LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE:
Field Technician – Computing and Peripherals

(QUALIFICATION PACK: Ref. Id. ELE/Q4601)

SECTOR: Electronics

Classes 11 and 12

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal – 462 002, M.P., India
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May, 2019

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Published by:

Joint Director

PSS Central Institute of Vocational Education, NCERT, Shyamla Hills, Bhopal

FOREWORD

The Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE) a constituent of the National Council of Educational Research and Training (NCERT) is spearheading the efforts of developing learning outcome based curricula and courseware aimed at integrating both vocational and general qualifications to open pathways of career progression for students. It is a part of Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education (CSSVSHSE) launched by the Ministry of Human Resource Development, Government of India in 2012. The PSS Central Institute of Vocational Education (PSSCIVE) is developing curricula under the project approved by the Project Approval Board (PAB) of *Rashtriya Madhyamik Shiksha Abhiyan* (RMSA). The main purpose of the competency based curricula is to bring about the improvement in teaching-learning process and working competences through learning outcomes embedded in the vocational subject.

It is a matter of great pleasure to introduce this learning outcome based curriculum as part of the vocational training packages for the job role of **Electronics – Field Technician Computing and Peripherals**. The curriculum has been developed for the secondary students of vocational education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skill Qualification Framework (NSQF).

The curriculum aims to provide children with employability and vocational skills to support occupational mobility and lifelong learning. It will help them to acquire specific occupational skills that meet employers' immediate needs. The teaching process is to be performed through the interactive sessions in classrooms, practical activities in laboratories and workshops, projects, field visits, and professional experiences.

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

Hrushikesh Senapaty
Director
National Council of Educational Research & Training

PREFACE

India today stands poised at a very exciting juncture in its saga. The potential for achieving inclusive growth are immense and the possibilities are equally exciting. The world is looking at us to deliver sustainable growth and progress. To meet the growing expectations, India will largely depend upon its young workforce. The much-discussed demographic dividend will bring sustaining benefits only if this young workforce is skilled and its potential is channelized in the right direction.

In order to fulfill the growing aspirations of our youth and the demand of skilled human resource, the Ministry of Human Resource Development (MHRD), Government of India introduced the revised Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education that aims to provide for the diversification of educational opportunities so as to enhance individual employability, reduce the mismatch between demand and supply of skilled manpower and provide an alternative for those pursuing higher education. For spearheading the scheme, the PSS Central Institute of Vocational Education (PSSCIVE) was entrusted the responsibility to develop learning outcome based curricula, student workbooks, teacher handbooks and e-learning materials for the job roles in various sectors, with growth potential for employment.

The PSSCIVE firmly believes that the vocationalisation of education in the nation need to be established on a strong footing of philosophical, cultural and sociological traditions and it should aptly address the needs and aspirations of the students besides meeting the skill demands of the industry. The curriculum, therefore, aims at developing the desired professional, managerial and communication skills to fulfill the needs of the society and the world of work. In order to honor its commitment to the nation, the PSSSCIVE has initiated the work on developing learning outcome based curricula with the involvement of faculty members and leading experts in respective fields. It is being done through the concerted efforts of leading academicians, professionals, policy makers, partner institutions, Vocational Education and Training experts, industry representatives, and teachers. The expert group through a series of consultations, working group meetings and use of reference materials develops a National Curriculum. Currently, the Institute is working on developing curricula and course-ware for over 100 job roles in various sectors.

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. We are grateful to MHRD and NCERT for the financial support and cooperation in realising the objective of providing learning outcome based modular curricula and course-ware to the States and other stakeholders under the PAB (Project Approval Board) approved project of *Rashtriya Madhyamik Shiskha Abhiyan* (RMSA) of MHRD.

Finally, for transforming the proposed curriculum design into a vibrant reality of implementation, all the institutions involved in the delivery system shall have to come together with a firm commitment and they should secure optimal community support. The success of this curriculum depends upon its effective implementation and it is expected that the managers of vocational education and training system, including subject teachers will make efforts to create better facilities, develop linkages with the world of work and foster a conducive environment as per the content of the curriculum document.

The PSSCIVE, Bhopal remains committed in bringing about reforms in the vocational education and training system through the learner-centric curricula and course-ware. We hope that this document will prove useful in turning out more competent Indian workforce for the 21st Century.

RAJESH P. KHAMBAYAT
Joint Director
PSS Central Institute of Vocational Education

ACKNOWLEDGMENT

On behalf of the team at the PSS Central Institute of Vocational Education (PSSCIVE) we are grateful to the members of the Project Approval Board (PAB) *of* Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and the officials of the Ministry of Human Resource Development (MHRD), Government of India for the financial support to the project for development of curricula.

We are grateful to the Director, NCERT for his support and guidance. We also acknowledge the contributions of our colleagues at the Technical Support Group of RMSA, MHRD, RMSA Cell at the National Council of Educational Research and Training (NCERT), National Skill Development Agency (NSDA) and National Skill Development Corporation (NSDC) and Electronics Sector Skill Council of Indian (ESSCI) for their academic support and cooperation.

We are grateful to the expert contributors and Deepak D. Shudhalwar, Associate Professor (CSE), PSSCIVE, for their earnest effort and contributions in the development of this learning outcome based curriculum. Their contributions are dully acknowledged.

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

We are also grateful to the Course Coordinator Deepak D. Shudhalwar, Associate Professor (CSE), Head, Department of Engineering and Technology, PSSCIVE, for bringing out this curriculum in the final form.

PSSCIVE Team

CONTENTS

1. COURSE OVERVIEW

COURSE TITLE: Field Technician – Computing and Peripherals

Field Technician also called 'Service Technician', the Field Technician provides after sale support services to customers, typically, at their premises. The individual at work is responsible for attending to customer complaints, installing newly purchased products, troubleshooting system problems and, configuring peripherals such as printers, scanners and network devices. The job requires the individual to have ability to build interpersonal relationships and critical thinking. The individual must be willing to travel to client premises in order to attend to calls at different locations.

