LEARNING OUTCOME BASED VOCATIONAL CURRICULUM

JOB ROLE:
Artificial Intelligence Assistant

(QP: Ref. Id. QG-03-IT-00356-2023-V1-NIELIT)

SECTOR: IT-ITES

Grades IX and X

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION
Shyamla Hills, Bhopal – 462 002, M.P., India
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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 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 *Samagra Shiksha*. 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 **IT-ITeS – Artificial Intelligence Assistant**. 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.

Dinesh Prasad Saklani
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 Education (MoE), 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 Ministry of Education 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 *Samagra Shiksa* of Ministry of Education.

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.

DEEPAK PALIWAL
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 IT-IteS Sector Skill Council (NIELT) for their academic support and cooperation.

We are grateful to the expert contributors and Deepak D. Shudhalwar, 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, 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 Deepak D. Shudhalwar, Professor (CSE), Head, ICT Centre, Department of Engineering and Technology, PSSCIVE, for bringing out this curriculum in the final form.

PSSCIVE Team

CONTENTS

1. COURSE OVERVIEW

COURSE TITLE: Artificial Intelligence Assistant

The Artificial Intelligence (AI) Assistant Qualification will cover the fundamentals of Python programming and libraries like Numpy and pandas used for data analysis. The course will also cover Visualization with Matplotlib. The course will lay stress on developing programming skills by providing practical exposure to the aspiring Python developers and also introduce to the concepts of Machine Learning. Participants from any background can develop the skills needed to become an AI Assistant

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 the ability to provide a self-analysis in context of entrepreneurial skills;
- ✓ Demonstrate the knowledge of the importance of green skills in meeting the challenges of sustainable development and environment protection;
- ✓ Identify and appreciate Artificial Intelligence and describe its applications in daily life;
- ✓ Relate, apply and reflect on the Human-Machine Interactions to identify and interact with the three domains of AI: Data, Computer Vision and Natural Language Processing and Undergo assessment for analysing their progress towards acquired AI-Readiness skills .
- ✓ Imagine, examine and reflect on the skills required for futuristic job opportunities.
- ✓ Unleash their imagination towards smart homes and build an interactive story around it.
- ✓ Understand the impact of Artificial Intelligence on Sustainable Development Goals to develop responsible citizenship.
- ✓ Research and develop awareness of skills required for jobs of the future.
- ✓ Gain awareness about AI bias and AI access and describe the potential ethical considerations of AI.
- ✓ Develop effective communication and collaborative work skills.
- ✓ Get familiar and motivated towards Artificial Intelligence and Identify the AI Project Cycle framework.
- ✓ Learn problem scoping and ways to set goals for an AI project and understand the iterative nature of problem scoping in the AI project cycle.
- ✓ Brainstorm on the ethical issues involved around the problem selected.
- ✓ Foresee the kind of data required and the kind of analysis to be done, identify data requirements and find reliable sources to obtain relevant data.
- ✓ Use various types of graphs to visualize acquired data.
- ✓ Understand types of modeling.
- ✓ Understand the importance of Math for AI.
- ✓ Learn the concept of data literacy and generative AI
- ✓ Acquire introductory Python programming skills in a very user-friendly format.

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

COURSE LEVEL: This course can be taken up at Intermediate level in Grade 9 and 10.

COURSE DURATION: **Total : 400 hours**
Grade 9 : 200 hours
Grade 10 : 200 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 IX and X opting for vocational subject along with general education subjects. The unit-wise distribution of hours and marks for Grade IX is as follows :

Grade IX			
	Units	**No. of Hours for Theory and Practical 200**	**Max. Marks for Theory & Practical 100**
Part A	**Employability Skills**		
Unit 1	Communication Skills – I	15	**10**
Unit 2	Self-management Skills – I	10	
Unit 3	Information and Communication Technology Skills – I	10	
Unit 4	Entrepreneurial Skills – I	15	
Unit 5	Green Skills – I	10	
	Total	**60**	**10**
Part B	**Vocational Skills**		
Unit 1	Introduction to AI Programming	30	**30**
Unit 2	Basic Python Programming	30	
Unit 3	Data Literacy	30	
Unit 4	Maths for AI	30	
Unit 5	Machine Learning	30	
	Total	**150**	**40**
Part C	**Practical Work**		
	Practical Examination		15
	Written Test		10
	Viva Voce		10
	Total		**35**
Part D	**Project Work/Field Visit**		
	Practical File/ Student Portfolio		10
	Viva Voce		5
	Total		**15**
Part E	**Continuous and Comprehensive Evaluation (CCE)**		**10**
	Total	**200**	**100**

