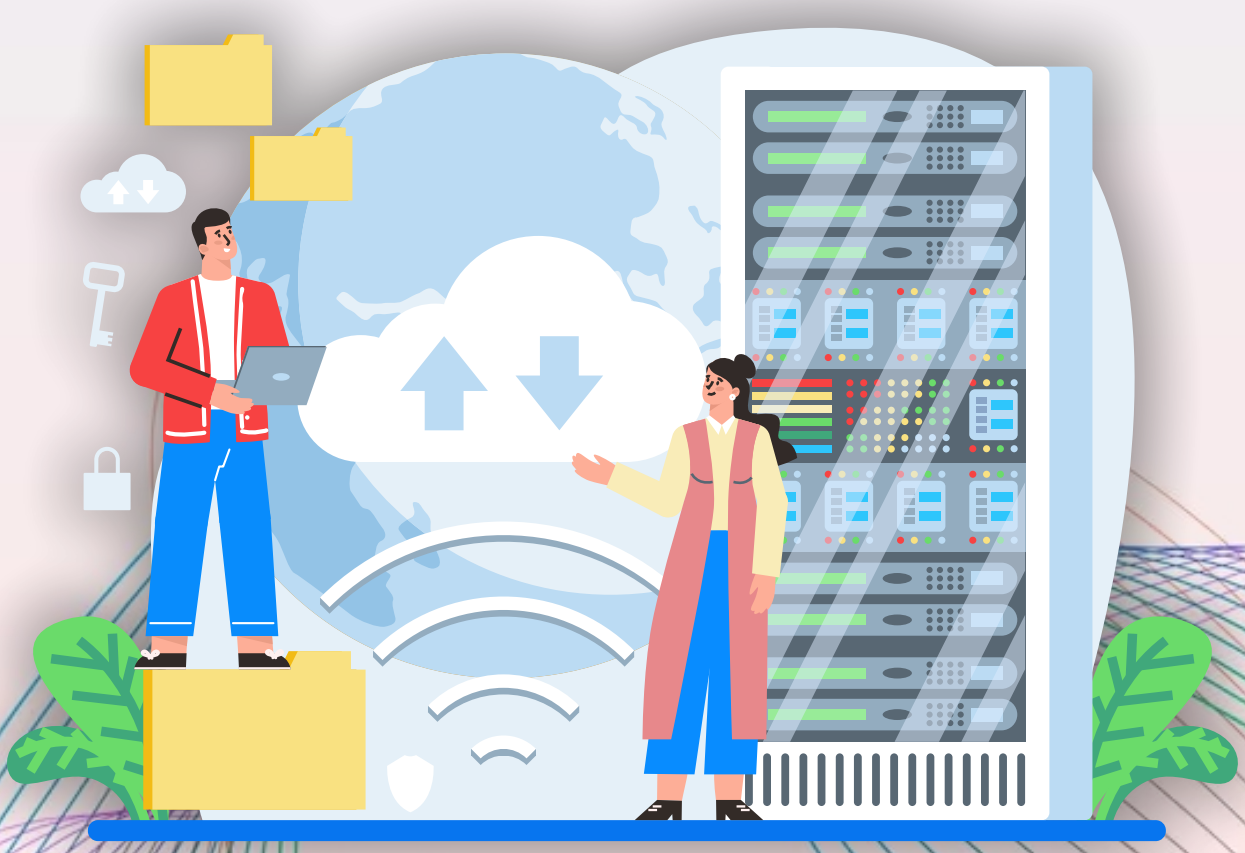
LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE

JUNIOR CLOUD COMPUTING ASSOCIATE

Qualification Pack
QG-04-IT-00354-2023-V1-NIELIT

SECTOR: IT-ITeS
Grades XI and XII



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NCERT

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

(a constituent unit of National Council of Educational Research and Training (NCERT)
under Ministry of Education, Government of India)

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Junior Cloud Computing Associate

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FOREWORD

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

It is a matter of great pleasure to introduce this learning outcome-based curriculum as part of the vocational education and training package for the job role/vocational subject of **"IT-ITeS – Junior Cloud Computing Associate "**. 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.

DINESH PRASAD SAKLANI
Director
National Council of Education Research and Training

PREFACE

India today stands poised at a very exciting juncture in its saga. The potential for achieving inclusive growth is immense and the possibilities are equally exciting. The world is looking at us to deliver sustainable growth and progress. To meet the growing expectations, India will largely depend upon its young workforce. In order to fulfil the growing aspirations of our youth and the demand for a skilled human resource, the Ministry of Education, Government of India introduced the revised Centrally Sponsored Scheme of Vocationalisation of School Education under Samagra Shiksha. For spearheading the scheme, the PSS Central Institute of Vocational Education (PSSCIVE) was entrusted with the responsibility of developing learning outcomebased curricula, student textbooks and e-learning materials for the job roles in various sectors.

