LEARNING OUTCOME-BASED VOCATIONAL CURRICULUM

JOB ROLE:

AI Solution Developer trainee

(QUALIFICATION PACK: Ref. Id. SSC/Q2212)

SECTOR: IT-ITeS

Grades 9 and 10

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COURSE OVERVIEW
Course Title: AI Solution Developer Trainee

With skills honed in AI solution development, accompanied by a good knowledge of the foundational concepts in AI and generative-AI, individuals can thrive in a variety of entry-level roles across the software development, consulting, entertainment, and marketing industries. Depending on their inclinations and passions, they can specialize as programmers, technical consultants, artists, and designers – who can tap into the power of AI to help deliver powerful designs and solutions. Their ability to train new AI models, fine-tune existing models, leverage pre-existing powerful models, and then use these models as appropriate in a given context to solve problems – is highly sought-after in the new AI-augmented digital age.

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

- Apply effective oral and written communication skills to interact with team members, clients, and stakeholders.
- Demonstrate the basic programming skills;
- Demonstrate self-management skills, including time management, goal setting, and adaptability.
- Analyze personal entrepreneurial skills and abilities for potential independent game development.
- Understand the importance of green skills in promoting sustainable development and environmental protection while developing products with Artificial Intelligence and Machine learning.
- Manage work effectively to meet project requirements and deadlines.
- Maintain a healthy, safe, and secure working environment for themselves and others.
- Work collaboratively in a team, contributing effectively to project goals and communication.
- Demonstrate basic computer operations
- Demonstrate use of operating systems, browsers, and the internet,
- Demonstrate aptitude for analyzing information and making logical conclusions.
- Demonstrate knowledge of the foundational mathematical concepts in computing.
- Design algorithms to solve problems and convert them into code using the appropriate programming language constructs.
- Demonstrate a portfolio of completed AI-assisted apps that showcase their acquired skills and creativity.
- Demonstrate self and work management.
- Continue self-development by staying updated on emerging trends and technologies in the AI solution development field.
- Demonstrate working and communicating in the team.
- Manage Health and Safety measures at the workplace.

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

COURSE LEVEL: This course can be taken up in Grades 9 & 10

COURSE DURATION:

Grade 9: 210 hours

Grade 10: 210 hours

Total: 420 hours

2. SCHEME OF UNITS AND ASSESSMENT

This course is a planned sequence of instructions consisting of Units meant for developing employability and vocational competencies of students of Grades 9 and 10 opting for vocational subjects along with general education subjects. The unit-wise distribution of hours and marks for Grade 9 and Grade 10 is as follows :

Unit-wise distribution of hours

Grade 9	Theory	Practicals	Total	Grade 10	Theory	Practicals	Total
Employability Skills				**Employability Skills**			
Communication Skills	8	12		Communication Skills	12	8	
Self-management Skills	7	3		Self-management Skills	5	5	
Basic ICT Skills	10	10		Basic ICT Skills	10	10	
Entrepreneurial Skills	6	9		Entrepreneurial Skills	6	9	
Green Skills	3	7		Green Skills	7	3	
Total Employability	**34**	**41**	**75**		**40**	**35**	**75**
Vocational skills				**Vocational skills**			
AI (ML) Fundamentals	15	3	18	Regression vs Classification	5	2	7
Basic Charting/Plotting	5	5	10	AI Metrics	5	3	8
Neural Networks as universal function approximators	25	30	55	Digit recognition -- model training and testing	5	10	15
Building a real AI application - I	11	26	37	Digit recognition -- app development	15	15	30
				AI bias and ethics	5	0	5
				Introduction to LLMs and Diffusion Models (Generative AI)	5	5	10
				Building a real AI application - II	10	35	45
Total Vocational	**56**	**64**	**120**		**50**	**70**	**120**
Field visit/ Bootcamp		**15**	**15**	**Field visit/ Bootcamp**		**15**	**15**