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

Grade X			
	Units	**No. of Hours for Theory and Practical 200**	**Max. Marks for Theory and Practical 100**
Part A	**Employability Skills**		
Unit 1	Communication Skills – II	15	**10**
Unit 2	Self-management Skills – II	10	
Unit 3	Basic ICT Skills – II	15	
Unit 4	Entrepreneurial Skills – II	10	
Unit 5	Green Skills – II	10	
	Total	**60**	**10**
Part B	**Vocational Skills**		
Unit 1	Advance Python Programming	30	**30**
Unit 2	Data Science	30	
Unit 3	Data Analysis	30	
Unit 4	Neural Network	30	
Unit 5	AI Project	30	
	Total	**150**	**30**
Part C	**Practical Work**		
	Practical Examination		15
	Written Test		10
	Viva Voce		10
	Total		**35**
Part D	**Project Work/Field Visit**		
	Practical File/ Student Portfolio		10
	Viva Voce		5
	Total		**15**
Part E	**Continuous and Comprehensive Evaluation (CCE)**		**10**
	Total	**200**	**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**

SN	Typology of Question	No. of Very Short Answer Q. (1 mark)	No. of Short Answer Q. (2 Marks)	No. of Long Answer Q. (3 Marks)	Marks
1.	Remembering – (Knowledge based simple recall questions, to know specific facts, terms, concepts, principles, or theories; identify, define or recite, information)	**2**	**1**	**2**	**10**
2.	Understanding – (Comprehension – to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase, or interpret information)	**1**	**2**	**2**	**11**
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**	**1**	**1**	**05**
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**	**1**	**0**	**02**
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	**3x1=3**	**6x2=12**	**5x3=15**	**30 (14 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 IX

Part A: Employability Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	Communication Skills – I	15
Unit 2	Self-management Skills – I	10
Unit 3	Information and Communication Technology Skills – I	10
Unit 4	Entrepreneurial Skills – I	15
Unit 5	Green Skills – I	10
	Total	**60**

Unit 1: Communication Skills – I				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (10 Hours)**	**15**
1	Demonstrate the Knowledge of Importance, Elements, and Perspectives in Communication	• Introduction to communication • Importance of communication • Elements of communication • Perspective in communication • Effective communication	• Role play on the communication process, • Group discussion and sharing of experiences on factors affecting communicatioin, • Asking students to write examples of 7Cs (i.e. Clear, Concise, Concrete, Correct, Coherent, Courteous and Complete), • Preparing charts for elements of communication	02
2	Demonstrate the knowledge of verbal communication	• Verbal communication, • Types of verbal communication, • Advantages & disadvantages of verbal communication • Public speaking	• Role play of a phone conversation • Chat prepartion on types of verbal communication • Group discussion on advantages and disadvantages of verbal communication • Delivering a speech and practicing public speaking by using 3P's.	02
3	Demonstrate the knowledge of non-verbal communication	• Non-verbal communication • Importance of non-verbal communication • Types of non-verbal communication • Visual communication	• Role plays on non-verbal communication, • Group discussion and demonstration of Do's and Don'ts to avoid body language mistakes, • Group discussion on three	01

			methods of communication.	
4	Demonstrate basic writing skills	• Writing skills: Parts of speech, • Using capitals, • Punctuations, • Basic parts of speech.	• Reading paragraphs and sentences and identifying parts of speech, • Constructing and writing sentences by using parts of speech, • Identifying nouns by guessing the name, place, animal, and thing.	02
5	Describe the parts and types of sentences	• Writing skills: Sentences, • Parts of a sentence, • Types of objects, • Types of sentences – active and passive, • Types of sentences, according to their purpose, • Paragraphs.	• Making and writing sentences using direct and indirect objects, • Writing paragraph using active and passive voice, • Writing different types of sentences (i.e. declarative, exclamatory, interrogative and imperative).	01
6	Demonstrate the knowledge of pronunciation basics	• Pronounciation basics, • Speaking correctly, • Phonetics, • Types of sounds.	• Pronouncing words and identifying vowels, diphthongs and consonants, • Practicing the pronunciation of words.	01
7	Demonstrate how to greet and introduce self	• Greetings and Introductions, • Types of greetings, • Introducing self and others	• Role-play on formal and informal greetings • Role-play on introducing someone, • Practicing geeting people.	01
8	Answer questions that others ask about you	• Talking about self, • Filling a form about self.	• Practicing introducing self out form, • Practicing how to talk about self	01
9	Asking questions according to a situation	• Asking questions, • Need for asking questions, • 5W+1H (Who, Where, When, What, Why+How) method for asking questions.	• Framing and writing questions (using Who, Where, When, What, Why and How) • Framing and writing questions, based on purpose of the question, • Discussing and guessing the personality using framed questions.	02
10	Use the correct question words to ask open-ended and close-ended questions	• Asking questions • Types of questions • Framing questions – open ended and close ended.	• Framing and writing open-ended and close-ended questions. • Group practice on framing questions.	02
			Total Duration in Hours	**15**