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

- ✓ Apply effective oral and written communication skills to interact with customers;
- ✓ Identify the principal components of a computer system;
- ✓ Demonstrate the basic skills of using computer;
- ✓ Demonstrate self-management skills;
- ✓ Demonstrate 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;
- ✓ Explain basic electronics and components;
- ✓ Explain computer system hardware and software product and their functionalities;
- ✓ Identify the computer parts and peripherals;
- ✓ Operate various tools and equipment for installation;
- ✓ Assemble and Install the computer system and configure the peripherals;
- ✓ Check and ensure functioning of system;
- ✓ Configure peripherals and network devices;
- ✓ Install and navigate an operating system.
- ✓ Upgrade or replace components of a laptop based on customer needs;
- ✓ Identify and control hazards in the workplace that pose a danger or threat to their safety or health, or that of others.
- ✓ Understand the symptoms and identify the fault;
- ✓ Identify system level problem on field and make decision;
- ✓ Undertake basic troubleshooting of computer system and peripherals;
- ✓ Understand under warranty incidents;
- ✓ Perform preventive maintenance and advanced troubleshooting;
- ✓ Understand customer's requirements and suggest possible solution;
- ✓ Follow Do's and Don'ts while handling field calls and dealing with customers;
- ✓ Attend to field calls from customer and complaints for system trouble shooting and repairs.
- ✓ Assess customer needs, analyze possible configurations, and provide solutions or recommendations for hardware, operating systems, networking, and security.

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

COURSE LEVEL: This course can be taken up at Intermediate level in Class 11 and Class 12.

COURSE DURATION: Total : 600 hrs

Class 11 : 300 hrs

Class 12 : 300 hrs

2. SCHEME OF UNITS AND ASSESSMENT

This course is a planned sequence of instructions consisting of Units meant for developing employ-ability and vocational competencies of students of Class 11 and 12 opting for 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 & Practical 100**
Part A	**Employability Skills**		
Unit 1	Communication Skills – III	25	**10**
Unit 2	Unit 2: Self-management Skills – III	25	
Unit 3	Unit 3: Basic ICT Skills – III	20	
Unit 4	Unit 4: Entrepreneurial Skills – III	25	
Unit 5	Unit 5: Green Skills – III	15	
	Total	**110**	**10**
Part B	**Vocational Skills**		
Unit 1	Basic Electronics and Computer Hardware Essentials	50	**40**
Unit 2	Installation and Configuration of Desktop Operating System	40	
Unit 3	Computer Maintenance and Troubleshooting	60	
Unit 4	Occupational Health and Safety Practices	15	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	6	15
	Written Test	1	10
	Viva Voce	3	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/ Student Portfolio	10	10
	Viva Voce	5	5
	Total	**15**	**15**
	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	25	**10**
Unit 2	Self-management Skills – IV	25	
Unit 3	Basic ICT Skills – IV	20	
Unit 4	Entrepreneurial Skills – IV	25	
Unit 5	Green Skills – IV	15	
	Total	**110**	**10**
Part B	**Vocational Skills**		
Unit 1	Computer Network Essentials	30	**40**
Unit 2	Installation and Configuration of Network Operating System Windows Server	30	
Unit 3	Installation and configuration of Network Operating System Linux Server	30	
Unit 4	Computer Network Maintenance and Troubleshooting	40	
Unit 5	IT Security	20	
Unit 6	Information Technology Infrastructure Library (ITIL) v4	15	
	Total	**165**	**40**
Part C	**Practical Work**		
	Practical Examination	6	15
	Written Test	1	10
	Viva Voce	3	10
	Total	**10**	**35**
Part D	**Project Work/Field Visit**		
	Practical File/ Student Portfolio	10	10
	Viva Voce	5	5
	Total	**15**	**15**
	Total	**300**	**100**

3. TEACHING/TRAINING ACTIVITIES

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace.

Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

CLASSROOM ACTIVITIES

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

PRACTICAL WORK IN LABORATORY/WORKSHOP

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

FIELD VISITS/ EDUCATIONAL TOUR

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

4. ASSESSMENT AND CERTIFICATION

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

The National Skills Qualifications Framework (NSQF) is based on outcomes referenced to the National Occupation Standards (NOSs), rather than inputs. The NSQF level descriptors, which are the learning outcomes for each level, include the process, professional knowledge, professional skills, core skills and responsibility. The assessment is to be undertaken to verify that individuals have the knowledge and skills needed to perform a particular job and that the learning programme undertaken has delivered education at a given standard. It should be closely linked to certification so that the individual and the employer could come to know the competencies acquired through the vocational subject or course. The assessment should be reliable, valid, flexible, convenient, cost effective and above all it should be fair and transparent. Standardized assessment tools should be used for assessment of knowledge of students. Necessary arrangements should be made for using technology in assessment of students.

KNOWLEDGE ASSESSMENT (THEORY)

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

WRITTEN TEST

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

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

Duration: 3 hrs **Max. Mark: 30**

		No. of Questions			
	Typology of Question	**Very Short Answer (1 mark)**	**Short Answer (2 Marks)**	**Long Answer (3 Marks)**	**Marks**
1.	Remembering – (Knowledge based simple recall questions, to know specific facts, terms, concepts, principles, or theories; identify, define or recite, information)	**3**	**2**	**2**	**13**
2.	Understanding – (Comprehension – to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	**2**	**3**	**2**	**14**
3.	Application – (Use abstract information in concrete situation, to apply knowledge to new situations; Use given content to interpret a situation, private an example, or solve a problem)	**0**	**2**	**1**	**07**
4.	High Order Thinking Skills – (Analysis & Synthesis – Classify, compare, contrast, or differentiate between different pieces of information; Organize and/ or integrate unique pieces of information from a variety of sources)	**0**	**2**	**0**	**04**
5.	Evaluation – (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	**0**	**1**	**0**	**02**
	Total	**5x1=5**	**10x2=20**	**5x3=15**	**40 (20 Ques.)**

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, 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

Sn	Units	Duration in Hours
1.	Unit 1: Communication Skills – III	25
2.	Unit 2: Self-management Skills – III	25
3.	Unit 3: Basic ICT Skills – III	20
4.	Unit 4: Entrepreneurial Skills – III	25
5.	Unit 5: Green Skills – III	15
	Total	**110**

Unit 1: Communication Skills – III

Sn	Learning Outcome	Theory (10 Hours)	Practical (15 Hours)	25 Hrs
1.	Demonstrate knowledge of various methods of communication	• Methods of communication • Verbal • Non-verbal • Visual	• Writing pros and cons of written, verbal and non-verbal communication • Listing do's and don'ts for avoiding common body language mistakes	15
2.	Identify specific communication styles	• Communication styles- assertive, aggressive, passive-aggressive, submissive, etc.	• Observing and sharing communication styles of friends, teachers and family members and adapting the best practices • Role plays on communication styles.	10
3.	Demonstrate basic writing skills	• Writing skills to the following: • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph	• Demonstration and practice of writing sentences and paragraphs on topics related to the subject	15
			Total Duration in Hours	**25**