The PSSCIVE firmly believes that the vocationalisation of education in the nation needs to be established on a strong footing of philosophical, cultural and sociological traditions and it should aptly address the needs and aspirations of the students besides meeting the skill demands of the industry. In order to honour its commitment to the nation, the PSSCIVE is developing learning outcome-based curricula with the involvement of faculty members and leading experts in the field. It is being done through the concerted efforts of leading academicians, professionals, policymakers, partner institutions, Vocational Education and Training (VET) experts, industry representatives, and teachers.

The expert group, through a series of consultations, working group meetings and use of reference materials develops a National curriculum. We extend our gratitude to all the contributors for selflessly sharing their precious knowledge, acclaimed expertise, and valuable time and positively responding to our request for development of curriculum.

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

DEEPAK PALIWAL
Joint Director
PSS Central Institute of Vocational Education

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 Media and Entertainment Skills Council (MESC) for their academic support and cooperation.

We are grateful to the expert contributors and Dr. Munesh Chandra, 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), Pinki Khanna, Professor and Head, Programme Planning and Monitoring Cell (PPMC) and Dr. Munesh Chandra, Professor (CSE) and Head, ICT and Computer Centre, PSSCIVE in development of the curriculum for the employability skills are duly acknowledged.

We are also grateful to the Course Coordinator Dr. Munesh Chandra, Professor (CSE), Head, ICT and Computer Centre, Department of Engineering and Technology, PSSCIVE, for bringing out this curriculum in the final form.

CONTENTS

1. COURSE OVERVIEW

COURSE TITLE: JUNIOR CLOUD COMPUTING ASSOCIATE

A Junior Cloud Computing Associate plays a vital role in designing, developing, and maintaining web-based applications and services hosted on cloud platforms. They are responsible for creating both static and dynamic website components, ensuring that sites are visually appealing, user-friendly, and technically sound. This includes implementing the design, layout, and coding of websites while adhering to best practices in performance, scalability, and security.

Key responsibilities include testing website performance, optimizing site speed, and ensuring the infrastructure can handle varying levels of traffic. They are also involved in troubleshooting technical issues, monitoring system performance, and maintaining site reliability. In collaboration with web designers and developers, they integrate technical features and content to meet user and business needs.

Junior Cloud Computing Associates should possess a foundational understanding of web technologies such as HTML, CSS, and JavaScript for front-end development, and PHP, Node.js, or similar technologies for back-end development. Those with full-stack capabilities can handle both aspects of development. Knowledge of cloud platforms like AWS, Azure, or Google Cloud is an asset.

Strong communication skills, logical problem-solving, and a creative mindset are essential for success in this role. Whether working independently or as part of a team, the Junior Cloud Computing Associate must be detail-oriented, adaptable, and focused on delivering high-quality, efficient web-based solutions.

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

- Understand the fundamentals of cloud computing and deployment models.
- Identify key cloud service models: IaaS, PaaS, and SaaS.
- Develop and deploy basic web applications using cloud platforms.
- Write and debug HTML, CSS, and JavaScript for front-end development.
- Implement simple backend functionality using PHP or Node.js.
- Understand the principles of responsive web design and UX/UI.
- Manage and maintain cloud-hosted websites and applications.
- Use version control tools like Git and GitHub for collaboration.
- Monitor cloud services and website performance metrics.
- Apply basic cloud security principles and best practices.
- Use databases (e.g., MySQL, MongoDB) in cloud-based apps.
- Troubleshoot common website and server-related issues.
- Create and manage virtual machines and cloud storage.
- Collaborate effectively in team-based development projects.
- Demonstrate problem-solving, logical thinking, and communication skills.

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

COURSE LEVEL: This course can be taken up at Intermediate level in Grade XI and Grade XII.

COURSE DURATION: Total : 330 hours

Grade XI : 240 (110 Theory + 130 Practical) hours

Grade XII : 90 (15 Theory + 75 Practical) hours

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 Grade XI and XII opting for vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Grade XI is as follows :

GRADE XI			
	Units	**No. of Hours for Theory and Practical 375**	**Max. Marks for Theory & Practical 100**
Part A	Employability Skills		
Unit 1	Communication Skills – III	20	10
Unit 2	Self-management Skills – III	15	
Unit 3	Basic ICT Skills – III	20	
Unit 4	Entrepreneurial Skills – III	20	
Unit 5	Green Skills – III	15	
	Total Hours	**90**	**10**
Part B	**Vocational Skills**		
Unit 1	Introduction to Operating Systems (Windows and Linux)	60	40
Unit 2	Introduction to Network Management	60	
Unit 3	Implementing Virtualization and Basics of Cloud Computing	120	
	Total Hours	**240**	**40**
Part C	**Field Visits (3x5)**	**15**	**15**
Part D	**On the Job Training**	**30**	
Part E	**Project/ Practical Work**		
	Practical File/ Student Portfolio		05
	Practical Work		10
	Written Test		10
	Viva Voce		10
	Total		**35**
	Total Hours	**375**	**100**