Grade 9	Theory	Practicals	Total	Grade 10	Theory	Practicals	Total
Employability Skills				**Employability Skills**			
Communication Skills	8	12		Communication Skills	12	8	
Self-management Skills	7	3		Self-management Skills	5	5	
Basic ICT Skills	10	10		Basic ICT Skills	10	10	
Entrepreneurial Skills	6	9		Entrepreneurial Skills	6	9	
Green Skills	3	7		Green Skills	7	3	
Total Employability	**34**	**41**	**75**		**40**	**35**	**75**
Vocational skills				**Vocational skills**			
AI (ML) Fundamentals	15	3	18	Regression vs Classification	5	2	7
Basic Charting/Plotting	5	5	10	AI Metrics	5	3	8
Neural Networks as universal function approximators	25	30	55	Digit recognition -- model training and testing	5	10	15
Building a real AI application - I	11	26	37	Digit recognition -- app development	15	15	30
				AI bias and ethics	5	0	5
				Introduction to LLMs and Diffusion Models (Generative AI)	5	5	10
				Building a real AI application - II	10	35	45
Total Vocational	**56**	**64**	**120**		**50**	**70**	**120**
Grand Total	**90**	**120**	**210**	**Grand Total**	**90**	**120**	**210**

Unit Wise allocation of hours and marks

Grade 9			
	Units	**No. of Hours**	**Max. Marks**
Part A	**Employability Skills**		
Unit 1	Communication Skills – I	20	10
Unit 2	Self-management Skills – I	10	
Unit 3	Basic ICT Skills – I	20	
Unit 4	Entrepreneurial Skills – I	15	
Unit 5	Green Skills - I	10	
	Total Hours	**75**	**10**
Part B	**Vocational Skills**		
Unit 1	AI (ML) Fundamentals	18	5
Unit 2	Basic Charting/Plotting	10	5
Unit 3	Neural Networks as universal function approximators	55	10
Unit 4	Building a real AI application - I	37	10
	Total Hours	**120**	**30**
Part C	**Project Work/Bootcamp/ Field Visit (3X5)**		
	Practical File/ Student Portfolio	10	10
	Viva Voce	5	5
	Total	**15**	**15**
	Total Instructional Hours	**210**	
Part D	**Practical Work**		
	Practical Examination	6	15
	Written Test	1	10
	Viva Voce	3	10
	Total	**10**	**35**

Part E	**Continuous and Comprehensive Evaluation (CCE)**	05	10
	Total Marks		**100**

Grade 10			
	Units	**No. of Hours for Theory and Practical 240**	**Max. Marks for Theory & Practical 100**
Part A	**Employability Skills**		
Unit 1	Communication Skills – II	20	10
Unit 2	Self-management Skills – II	10	
Unit 3	Basic ICT Skills – II	20	
Unit 4	Entrepreneurial Skills – II	15	
Unit 5	Green Skills - II	10	
	Total Hours	**75**	**10**
Part B	**Vocational Skills**		
Unit 1	Regression vs Classification	7	2
Unit 2	AI Metrics	8	2
Unit 3	Digit recognition - model training and testing	15	4
Unit 4	Digit recognition - app development	30	7
Unit 5	AI bias and ethics	5	2
Unit 6	Introduction to LLMs and Diffusion Models (Generative AI)	10	3
Unit 7	Building a real AI application - II	45	10
	Total Hours	**120**	**30**
Part C	**Project Work/Bootcamp/ Field Visit (3X5)**		
	Practical File/ Student Portfolio	10	10

	Viva Voce	5	5
	Total	**15**	**15**
	Total Instructional Hours	**210**	
Part D	**Practical Work**		
	Practical Examination	6	15
	Written Test	1	10
	Viva Voce	3	10
	Total	**10**	**35**
Part E	**Continuous and Comprehensive Evaluation (CCE)**	05	10
	Total Marks		**100**

3. TEACHING/TRAINING ACTIVITIES

Teaching and training activities must be conducted in classrooms, labs/workshops, and field visits. Students should be taken on field visits to interact with experts and be exposed to the various tools, equipment, materials, procedures, and operations in the workplace.
Special emphasis should be placed on occupational safety, health, and hygiene during 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 teachers. 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 is not limited to hands-on training, simulated training, role play, case-based studies, exercises, etc. Equipment and supplies should be provided to enhance the 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 teacher to the Head of the Institution.

