**SECTOR: ELECTRONICS SECTOR SKILLS COUNCIL OF INDIA
(ESSCI)**

Classes 11 and 12

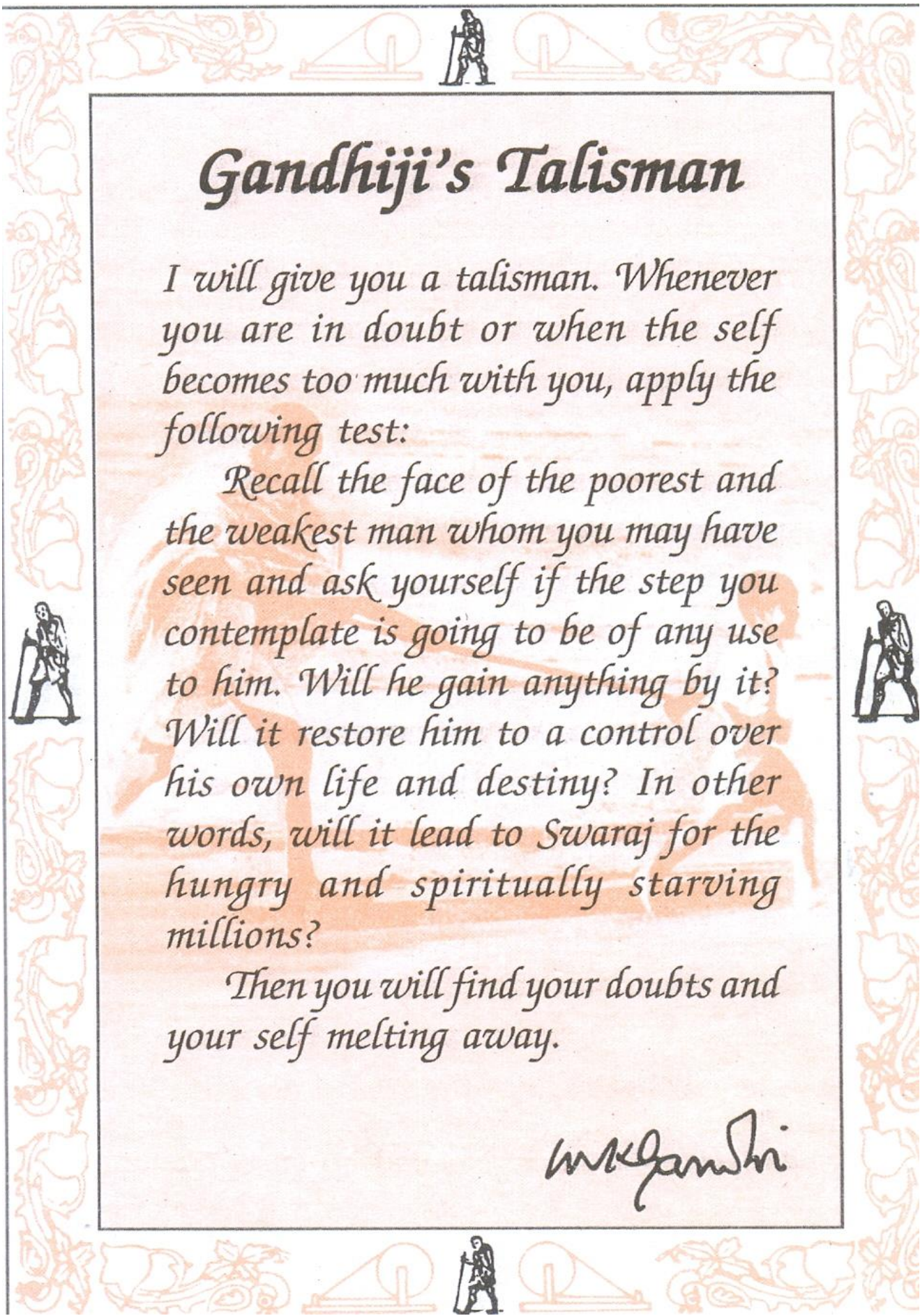


PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

(a constituent unit of NCERT, under MoE, Government of India)

Shyamla Hills, Bhopal- 462 002, Madhya Pradesh, India

<https://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

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FOREWORD

The Pandit Sundarlal 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 Education (MOE) and is aligned to the National Skill Qualifications Framework (NSQF). The curricula for vocational courses are being developed under the project approved by the Project Approval Board (PAB) of 'Samagra Shiksha', which is an overarching programme for the school education sector extending from pre-school to Grade 12.