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

GRADE XII			
	Units	**No. of Hours for Theory and Practical 255**	**Max. Marks for Theory & Practical 100**
Part A	Employability Skills		
Unit 1	Communication Skills – III	20	10
Unit 2	Self-management Skills – III	15	
Unit 3	Basic ICT Skills – III	20	
Unit 4	Entrepreneurial Skills – III	20	
Unit 5	Green Skills – III	15	
	Total Hours	**90**	**10**
Part B	**Vocational Skills**		
Unit 1	Introduction to Advance Linux	30	40
Unit 2	Managing Cloud Architecture with Open Stack	30	
Unit 3	Emphasizing Cloud Computing Services	30	
	Total Hours	**90**	**40**
Part C	**Field Visits (3x5)**	**15**	**10**
Part D	**On the Job Training**	**60**	
Part E	**Project/ Practical Work**		
	Practical File/ Student Portfolio		10
	Practical Work		10
	Written Test		10
	Viva Voce		10
	Total		**40**
	Total Hours	**255**	**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 Q)**

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

GRADE XI, Part A: Employability Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	Communication Skills – III	20
Unit 2	Self-management Skills – III	15
Unit 3	Basic ICT Skills – III	20
Unit 4	Entrepreneurial Skills – III	20
Unit 5	Green Skills – III	15
	Total	**90**

Unit 1: Communication Skills – III				
Sn	**Learning Outcome**	**Theory (08 Hours)**	**Practical (12 Hours)**	**20**
1	Demonstrate knowledge of communication	• Introduction to communication • Importance of communication • Elements of communication • Perspectives in communication • Effective communication	• Role-play on the communication process • Group discussion on the • importance of communication and factors affecting perspectives in communication • Charts preparation on elements • of communication • Classroom discussion on the 7Cs (i.e. Clear, Concise, Concrete, Correct, Coherent, Courteous and Complete) for effective • communication	03
2	Demonstrate verbal communication	• Verbal communication • Public Speaking	• Role play of a phone conversation • Group activity on delivering a speech and practicing public • speaking	02

3	Demonstrate non- verbal communication	• Importance of non-verbal communication, • Types of non-verbal communication, • Visual communication	• Role plays on non-verbal communication • Group exercise and discussion on Do's and Don'ts to avoid body language mistakes • Group activity on methods of • communication	02
4	Demonstrate speech using correct	• Pronounciation basics, • Speaking poperly, • Phonetics, pronunciation	• Group activities on practicing pronunciation	01
5	Apply an assertive communication style	• Important communication styles, • Assertive communication, • Advantages of assertive communication, • Practicing assertive • communication	• Group discussion on communication styles, • Group discussion on observing and sharing communication styles	02
6	Demonstrate the knowledge of saying no	• Steps for saying "No" • Connecting words	• Group discussion on how to say 'No'	01
7	Identify and use parts of speech in writing	• Capitalization, • Punctuation, • Basic parts of speech, • Supporting parts of speech	• Group activity on identifying parts of speech, • Writing a paragraph with punctuation marks, • Group activity on constructing sentences, • Group activity on identifying • parts of speech	02
8	Write correct sentences and paragraphs	• Parts of a sentence • Types of object • Types of sentences • Paragraph	• Activity on framing sentences • Activity on active and passive voice • Assignment on writing different • types of sentences.	01

9	Communicate with people	• Greetings, • Introducing self and others	• Role-play on formal and informal greetings, • Role-play on introducing someone, • Practice and group discussion • on how to greet different people	01
10	Introduce yourself to others and write about oneself	• Talking about self • Filling a form	• Practicing self-introduction and filling up forms • Practicing self-introduction to • others	01
11	Develop questioning skill	• Main types of questions, • Forming closed and open-ended questions	• Practice exercise on forming questions, • Group activity on framing • questions.	01
12	Communicate information about family to others	• Names of relatives, • Relations	• Practice taking about family, • Role-ply on talking about family members	01
13	Describe habits and routines	• Concept of habits and routines	• Group discussion on habits and routines • Group activity on describing • routines	01
14	Ask or give directions to others	• Asking for directions, • Using landmarks	• Role-play on asking and giving directions, • Identifying symbols used for • giving directions	01
			Total Duration in Hours	**20**

Unit 2: Self-management Skills – III				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (08 Hours)**	**15**
1.	Identify and analyze own strengths and weaknesses	• Understanding self • Techniques for identifying strengths and weaknesses • Difference between interests • and abilities	• Activity on writing aims in life • Prepare a worksheet on interests and abilities	02
2.	Demonstrate personal grooming skills	• Guidelines for dressing and grooming • Preparing a personal grooming checklist	• Role-play on dressing and grooming standards • Self-reflection activity on • various aspects of personal grooming	02
3.	Maintain personal hygiene	• Importance of personal hygiene • Three steps to personal hygiene • Essential steps of hand washing	• Role-play on personal hygiene • Assignment on personal hygiene	02
4.	Demonstrate the knowledge of working in a team and participating in group activities	• Describe the benefits of teamwork, • Working in a team	• Assignment on working in a team, • Self-reflection on teamwork	02
5	Develop networking skills	• Benefits of networking skills, • Steps to build networking skills	• Group activity on networking in action, • Assignment on networking skills	01
6	Describe the meaning and importance of self-motivation	• Meaning of self-motivation, • Types of motivation, • Steps to building self-motivation	• Activity on staying motivated, • Assignment on reasons hindering motivation	02
7	Set goals	• Meaning of goals and purpose of goal-setting, • Setting SMART goals	• Assignment on setting SMART goals, • Activity on developing long- • term and short-term goals using SMART method	02
8	Apply time management strategies and techniques	• Meaning and importance of time management, • Steps for effective time • management	• Preparing checklist of daily activities	02
			Total Duration in Hours	**15**