Unit 2: Self-management Skills – I				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (03 Hours)**	**10**
1.	Describe the meaning and importance of self-management	• Introduction to self managemen t and its components • Self-awareness • Self-confidence • Self-motivation • Positive thinking • Self-control • Problem solving • Personal hygiene and grooming, • Team work • Time management • Goal setting	• Group discussion on self-management skills • Performing activities to know how much aware are you about yourself. • Chart preparation on components of self-management	01
2.	Identify strength and weakness analysis	• Identifying strength and weakness • Knowing yourself • Strength and weakness analysis • Difference between interests and abilities	• Group discussion on aim and goal in life • Perform a strength and weakness analysis • Group discussion on interests and abilities	01
3.	Build self-confidence	• Self–confidence, • Qualities of self-confident people, • Building self-confidence	• Role play on building self-confidence • Performing activities on building confidence through positive words	02
4.	Build the concept on positive thinking	• Posittive thninking, • Posittive thninking and its importance, • How to keep your things positive	• Storytelling, • Role-play on following the class rules • Practicing saying positive words • Making a list of steps involved in self-reflection) on how you will follow positive attitude practices • Home activity on helping others,	02
5	Describe the concept and aspects of personal hygiene	• Personal hygiene • Three steps of personal hygiene - Care, Wash, Avoid • Essential steps of handwashing	• Role-play on following personal hygiene steps • Discussion and follow up on personal hygiene practices	02
6	Follow the guidelines for dressing and personal grooming	• Grooming • Grooming and its importance, • Guidelines for dressing and personal grooming – clothes, hair, face	• Role play on dressing and grooming standards • Self-reflection on dressing and grooming well	02
			Total Duration in Hours	**10**

Unit 3: Information and Communication Technology Skills – I				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (10 Hours)**	**15**
1.	Explain the role of Information and Communication Technology (ICT) in day-to-day life and the workplace	• Introduction to Information and Communication Technology (ICT) • ICT at workplace • ICT at home	• Group discussion on past, present, and future use of ICT • Preparations of posters on applications of ICT	02
2.	Differentiate between the ICT tools and use of mobile apps	• ICT tools – • Smartphones, • Tablets, • TV and Radio	• Performing activities to get familiar with mobile devices	01
3.	Differentiate between smartphones and tablets	• ICT tools – smartphone and tablet, • Mobile device layout • Basic features of a mobile device • Home screen of mobile device • Basic gestures used	• Performing activities to get familiar with the mobile device – use and applications of mobile devices	01
4.	Describe the parts of computer and computer peripherals	• Parts of a computer, • Input devices, • Output devices, • Peripherals devices and their functions, • Central Processing Unit (CPU), • Understanding Random Access Memory (RAM) and Read Only Memory (ROM), • Motherboard, • Ports and connectons.	• Chart preparation on components of a computer • Group activity on connecting devices to a computer	02
5.	Demonstrate basic computer operations	• Basic computer operations, • Computer hardware and software, • Starting a computer, • Log in and log out, • Shutting down computer, • Using the keyboard • Using mouse	• Group activity on use of computer • Group practice on using the keyboard	02
6.	Perform basic file operations	• Performing Basic file operations, • File and folders – creating afile and using text editor	• Group practice on creating a file	01
7.	Demonstrate the knowledge of internet and networking	• Communication and Networking -Internet browsing • Use of internet • Connecting to internet • Types of connection	• Group discussion on the uses of internet	01

		• Bandwidth • Internet browser		
8.	Perform internet browsing	• World Wide Web • Web pages • Web browsers	• Group practice on web browsing	01
9.	Apply the knowledge of communication networking	• Introduction to Email • Working of Email • Email address • Advantages of Email	• Group discussion on using Email and its advantages	01
10.	Create an Email account	• Creating an Email account • Steps to open an Email account on Gmail	• Group practice on creating and opening an Email account	01
11.	Write an Email	• Writing an Email • Attaching a file to an Email • Managing folders in Email account	• Group practice on receiving and replying to an email message	01
12.	Reply an Email	• Receiving Email, • Replying to an Email • Forwarding Email • Deleting Email	• Group practice on receiving and replying to an Email.	01
			Total Duration in Hours	**15**