Unit 2: Self-management Skills – III				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Demonstrate impressive appearance and grooming	• Describe the importance of dressing appropriately, looking decent and positive body language. • Describe the term grooming • Prepare a personal grooming checklist. • Describe the techniques of self-exploration.	• Demonstration of impressive appearance and groomed personality. • Demonstration of the ability to self- explore.	07
2.	Demonstrate team work skills	• Describe the important factors that influence in team building. • Describe factors influencing team work.	• Group discussion on qualities of a good team. • Group discussion on strategies that are adopted for team building and team work.	08
3.	Apply time management strategies and techniques	• Meaning and importance of time management – setting and prioritizing goals, creating a schedule, making lists of tasks, balancing work and leisure, using different optimization tools to break large tasks into smaller tasks.	• Game on time management. • Checklist preparation. • To-do-list preparation.	10
			Total Duration in Hours	**25**

Unit 3: Basic ICT Skills – III				
Sn	**Learning Outcome**	**Theory (08 Hours)**	**Practical (12 Hours)**	**20 Hrs**
1.	Create a document on word processor	• Introduction to word processing. • Software packages for word processing. • Opening and exiting the word processor. • Creating a document	• Demonstration and practice of the following: • Listing the features of word processing, • Listing the software packages for word processing, • Opening and exit the word processor, • Creating a document	10
2.	Edit, save and print a document in word processor	• Editing text • Wrapping and aligning the text • Font size, type and face. • Header and Footer	• Demonstration and practicing the following: • Editing the text • Word wrapping and	10

		• Auto correct • Numbering and bullet • Creating table • Find and replace • Page numbering. • Printing document. • Saving a document in various formats	alignment, • Changing font type, size and face, • Inserting header and footer, • Removing header and footer, • Using autocorrect option, • Insert page numbers and bullet, • Save and print a document.	
			Total Duration in Hours	**20**

Unit 4: Entrepreneurial Skills – III				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Describe the significance of entrepreneurial values and attitude.	• Values in general and entrepreneurial values. Entrepreneurial value orientation with respect to inattentiveness, independence, outstanding performance and respect for work.	• Listing of entrepreneurial values by the students. • Group work on identification of entrepreneurial values and their roles after listing or reading 2-3 stories of successful entrepreneur. • Exhibiting entrepreneurial values in Ice breaking, rapport building, group work and home assignments.	10
2.	Demonstrate the knowledge of attitudinal changes required to become an entrepreneur.	• Attitudes in general and entrepreneurial attitudes • Using imagination/ intuition • Tendency to take moderate risk • Enjoying freedom of expression and action • Looking for economic opportunities • Believing that we can change the environment • Analyzing situation and planning action • Involving in activity	• Preparing a list of factors that influence attitude in general and entrepreneurial attitude. • Demonstrating and identifying own entrepreneurial attitudes during the following micro lab activities like thematic appreciation test. • Preparing a short write-up on "who am I". • Take up a product and suggest how its features can be improved. • Group activity for suggesting brand names, names of enterprises, etc.	15
			Total Duration in Hours	**25**

Unit 5: Green Skills – III				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (08 Hours)**	**15 Hrs**
1.	Describe importance of main sector of green economy	• Main sectors of green economy- E-waste management, green transportation, renewal energy,green construction, water management. • Policy initiatives for greening economy in India.	• Preparing a poster on any one of the sectors of green economy. • Writing a two-page essay on important initiatives taken in India for promoting green economy.	08
2.	Describe the major green Sectors/ Areas and the role of various stakeholder in green economy	• Stakeholders in green economy. • Role of government and private agencies in greening cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries.	• Preparing posters on green Sectors/Areas: cities, buildings, tourism, industry, transport, renewable energy, waste management, agriculture, water, forests and fisheries.	07
			Total Duration in Hours	**15**

Class XI, Part B: Vocational Skills

Sn	Units	Duration in Hours
1.	Unit 1: Basic Electronics and Computer Hardware Essentials	50
2.	Unit 2: Installation and Configuration of Desktop Operating System	40
3.	Unit 3: Computer Maintenance and Troubleshooting	60
4.	Unit 4: Occupational Health and Safety Practices	15
	Total Duration	**165**

Class XI, Unit 1: Basic Electronics and Computer Hardware Essentials				
Sn	**Learning Outcome**	**Theory (20 Hours)**	**Practical (30 Hours)**	**50 Hrs**
1.	Describe the basic concepts of electrical and electronics	• Concept of electricity, • Electrical quantities – current, voltage, AC and DC, • Electronic components – active and passive components, • Active components –	• Illustrate the energy foundation and concept of electricity, • Define electrical quantities – voltage, current, resistance, • Identify, name and check the given electronic components, • Identify and test digital gates,	15

		semiconductor diode, transistor, • Passive components – Resistor, capacitor, inductor • Transformer, • Basics of digital electronics, • Integrated Circuit (IC), • Semiconductor memory, • Power supply and its types, • Batteries, • Switched Mode Power Supply, • Uninterrupted Power Supply • Printed Circuit Board and its types, • Soldering and de-soldering,	• Identify and test transformer, • Identify Integrated Circuit, • Identify semiconductor memory, • Identify and test power supply and its types, • Identify and test batteries, • Identify and test Switched Mode Power Supply, • Identify and test Uninterrupted Power Supply • Identify Printed Circuit Board and its types, • Illustrate the soldering and de-soldering.	
2.	Describe the main components of computer system	• Computer as a system, • Characteristics and limitations of computer, • Generation of computer, • Hardware and software, • Main components of computer System, • Classification of computer.	• Identify the computer hardware and software, • Identify and name the main components of computer, • List the classification criteria of computer, • Classify the given computer, • Identify the various computers and determine its type,	5
3.	Identify and connect internal components of computer hardware	• Motherboard – types, functionality, form factor, working, connectivity, ports and connectors • CPU – types, functionality, form factor, working, connectivity, • Memory – types, functionality, form factor, working and connectivity,	• Identify and connect motherboard, • Identify various ports and connectors on motherboard, • Connect various devices on ports of motherboard, • Identify and connect CPU, • Identify and connect memory modules.	8
4.	Identify and connect Input/ Output devices	• Input devices, • Types of input devices – Text input devices, Pointing devices, Audio visual input devices, Input card readers, Input Reading Text / Codes, Input Sensors, Scanners, • Output devices, • Types of output devices, • Soft copy output devices – Monitors, LCD, LED monitors, • Hard copy output devices – Printer, plotter	• List and name the various types of input devices, • List the features of various input devices, • Identify and connect various input devices, • Identify and name the various types of monitors, • Compare the features of different types of monitors, • Identify and name the various types of printers, • Compare the features of	12