It is a matter of great pleasure to introduce this learning outcome-based curriculum as part of the vocational training package for the job role of **Drone Service Technician (QUALIFICATION PACK: Ref. Id. ELE/Q7003)**. 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 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.

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DINESH PRASHAD SAKLANI
Director
National Council of Education Research and Training
New Delhi

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 sector.

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 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 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.

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 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 Sector Skill Council for Management and Entrepreneurship and Professional Skills for their academic support and cooperation in the development of Qualification file and curriculum.

We are grateful to Prof. Saurabh Prakash, Course Coordinator for his untiring efforts and contribution to the development of this learning outcome-based curriculum. The contribution made by and his team, Industry Partner in the development of the curriculum for domain and non-domain skills is duly acknowledged.

The suggestions and editorial support provided by Manoj Darwai, Assistant Professor, Department of Engineering and Technology, Consultant on contractual basis at PSSCIVE, Bhopal are duly appreciated and acknowledged.

PSSCIVE Team

CONTENTS

S.No.	Title	Page No.
	Foreword	(i)
	Preface	(iii)
	Acknowledgement	(iii)
1.	Course Overview	1
2.	Scheme of Units	2
3.	Teaching/Training Activities	3
4.	Assessment and Certification	4
5.	Unit Content	
	CLASS 11	
	Part A Employability Skills	6
	Unit 1: Communication Skills-III	6
	Unit 2: Self-management Skills-III	9
	Unit 3: Information and Communication Technology Skills-III	10
	Unit 4: Entrepreneurial Skills-III	11
	Unit 5: Green Skills-III	12
	Part B Vocational Skills	13
	Unit 1: Introduction of drones	13
	Unit 2: Tools for drone technician	14
	Unit 3: Major components of drone	15
	Unit 4: Work and safety	17
	CLASS 12	
	Part A Employability Skills	18
	Unit 1: Communication Skills-IV	19
	Unit 2: Self-management Skills-IV	20
	Unit 3: Information and Communication Technology Skills-IV	20
	Unit 4: Entrepreneurial Skills-IV	22
	Unit 5: Green Skills-IV	23
	Part B Vocational Skills	24
	Unit 1: Assembly and disassembly processes of drone	24
	Unit 2: Repair and Maintenance of drone	25
	Unit 3: Opportunities and rules and regulation	26
	Unit 4: Innovation and development in drone technology	27
6.	Organisation of Field Visits	28
7.	List of Equipment and Materials	28
8.	Vocational Teacher's/ Trainer's Qualification and Guidelines	29
9.	List of Contributors	32

1. COURSE OVERVIEW

COURSE TITLE: Drone Service Technician ELE/Q7003

The current course Drone Service Technician Job Role caters to the needs of the students who want to learn activities related to the Drone Service Technician Job Role. Any student/entrepreneur who wants to start a Drone Service Center can acquire the desired competencies with the help of this course. A Drone Service Technician consist of preliminary checkup of the drone, replacement or repair of drone components, maintain, assembling, electrical wiring, operate the equipment and test systems.

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

- Identify the principal components of a drones
- 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
- Understand the work requirement of drones
- Check out and assess the drones
- Understand the assembly requirement of drones
- Collect materials required for repair drone
- Do the assembling of drones.
- Ensure quality material usage and appropriate handling mechanism
- Repair and maintain the minor and major mechanism of drone.