Unit 4: Entrepreneurial Skills – I				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (05 Hours)**	**10**
1.	Describe the concept of Entrepreneurship skills	• Concept of Entrepreneurship and Enterprise	• Group activity on guessing the Entrepreneur	01
2.	Describe the role of entrepreneurship	• Role of Entrepreneurship • Economic development • Social development • Improved standard of living • Optimal use of resources • More benefits at lower prices products and services at competitive prices	• Group discussion on "A world without entrepreneurship" • Role play on roles of entrepreneurship	02
3.	Describe the qualities of a successful entrepreneur	• Qualities of a successful entrepreneur • Patience • Positive attitude • Hardworking • Confident • Open to trial and error • Creative and innovative	• Role play on appearing for interview • Group activity on inteeractions with entrepreneurs	02
4.	State the characteristics of	• Dstinguishing characteristics of entrepreneurship and wage	• Group activity on identifying characteristics of enterprise	02

	entrepreneurship	employment • Characteristics of entrepreneurship • Wage employment • Benefits of entrepreneurship	• Discussion on advantages of entrepreneurship over wage employment	
5.	Identify the type of business activity	• Types of business activities • Product business • Service business • Hybrid business	• Group activity on identifying different types of products and services	01
6.	Differentiate between the product, service, and hybrid businesses	• Product, Service, and Hybrid Businesses • Types of product-based business • Manufacturing businesses • Trade businesses	• Poster making on business activities around us	01
7.	Describe the entrepreneurship development process	• Enterpreneurship development process • Steps of starting a business – idea generation, getting money and material, understanding customer needs, improving product/ service	• Group activity on Make-and-Sell business	01
			Total Duration in Hours	**10**

Unit 5: Green Skills – I				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (03 Hours)**	**10**
1.	Demonstrate the knowledge of society and environment	• Society and Environment • Natural resources • Renewable and Non-renewable resources • Types of pollutions • Climate change • Harmful radiation • Natural disaster • Saving the environment: What can you do? • Reduce, reuse and recycle • Actions for saving the environment	• Group activity on listing the factors influencing the environment • Group activity on listing the steps one can take to save the environment	05
2.	Describe the meaning and importance of conserving natural resources	• Conserving the natural resources • Soil conservation • Water conservation • Energy conservation • Food conservation • Forest conservation	• Group discussion on conserving natural resources	02

3.	Describe the meaning and scope of sustainable development and green economy	• Sustainable Development • Sustainable Development Goals (SDGs) • Green growth • Green economy • Components of green economy – Renewable energy, green building, well managed • Skill development for the green economy • Green skills • Green jobs • Green projects	• Group discussion on importance of green skills • Poster making on importance of green economy	03
			Total Duration in Hours	**10**

Grade IX, Part B: Vocational Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	Introduction to AI Programming	30
Unit 2	Basic Python Programming	30
Unit 3	Data Literacy	30
Unit 4	Maths for AI	30
Unit 5	Machine Learning	30
	Total Duration	**150**

Unit 1: Introduction to AI Programming				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1.	Introduction to occupation of AI Assistant	• Introduction to Artificial Intelligence(AI), • AI Reflections, • Need of AI in school education, • Uses of AI, • Introduction to AI Assistant • Definition of AI Assistant • Role and Responsibilities of AI Assistant • Knowledge and Skills required for AI Assistant • Future scope of AI Assistant,	• Identify AI technology used in your smartphone, • Identify and list use of AI in your daily life, • Illustrate the use of AI technolgy used at home in daily life, • Illustrate the use of AI technolgy used in industry and business, • List the Role and Responsibilities of AI Assistant, • Identify the knowledge and skills required for AI Assistant • List the avaliable framework of AI Assistant – Google Dialogflow, IBM Watson Assistnat, Amaxon Alexa skills kit, • List the areas for future scope of AI Assistant	10
2.	Describe the basics of programming	• Concept of Algorithm, • Need Of Algorithm, • Characteristics of good algorithm, • Representation of algorithms, • Flowchart, • Example of flowchart, • Advantages of using flowchart, • Flow of control, • Sequence with Example, • Selection with Example, • Repetition with Example, • Alternative solution and	• Write an algorithm to find the square of number, • Write an algorithm for swapping of variables, • Compute the factorial of a number • Draw a flowchart for swapping of variables. • Draw a flowchart to compute the factorial of a number N, • Draw the flowchart to find the largest of three given numbers, • Draw the flowchart to find the	10

		efficiency of algorithm • Concept of coding, • Problem decomposition, • Example of problem decomposition	largest set of numbers, • Draw the flowchart for generation of N fibonacci numbers.	
3.	Write and execute the script in Scratch	• Introduction to Scratch, • Creating login in Scratch, • Steps to login Scratch, • Opening the Scratch, • Exploring the basic elements of Scratch-Sprites, Stage, Blocks, Script, • Scratch modes – Stage mode, Upload mode, • Default Blocks in Scratch – Motion Blocks, Loop Blocks, Sound Blocks, Control Blocks, Event Blocks, Operator Blocks, Variable Blocks,	• Write the script for making the Tobi Move in Scratch, • Write the script for making Tobi Look Like He's Walking in Scratch, • Write the script for Ball Movement in Scratch,	10
			Total Duration in Hours	**30**