		• Audio output devices, • Connectivity of Input/Output devices to the computer system.	different types of printers, • Identify and name the audio output devices.	
5.	Identify and connect various storage devices	• Introduction to storage devices, • Different storage devices – HDD, Pen drive, memory cards, optical disk drive, • Types of HDD – IDE, SATA, SCSI, SSD, • Functionality, working and connectivity of HDD, • Functionality, working and connectivity of optical discs drive.	• Identify the types and storage capacity of HDD, • Connect internal HDD to the computer, • Connect the external HDD to the computer, • Identify and name the optical discs drives, • Connect optical discs drives to computer.	10
			Total Duration in Hours	**50**

Class XI, Unit 2: Installation and Configuration of Desktop Operating System				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (25 Hours)**	**40 Hrs**
1.	Describe the basic concept of operating system	• Overview of operating system, • Booting process of operating system, • Functions or tasks performed by the operating system, • Examples of operating system – Windows, Linux, Mac, • Types of operating system, • Classification of operating system – single user, multi-user, multitasking, multiprocessing, • Components of operating system – device driver, kernel, shell, file system	• Observe the booting process, • Illustrate the functions of operating system, • List the features of various operating systems, • Identify and name the given operating system and its user interface, • Classify the given operating system as single user, multi-user, multitasking, multiprocessing, • Identify and list the various components of operating system.	10
2.	Install Windows 10 operating system	• Windows 10 operating system requirements, • Features of Windows 10, • 32-bit and 64-bit versions of Windows 10, • Windows 10 upgrade or clean installation, • Configuration of boot order, • Clean installation process of	• Identify and list Windows 10 system requirements, • Identify 32-bit and 64-bit versions of Windows 10, • List the general features of Windows 10, • Demonstrate to configure correct boot order, • Demonstrate to install Windows	15

		Windows 10, • Post installation tasks, • Static IP address configuration in Windows10, • Installation of printer and scanner in Windows10, • Installation of antivirus software, device driver and application software.	10 operating system, • Perform post installation tasks, • Demonstrate to turning off automatic installation of device driver, • Demonstrate to configure static IP address in Windows10, • Demonstrate to install printer and scanner in Windows10, • Demonstrate to install antivirus, device driver and application software in Windows10.	
3.	Install Ubuntu Linux operating system	• Introduction to Linux, • Features of Ubuntu Linux, • Installation Requirements, • Preparing the boot-able disk, • Installation process of Linux, • Post installation tasks, • Installation of packages and utilities, • Static IP address configuration, • Installation of printers, scanner in Linux, • Basic commands of Linux.	• List the features of Linux, • List the requirements for installation of Ubuntu Linux, • Demonstrate to prepare boot-able disk, • Demonstrate to install Linux, • Perform post installation tasks, • Demonstrate to install packages and utilities, • Configure static IP address for internet connectivity, • Demonstrate to install printer and scanner in Linux.	15
			Total Duration in Hours	**40**

Class XI, Unit 3: Computer Maintenance and Troubleshooting				
Sn	**Learning Outcome**	**Theory (20 Hours)**	**Practical (40 Hours)**	**60 Hrs**
1.	Appreciate the customer complaint	• Concept of complaint, • Nature of complaint, • Types of complaint, • Various ways to make complaints – personal reporting, telephone, email, messaging, • Concept of customer support, • Registration / log of complaint, • Work flow to solve the complaint.	• Identify and list the nature of complaint received, • Illustrate to use various ways to make complaints, • Identify and list the various customer support services, • Demonstrate the complaint ticket generation, • Draw the work flow diagram to solve the complaint.	5
2.	Identify the complaints on field	• Interacting with customer for understanding the nature before visit, • Field trip with tools and	• Role play to interact with customer to understand the nature of complaint before visit,	5

		devices, • Understand the nature of problem on field by interacting with customer.	• Perform field trip with tools and devices, • Role play to understand the problem on field by interacting with customer.	
3.	Repair and replace faulty modules	• Procedures for warranty and non warranty part replacement, • Replacement and repair faulty module as per policy, • Computing cost of repairing, • Decision making in repair on site or at office,	• List the products under warranty and non warranty, • Demonstrate to replace or repair the faulty modules, • Compute the cost of repairing, • Classify the given parts to repair on site and off site.	6
4.	Generate product repair report	• Generation of various report, • Terms and conditions of warranty, • Yearly maintenance contract, • Terms and conditions of maintenance contract,	• Generate various reports such as fault report, repair report, report to the superior, invoice report, repairing cost report, complaint track report, • List the various terms and conditions of warranty, • Read the yearly maintenance contract, • Read the terms and conditions of maintenance contract, • Prepare your own yearly maintenance contract based on service.	6
5.	Use tools and equipment for repairing	• Tools and equipment for repairing – soldering iron, de-soldering pump, multi-meter, • Soldering and de-soldering on PCB • Cathode ray oscilloscope (CRO), • Analog and digital multi-meters, • Signal detection meters, power meters.	• Identify, list and name tools and equipment for repairing, • Demonstrate the soldering and de-soldering on PCB, • Demonstrate to measure AC, DC voltages and current in the circuit using multi-meters, • Demonstrate to use CRO in signal observation, frequency and time period computation, • Demonstrate to use signal detection meters and power meters.	8
6.	Demonstrate the assembly and disassembly of computer	• Connectivity diagram of different parts of computer system, • Connectivity of internal parts of computer system, • Computer assembly process,	• Draw the connectivity diagram of various parts of computer, • Demonstrate to connect and assemble different parts of the computer as per the connectivity diagram,	10