FIELD VISITS/ EDUCATIONAL TOUR

In field visits, children go outside the classroom to obtain specific information from experts or to observe activities. Teachers should develop a checklist of observations to be made by the

students during the field visits to systematically collect information 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 the candidate's successful completion of the course, 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 can 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 the assessment of the knowledge of students. Necessary arrangements should be made for using technology in the assessment of students.

KNOWLEDGE ASSESSMENT (THEORY)

Knowledge Assessment should include two components: one consisting 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 an 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 papers for the vocational subject should be prepared by the subject experts, a group of experts from academics, experts from existing vocational subject experts/teachers, and subject experts from universities/colleges or industry. The respective Sector Skill Council should be consulted by the Central/State Board for preparing the panel of experts for question paper setting and conducting the examinations.

The blueprint for the question paper may be as follows:

Duration: 3 Hrs **Max Marks: 40**

		No of Questions			
	Typology of Question	**Very Short Answer (1 mark)**	**Short Answer (2 mark)**	**Long Answer (1 mark)**	**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 situations, to apply knowledge to new situations: Use given content to interpret a situation, private an example, or solve a problem)	0	2	1	07
5	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
6	Evaluation – (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	0	1	0	02
	Total	**5X1= 5**	**10x2=20**	**5x3=15**	**40 (20 ques)**

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners on the basis of practical demonstration of skills by the candidate, using a competency checklist. The competency checklist should be developed as per the National Occupation Standards (NOSs) given in the Qualification Pack for the Job Role to bring about necessary consistency in the

quality of assessment across different sectors and Institutions. The student has to demonstrate competency against the performance criteria defined in the National Occupation Standards and the assessment will indicate that they are 'competent', or are 'not yet competent'. The assessors assessing the skills of the students should possess a current experience in the industry and should have undergone an effective training in assessment principles and practices. The Sector Skill Councils should ensure that the assessors are provided with the training on the assessment of competencies.

The practical examination allows candidates to demonstrate that they have the knowledge and understanding to perform a task. This will include hands-on practical exams and viva voce. For practical purposes, 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 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 a practical file or student portfolio.
A Student Portfolio is a compilation of documents that support the candidate’s claim of competence. Documents may include reports, articles, and photos of products prepared by students related 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 a student's development. In this scheme, the term `continuous' is meant to emphasize that the 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 an 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 the

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 9, Part A: Employability skills	
Unit No	**Unit Name**	**Duration in Hrs**
Unit 1	Communication Skills – I	20
Unit 2	Self-management Skills – I	10
Unit 3	Basic ICT Skills – I	20
Unit 4	Entrepreneurial Skills – I	15
Unit 5	Green Skills - I	10
	Total	**75**

	Grade 10, Part A: Employability skills	
Unit No	Unit Name	Duration in Hrs
Unit 1	Communication Skills – II	20
Unit 2	Self-management Skills – II	10
Unit 3	Basic ICT Skills – II	20
Unit 4	Entrepreneurial Skills – II	15
Unit 5	Green Skills - II	10
	Total	**75**