COURSE REQUIREMENTS: The learner should have a 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 the Drone 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 11 and 12 opting for the vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Class 11 is as follows:

CLASS 11			
Units		No. of Hours for Theory and Practical 300	Max. Marks for Theory and Practical 100
Part A	Employability Skills		
	Unit 1: Communication Skills-III	25	10
	Unit 2: Self-management Skills-III	25	
	Unit 3: Information and Communication Technology Skills-III	20	
	Unit 4: Entrepreneurial Skills-III	25	
	Unit 5: Green Skills-III	15	
		110	10
Part B	Vocational Skills		
	Unit 1 : Introduction of drones	30	40
	Unit 2: Tools for drone technician	60	
	Unit 3: Major components drone	50	
	Unit 4: Work and safety	25	
		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: Assembly and disassembly processes of drone	80	40
	Unit 2: Repair and Maintenance of drone	30	
	Unit 3: opportunities and rules and regulation	30	
	Unit 4: Innovation and development in drone technology	25	
		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 classrooms, 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 is 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, 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 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, provide an example, or solve a problem)	0	2	1	07
4.	High Order Thinking Skills – (Analysis & Synthesis – Classify, compare, contrast, or differentiate between different pieces of information; Organize and/ or integrate unique pieces of information from a variety of sources)	0	2	0	04
5.	Evaluation – (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	0	1	0	02
	Total	5x1=5	10x2=20	5x3=15	40 (20 questions)

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners 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 organised as part of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio.

Student Portfolio is a compilation of documents that supports the candidate's claim of competence. Documents may include reports, articles, and 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 SKILL - 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	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	03

	communication	elements of communication 4. Classroom discussion on the 7Cs (i.e. Clear, Concise, Concrete, Correct, Coherent, Courteous and Complete) for effective communication	
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
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. Capitalisation 2. Punctuation 3. Basic parts of	1. Group activity on identifying parts of speech	

	speech 4. Supporting parts of speech	2. Writing a paragraph with punctuation marks 3. Group activity on constructing sentences 4. Group activity on identifying parts of speech	03
8. Write correct sentences and paragraphs	1. Parts of a sentence 2. Types of object 3. Types of sentences 4. Paragraph	1. Activity on framing sentences 2. Activity on active and passive voice 3. Assignment on writing different types of sentences	02
9. Communicate with people	1. Greetings 2. Introducing self and others	1. Role-play on formal and informal greetings 2. Role-play on introducing someone 3. Practice and group discussion on how to greet different people?	02
10. Introduce yourself to others and write about oneself	1. Talking about self 2. 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 2. 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	1. Group discussion on habits and routines 2. Group activity on describing routines	01
14. Ask or give directions to others	1. Asking for directions 2. Using landmarks	1. Role-play on asking and giving directions 2. Identifying symbols 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	<ol style="list-style-type: none"> 1. Understanding self 2. Techniques for identifying strengths and weaknesses 3. Difference between interests and abilities 	<ol style="list-style-type: none"> 1. Activity on writing aims in life 2. Preparing a worksheet on interests and abilities 	03
2. Demonstrate personal grooming skills	<ol style="list-style-type: none"> 1. Guidelines for dressing and grooming 2. Preparing a personal grooming checklist 	<ol style="list-style-type: none"> 1. Role-play on dressing and grooming standards 2. Self-reflection activity on various aspects of personal grooming 	04
3. Maintaining personal hygiene	<ol style="list-style-type: none"> 1. Importance of personal hygiene 2. Three steps to personal hygiene 3. Essential steps of hand washing 	<ol style="list-style-type: none"> 1. Role-play on personal hygiene 2. Assignment on personal hygiene 	03
4. Demonstrate the knowledge of working in a team and participating in group activities	<ol style="list-style-type: none"> 1. Describe the benefits of teamwork 2. Working in a team 	<ol style="list-style-type: none"> 1. Assignment on working in a team 2. Self-reflection on teamwork 	03
5. Develop networking skills	<ol style="list-style-type: none"> 1. Benefits of networking skills 2. Steps to build networking skills 	<ol style="list-style-type: none"> 1. Group activity on networking in action 2. Assignment on networking skills 	03
6. Describe the meaning and importance of self-motivation	<ol style="list-style-type: none"> 1. Meaning of self-motivation 2. Types of motivation 3. Steps to building self-motivation 	<ol style="list-style-type: none"> 1. Activity on staying motivated 2. Assignment on reasons hindering motivation 	03
7. Set goals	<ol style="list-style-type: none"> 1. Meaning of goals and purpose of goal-setting 2. Setting SMART goals 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Meaning and importance of time management 2. Steps for effective time management 	<ol style="list-style-type: none"> 1. Preparing a checklist of daily activities 	03
Total			25