		• Computer dis-assembly process, • Laptop parts and peripherals and its compatibility with motherboard, • Connectivity of internal parts in laptop, • Laptop assembly process, • Laptop disassembly process.	• Test the working of assembled computer system, • Demonstrate to connect the external parts and peripherals and check the functionality of computer, • Demonstrate to remove each part inside the computer, • Demonstrate to connect and assemble parts of laptop, • Test the assembled laptop.	
7.	Identify, trace and resolve common hardware problems	• Portfolio of products, • Different types of hardware products and their functionalities, • Basic tools and devices for repair, • Procedures for hardware troubleshooting, • Procedures for hardware preventive maintenance, • Safety procedures, • Common hardware problems – device not working, device not getting boot, connectivity problems, power supply failures, memory failure, printer not working, problem with cartridge of printer, printer not detected, peripherals not detected.	• Prepare portfolio of products, and its standards, • List the different types of hardware products and their functionalities, • Identify and list basic tools and devices for repair, • Enlist the procedures for hardware troubleshooting, • Enlist the procedures for hardware preventive maintenance, • Identify and list safety procedures, • Identify and resolve the common hardware problems – power supply failures, device connectivity problems, memory failure, printer not working, cartridge of printer, peripherals not detected.	10
8.	Identify, trace and resolve common software problems	• Concept of boot-able disk, • Preparation of boot-able disk, • Procedure for troubleshooting operating system problem, • Backup procedure of data, • Common operating system problems, • Problems related with device driver and antivirus software, • Problems related with application software, • Internet connectivity problem.	• Prepare boot-able disk, • Enlist the procedure for troubleshooting operating system problem, • Perform backup procedure, • Identify and resolve the common problems related with operating system, Internet, problems related with device driver, antivirus software, application software.	10
			Total Duration in Hours	**60**

Class XI, Unit 4: Occupational Health and Safety Practices				
Sn	**Learning Outcome**	**Theory (8 Hours)**	**Practical (7 Hours)**	**15 Hrs**
1.	Appreciate and follow the Computer Ergonomics	• Concept of computer Ergonomics, • Importance of cleanliness, • Appropriate lighting conditions at workplace, • Importance of air conditioning at workplace, • Keeping food and drinks away from work place.	• Demonstrate the computer ergonomics at work place, • List the possible threats to computing machine due to non-cleanliness, • Demonstrate the impact of bad lighting conditions at computer work place, • Record the working temperature of computing machine and observe the requirement of air condition, • List the factors affecting life span of electronic machine, • Practice to keep away food and drinks from work place.	3
2.	Observe electrical safety at work place	• Proper electrical connections • Wiring diagram of electrical connections, • Concept of earthing, • Measurement of input AC voltage, voltage between neutral and earthing, • Electric shock and precautions to be taken, • Precautions in electrical short circuit, • Working practices for electrical devices.	• Observe and draw the wiring diagram of electrical connections, • Measure input AC voltage, voltage between neutral and earth, and voltage between phase and earth, • List the precautions to be taken in case of electric shock and short circuit, • Practice to switch off electrical connections and devices before leaving work place.	3
3.	Observe and practice organisation safety	• Concept of safety of work infrastructure, • Organisation safety rules, • Tools for safety, • Tools for fire safety, • Emergency procedures, • Emergency exit locations, • Precautions in case of smoke and smell, • Precautions for computer repair and cleaning.	• Demonstrate to practice safety of work infrastructure, • List and use the tools for safety, fire safety, • List and follow emergency and emergency exit procedures, • Identify the exit locations, • List and follow precautions in case of smoke and smell, • List and follow precautions for computer repair and cleaning.	3
4.	Observe and practice self safety	• Self safety rules, • Importance of eye protection, • Importance of dress code,	• List and practice self safety rules, • Demonstrate to protect eyes,	3

		• Taking care of discharge of capacitors in electrical equipment, • Reasons to avoid jwellery at work place.	• Practice to switch off electrical devices to avoid effect of charged capacitors, • List impact of wearing jwellery at work place.	
5.	Observe and practice safety of tools and equipment	• Safety manual of equipment, • Safety of tools and equipment, • Concept of Electrostatic Discharge (ESD), • Concept of anti-static mat and wrap.	• Read safety manual of equipment, • Demonstrate the safety of tools and equipment, • Demonstrate to use anti-static mat and wrap.	3
			Total Duration in Hours	**15**

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: Basic ICT Skills – IV	20
4.	Unit 4: Entrepreneurial Skills – IV	25
5.	Unit 5: Green Skills – IV	15
	Total	**110**

Unit 1: Communication Skills – IV

Sn	Learning Outcome	Theory (10 Hours)	Practical (15 Hours)	25 Hrs
1.	Describe the steps to active listening skills	• Importance of active listening at workplace • Steps to active listening.	• Demonstration of the key aspects of becoming active listener. • Preparing posters of steps for active listening.	10
2.	Demonstrate basic writing skills	• Writing skills to the following: • Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph	• Demonstration and practice of writing sentences and paragraphs on topics related to the subject.	15
			Total Duration in Hours	**25**

Unit 2: Self-management Skills – IV				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25 Hrs**
1.	Describe the various factors influencing self-motivation	• Finding and listing motives (needs and desires); • Finding sources of motivation and inspiration (music, books, activities); expansive thoughts; living fully in the present moment; dreaming big.	• Group discussion on identifying needs and desire. • Discussion on sources of motivation and inspiration.	10
2.	Describe the basic personality traits, types and disorders	• Describe the meaning of personality. • Describe how personality influence others. • Describe basic personality traits. • Describe common personality disorders- paranoid, antisocial, schizoid, borderline, narcissistic, avoidant, dependent and obsessive.	• Demonstrate the knowledge of different personality types.	15
			Total Duration in Hours	**25**

Unit 3: Basic ICT Skills – IV				
Sn	**Learning Outcome**	**Theory (06 Hours)**	**Practical (14 Hours)**	**20 Hrs**
1.	Perform tabulation using spreadsheet application	• Introduction to spreadsheet application, • Spreadsheet applications, • Creating a new worksheet, • Opening workbook and entering text, • Resizing fonts and styles, • Copying and moving, • Filter and sorting, • Formulas and functions, • Password protection, • Printing a spreadsheet, • Saving a spreadsheet in various formats.	• Demonstration and practice on the following: • Introduction to the spreadsheet application, • Listing the spreadsheet applications, • Creating a new worksheet, • Opening the workbook and enter text, • Resizing fonts and styles, • Copy and move the cell data, • Sorting and Filter the data, • Applying elementary formulas and functions, • Protecting the spreadsheet with password, • Printing a spreadsheet, • Saving the spreadsheet in various formats.	10