Unit 1: Communication Skills – I				
S. No.	**Learning Outcome**	**Theory (08 Hours)**	**Practical (12 Hours)**	**20 Hrs**
1.	Demonstrate knowledge of various methods of communication.	• Methods of communication. • Verbal. • Non-verbal. • Visual.	• Writing pros and cons of written, verbal and non- verbal communication. • Listing do's and don'ts for avoiding common body language mistakes.	05
2.	Identify elements of the communication cycle.	• Meaning of communication • Importance of communication skills • Elements of communication cycle– • (i) sender, • (ii) ideas, • (iii) encoding, • (iv) communication channel, • (v) receiver, • (vi) decoding, and • (vii) feedback	• Draw a diagram of communication cycle • Role plays on communication process related to the sector/ job role.	05
3.	Identify the factors affecting our perspectives in communication	• Perspectives in communication. • Factors affecting perspectives in communication. • Visual perception. • Language. • Past experience. • Prejudices. • Feelings. • Environment.	• Group discussion on factors affecting perspectives in communication. • Sharing of experiences on factors affecting perspectives. • Sharing experiences on factors affecting communication at the workplace.	05
4.	Demonstrate the knowledge of basic writing skills	• Writing skills related to the following: • Phrases • Kinds of sentences • Parts of sentence • Parts of speech • Use of articles • Construction of a paragraph	• Demonstration and practice of writing sentences and paragraphs on topics related to the subject.	05
			Total Duration in Hours	**20**

Unit 1: Communication Skills – II				
Sn	**Learning Outcome**	**Theory (12 Hours)**	**Practical (08 Hours)**	**20 Hrs**
1.	Demonstrate knowledge of various methods of communication.	• Methods of communication • Verbal. • Non-verbal. • Visual.	• Writing pros and cons of written, verbal and non-verbal communication • Listing do's and don'ts for avoiding common body language mistakes	04
2.	Provide descriptive and specific feedback.	• Communication cycle and importance of feedback. • Meaning and importance of feedback. • Descriptive feedback - written comments or conversations. • Specific and non-specific feedback.	• Constructing sentences for providing descriptive and specific feedback.	04
3.	Apply measures to overcome barriers in communication.	• Barriers to effective communication – types and factors. • Measures to overcome barriers in effective. Communication.	• Enlisting barriers to effective communication. • Applying measures to overcome barriers in communication.	04
4.	Apply principles of communication.	• Principles of effective communication. • 7 Cs of effective communication.	• Constructing sentences that convey all facts required by the receiver. • Expressing in a manner that shows respect to the receiver of the message	04

			• Exercises and games on applying 7Cs of effective communication.	
5.	Demonstrate basic	• Writing skills to the following:	• Demonstration and practice	04
	writing skills.	• Sentence • Phrase • Kinds of Sentences • Parts of Sentence • Parts of Speech • Articles • Construction of a Paragraph.	of writing sentences and paragraphs on topics related to the subject.	
			Total Duration in Hours	**20**

Unit 2: Self Management Skills – I				
S. No.	**Learning Outcome**	**Theory (07 Hours)**	**Practical (03 Hours)**	**10 Hrs**
1.	Describe the meaning and importance of self-management.	• Meaning of self-management. • Positive results of self-management. • Self-management skills.	• Identification of self- • management skills • Strength and • weakness analysis.	05
2.	Identify the factors that help in building self-confidence .	• Factors that help in building self-confidence – social, cultural, and physical factors • Self-confidence building tips - getting rid of the negative thoughts, thinking positively, staying happy with small things, staying clean, hygienic and smart, chatting with positive people, etc.	• Role play exercises on building self-confidence. • Use of positive metaphors/ words. • Positive stroking on wakeup and before going to bed. • Helping others and working for the community.	05
			Total Duration in Hours	**10**

Unit 2: Self-management Skills – II				
Sn	**Learning Outcome**	**Theory (05 Hours)**	**Practical (05 Hours)**	**10 Hrs**