Unit 3: Information and Communication Technology Skills – III				
Sn	**Learning Outcome**	**Theory (08 Hours)**	**Practical (12 Hours)**	**20**
1.	Create a document on the word processor	• Introduction to ICT, • Advantages of using a word processor, • Work with LibreOffice Writer	• Demonstration and practice of the following: • Creating a new document • Typing text • Saving the text • Opening and saving file in • Microsoft word/Libre Office Writer	02
2.	Identify icons on the toolbar	• Status bar, • Menu bar, • Icons on the Menu bar, • Multiple ways to perform a function	• Group activity on using basic user interface of LibreOffice writer • Group activity on working with Microsoft Word	02
3.	Save, close, open and print document	• Save a document, • Close a document, • Open an existing document, • Print a document	• Group activity on performing the functions for saving, closing and printing documents in LibreOffice Writer, • Group activity on performing • the functions to save, close and print documents	02
4.	Format text in a document	• Change style and size of text • Align text, • Cut, Copy, Paste, • Find and replace	• Group activity on formatting text in LibreOffice Writer, • Group activity on formatting text in Microsoft Word	02
5.	Check spelling and grammar in a word document	• Use of spell checker, • Autocorrect	• Group activity on checking spellings and grammar using LibreOffice Writer • Group activity on checking • spellings and grammar using Microsoft Word	02
6.	Insert lists, tables, pictures, and shapes in a word document	• Insert bullet list, • Number list, • Tables, • Pictures, • Shapes	• Practical exercise of inserting lists and tables using LibreOffice Writer	03
7.	Insert header, footer and page number in a word document	• Insert header, • Insert footer, • Insert page number, • Page count	• Practical exercise of inserting header, footer and page numbers in LibreOffice Writer • 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	• Tracking option • Manage option • Compare documents	• Group activity on performing track changes in LibreOffice Writer • Group activity on performing track changes in Microsoft Word	04
			Total Duration in Hours	**20**

Unit 4: Entrepreneurial Skills – III				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (13 Hours)**	**20**
1.	Differentiate between different kinds of businesses	• Introduction to entrepreneurship • Types of business activities	• Role play on different kind of business around us	02
2.	Describe the significance of entrepreneurial values	• Meaning of value, • Values of an Entrepreneur, • Case study on qualities of an entrepreneur	• Role play on qualities of an Entrepreneur	02
3.	Demonstrate the attitudinal changes required to become an entrepreneur	• Difference between the attitude of entrepreneur and employee	• Interviewing employees and entrepreneurs	02
4.	Develop thinking skills like an entrepreneur	• Problems of entrepreneurs • Problem-solving, • Ways to think like an entrepreneur	• Group activity on identifying and solving problems	03
5.	Generate business ideas	• The business cycle, • Principles of idea creation, • Generating a business idea, • Case studies	• Brainstorming on generating a business ideas	03
6.	Describe customer needs and importance of conducting a customer survey	• Understanding customer needs • Conducting a customer survey	• Group activity to conduct a customer survey	04
7.	Create a business plan	• Importance of business planning, • Preparing a business plan, • Principles to follow for growing a business, • Case studies	• Group activity on developing a business plan	04
			Total Duration in Hours	**20**

Unit 5: Green Skills – III				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (08 Hours)**	**15**
1.	Describe the importance of the main sector of the green economy	• Meaning of ecosystem, food chain and sustainable development • Main sectors of the green • economy- E-waste management, green transportation, renewal energy, green construction, and water management	• Group discussion on sectors of green economy, • Poster making on various sectors • for promoting green economy	06
2.	Describe the main recommendations of policies for the green economy	• Policies for a green economy	• Group discussion on initiatives for promoting the green economy, • Writing an essay or a short note • on the important initiatives for promoting green economy.	03
3.	Describe the major green sector/area and the role of various stakeholders in the green economy	• Stakeholders in the green economy	• Group discussion on the role of stakeholders in green economy • Preparation of posters on green sectors and their stakeholders • Making solar bulbs.	03
4.	Identify the role of government and private agencies in the green economy	• Role of the government in promoting a green economy, • Role of private agencies in promoting green economy	• Group discussion on the role of Government and Private Agencies in promoting a green economy. • Posters making on green sectors.	03
			Total Duration in Hours	**15**

GRADE XI, Part B: Vocational Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	Introduction to Operating Systems (Windows and Linux)	60 (15 Theory + 45 Practical)
Unit 2	Introduction to Network Management	60 (35 Theory + 25 Practical)
Unit 3	Implementing Virtualization and Basics of Cloud Computing	120 (60 Theory + 60 Practical)
	Total Duration	**240**