2.	Prepare presentation using presentation application	• Introduction to presentation, • Software packages for presentation, • Creating a new presentation, • Adding a slide, • Deleting a slide, • Entering and editing text, • Formatting text, • Inserting clipart and images, • Slide layout, • Saving a presentation, • Printing a presentation document.	• Demonstration and practice on the following: • List the software packages with features for presentation, • Creating a new presentation, • Adding a slide to presentation, • Deleting a slide, • Entering and edit text, • Formatting text, • Inserting clipart and images, • Sliding layout, • Saving a presentation, • Printing a presentation.	10
			Total Duration in Hours	**20**

Unit 4: Entrepreneurial Skills – IV

Sn	Learning Outcome	Theory (10 Hours)	Practical (15 Hours)	25 Hrs
1.	Identify the general and entrepreneurial behavioral competencies	• Barriers to becoming entrepreneur. • Behavioral and entrepreneurial competencies – adaptability/decisiveness, initiative/perseverance, interpersonal skills, organizational skills, stress management, valuing service and diversity.	• Administering self-rating questionnaire and score responses on each of the competencies. • Collect small story/ anecdote of prominent successful entrepreneurs. • Identify entrepreneurial competencies reflected in each story and connect it to the definition of behavioral competencies. • Preparation of competency profile of students.	10
2.	Demonstrate the knowledge of self-assessment of behavioral competencies	• Entrepreneurial competency in particular: self-confidence, initiative, seeing and acting on opportunities, concern for quality, goal setting and risk taking, problem solving and creativity, systematic planning and efficiency, information seeking, persistence, influencing and negotiating, team building.	• Games and exercises on changing entrepreneurial behavior and development of competencies for enhancing self-confidence, problem solving, goal setting, information seeking, team building and creativity.	15
			Total Duration in Hours	**25**

Unit 5: Green Skills – IV				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (10 Hours)**	**15 Hrs**
1.	Identify the role and importance of green jobs in different sectors	• Role of green jobs in toxin-free homes. • Green organic gardening, public transport and energy conservation, • Green jobs in water conservation. • Green jobs in solar and wind power, waste reduction, reuse and recycling of wastes, • Green jobs in green tourism • Green jobs in building and construction. • Green jobs in appropriate technology. • Role of green jobs in Improving energy and raw materials use • Role of green jobs in limiting greenhouse gas emissions • Role of green jobs minimizing waste and pollution • Role of green jobs in protecting and restoring ecosystems • Role of green jobs in support adaptation to the effects of climate change	• Listing of green jobs and preparation of posters on green job profiles. • Prepare posters on green jobs.	15
			Total Duration in Hours	**15**

Class XII, Part B: Vocational Skills

Sn	Units	Duration in Hours
1.	Unit 1: Computer Network Essentials	30
2.	Unit 2: Installation and configuration of Windows Server OS	30
3.	Unit 3: Installation and configuration of Linux Server OS	30
4.	Unit 4: IT Security	20
5.	Unit 5: Computer Network Maintenance and Troubleshooting	40
6.	Unit 6: Information Technology Infrastructure Library (ITIL) v4	15
	Total Duration	**165**

Class XII, Unit 1: Computer Network Essentials				
Sn	**Learning Outcome**	**Theory (12 Hours)**	**Practical (18 Hours)**	**30 Hrs**
1.	Describe the network concept and technology	• Concept of networking, • Network Technologies : peer to peer and Client/ Server, • Types of networking – LAN, MAN, WAN, • Network Topology – Bus, Star, Mesh, Hybrid, Ring, • Advantages and disadvantages of different topology, • OSI Model – 7 layer , • TCP/IP Model – 4 layer, • Data transmission – simplex, half duplex, full duplex.	• Identify the given network technology as peer to peer or client server, • Draw a diagram of various network – LAN, MAN, WAN, • Draw a diagram of various network topology – Bus, Star, Mesh, Hybrid, Ring, • Draw a diagram of OSI, TCP/IP model, • Draw the diagram of simplex, half duplex and full duplex data flow.	10
2.	Describe protocol and assign IP address	• Concept of protocol, • Protocol: TCP, IP, UDP, FTP, HTTP, HTTPS, • Assigning IP address (IPv4, IPv 6) and subnet, • Inter-network (Internet, Intranet, Extra-net).	• List the various protocol with its features, • Demonstrate to assign IP address and subnet, • Identify the given network as Internet, Intranet or Extra-net,	5
3.	Connect and use network devices and peripherals	• Physical components : nodes/ computer/ hosts, Modem, RJ 45 connector and port, NIC, • Installation and configuration of NIC, • Network devices – repeaters, hub, switch, bridges, router, gateway.	• Identify and name the given network component, • Identify and name the given network devices, • Connect computers/ host to switch/hub, • Assign IP address to host, • Check connectivity using commands.	8
4.	Prepare cable and configure network	• Network transmission medium – guided and, unguided, • Guided – coaxial cable, twisted pair cable (UTP/ STP), optical fibre cable, • Unguided – radio waves, infra red, wi-fi, li-fi, bluetooth, • Crimping tools, punch down tool, LAN tester, • Cable preparation – straight through, cross over cabling.	• Identify and list the various guided and unguided transmission media, • Demonstrate to crimp the cable, • Demonstrate to prepare straight through and cross over cable. • Test cable using LAN tester.	7
			Total Duration in Hours	**30**

Class XII, Unit 2: Installation and Configuration of Network Operating System Windows Server				
Sn	**Learning Outcome**	**Theory (12 Hours)**	**Practical (18 Hours)**	**30 Hrs**
1.	Install Windows Server 2016	• Windows Server 2016 Overview, • Hardware requirements for Windows server installation • Installation procedure of Windows Server 2016, • Post-Installation configuration of Windows Server 2016.	• List the hardware requirements for Windows server installation, • Create partitioning, • Demonstrate to install Windows Server 2016, • Demonstrate to configure Windows Server 2016 Server, • Demonstrate to perform post-installation tasks in Windows Server 2016, • Demonstrate to deploy Windows Server 2016,	5
2.	Manage Windows Server 2016	• Overview of Windows Server 2016 Management, • Management tools available in Windows Server 2016, • Introduction to Windows PowerShell.	• Managing Servers • Using Windows PowerShell to Manage Servers, • Perform basic administrative tasks using Windows PowerShell.	5
3.	Install and configure Active Directory Domain Services (AD DS)	• Overview of AD DS • Overview of Domain Controllers • Purpose of domain controllers • Structure of AD DS, • Installing a domain controller.	• Demonstrate to configure AD DS • Demonstrate to install Domain Controller.	7
4.	Implement AD DS and mange group policy	• Managing user accounts, • Managing groups, • Overview of group policy, • Group policy processing, • Creating Group Policy Objects (GPOs).	• Demonstrate to create and configuring User Accounts in AD DS • Demonstrate to manage user accounts through GUI, • Demonstrate to manage group accounts user accounts through GUI, • Demonstrate to create and manage GPOs.	8
5.	Install antivirus and print services	• Installation and configuration of antivirus software and application software for server, • Installation and configuration of print services.	• Demonstrate to install antivirus and application software, • Installation of print services role, and configure print services.	5
			Total Duration in Hours	**30**