1.	Apply stress management techniques	• Meaning and importance of stress management • Stress management techniques – physical exercise, yoga, meditation • Enjoying, going to vacations and holidays with family and friends • Taking nature walks	• Exercises on stress management techniques – yoga, meditation, physical exercises. • Preparing a write-up on an essay on experiences during a holiday trip.	04
2.	Demonstrate the ability to work independently	• Importance of the ability to work independently. • Describe the types of self-awareness. • Describe the meaning of self-motivation and self-regulation.	• Demonstration on working independently goals. • Planning of an activity Executing tasks in a specific period, with no help or directives. • Demonstration on the qualities required for working independently.	06
			Total Duration in Hours	**10**

Unit 3: Basic ICT Skills – I				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (10 Hours)**	**20 Hrs**
1.	Demonstrate the knowledge of the role of Information and Communication Technology (ICT) in day-to-day life and workplace	• Introduction to ICT • Role and importance of ICT in personal life and at workplace • ICT in our daily life (examples) • ICT tools – Mobile, tab, radio, TV, email, etc.	• Discussion on the role and importance of ICT in personal life and at the workplace. • Preparing posters / collages for showing the role of ICT at workplace	**04**
2.	Identify components of basic computer system and their functions	• Computer system – Central Processing Unit (CPU), memory, motherboard, storage devices • Hardware and software of a computer system • Role and functions of Random Access	• Connecting the cables and peripherals to the Central Processing Unit • Starting and shutting down a computer • Group discussion on the	**07**

		• Memory (RAM) and Read • Only Memory (ROM) • Role and functions of Central Processing Unit • Procedure for starting and shutting down a computer	various aspects of hardware and software	
3.	Demonstrate use of various components and peripherals of computer system	• Peripherals devices and their uses – mouse, keyboard, scanner, webcam, etc. of a computer system	• Identification of various parts and peripherals of a computer • Demonstration and practice on the use of mouse • Demonstration and practice on the use of keyboard • Demonstration of the uses of printers, webcams, scanner and other peripheral devices • Drawing diagram of computer system and labelling it	**05**
4.	Demonstrate basic computer skills	• Primary operations on a computer system – input, process, storage, output, communication networking, etc.	• Identification of the various input and output units and explanation of their purposes	**04**
			Total Duration in Hours	**20**

Unit 3: Basic ICT Skills – II				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (10 Hours)**	**20 Hrs**
1.	Distinguish between different operating systems	• Classes of operating systems • Menu, icons and taskbar on the desktop • File concept, file operations,	• Identification of taskbar, icons, menu, etc. • Demonstration and practising of creating, renaming and deleting files and folders, saving	17

		file organization, directory structures, and file-system structures • Creating and managing files and folders	files in folders and sub-folders, restoring files and folders from recycle bin	
2.	Apply basic skills for care and maintenance of computer	• Importance and need of care and maintenance of computer • Cleaning computer components • Preparing maintenance	• Demonstration of the procedures to be followed for cleaning, care and maintenance of hardware and software	03
		schedule • Protecting computer against viruses • Scanning and cleaning viruses and removing SPAM files, temporary files and folders		
			Total Duration in Hours	**20**

Unit 4: Entrepreneurial Skills – I				
Sn	**Learning Outcome**	**Theory (06 Hours)**	**Practical (09 Hours)**	**15 Hrs**
1.	Identify various types of business activities	• Types of businesses service, manufacturing, hybrid. • Types of businesses found in our community Business activities around us.	• Prepare posters of business activities found in cities/ villages, using pictures. • Discuss the various types of activities, generally adopted by small businesses in a local community. • Best out of waste. • Costing of the product made out of waste. • Selling of items made from waste materials. • Prepare a list of businesses that provide goods and services in exchange for money.	09

2.	Demonstrate the knowledge of distinguishing characteristics of entrepreneurship	• Meaning of entrepreneurship development. • Distinguishing characteristics of entrepreneurship. • Role and rewards of entrepreneurship.	• Prepare charts showing advantages of entrepreneurship over wages. • Group discussions on role and features of entrepreneurship. • Lectures/presentations by entrepreneurs on their experiences and success stories. • Identify core skills of successful entrepreneurs.	06
			Total Duration in Hours	**15**