Unit 1: Conceptualize Operating Systems (Windows and Linux)				
S. N.	**Learning Outcome**	**Theory (15 Hours)**	**Practical (45 Hours)**	**60**
1.	Students will be able to describe the basic concepts of Operating system	• Fundamental OS concepts • Types of OS (batch, multi-tasking, real-time, distributed) • Evolution of OS • Explain and understand the installation of Windows Operating system • Overview of Windows OS- Windows architecture, Command Line interface, registry, event viewer, firewall and task manager. • File systems and security • Protection and security • User interfaces of the operating system. • Difference between Windows OS and Linux OS	• Installation of OS and configuring it. • Creation of disk partitions and configure Active directory. • Demonstration of the difference between Windows OS and Linux OS (Through simulation…). • Demonstration of different commands on CMD on Windows OS & familiarity of these commands with LINUX. • Create/delete files and directories. • Create/manage users and permissions. • Demonstration of file system in Windows	30
2.	Students will be able to describe Operating system structures	• Operating system services • System calls • Types of system calls: process, file, device management; intro to APIs • System programs • Structure of operating systems • Comparison of UNIX and Windows	• Demonstration of system calls • Demonstration of various UNIX system calls for: Process Management • Write simple shell scripts using system calls like fork(), exec(), wait(), file handling.	20
3.	Students will be able to explore Windows & Linux OS environment	• Introduction of Windows OS and Linux OS (GUI vs CLI) • Overview of LINUX operating system-Linux kernel, users and groups Linux file system and security • Explain and understand the installation of Linux Operating system • Basic Commands of Linux OS	• Demonstration of File system in Linux • Explore file structure using File Explorer (Windows) and terminal (ls, cd) in Linux • Demonstrate and Configuring Permissions, Read, Write, and Execute Sudo command, working with hard & soft link in Linux	10
	Total Duration			**60**

Unit 2: Introduction to Network Management				
S. N.	**Learning Outcome**	**Theory (35 Hours)**	**Practical (25 Hours)**	**60**
1.	Students will be able to describe the basic components of a computer network	• Introduction to Computer Network and its benefits • Components & topologies used in networking • Explain various networking devices like Repeaters, Hubs, Bridges, Switches, and routers • Explain various Transmission modes guided and unguided, Ethernet, and the Classification of Transmission Media	• Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc • Demonstration of various topologies (STAR, BUS…) used in networking • Configure a Network topology using packet tracer software.	20
2.	Students will be able to describe the concept of OSI Reference Model & TCP/IP Protocol Suite	• Overview of OSI • Introduction of TCP/IP Protocol Model in Depth • OSI vs. TCP/IP • Demonstrate important TCP/IP protocols • Describe Port Numbers, Common TCP & UDP Ports • Explain IP addressing, Classes, IP Addressing Scheme • IP Address (IPv4), Subnet mask, MAC address, Port numbers, TCP vs UDP	• Demonstrate how data travels using CLI (command line interface) tools • To configure the IP address manually in windows and linux for a computer connected to LAN and to configure network parameters of a web browser for the same computer • Demonstrate the following: IP address to class mapping, IP address to binary conversion, Subnetting	20
3.	Students will be able to explore basics of network management	• What is network management (Meaning, importance, evolution from manual to automated systems) • Key Network management functions Fault management, configuration, accounting, performance, and security • Current network management challenges. • Cloud based network management models. • Benefits of cloud-based network management. • Migration to cloud-based network management.	• Identify IP conflicts or disconnections • Demonstration of Cloud-based application of Network Management.	10
4.	Students will be able to describe basics of network devices and infrastructure	• Switching and routing concepts. • LAN and WAN technologies • Wireless networking • Network Security Fundamentals • Network cables (UTP, STP), Patch panels, RJ45 connectors, physical layout	• Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc., NIC • File sharing over LAN	10
	Total Duration			**60**

Unit 3: Implementing Virtualization and Basics of Cloud Computing				
S. N.	**Learning Outcome**	**Theory (60 Hours)**	**Practical (60 Hours)**	**120**
1.	Students will be able to describe Cloud Computing Fundamentals	• Introduction to Cloud Computing • Cloud Service Models (IaaS, PaaS, SaaS) • Cloud Deployment Models (Public, Private, Hybrid) • Cloud Security and Compliance • Cloud Service Providers Overview	• Implementation of Virtualization in Cloud Computing to Learn Virtualization Basics, Benefits of Virtualization in Cloud using Open-Source Operating System • Install Virtualbox with different flavors of OS	30
2.	Students will be able to explore Cloud Infrastructure as a Service (IaaS)	• Virtual Machines in the Cloud • Storage Services Types: Block, Object, File; Data persistence; Access control • Networking in the Cloud • Disaster Recovery in the Cloud	• Install a virtual machine • Attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine	30
3.	Students will be able to describe Platform as a Service (PaaS)	• PaaS Overview and Use Cases • Containerization (Docker) • Kubernetes Orchestration • Building and Deploying Applications in the Cloud	• Show the virtual machine migration based on the certain condition from one node to the other. • Visual walkthrough of how multiple containers are managed • Demonstration of PaaS	20
4.	Students will be able to describe Software as a Service (SaaS) and Cloud Applications	• SaaS Characteristics and Examples • Cloud-based Productivity Applications • Collaboration Tools in the Cloud • Integration with Cloud APIs • Customizing and Extending SaaS Applications	• Demonstration of procedure to transfer the files from one virtual machine to another virtual machine • Demonstration of SaaS	20
5.	Students will be able to explore Cloud Security and Governance	• Security Challenges in the Cloud • Threats in Cloud • Identity and Access Management • Incident Response in the Cloud • Security Best Practices	• Discuss the case studies related to Cloud attack • Introduction to Security tools	20
	Total Duration			**120**