UNIT 3: INFORMATION & COMMUNICATION TECHNOLOGY - III			
Learning Outcome	Theory (08hrs)	Practical (12hrs)	Duration (20 Hrs)
1.Create a document on the word processor	<ol style="list-style-type: none"> 1. Introduction to ICT 2. Advantages of using a word processor. 3. Work with Libre Office Writer 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Status bar 2. Menu bar 3. Icons on the Menu bar 4. Multiple ways to perform a function 	<ol style="list-style-type: none"> 1. Group activity on using basic user interface of LibreOffice writer 2. Group activity on working with Microsoft Word 	02
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 	02

		checking spellings and grammar using Microsoft Word	
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 changes by using the track change option in a word document	<ol style="list-style-type: none"> 1. Tracking option 2. Manage option 3. Compare documents 	<ol style="list-style-type: none"> 1. Group activity on performing track changes in LibreOffice Writer 2. Group activity on performing track changes in Microsoft Word 	04
Total			20

UNIT 4: ENTREPRENEURSHIP DEVELOPMENT - III

Learning Outcome	Theory (10 hrs)	Practical (15 hrs)	Duration (25 Hrs)
1. Differentiate between different kinds of businesses	<ol style="list-style-type: none"> 1. Introduction to entrepreneurship 2. Types of business activities 	<ol style="list-style-type: none"> 1. Role-play on different kinds of businesses around us 	03
2. Describe the significance of entrepreneurial values	<ol style="list-style-type: none"> 1. Meaning of value 2. Values of an Entrepreneur 3. Case study on qualities of an entrepreneur 	<ol style="list-style-type: none"> 1. Role-play on qualities of an entrepreneur 	03
3. Demonstrate the attitudinal changes required to become an entrepreneur	<ol style="list-style-type: none"> 1. Difference between the attitude of entrepreneur and employee 	<ol style="list-style-type: none"> 1. Interviewing employees and entrepreneurs 	03

4. Develop thinking skills like an entrepreneur	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. The business cycles 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	<ol style="list-style-type: none"> 1. Understanding customer needs 2. Conducting a customer survey 	1. Group activity to conduct a customer survey	04
7. Create a business plan	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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 Skill

S. No.	Units	Duration (Hrs.)
1	Unit 1: Introduction of drones	30
2	Unit 2: Tools for drone technician	60
3	Unit 3: Major components of drone	50
4	Unit 4: Work and safety	25
	Total	165

UNIT 1: INTRODUCTION OF DRONES

Learning Outcome	Theory (30 Hrs)	Practical (12 Hrs)	Duration (30 Hrs)
1. Describe role of Drone Service Technician	<ul style="list-style-type: none"> • Roles and responsibilities of drone service technician • Personal attribute of the drone service technician • Discuss various employment opportunities for a Drone Service Technician in the Electronics industry • Basic Principles of Electricity -load, current (AC/DC), conductors, Switch, Series circuit, Parallel circuit, voltage, power. 	<ul style="list-style-type: none"> • Draw a chart of career progression of drone service technician • Role and responsibilities of drone technician 	2
2. Describe drone	<ul style="list-style-type: none"> • Introduction of drone • Classification of drone • Advantages and disadvantages of using drone. • Need of Drone 	<ul style="list-style-type: none"> • List the various types of drones • Preparing chart and poster • Identify Drone Type 	7
3. Describe the use of drone and its application	<ul style="list-style-type: none"> • Drone technology • Various applications of drone • List various types of Drones and their respective applications 	<ul style="list-style-type: none"> • Make a list of various applications 	05
4. Explain the drone Technology	<ul style="list-style-type: none"> • History and evolution of drone technology • Identify the future scope of drone technology • Need for training in the drone sector 	<ul style="list-style-type: none"> • List the chronological development of drone technology 	06
5. Explain the use of various types of electronic components, hardware and software of drone	<ul style="list-style-type: none"> • Electronic components such as a resistor, capacitors, coil, diode, transistor, integrated circuit (IC) etc. • Hardware, • Software: Firmware components, OS and drivers, Sensing, navigation, and control Application-specific components 	<ul style="list-style-type: none"> • Make a list of various components of drone • Make a list of various sensors used in drone • Make a list of various software used in drone 	10
Total			30