Class XII, Unit 3: Installation and Configuration of Network Operating System Linux Server				
Sn	**Learning Outcome**	**Theory (12 Hours)**	**Practical (18 Hours)**	**30 Hrs**
1.	Install Linux Server	• Linux server overview, • Partitioning, • Dual booting, • Installation process of Linux server, • Post-Installation configuration of Linux server.	• Demonstrate to create partitioning, dual booting, • Demonstrate to install Linux server, • Demonstrate to configuring Linux server, • Perform post-installation configuration of Linux server.	6
2.	Understand the file structure of Linux	• Overview of Linux file structure, • Linux users – superuser, group user and others, • User permissions – read, write, execute, • Common commands for system administration.	• Draw the diagram of Linux file structure, • List the various system directory, • Create user and group, • Change user and group permissions, • Perform the basic system administration using command	6
3.	Manage Linux server	• Overview of Linux server management, • Introduction to Linux terminal, • Linux server management commands, • DHCP configuration.	• Login as a superuser, • List the common administrative tasks, • Use Linux commands for basic administration.	7
4.	Install and remove packages for services	• Overview of various services, • Commands for installing packages for various services, • Commands for removing packages for various services, • Commands for updating packages.	• List the various services and its commands, • Demonstrate to install packages for various services, • Demonstrate to remove packages using commands, • Demonstrate to update packages using commands.	7
5.	Install and configure print services and file sharing services	• Concept of print services and file sharing services, • Commands for installing print services and file sharing services,	• List the print services and file sharing services, • Install print services and file sharing services by using commands,	4
			Total Duration in Hours	**30**

Class XII, Unit 4: Computer Network Maintenance and Troubleshooting				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (25 Hours)**	**40 Hrs**
1.	Identify, trace and resolve common network problems	• Problems related with – power failure problems, – wiring problems in network, – problems of devices not working in the network, – related with the non availability of common network services, – problems of Internet not working, – server connectivity problems, – network hang problems, – issues related to downloading and uploading speed of Internet and network.	• Identify, trace and resolve the problems – power failure problems, – wiring problems in network, – problems of devices not working in the network, – related with the non availability of common network services, – problems of Internet not working, – server connectivity problems, – network hang problems, – issues related to downloading and uploading speed of Internet and network.	12
2.	Identify, trance and resolve problems related with hardware devices	• Problems related with – physical connectivity of hardware devices, – setting and configuration of hardware devices, – replacement of old non functional devices, – maintenance of devices.	• Identify, trace and resolve the problems related with – physical connectivity of hardware devices, – setting and configuration of hardware device, – replacement of old non functional devices, – maintenance of devices.	10
3.	Identify, trance and resolve problems related with network OS	• Problems related with – installation of software, – setting and configuration of software, – maintenance and updataion of software, – replacement and re-installation of software.	• Identify, trace and resolve problems related with – installation of software, – setting and configuration of software, – maintenance and updataion of software, – replacement and re-installation of software.	8
4.	Identify, trance and resolve problems related to network user	• Authentication problem, • Problems related to login and password issues, • Addition and deletion of users, • User rights and permission policy, • Permission to access network resources.	• Identify, trace and resolve authentication problem, problems related to login and password, • Add, delete users, groups and their permissions to access network resources hardware, software and data.	10
			Total Duration in Hours	**40**

Class XII, Unit 5: IT Security				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (10 Hours)**	**20 Hrs**
1.	Appreciate IT Security Concepts	• Concept of security, • IT security, • Data Threats – Virus, malware, Trojan, worm, • Denial of service (DoS) attacks, phishing attacks, man-in-the-middle, • File Security.	• List different types of threats in computer system, • List the Characteristics of Phishing mail and websites, • Recognise malicious, accidental threats to data from individuals, service providers, other organisation, • Demonstrate to set the security level – Low, Medium or High.	4
2.	Mange file security using antivirus software	• Antivirus • Procedure for installation, configuration and updataion of antivirus software, • Automatic and manual update procedure of antivirus, • Settings of antivirus software. • Detection removal of viruses by using antivirus software, • File security using antivirus.	• List the antivirus software, • Install the antivirus software in the given system, • Demonstrate to run antivirus software for detection removal of viruses, • Update the antivirus software automatically and manually, • Check and change settings of antivirus software.	4
3.	Manage Internet security	• Concept of Internet security, • Software for Internet security, • Installation, configuration and updation of software for Internet security, • Uses of Internet security software.	• List the threats to the Internet, • List Internet security software, • Demonstrate to install, configure and update software for Internet security, • Demonstrate the use of Internet security software.	4
4.	Describe the concept of hacking	• Overview on hacking, • Types of hackers, • Ethical hacking, • Cyber crime.	• List the various types of hackers – white, gray, black, • List the various techniques for ethical hacking, • Prepare a chart of different cyber crime activities.	4
5.	Implement security policy using firewalls	• Security policy, • Firewall, • Types of firewall – software and hardware, • Functioning of firewal at different layers (Packet filter, Stateful, Application),	• Draw a diagram of firewall, • List different types of firewall, • Checking firewall is enabled or disabled in PC, • Demonstrate to restrict sites using firewall.	4
			Total Duration in Hours	**20**