GRADE XII, Part A: Employability Skills

Unit No.	Unit Name	Duration (Hrs.)
Unit 1	Communication Skills – IV	20
Unit 2	Self-management Skills – IV	15
Unit 3	Basic ICT Skills – IV	20
Unit 4	Entrepreneurial Skills – IV	20
Unit 5	Green Skills – IV	15
	Total Hours	**90**

Unit 1: Communication Skills – IV				
Sn	**Learning Outcome**	**Theory (08 Hours)**	**Practical (12 Hours)**	**20**
1.	Demonstrate active listening skills	• Active listening -listening skill, stages of active listening, • Overcoming barriers to active listening	• Group discussion on the factors affecting active listening, • Preparing posters of steps for active listening, • Role-play on negative effects of not listening actively	07
2.	Identify the parts of speech	• Parts of speech – using capitals, punctuation, basic parts of speech, supporting parts of speech	• Group practice on identifying parts of speech • Group practice on constructing sentences	07
3.	Write sentences	• Writing skills to practice the following: • Simple sentence • Complex sentence • Types of object • Identify the types of sentences • Active and Passive sentences • Statement/Declarative sentence • Question/Interrogative sentence • Emotion/Reaction or Exclamatory sentence • Order or Imperative sentence	• Group activity on writing sentences and paragraphs, • Group activity on practicing writing sentences in active or passive voice, • Group activity on writing different types of sentences (i.e., declarative, exclamatory, interrogative and imperative)	06
			Total Duration in Hours	**20**

Unit 2: Self-management Skills – IV				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (08 Hours)**	**15**
1.	Describe the various factors influencing motivation and positive attitude	• Motivation and positive attitude • Intrinsic and extrinsic motivation • Positive attitude – ways to maintain positive attitude • Stress and stress management - ways to manage stress	• Role Play on avoiding stressful situation, • Activity on listing negative situations and ways to turn it positive	06
2.	Describe how to become result oriented	• How to become result oriented, • Goal setting – examples of result-oriented goals	• Pair and share activities on the aim of life	03
3.	Describe the importance of self- awareness and the basic personality traits, types and disorders	• Steps towards self-awareness • Personality and basic personality traits • Common personality disorders- • Suspicious • Emotional and impulsive • Anxious • Steps to overcome personality disorders	• Group discussion on self awareness • Group discussion on common personality disorders • Brainstorming steps to overcome personality disorder	06
			Total Duration in Hours	**15**

Unit 3: Information and Communication Technology Skills – IV				
Sn	**Learning Outcome**	**Theory (06 Hours)**	**Practical (14 Hours)**	**20**
1.	Identify the components of a spreadsheet application	• Getting started with spreadsheet – types of a spreadsheet, components of a worksheet, • Starting LibreOffice Calc • Creating a worksheet	• Group activity on identifying components of spreadsheet in LibreOffice Calc	02
2.	Perform basic operations in a spreadsheet	• Opening workbook and entering data – types of data, steps to enter data, editing and deleting data in a cell • Selecting multiple cells • Saving the spreadsheet in various formats • Closing the spreadsheet	• Group activity on working with data on LibreOffice Calc	03

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

Unit 4: Entrepreneurial Skills – IV				
Sn	**Learning Outcome**	**Theory (08 Hours)**	**Practical (12 Hours)**	**20**
1.	Describe the concept of entrepreneurship and the types and roles and functions entrepreneur	• Entrepreneurship and entrepreneur • Characteristics of entrepreneurship • Entrepreneurship-art and science • Qualities of a successful entrepreneur • Types of entrepreneurs • Roles and functions of an entrepreneur • What motivates an entrepreneur • Identifying opportunities and risk-taking • Startups	• Group discussion on the topic "An entrepreneur is not born but created". • Conducting a classroom quiz on various aspects of entrepreneurship. • Chart preparation on types of entrepreneurs • Brainstorming activity on What motivates an entrepreneur	08
2.	Identify the barriers to entrepreneurship	• Barriers to entrepreneurship, • Environmental barriers, • No or faulty business plan, • Personal barriers	• Group discussion about "What we fear about entrepreneurship" • Activity on taking an interview of an entrepreneur.	04
3.	Identify the attitude that make entrepreneur successful	• Entrepreneurial attitude	• Group activity on identifying entrepreneurial attitude.	04
4.	Demonstrate the knowledge of entrepreneurial attitude and competencies	• Entrepreneurial competencies • Decisiveness, • Initiative • Interpersonal skills- positive attitude, stress management • Perseverance • Organisational skills- time management, goal setting, efficiency, managing quality.	• Playing games, such as "Who am I". • Brainstorming a business ideas • Group practice on "Best out of Waste" • Group discussion on the topic of "Let's grow together" • Group activity on listing stress and methods to deal with it like Yoga, deep breathing exercise.	04
			Total Duration in Hours	**20**