UNIT 2: TOOLS FOR DRONE TECHNICIAN			
Learning Outcome	Theory (30 Hrs)	Practical (30 Hrs)	Duration (60Hrs)
1. Describe the various mechanical tool	<ul style="list-style-type: none"> Mechanical tools for drone service technician- Phillips screwdriver, spanner, drill machine, hammer, chisel, grinder, power drill, scrapers, screwdriver. 	<ul style="list-style-type: none"> List and Identify the various mechanical tool Draw the image of the mechanical tool and label it Handling of the different mechanical tools. 	12
2. Describe the various electrical tools	<ul style="list-style-type: none"> Electrical tools used in the Drone system – Technical tweezers, Technical Hair Dryer, multimeter, clamp meter, Wire stripper, tester electrical insulator, pliers, crimper, Heat Gun, Wattmeter, Soldering Iron, Soldering Machine 	<ul style="list-style-type: none"> Identify the various electrical tool for the specific task Sketch the electrical tool and label it Handling and operate the different electrical tools (clamp meter, multimeter, Wire stripper, tester electrical insulator, pliers, crimper) Do the all electrical tool operations (multimeter, tester electrical insulator, pliers, crimper) 	15
3. Describe the various safety tool	<ul style="list-style-type: none"> Safety tools – First Aid Kit, Fire Extinguisher, Fire Blanket, Landing Mat, equipment kit (PPE KIT) 	<ul style="list-style-type: none"> Identify the various safety tool for the specific task Demonstrate the different safety tool Perform practical of all safety tool operations 	8
4. Describe the different electrical parameters	<ul style="list-style-type: none"> Electrical parameters- current, voltage, power, AC and DC, battery power, battery rating, frequency, resistance. 	<ul style="list-style-type: none"> Make a list of different electrical parameter Draw the symbols of electrical parameters 	15
Total			60

UNIT 3: MAJOR COMPONENTS DRONE			
Learning Outcome	Theory (26 Hrs)	Practical (24 Hrs)	Duration (50 Hrs)
1. Describe the major components of drone	<p>Explain the major components of drone : Propellers, motor, frame, battery, camera, GPS, Flight controller, Electronic speed controller, etc</p>	<ul style="list-style-type: none"> List and Identify the major components of drone. 	14
2. Describe the electronic components of drone	<ul style="list-style-type: none"> Explain the use of various types of electronic components such as a resistor, capacitors, coil, Transmitter, diode, 	<ul style="list-style-type: none"> List and Identify the electronics components of drone. Draw the image of the components of drone. 	14

	Receiver transistor, integrated circuit (IC) etc.		
3. Describe the different electrical parameters	<ul style="list-style-type: none"> Electrical parameters- voltage, AC and DC, earthing, power factor, frequency, resistance. 	<ul style="list-style-type: none"> Make a list of different electrical parameter Draw the symbols of electrical parameters 	14
4. Describe the take off and landings of drone	<ul style="list-style-type: none"> Explain take off and landings of drone. Explain which factor affecting the take off and landings of drone. 	<ul style="list-style-type: none"> Make a list of different factors affecting the take off and landings of drone. 	8
Total			50

UNIT 4: WORK AND SAFETY

Learning Outcome	Theory (15 Hrs)	Practical (10 Hrs)	Duration (25 Hrs)
1. Explain the toolbox talk and different types of hazards, risks and accidents.	<ul style="list-style-type: none"> Tools box talk- talking about safety at work, identifying the hazards of today's work and taking precautions during assembly and disassembly of drone, talking about safety tools and current work 	<ul style="list-style-type: none"> Perform the role play on the toolbox talk Make a list of hazards and precautions to be taken during installations 	05
2. Discuss and perform the different safety practices	<ul style="list-style-type: none"> Importance of PPE kit, <ul style="list-style-type: none"> demonstration of gathering points and different safety measures first aid, practice evacuation plant Safety regulation- industrial and construction safety act and practice 	<ul style="list-style-type: none"> Demonstrate how to use a PPE kit and its importance Demonstration of First aid box Demonstration of CPR 	05
3. Describe the different types of safety tools	Use of PPE kit <ul style="list-style-type: none"> helmet and its types, gloves, shoe, apron, harness First aid – discuss about first aid material Hazard sign board <ul style="list-style-type: none"> electrical hazard sign boards, precaution signboard, safety measures signboard, emergency, and emergency number signboard 	<ul style="list-style-type: none"> Identify different types of PPE kit Mock Practice of using first aid Make a chart and poster of different hazard sign and emergency sign Identification of different components of fire extinguisher Operate and handling of fire extinguisher Operate the safety harness during work at a height 	10