Unit 2: Basic Python Programming				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1.	Install and Setup Python	• Introduction to Python programming, • Features of Python programming, • Keywords with examples, • Identifiers with examples, • Variables with examples • Python Interpreter Mode – Interactive Mode and Script Mode, • Setting up path, • Coding in Python IDLE, • Crating a new file in Python, • Structure of Python program, • Basic Syntax, Comments, • Procedure to compile and execute a program in Python, • Debugging process, • Syntax errors, Logical errors, Runtime errors.	• Install, set up the environment and run Python. • Demonstrate to use Command Line and IDE to create, debug and execute Python program, • Write, compile, execute, debug and test simple code in Python, • Practice the coding and debugging in IDE.	15
2.	Perform Operations using	• Different Data types in Python – Numbers, Sequence, Set,	• Write and test Python program to demonstrate print statement,	15

	Data Types and Operators	None, Mapping, • Classification of data types – mutable and immutable, • Casting, string, Boolean, • Python Operators – Arithmatic, Logical, Identity, Membership, Bitwise, • Expression, • Presedence of operators, • Input and output statements, • Type conversion – Explicit and Implicit conversion,	comments, different types of variables, • Write and test Python program to perform data and data operations, string operatioins, date, input and output, output formatting and operators, • Determine the sequence of execution based on operator precedence,	
			Total Duration in Hours	**30**

Unit 3: Data Literacy				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**25**
1.	Describe the Data Science	• Data, • Data and information, • Types of data – quntitative and qualitative data, • Data science, • Data mining.	• Identify data types for the given data values, • Visualise the data using bar graph, pie chart and line graph	15
2.	Describe the Preprocessing of data	• Data preprocessing, • Data understanding – numerical, categorical, ordinal, textual data, • Characteristics of data sets – features, target variables, rows and columns, • Data cleaning – missing values, deletion, outlier, data inconsistancy,	• Identify the category of data values for the given set of values, • Identify the characteristics of data from given data set, • Identify the missing values in the given data set, • Identify of inconsistancy of data from the given data set,	15
			Total Duration in Hours	**30**

Unit 4: Maths for AI				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (15 Hours)**	**25**
1.	Describe the concept data analysis	• Data analysis, • Importance of data analysis, • Data analysis work flow, • Data Analysis with respect to AI, • Data structures, • Stastical analysis • Central tendency – Mean,	• List the importance of data analysis, • List the application of data analysis, • List the different types of data structure, • Compute Mean, Median and Mode for the given data set,	15

		Mode, Median • Dispersion – Range, Variance, Standard Deviation • Probability, • Applcation of data analysis.	• Draw work flow of data analysis.	
2.	Visualise the data using data analysis tools	• Spredsheet – Excel, Google sheet, • Python data analysis tools, • SQL data analysis tools, • Data visualisation,	• Create a spreadsheet, enter the various types of data and perform calculation on data, • Analyse the data, • List the data analysis tools in Python, • Write the SQL query for obtaining useful information from the given data.	15
			Total Duration in Hours	**30**

Unit 5: Machine Learning				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1.	Describe the concept of Machine Learning	• Introduction to Machine Learning, • Importance of Machine Learning, • Workflow of Machine Learning, • Applications of Machine Learning in various industries,	• Illustrate an example to understand the concept of Machine Learning, • List the importance of Machine Learning, • Draw the workflow of Machine Learning, • List the applications of Machine Learning in various industries,	10
2.	Describe the types of Machine Learning	• Types of Machine Learning, • Supervised Leaning, • Un-Supervised Leaning, • Reinforcement Learning, • Deep Learning.	• Draw the diagram to illustrate the types of Machine Learning, • Differentiate between different types of Machine Learning, • Illustrate the examples of Supervised Leaning, un-Supervised Leaning, semi-Supervised Leaning, reinforcement learning,	15
			Total Duration in Hours	**25**

GRADE X

Part A: Employability Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	Communication Skills – II	15
Unit 2	Self-management Skills – II	10
Unit 3	Information and Communication Technology Skills – II	15
Unit 4	Entrepreneurial Skills – II	10
Unit 5	Green Skills – II	10
	Total	**60**

Unit 1: Communication Skills – Ii				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (08 Hours)**	**20**
1.	Demonstrate the knowledge of various methods of communication	• Methods of communication • Communication process and elements	• Role plays on communication process • Group discussion on the effects of elements of communication cycle.	02
2.	Describe the types of verbal communication	• Verbal communication • Types of verbal communication • Advantages and disadvantages of verbal communication • Mastering verbal communication	• Role play of a telephonic conversation • Chart preparation on types of verbal communication • Group discussion on the advantages and disadvantages of verbal communication • Group activity on delivering a speech and practicing public speaking.	02
3.	Demonstrate the knowledge of non-verbal communication	• Non-verbal communication – Importance of non–verbal communication • Types of non-verbal communication • Visual communication	• Role play on non-verbal communication • Group discussion and practice on how to avoid body language mistakes • Group discussion on three methods of communication	02
4.	Describe the communication cycle and importance of feedback	• Communication cycle and importance of feedback • Feedback • Types of feedback • Importance of feedback	• Role play on providing feedback • Group activity on constructive feedback	02
5.	Identify the barriers to effective communication	• Effective communication • Barriers to effective communication - • Physical barriers	• Role play on barriers to effective communication • Group practice on overcoming the barriers to effective	03