Unit 5: Green Skills – IV				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (10 Hours)**	**15**
1.	Identify the benefits of the green jobs	• Green jobs • Benefits of green jobs • Green jobs in different sectors: • Agriculture • Transportation • Water conservation • Solar and wind energy • Eco-tourism • Building and construction • Solid waste management • Appropriate technology	• Group discussion on the importance of green job, • Chart preparation on green jobs in different sectors.	08
2	State the importance of green jobs	• Importance of green jobs in • Limiting greenhouse gas emissions, • Minimizing waste and pollution, • Protecting and restoring ecosystems, • Adapting to the effects of climate change	• Preparing posters on green jobs, • Group activity on tree plantation. • Brainstorming different ways of minimizing waste and pollution	0
			Total Duration in Hours	**15**

GRADE XII, Part B: Vocational Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	Introduction to Advance Linux	30 (5 Theory + 25 Practical)
Unit 2	Managing Cloud Architecture with Open Stack	30 (5 Theory + 25 Practical)
Unit 3	Emphasizing Cloud Computing Services	30 (5 Theory + 25 Practical)
	OJT	
	Total Duration	**90**

Unit 1: Introduction to Advance Linux				
S. N.	**Learning Outcome**	**Theory (5 Hours)**	**Practical (25 Hours)**	**30**

1.	Students will be able to describe Linux Networking Concepts	• Definition of OSI Model & layers
		• Domain Name System-DNS client
		  • DNS Hierarchy
		  • BIND (named) Server
		  • BIND Zone Configuration
		  • DNS Security Basics
		• System Services
		• Managing System Services
		• Runtime Network Configuration
		• Boot Time Network Configuration
		• Introduction to OpenVPN
			• Demonstrate browser developer tools to observe DNS activity
			• Demonstration of Simulator
			• Demonstration of DNS and OpenVPN
			• Demonstration of
			• BIND (named) Server
			• BIND Zone Configuration
				10

2.	Students will be able to explore Network Troubleshooting and Monitoring	• Network Troubleshooting
		• Client-Side Troubleshooting
		• Server-Side Troubleshooting
		• Network Monitoring
			• Create Client Server model
			• Demonstration using packet tracer of the following
			  • Network Troubleshooting
			  • Client-Side Troubleshooting
			  • Server-Side Troubleshooting
			  • Network Monitoring
				10

3.	Students will be able to describe Remote Access	• Types: Remote Desktop, Remote Assistance, VPN • Intro to Cryptography • Secure Remote Access • Remote Graphics	• Network establishment using remote access • Demonstration of • Secure Remote Access • Remote Graphics	10
	Total Duration			**30**

Unit 2: Managing Cloud Architecture with Open Stack				
S. N.	**Learning Outcome**	**Theory (5 Hours)**	**Practical (25 Hours)**	**30**
1.	Students will be able to describe the basics of Open Stack	• Introduction to Openstack • Openstack authentication system • Openstack identity • Token and token validation API	• Demonstration of Openstack authentication	10
2.	Students will be able to describe the Open stack architecture	• NOVA (Openstack compute service) • Cinder (Openstack Block service) • Glance (Openstack Image Service) • Neutron (Openstack Neutron Service) • Horizon (Openstack Dashboard Service) • Heat (Openstack Orchestration Service) • Ceilometer (Openstack Billing Service) • Trove (Openstack Database as a service) • Swift (Openstack's Object Storage)	• Familiarization with different services • Nova, Cinder, Glance, Neuron, Horizon, Heat, Ceilometer, Trove, Swift.	10
3.	Students will be able to explore basics of troubleshooting in Open stack	• Controller Node and its functions • Network node and its functions • Compute node and its functions	• Demonstration of Environment set up • Building a controller node • Building a network node • Building a compute node	10
	Total Duration			**30**

Unit 3: Emphasizing Cloud Computing Services				
S. N.	**Learning Outcome**	**Theory (5 Hours)**	**Practical (25 Hours)**	**30**
1.	Students will be able to describe the Cloud Computing Services	• Revision of Cloud computing services • Models of Cloud Deployment • Cloud service models • Cloud Applications in Daily Life	• Discuss various types of Cloud deployment • Creation and sharing files using Google Drive/One Drive • Host a Simple Website using Google Cloud Storage	10
2.	Students will be able to describe Cloud Infrastructure and Architecture	• Concept of Virtualization and Virtual machines. • Dockers and Containers • Resource pooling and Cloud data centers • Concept of Serverless Computing	• Create and run a virtual machine on free –tier platform (eg, Google Cloud) • Understand the difference between containers and virtual machines • Demonstration of collaboration of Documents in real time.	10

3.	Students will be able to describe Cloud Storage and Databases	• Types of Cloud Storage • Concept and usage of Cloud databases • Management and Syncing of files in cloud	• Setting up of Cloud storage account with Best practices • Setting up of Cloud based project using Google Workspace, Microsoft Onedrive/Teams • Demonstration of various case studies (Netflix, Amazon, Zoom)	10
	Total Duration			**30**

6. ORGANISATION OF FIELD VISITS and OJT

To enhance practical learning and industry exposure, at least three field visits/educational tours and On-the-Job Training (OJT) during vacations should be organised annually. These activities aim to acquaint students with real-world cloud infrastructure, deployment practices, and maintenance procedures.