Unit 4: Entrepreneurial Skills – II				
Sn	**Learning Outcome**	**Theory (06 Hours)**	**Practical (09 Hours)**	**15 Hrs**
1.	List the characteristics of successful entrepreneur	• Entrepreneurship and society. • Qualities and functions of an entrepreneur. • Role and importance of an entrepreneur. • Myth about entrepreneurship. • Entrepreneurship as a career option.	• Writing a note on entrepreneurship as career option. • Collecting success stories of first generation and local entrepreneurs. • Listing the entrepreneurial qualities – analysis of strength and weaknesses. • Group discussion of self- qualities that students feel are needed to become successful entrepreneur. • Collect information and related data for a business. • Make a plan in team for setting up a business.	15
			Total Duration in Hours	**15**

Unit 5: Green Skills – I				
Sn	**Learning Outcome**	**Theory (03 Hours)**	**Practical (07 Hours)**	**10 Hrs**
5.	Demonstrate the knowledge of the factors influencing natural resource conservation.	• Introduction to the environment. • Relationship between society and environment, ecosystem and factors causing imbalance. • Natural resource conservation. • Environment protection and conservation.	• Group discussion on hazards of deteriorating environment. • Prepare posters showing environment conservation. • Discussion on various factors that influence our environment.	05
6.	Describe the importance of the green economy and green skills.	• Definition of green economy • Importance of green economy	• Discussion on the benefits of green skills and importance of green economy. • Prepare a Poster showing the importance of green economy with the help of newspaper/ magazine cuttings.	05
			Total Duration in Hours	**10**

Unit 5: Green Skills – II				
Sn	**Learning Outcome**	**Theory (07 Hours)**	**Practical (03 Hours)**	**10 Hrs**
1.	Demonstrate the knowledge of importance, problems and solutions related to sustainable development	• Definition of sustainable development. • Importance of sustainable development. • Problems related to sustainable development.	• Identify the problem related to sustainable development in the community. • Group discussion on the importance of respecting and conserving indigenous knowledge and cultural heritage. • Discussion on the responsibilities and benefits of	10

			environmental. citizenship, including the conservation and protection of environmental values. • Preparing models on rain water harvesting, drip / sprinkler irrigation, vermin- compost, solar energy, solar cooker, etc.	
			Total Duration in Hours	**10**

GRADE 9, Part B: Vocational Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	AI (ML) Fundamentals	18
Unit 2	Basic Charting/Plotting	10
Unit 3	Neural Networks as universal function approximators	55
Unit 4	Building a real AI application: Predict a variable based on another variable in a real-world dataset. Context - understand a problem, train a model, come up with a solution	37
	Total Duration	**120**

Unit 1: AI (ML) Fundamentals				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (3 Hours)**	**18**
1	Understand the role of AI in the world and in the lives of individuals	1. Examples of AI usage and benefits	Coming up with new AI examples showing AI benefits	8
2	Understanding the core ideas in AI (ML)	1. AI as the learning of functions	Playing with functions such as tables and charts	10

		2. Review of the concept of functions 3. Example functions in AI	Coming up with new examples of AI scenarios and functions used in these	

Unit 2: Basic Charting/Plotting				
Sn	**Learning Outcome**	**Theory (5 Hours)**	**Practical (5 Hours)**	**10**
1	Understand the benefits of charts	1. Why do we need charts		2
2	Different chart types	1. Scatter chart 2. Line chart 3. Bar chart 4. Histogram	Create charts based on the provided data	8