	<p>Hazard identification-</p> <p>A. Electrical safety</p> <ul style="list-style-type: none"> - Shock prevention - First aid after electrical shock. <p>B. Fire hazard</p> <ul style="list-style-type: none"> - types and use of fire extinguishers - fire exit plan <p>C. Work at height hazard</p> <ul style="list-style-type: none"> - use of safety harness 		
4. Describe the concept of waste management	<ul style="list-style-type: none"> • Explain the waste managements • Explain methods of disposing hazardous waste. <p>Explain electronic waste disposal procedures.</p>	<ul style="list-style-type: none"> • Make a list of methods of waste managements. • Make list of general waste symbols with colours. 	5
Total			25

CLASS 12

Part A: Employability Skills

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills – IV	25
2.	Unit 2: Self-management Skills –IV	25
3.	Unit 3: Information and Communication Technology Skills - IV	20
4.	Unit 4: Entrepreneurial Skills –IV	25
5.	Unit 5: Green Skills –IV	15
	Total	110

UNIT 1: COMMUNICATION SKILLS – IV

Learning Outcome	Theory (10 Hrs)	Practical (15 Hrs)	Duration (25 Hrs)
1. Demonstrate active listening skills	<p>1. Active listening -listening skill, stages of active listening</p> <p>2. Overcoming barriers to active listening</p>	<p>1. Group discussion on factors affecting active listening</p> <p>2. Poster making on steps for active listening</p> <p>3. Role-play on negative effects of not listening actively</p>	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 sentence - Emotion/ Reaction or Exclamatory sentence - Order or Imperative sentence 3. Paragraph writing	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
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- • 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	1. Group activity on formatting a spreadsheet in LibreOffice Calc 2. Group activity on	

	<ul style="list-style-type: none"> 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 	performing basic calculations in LibreOffice Calc.	02
4. Demonstrate the knowledge of using advanced features in spreadsheet	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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)
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<p>1. Describe the concept of entrepreneurship and the types and roles and functions entrepreneur</p>	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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 	<p>10</p>
<p>2. Identify the barriers to entrepreneurship</p>	<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. 	<p>05</p>
<p>3. Identify the attitude that make an entrepreneur successful</p>	<ol style="list-style-type: none"> 1. Entrepreneurial attitude 	<ol style="list-style-type: none"> 1. Group activity on identifying entrepreneurial attitude. 	<p>05</p>
<p>4. Demonstrate the knowledge of entrepreneurial attitude and competencies</p>	<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 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 	<p>05</p>
<p>Total</p>			<p>25</p>

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 • Building and construction • Solid waste management • Appropriate technology 	<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
2. State the importance of green jobs	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 1. Preparing posters on green jobs. 2. Group activity on tree plantation. 3. Brainstorming different ways of minimizing waste and pollution 	07
3. 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 • Building and construction • Solid waste management • Appropriate technology 	<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
Total			15

Part B: Vocational Skills

S. No.	Units	Duration (Hrs.)
1	Unit 1: Assembly and Disassembly Processes of Drone	80
2	Unit 2: Repair and Maintenance of Drone	30
3	Unit 3: Opportunities and Rules and Regulation	30
4	Unit 4: Innovation and development in drone technology	25
	Total	165