For instance, students may visit a cloud service provider's data center, IT support center, or managed cloud services company. During such visits, students are expected to observe and learn about:

- Location and layout of IT infrastructure
- Types of equipment and cloud services offered
- Installation, monitoring, and maintenance of cloud-based systems

Learning Outcomes:

Students should be able to:

- Explain the use of appropriate tools, software environments, configuration files, and technical documentation.
- Follow protocols for e-waste disposal and environmentally safe handling of obsolete IT components.
- Perform basic inspection of hardware and software used in cloud setups (e.g., servers, network devices, virtual machines).
- Identify reasons for service interruptions (e.g., configuration errors, resource limits, network issues).
- Detect signs of failing hardware or poor connectivity in virtualized environments.
- Diagnose common issues such as misconfigured security groups, DNS resolution failures, or storage bottlenecks.
- Detect electrical or cabling faults affecting network/server racks.
- Conduct modular testing of individual services (e.g., compute, storage, network) if basic checks don't isolate the issue.
- Communicate effectively with technical teams and support staff at the workplace.
- Apply health, safety, and cyber security practices at the workplace.

7. LIST OF EQUIPMENT AND MATERIALS

The following is a suggestive list. An exhaustive list should be developed by the vocational teacher as per the institutional context. Basic tools and equipment should be procured to facilitate hands-on practice and reinforce learning:

• PCs/Laptops with internet access (minimum 2 Mbps dedicated bandwidth)
• LCD Projector, Laptop, Whiteboard, Markers
• Chart papers, sketch pens
• Audio-visual aids: microphone/sound system
• Computer lab with 1:1 student-to-PC ratio
	• Installed software:
	  • Operating systems (Windows/Linux)
	  • Office Suite (MS Office/Open Office)
	  • Email client and communication tools (Outlook, Slack, etc.)
	  • VirtualBox / VMware, Linux (Ubuntu/CentOS) & Windows OS, AWS / Microsoft Azure / Google Cloud Platform (GCP) accounts, Docker & Kubernetes, Git / GitHub
	  • Learning Platforms (Coursera, edX, Udemy, Cloud Academy), Certification Guides (AWS Cloud Practitioner, Azure Fundamentals, Google Associate Cloud Engineer)

Classroom Aids Trainer kit including Trainer Guide, Presentations, Whiteboard, Projector, and Laptop.	

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:

Minimum Educational Qualification	**Specialization**	**Age Limit**	**Industry Experience**		**Training Experience**	
			Years	**Specialization**	**Years**	**Specialization**
Bachelor's Degree in Computer Science/IT or Certified in relevant CITS course, or SSC Certified on the said job role with minimum accepted score of 80%	Cloud Computing / Virtualization / System Administration / DevOps	18–37 years (as on January 1 of current year). Age relaxation to be provided as per Govt. rules	2 Years	Cloud technologies, Virtualization, or DevOps	2 Years	Training/Teaching in Cloud Platforms (e.g., AWS, Azure, Google Cloud) or System Administration

Additional Competencies:

- Good communication skills in English and regional language.
- Practical skills to handle and operate cloud-based tools, services, and deployment pipelines safely.
- Proficiency in virtualization platforms (e.g., VMware, VirtualBox), cloud platforms (e.g., AWS, Azure), containerization (e.g., Docker), orchestration tools (e.g., Kubernetes), and basic networking.

Note – The qualifications for vocational teachers mentioned above are 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 committee 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 aim to help States in engaging quality Vocational Teachers/Trainers. Various parameters that need to be considered include mode and procedure of selection, educational qualifications, industry experience, and certifications.

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

- **Direct recruitment** as per qualifications and experience suggested by PSS Central Institute of Vocational Education (PSSCIVE), NCERT or the relevant Sector Skill Council (SSC); OR
- **Through accredited Vocational Training Providers (VTPs)** under the **National Quality Assurance Framework (NQAF)** Level 2 or higher, approved by the **National Skill Qualification Committee (NSQC).**

The **National Quality Assurance Framework (NQAF)** provides quality benchmarks that must be met by organizations offering NSQF-compliant qualifications.

The teacher/trainer should preferably be certified by the concerned **Sector Skill Council (SSC)** for the specific Qualification Pack/Job Role. Copies of relevant certificates and/or industry experience must be retained for record.

9. LIST OF CONTRIBUTORS

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