Unit 3: Neural Networks as universal function approximators				
Sn	**Learning Outcome**	**Theory (25 Hours)**	**Practical (30 Hours)**	**55**
1	Neural Networks – Core ideas	1. Structure of an AI neuron 2. What can one neuron learn		5
2	Neural Networks – Learning procedure	1. The learning task 2. Manual walkthrough of the learning procedure 2. Formalization of learning procedure	Learning a linear function – hands-on	15
3	Neural Networks – Learning capacity	1. What can a neuron with an activation function learn 2. What can two neurons learn	Learning an elbow function – hands-on	15
4	Neural Networks – Learning different functions	1. What can a neural network with many neurons learn	Using Neural Nets to Learn Arbitrary Functions	20

Unit 4: Case Study (solving a real-world problem with AI)				
Sn	**Learning Outcome**	**Theory (11 Hours)**	**Practical (26 Hours)**	**37**
1	Case study – understanding the problem	1. Problem review	Plotting the data	5
2	Training an AI model for prediction.	1. Exploring the neural network architecture	● Model training ● Interpreting results and report writing	32

GRADE 10, Part B: Vocational Skills

Unit No.	Unit Name	Duration in Hours
Unit 1	Regression vs Classification	7
Unit 2	AI Metrics	8
Unit 3	Digit recognition - model training and testing	15
Unit 4	Digit recognition - app development	30
Unit 5	AI bias and ethics	5
Unit 6	Introduction to LLMs and Diffusion Models (Generative AI)	10
Unit 7	Building a real AI application: Understand a problem, use a trained model, and come up with an app/solution	45
	Total Duration	**120**

Unit 1: Regression vs Classification				
Sn	**Learning Outcome**	**Theory (5 Hours)**	**Practical (2 Hours)**	**7**
1	Understand the difference between Regression and Classification	1. Regression – as the learning of functions seen till now 2. Classification – as the learning of functions from inputs to classes or categories	● Identify some classification problems in the world	7

Unit 2: AI Metrics				
Sn	**Learning Outcome**	**Theory (5 Hours)**	**Practical (3 Hours)**	**8**
1	Evaluating how well a neural net has learnt a function	1. Accuracy 2. Sensitivity 3. Specificity 4. Precision	● Hand-calculation of metrics for a given scenario	8

Unit 3: Digit recognition - model training and testing				
Sn	**Learning Outcome**	**Theory (5 Hours)**	**Practical (10 Hours)**	**15**
1	Understanding the MNIST problem	1. The MNIST Dataset	● Loading and viewing MNIST data	3
2	Training a model to recognize digits	1. A classification Net for MNIST	● MNIST Model training	6
3	Testing the model	1. MNIST Model accuracy	● MNIST Model testing	6

Unit 4: Digit recognition - app development				
Sn	**Learning Outcome**	**Theory (15 Hours)**	**Practical (15 Hours)**	**30**
1	Interactive drawing on	1. Mouse click handling	● Mouse-driven painting	5

	the canvas	2. Storing clickstream in a sequence 3. Using a loop to draw shapes based on mouse input	program	
2	Data display in the canvas	1. Basic shapes to represent text and bars 2. Combining shapes	● A program that displays some given data in a customizable format	5
3	Widgets for App UI	1. Buttons 2. Text Fields 3. Dropdowns	● Interactive widget-driven program	5
4.	App for digit recognition	App architecture based on learnt ideas	● Interactive app for MNIST digit recognition	15

Unit 5: AI Bias and Ethics				
Sn	**Learning Outcome**	**Theory (5 Hours)**	**Practical (0 Hours)**	**5**
1	Bias and Ethics in the Context of AI	Core ideas		5

Unit 6: Introduction to LLMs and Diffusion Models (Generative AI)				
Sn	**Learning Outcome**	**Theory (5 Hours)**	**Practical (5 Hours)**	**10**
1	Generative AI	1. Introduction to Generative AI		2
2	LLMs	1. Core Concepts 2. Prompt crafting	● Topic Research based on an LLM	4
3	Diffusion Models	1. Core Concepts 2. Prompt Crafting	● Creating an art piece with Stable Diffusion	4