Unit 1: ASSEMBLY AND DISASSEMBLY PROCESSES OF DRONE			
Learning Outcome	Theory (30 Hrs)	Practical (50 Hrs)	Duration (80 Hrs)
1. Describe the Assembling/ disassembling different types of Drone.	<ul style="list-style-type: none"> • Explain the assembling and disassembling procedure of drone <ul style="list-style-type: none"> - Central body - Motherboard - Motor card + ventilator - Motor + propeller - Camera + Gimbal - Flex wire and micro coaxial wire holder - GPS holder - Foot - Bottom cover - Antenna + reflector + wire - GPS card - Arm hinges - Motherboard holder for motor wire - Antenna and micro coaxial wire holder - Arm washer - Landing Gear 	<ul style="list-style-type: none"> • Demonstrate the procedure of assembling disassembling different types of Drone. 	40
2. Describe Power Architecture of drone	<ul style="list-style-type: none"> • Explain the power architecture of drone: <ul style="list-style-type: none"> - Power Estimation - SOC Power Requirements - Power Devices -Battery Estimation Watt Hours and Energy Density 	<ul style="list-style-type: none"> • Make a list of steps process various electronic components in a Drone. 	25
3. Describe Software Architecture and Communication Module	<ul style="list-style-type: none"> • Logistics and Operations Management • Board and System Assembly • Communication Module 		15

	- WIFI + Bluetooth - IR/RF Wireless		
Total			80

UNIT 2: REPAIR AND MAINTENANCE			
Learning Outcomes	Theory (15 Hrs)	Practical (15 Hrs)	Duration (30 Hrs)
1. Describe the maintenance of drone	<ul style="list-style-type: none"> • Explain the maintenance. • Explain the different types of maintenance 	<ul style="list-style-type: none"> • Make a list of maintenance of drone. 	5
2. Describe various tests and procedures for checking a Drone.	<ul style="list-style-type: none"> • Explain the various tests and procedure for drone checking • Take-off and Landing of Drones 	<ul style="list-style-type: none"> • Demonstrate how to conduct various tests for identifying faulty electronic components in a drone. 	10
3. Describe the relevant troubleshooting methods for various types of Drones.	<ul style="list-style-type: none"> • Explain the troubleshooting methods for various types of Drones • Calibration of System Components 	<ul style="list-style-type: none"> • Demonstrate the relevant troubleshooting and maintenance procedures for different components of a Drone 	5
4. Describe the standard procedure for repairing and replacing any faulty components of a Drone.	<ul style="list-style-type: none"> • Explain standard procedure for repairing and replacing any faulty components of a Drone. 	<ul style="list-style-type: none"> • Prepare a sample repair and maintenance report using the relevant computer system 	5
5. List different types of documents to be prepared during the repair and maintenance of a Drone.	<ul style="list-style-type: none"> • Explain the various documents list prepare during repair and maintenance of drone 	<ul style="list-style-type: none"> • Prepare a sample incident report. • List the necessary product details to be communicated to the customer at the time of repair and maintenance such as warranty, Annual Maintenance Contract (AMC) info, operating procedure, etc. 	5
Total			30

UNIT 3: OPPORTUNITIES AND RULES AND REGULATION

Learning Outcomes	Theory (15 Hrs)	Practical (15 Hrs)	Duration (30 Hrs)
1. Describe the Career in the drone industry	<ul style="list-style-type: none"> Drone jobs: Drone Jobs in Real Estate, Drone Jobs in Construction / Mining / Aggregates, Drone Jobs in Filmmaking, Drone Jobs in Public Safety, Drone Jobs in Insurance, Drone Jobs in Journalism, Drone Jobs in Agriculture, Drone Jobs in Transportation, Drone Jobs in Energy, Drone Jobs in Telecommunications, Drone Jobs in Education, Drone Careers: Building Your Own Drone Business. 	<ul style="list-style-type: none"> Do the practice of mock interview for careers in drone sector. 	15
2. Describe Drone laws in India	<ul style="list-style-type: none"> Explain the Laws and regulations of drone flying in India. (DGCA Guidelines) Explain the Do's and don'ts to be kept in mind while flying drones in India. 	<ul style="list-style-type: none"> Group discussion on the Drone laws 	15
Total			30