Class XII, Unit 6: Information Technology Infrastructure Library (ITIL) v4				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (5 Hours)**	**15 Hrs**
1.	Appreciate the need and importance of best practices in IT service sector	• Problems in IT service sector, • Problems related to the customer queries, acquisition of knowledge, demand for new technology, • Examples of best practices in IT service sector.	• Identify and list the problems in IT service sector, • Identify and list the problems related to the customer queries, acquisition of knowledge, demand for new technology, • Give the examples of best practices in IT service sector.	2
2.	Appreciate the concept and method of monitorinig in IT service sector	• Concept and imporance of monitoring IT service, • Method for monitoring, • Examples of monitoring, • Possible problems and solutions in IT service monitoring.	• List out the importance of monitoring IT service, • Give the steps for monitoring, • List the possible problems and solutions for monitoring of given IT service, • Give the examples of best monitoring methods,	2
3.	Measure the IT service parameters by using tools	• IT quality service parameters – competence, courtesy, credibility, access, communication, reliability, responsiveness, • Process to measure IT service parameters, • Tools for measuring IT service parameters, • Process to report measurement of IT service parameters, • Examples of measurement of IT service parameters,	• List the IT quality service parameters, • Draw the diagram of measuring process of IT service parameters, • Identify and list the tools for measuring IT service parameters, • Draw the diagram of reporting procedure of IT service parameters.	3
4.	Describe the concepts of CSF, KPI, SLA	• Concept of critical success factor (CSF), • Concept of key performance indicators (KPI), • Concept of service level agreement (SLA), • Importance of CSF, KPI and SLA • Prototype examples of CSF, KPI, SLA.	• Determine the critical success factor (CSF) in the given service, • List the key performance indicators (KPI) in the given service, • List different clauses in service level agreement (SLA), • Give best examples of CSF, KPI, SLA.	2
5.	Appreciate the importance of	• Concept and importance of timeliness,	• List the parameters of timeliness,	2

	timeliness and response to the customer queries	• Methods of responding to the customer, • Importance of of data resolution in cloud services, • Examples of timeliness and its impact on service, • Examples of responses.	• Give the methods of responding to the customer, • List the importance of data resolution, • Give best examples of timeliness and responses.	
6.	Describe the problem management process flow and determine resolutions	• Concept of problem management, • Concept of control measures, • Problem management process flow, • Process to find solutions for given problem using control measures • Determining resolutions, • Examples of problem management.	• List the necessity of problem management, • List the necessity of control measures, • Draw the diagram of problem management process flow, • Draw the process diagram to find solutions for given problem using control measures, • Determine resolutions for given problem, • Give the best examples of problem management.	2
7.	Describe the imporance of learning new things and implement them at your work	• Limitations of existing knowledge, tools and techniques, • Demand for new technology, • Learning through experiences, • Implementation of newly learnt knowledge, • Examples of implementation of newly learnt knowledge.	• List the limitations of existing knowledge, tools and techniques, • Illustrate the demand for new technology, • Illustrate how new things are learnt from past experiences, • Demonstrate how to implement newly learnt knowledge.	2
			Total Duration in Hours	**15**

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.

Visit a computer assembly and service centre and observe the following: Location, Site, Computer systems and peripheral devices. During the visit, students should obtain the following information from the owner or the supervisor :

1. Computer System of various brands.
2. Computer parts and peripherals of various brands.
3. Specifications of various parts of computer system.
4. Comparison of various brands.
5. Types of computers.
6. Types of printers.
7. Types of scanners.
8. External and Internal Hard Disk.
9. Storage capacity of various storage devices.
10. Comparison of various parts based on cost.

11. Tools and equipment required for computer assembly.
12. Cost benefit analysis to purchase computer.
13. Specifications of computer based on the work requirement.

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	Equipment	Materials
• Rulers • T-square • Multi-tester • Multi-meter – analog & digital • Pliers • Cutters • Screw drivers • Goggles • Gloves • Protractor • LAN tester • Antistatic wrist wrap • Masks • Crimping tools • Punch down tools • Flashlights • Sharp pointed tweezers • Mirror (inspection) • Soldering iron • De-soldering pump	• CRO • Function generator • UPS • Power supply • Power meter • Signal detector • Hubs • Switches • Modem/ router • Server computer • Peripherals – printers, scanner • Desktop and laptop for installation and troubleshoot (number as per the number of students ratio 2:1) • Windows 10 OS • Windows Server 2016, • Ubuntu Linux OS (free), • Cent OS Server (free), • Utility software	• Electronic Components – Active and Passive • ICs • PCB, • CD / DVDs • UTP Cat. 5E/ 6 cables • RJ 45 modular plug • Board marker • White board • Schematic diagrams • Charts • Block diagrams • Layout plans • Location Plans • Instrumentation diagrams • Loop diagrams • System Control diagrams • Drawing boards

8. TEACHER'S/TRAINER'S QUALIFICATION

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:

Qualification	Minimum Competencies	Age Limit
Bachelor of Engineering / Technology in Electronics or Computer Science / Technology **OR** Master of Computer Application (MCA) **OR** Master of Science (Computer Science) **OR** Master of Science (Information Technology) **OR** NIELIT "B" Level Certificate. It is recommended to have additional qualification such as CCNA, CCP or any other diploma in computer hardware maintenance.	The candidate should have a minimum of 1 year of work experience in the same job role. S/He should be able to communicate in English and local language. S/He should have knowledge of equipment, tools, material, Safety, Health & Hygiene.	18-37 years (as on Jan. 01 (year)) Age relaxation to be provided as per Govt. rules

Note – The qualifications for vocational teachers mentioned above is suggestive and not prescriptive. The States/ UTs can make modifications in the qualifications for appointment of vocational teachers/ trainers as per their requirement through a committe appointed by the competent authority in the State/ UT Directorate/ Department of School Education.

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 following ways:

1. 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**
2. 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:

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

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

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

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

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

- Prepare session plans and deliver sessions which have a clear and relevant purpose and which engage the students;
- Deliver education and training activities to students, based on the curriculum to achieve the learning outcomes;
- Make effective use of learning aids and ICT tools during the classroom sessions;
- Engage students in learning activities, which include a mix of different methodologies, such as project based work, team work, practical and simulation based learning experiences;
- Work with the institution's management to organise skill demonstrations, site visits, on-job trainings, and presentations for students in cooperation with industry, enterprises and other workplaces;
- Identify the weaknesses of students and assist them in up-gradation of competency;
- Cater to different learning styles and level of ability of students;
- Assess the learning needs and abilities, when working with students with different abilities
- Identify any additional support the student may need and help to make special arrangements for that support;
- Provide placement assistance

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

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

9. LIST OF CONTRIBUTORS

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