		• Linguistic barrier • Interpersonal barriers • Organizational barriers • Culture barriers • Ways to overcome barriers to effective communication	communication • Chart preparation on barriers to effective communication	
6.	Demonstrate the knowledge of parts of speech	• Writing skills – Parts of speech • Capitalization • Punctuations • Basics of parts of speech • Supporting parts of speech • Article • Conjunctions • Prepositions • Interjections	• Reading paragraph and sentences and identifying parts of speech • Group activity on sentence construction • Identifying nouns by guessing the name, place, animal, or thing	02
7.	Write sentences	• Meaning of sentence • Parts of sentence • Subject • Verb • Object • Types of objects • Types of sentences • Active • Passive • Paragraphs	• Making sentences using direct and indirect objects • Writing a paragraph using active and passive voice • Framing different types of sentences (i.e., declarative, exclamatory, interrogative and imperative)	02
			Total Duration in Hours	**15**

Unit 2: Self-Management Skills – Ii				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (05 Hours)**	**10**
1.	Apply stress management techniques	• Stress management • Stress and Stress management techniques • Management technique • Ability to work independently • Emotional intelligence	• Role Play on avoiding stressful situation, • Activity on listing stressful situations and discussing the stress management techniques like yoga, deep breathing exercises	02
2.	Identify strengths and weaknesses of self	• Self-Awareness – Strength and Weakness Analysis • Knowing yourself • Strength and weakness analysis • Techniques for identifying strengths and weaknesses • Difference between interests and abilities	• Group discussion on aim and goal in life • Perform a strength and weakness analysis • Group discussion on interests and abilities	02
3.	Demonstrate the knowledge of self -	• Self-Motivation • Types of motivation	• Group discussion on staying motivated	02

	motivation	• Qualities of self-motivated people • Building self–motivation	• Activity on listing the ways to motivate oneself	

4.	Set SMART goals	• Self regulation – Goal setting,
		• Goals and setting SMART Goals
		• How to set SMART Goals,
		  • Specific
		  • Measurable
		  • Achievable
		  • Realistic
		  • Time bound
			• Group activity on setting SMART goals
			• Writing long- term and short-term goals
			• Activity on listing the ways to surely set SMART goals
				02

5.	Demonstrate the knowledge of time management	• Self-Regulation – Time Management
		• Time management and its importance
		• Example and non-example of time management
		• Four steps for effective time management
		  • Organise
		  • Prioritise
		  • Control
		  • Track
		• Tips for practicing the four steps of effective time management
			• Preparing a list of activities to practice time management
			• Discussion on how to manage time to reach school on time
				02

			Total Duration in Hours	**10**

Unit 3: Information And Communication Technology Skills – Ii				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (10 Hours)**	**15**
1.	Perform basic computer operations	• Basics computer operations, • Starting a computer - basic functions performed when a computer starts, login and logout, • Shutting down a computer, • Using keyboard, • Using a mouse - Roll over or hover, Point and click, Drag and drop, Double click	• Demonstration on use of computers • Group practice on using the keyboard	07
2.	Perform basic file operations	• Concept of basic file operations • Files and folders • Creating a file • Creating a folder	• Demonstration and practice on creating a file and folder	02
3.	Demonstrate computer care	• Importance of care and maintenance of computers	• Making a chart on care and maintenance of computer	03

	and maintenance	• Basic tips for taking care of devices • Cleaning computer devices • Preparing maintenance schedule for computers • Taking backup data • Scanning and cleaning viruses • Removing SPAM files		
4.	Describe the importance of maintaining computer security and privacy	• Computer security and privacy •Reasons for security breach •Threats to computer • Protecting your data	• Group work on preparing a chart of computer security and privacy	03
			Total Duration in Hours	**15**

Unit 4: Entrepreneurial Skills – Ii				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (05 Hours)**	**10**

1.	Describe the meaning of entrepreneurship	• Entrepreneurship and society
		• Activities of entrepreneurs:
		  • Fulfil customer needs
		  • Use local materials
		  • Help society
		  • Create job
		  • Share wealth
		  • Lower price product
			• Group work on finding the problems in school campus and turning them into business opportunities	03