UNIT 4: INNOVATION AND DEVELOPMENT IN DRONE TECHNOLOGY			
Learning Outcomes	Theory (15 Hrs)	Practical (10 Hrs)	Duration (25 Hrs)
<ul style="list-style-type: none"> Describe The drone Innovation & manufacturing potential in India 	<ul style="list-style-type: none"> Explain the drone manufacturing potential in India <ul style="list-style-type: none"> - Drone Innovation - Improved Battery Life and Charging Solutions - Enhanced Safety and Security Features - Expansion of Drone Delivery Services - Growth in Drone-as-a-Service (Daas) - Swarm Technology and Collaborative Drones 	<ul style="list-style-type: none"> Make a list of idea of drone innovation Group discussion on the importance of drone innovation. Make list of drone manufacturing industry. 	15
<ul style="list-style-type: none"> Describe the challenges regarding drone development in India 	<ul style="list-style-type: none"> Explain challenges regarding drone development <ul style="list-style-type: none"> -Endurance -Traffic and Obstacle -Detecting of drones -Limitation usage etc. 	<ul style="list-style-type: none"> Group discussion on the challenges regarding drone development. 	10
Total			25

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 Drone Manufacturing Company, Drone assembling, Different section of show room and service centre.

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

1. Activity of Drone System and service centre
2. Different section of show room and service centre
3. Service centre activities
4. Sale procedure
5. Manpower engaged
6. Total expenditure of showroom
7. Total annual income
8. Profit/Loss (Annual)
9. Any other information

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

A complete unit of drone model, Quad copter kit includes:

- GPS Module
- Propellers
- Frame
- BLDC Motors
- ESC (Electronic Speed controllers)
- FCB (Flight Controller Board)
- Camera
- Guard
- Lipo Battery and Charger
- RF Transmitter and receiver
- Drone base
- Receiver cables
- Hovering function using LiDAR sensor

Soldering Iron, Screwdriver, Torque Screwdriver, Nut Driver, Safety Knife, Pliers, Wire Strippers, Wire Cutters, Glue Gun, Tweezers, Multimeter, Heat Gun, Desk Light and Magnifier, Digital Weighing Scale, Wattmeter and Clamp meter, Motor Thrust Stand, Connectors, different MODEL of drone, Tool kit, combination plier, side cutting plier, Nose pliers, wire stripper, hacksaw frame with the blade, screwdriver, torque wrench, wire stripper, measuring tape, Allen key set, Cable ties, connecting wires, Screw driver set, Soldering flux, safety helmet, safety belt, Nose mask, Safety goggles, ear plug, cotton hand glove.

Training materials and First Aid kit

- 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 the work area.
- Audio/video on English, Hindi, or local language course
- Reference books
- Workbooks
- Study for Soft Skills

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/ B.Voc. (Bachelor in Vocation)	• Effective communication skills (oral and written)	18-37 years (as on Jan. 01 (year))

	<p>in, Mechanical, Electrical and Electronics Engineering, from a recognized Institute /University, with at least 1-year work / teaching experience. Or Diploma in Mechanical and Electrical and Electronics Engineering from a recognized Institute/ University, with at least 2-year work / teaching experience</p>	<ul style="list-style-type: none"> • Basic computing skills. 	<p>Age relaxation to be provided as per Govt. rules.</p>
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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:

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

OR

- (ii) 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:

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

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

The State should ensure that the Vocational Teachers/ Trainers who are recruited should undergo induction training of 20 days 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:

- (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, team work, practical and simulation-based learning experiences;
- (v) Work with the institution's management to organise skill demonstrations, site visits, on-job trainings, and presentations for students in cooperation with industry, enterprises and other workplaces;
- (vi) Identify the weaknesses of students and assist them in up-gradation of competency;
- (vii) Cater to different learning styles and level of ability of students;
- (viii) Assess the learning needs and abilities, when working with students with different abilities
- (ix) Identify any additional support the student may need and help to make special arrangements for that support;
- (x) Provide placement assistance

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

1. Participation in guidance and counselling activities conducted at the Institutional, District and State level;
2. Adoption of innovative teaching and training methods;
3. Improvement in the result of vocational students of Class X or Class XII;
4. Continuous up-gradation of knowledge and skills related to vocational pedagogy, communication skills and vocational subject;
5. Membership of professional society at the 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 the promotion of vocational subjects;
11. Involvement in the placement of students/student support services.

9. LIST OF CONTRIBUTORS

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