Unit 7: Building a real AI application				
Sn	**Learning Outcome**	**Theory (10 Hours)**	**Practical (35 Hours)**	**45**
1	Case study – understanding the problem	1. Problem review		2
2	Learn to use pre-trained models	1. Model loading from model-hub	● Example usage of a pre-trained model	5
3	Building an AI application	1. Identify the pre-trained model 2. Application architecture	● Build app UI ● Use pre-trained model in UI ● App testing and refinement	38

6. ORGANISATION OF FIELD VISITS

In a year, at least 3 sessions of bootcamps/ field visits /educational tours should be organised for the students to expose them to the activities in the workplace.

Bootcamps to train and conduct a competition to build a game or Visit a Game development center and observe the following: Location, Site, Office building, Computer Systems, Tools and Equipment, softwares being used. During the visit

7. LIST OF EQUIPMENT AND MATERIALS

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

Minimum requirements: Computer lab with i3 8GB desktops, preferred OS : Linux, Broadband connection, table, chair any other resource that may be required towards successful completion of the syllabus.

8. VOCATIONAL TEACHER'S/TRAINER'S QUALIFICATION

Qualification and other requirements for the appointment of vocational teachers/trainers on a contractual basis should be decided by the State/UT. The suggestive qualifications and minimum competencies for the vocational teacher should be as follows:

Qualification	Minimum Competencies	Age Limit
Diploma in Computer Science/ Information Technology OR Bachelor Degree in Computer Application/ Science/ Information Technology (BCA, B. Sc. Computer Science/Information Technology) OR Graduate with PGDCA OR DOEACC A Level Certificate. The suggested qualification is the minimum criteria. However, higher qualifications will also be acceptable.	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 of Jan. 01 (year)) Age relaxation to be provided as per Govt. rules

Vocational Teachers/Trainers form the backbone of Vocational Education, which is imparted as an integral part of Rashtriya Madhyamik Shiksha Abhiyan (RMSA). They are directly involved in teaching 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:

(i) Directly as per the prescribed qualifications and industry experience suggested by the PSS Central Institute of Vocational Education(PSSCIVE), NCERT or the respective Sector Skill Council(SSC).
OR
(ii) Through accredited Vocational Training Providers accredited under the National Quality Assurance Framework (NQAF*) approved by the National Skill Qualification Committee on 21.07.2016. If the State is engaging Vocational Teachers/Trainers through the Vocational Training Provider (VTP), it should ensure that VTP should have been accredited at NQAF Level 2 or higher.

* The National Quality Assurance Framework (NQAF) provides the benchmarks or quality criteria which the different organisations involved in education and training must meet in order to be accredited by competent bodies to provide government- funded education and training/skills activities. This is applicable to all organizations offering NSQF-compliant qualifications.

The educational qualifications required for being a Vocational Teacher/Trainer for a particular job role are clearly mentioned in the curriculum for the particular NSQF compliant job role. The State should ensure that teachers / trainers deployed in the schools have relevant technical competencies for the NSQF qualification being delivered. The Vocational Teachers/Trainers preferably should be certified by the concerned Sector Skill Council for the particular Qualification Pack/Job role which he will be teaching. Copies of relevant certificates and/or record of experience of the teacher/trainer in the industry should be kept as record.

To ensure the quality of the Vocational Teachers/Trainers, the State should ensure that a standardized procedure for selection of Vocational Teachers/Trainers is followed. The selection procedure should consist of the following:

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

In case of appointment through VTPs, the selection may be done based on the above procedure by a committee having representatives of both the State Government and the VTP. The State should ensure that the Vocational Teachers/ Trainers who are recruited should undergo induction training of 20 days for understanding the scheme, NSQF framework and Vocational Pedagogy before being deployed in the schools.

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

The HeadMaster/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 grade 9 or grade 10;
- 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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