2.	Identify the qualities and functions of an entrepreneur	• Qualities and functions of an entrepreneur • Qualities of an entrepreneur	• Activity on self-assessment of entrepreneurial qualities • Brainstorming on solving a problem in their area • Taking an interview of an entrepreneur	02
3.	Describe the myths and realities about entrepreneurship	• Misconceptions and myths about entrepreneurship	• Group activity on identifying everyday heroes • Activity on interviewing the entrepreneurs • Group activity on making items and selling to someone	02
4.	Describe entrepreneurship as a career option	• Entrepreneurship as a career option • Meaning of career • Ways of earning a living • Self-employment • Wage employment • Entrepreneurship career process – Enter, Survive, Grow	• Brainstorming on entrepreneurship as a life option • Group discussion on The power of entrepreneurship	03
			Total Duration in Hours	**10**

Unit 5: Green Skills – II				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (03 Hours)**	**10**
1.	Demonstrate the knowledge of green skills	• Sustainable development, • Importance of sustainable development, • Problems related to sustainable development, • Sustainable development Goals, • Sustainable development initiatives, • Sustainable process	• Group activity on creating garden in the school or planting tree saplings • Group discussion on "How to prevent wastage"	05

2	Describe the role of self in sustainable development	• Our role in sustainable development
		• Our role towards Sustainable Development
		  • Quality education
		  • Clean water and sanitation
		  • Affordable and clean energy
		  • Decent work and economic growth
		  • Reducing inequalities
		  • Creating sustainable cities and communities
		  • Responsible consumers and producers
		  • Protect life below water
		• Protect life on land
			• Group discussion on conservation and protection of environment
			• Group activity on organising an art project using waste
				05

			Total Duration in Hours	**10**

Grade X, Part B: Vocational Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	Python Programming	30
Unit 2	Data Science	30
Unit 3	Data Analysis	30
Unit 4	Neural Network	30
Unit 5	AI Project	30
	Total Duration	**150**

Unit 1: Advance Python Programming				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1	Control Flow with Decisions and Loops	• Control structure – Selection • Syntax and examples of if … else structure, • Syntax and examples of if .. elif … else structure, • Structural pattern matching, • Example to use structural pattern matching, • Control structure – Repetition, • Syntax and examples of for loop, • Range function in for loop, • Syntax and examples of while loop, • Syntax and examples of break statement, • Syntax and examples of continue statement, • Nested loops,	• Construct and analyze code segments that usebranching statements, • Construct and analyze code structure that perform iteration.	15
2	Perform Operations using Functions and Modules	• Functions in Python, • Advantages of functions, • Types of functions – Built in, User defined functions, • Creating user defined functions, • Arguments and parameters in function, • Variable number of arguments, • Functions returning values, • Flow of execution of function, • Scope of variable – global and local variable,	• Perform basic operations using built-in modules. • Solve complex computing problems by using built-in modules,	15

		• Standard library – Built in functions, Module, Built-in modules,		
			Total Duration in Hours	**30**

Unit 2: Data Science				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1.	NumPy	• Introduction to NumPy, • Installation of NumPy, • Concept of arrays, • Creating basic arrays using NumPy • Array dimesions – 1D, 2D, 3D, • Array data types, • Array properties – shape, size, dimensions	• Demonstrate the installation procedure of NumPy in Python, • Write Python code using NumPy for creation of 1D, 2D, 3D array, • Write Python code to assign values to the array elements.	10
2.	Array manipulation using NumPy	• Array manipulation, • Reshaping of array, • Resizing of arrays, • Joining of arrays, • Splitting of arrays,	• Write and execute simple programs of Array manipulation, • Write and execute simple programs of Reshaping of array, • Write and execute simple programs for Resizing of arrays, • Write and execute simple programs for Joining of arrays, • Write and execute simple programs for Splitting of arrays,	10
3.	Array computation using NumPy	• Arrary computation, • Arithmatic operations on arrays, • Trignometric functions,	• Write and execute simple programs for Arrary computation, • Write and execute simple programs for using arithmatic operations on arrays, • Write and execute simple programs for using Trignometric functions on arrays,	10
			Total Duration in Hours	**30**

Unit 3: Data Analysis				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1.	Describe Pandas	• Introduction to Pandas, • Overview of Pandas in data analysis, • Importance of Pandas in data analysis,	• Illustrate the difference between NumPy and Pandas, • List the importance of Pandas in data analysis, • Demonstrate the installation	10

		• Difference between NumPy and Pandas • Installation of Pandas, • Data structures in Pandas.	procedure of Pandas in Python, • List the data structures in Pandas.	
2.	Coding with Pandas	• Creating data structure – Series and Data frames using Pandas, • Data access using Pandas,	• Write and execute simple programs to create data structure – Series and Data frames using Pandas, • Write and execute simple programs to access data using Pandas,	10
3.	Introduction to Matplotlib	• Introduction to Matplotlib, • Use of Pyplot Matplotlib library, • Installing Matplotlib, • Importing Pyplot, • Basics of simple ploting – Line chart, Bar chart, Pie chart, • Creating line chart, • Creating bar chart, • Creating multiple bar chart, • Creating horizontal bar chart, • Creating Pie chart, • Chart anatomy and saving graph.	• Write python code to plot a line graph with for two given list, • Write python code to plot a line graph, • Write python code to plot a line chart with differtent colours, • Write python code to plot a bar chart and multiple bar chart, • Write python code to plot a horizontal bar graph, • Write python code to plot a Pie chart, • Write python code to plot a graph showing anatomy of chart.	10
			Total Duration in Hours	**30**

Unit 4: Neural Network				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1.	Neural Network	• Concept of Neural Network, • Working of Neural Network, • Breakdown of Neural Network, • Layers of Neural Network – Input Layer, Hidden Layer, Output Layer, • Connection and weights, • Training the Neural Network, • Types of Neural Network,	• Demonstratre to Create Neural Network using Scratch script, • Demonstratre to Train Neural Network using Scratch script, • Demonstratre to Create different types of Neural Network using Scratch script,	10
2.	Applications of Neural Network	• Applications of Neural Network, • Object detection using ANN, • Image segmentation using ANN, • Classification using ANN, • Speech to Text using ANN,	• Demonstratre to detect object using Scratch script, • Demonstratre to convert speech to text using Scratch script, • Demonstratre the image segmentation using Scratch	10

		• Machine Translation using ANN	script,	
3.	Describe the Machine Learning using ML tools	• Tools for Machine Learning, • Python libraries, • ML Tools – Scikit-Learn, PyTorch, Tesnsorflow • AI Assistant framework – Google Dialogflow, IBM Watson Assistnat, Amaxon Alexa skills kit,	• Demonstrate to perform Scratch activities of Machine Learning.	10
			Total Duration in Hours	**30**

Unit 5: AI Project				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1.	Identify the AI Project Cycle framework.	• Introduction to AI Project Cycle, • Problem Scoping, • Data Acquisition, • Data Exploration, • Modeling, • Evaluation, • Deployment	• Activity: Brainstorm around the theme provided and set a goal for the AI project, • Activity: To set actions around the goal, • Activity: Data and Analysis, • Brainstorming solutions for the problem statement	30
			Total Duration in Hours	**30**

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 workshop or service center and observe the following: Location, Site, Home appliances, Parts of Appliances, Assembly, Installation, Repair and Mainenance of the applinces such as LED and othet light, Electric Iron, Fan, Cooler. During the visit, students should obtain the following information from the owner or the supervisor :

1. Explain the use of appropriate tools, parts, relevant reference sheets
2. Disposing the packaging material waste as per the company's norms.
3. Detect basic electrical faults such as improper/no earth, defective power cord, connector or internal wiring defect, short/ loose/open contacts, blown fuse
4. Communicating effectively at the workplace.
5. Applying health and safety practices at the workplace.

7. LIST OF EQUIPMENT AND MATERIALS

The equipment / materials listed below are required to conduct effective hands-on learning sessions while delivering the AI curriculum to class 10 students. The list below consists of minimal configuration required to execute the AI curriculum for class 10 and create social impact real time solutions/ projects. The quantities mentioned here are recommended for a batch of 20 students keeping the human-machine ratio as 2:1. An exhaustive list may be compiled by the teacher(s) teaching the subject.

List of Tools and Equipment

Sn	Tool/ Equipment	Specifications	Quantity
1	Student Chair	Revolving chair	30
2	Student Table	Computer Table	30
3	Desktop computers	Desktop computer with latest specifications, Camera, Headphone with Wifi/internet connectivity	30
4	Printer	Laser Printer	1
5	Software	Operating System: Linux/Windows, Anti-Virus Activated Productivity Suite: Any (Google+ Suite recommended) Anaconda Navigator Distribution (https://bit.ly/AI-installation-guide) Installed with software: Python, NumPy, Pandas, Matplotlib, Seaborn, Scikit-Learn Conceptual installations (https://bit.ly/AI-installation-guide) Intel Open VINO tools	

NOTE: In keeping with the spirit of Recycle, Upcycle and Reuse, it is recommended to make use of any equipment/ devices/ accessories from the existing inventory in school.

Classroom Aids

Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Pin-up Board, Projector, 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 Qualification	**Minimum Competencies**	**Age Limit**
Graduate with Diploma in Computer Science/ Information Technology **OR** Bachelor's Degree in Computer Applications/ Science/ Information Technology (BCA, B. Sc. Computer Science/ Information Technology) **OR** Graduate with PGDCA **OR** DOEACC A Level Certificate.	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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विद्यया ऽ मृतमश्नुते

एन सी ई आर टी
NCERT

PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION

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