केन्द्रीय विद्यालय संगठन

Kendriya Vidyalaya Sangathan

कृत्रिम बुद्धिमता

ARTIFICIAL INTELLIGENCE

कक्षा/Class: IX

2024-25

विद्यार्थी अध्ययन सामग्री

Student Support Material

संदेश

विद्यालयी शिक्षा में शैक्षिक उत्कृष्टता प्राप्त करना केन्द्रीय विद्यालय संगठन की सर्वोच्च वरीयता है। हमारे विद्यार्थी, शिक्षक एवं शैक्षिक नेतृत्व कर्ता निरंतर उन्नति हेतु प्रयासरत रहते हैं। राष्ट्रीय शिक्षा नीति 2020 के संदर्भ में योग्यता आधारित अधिगम एवं मूल्यांकन संबन्धित उद्देश्यों को प्राप्त करना तथा सीबीएसई के दिशा निर्देशों का पालन, वर्तमान में इस प्रयास को और भी चुनौतीपूर्ण बनाता है।

केन्द्रीय विद्यालय संगठन के पांचों **आंचलिक शिक्षा एवं प्रशिक्षण संस्थान** द्वारा संकलित यह 'विद्यार्थी सहायक सामग्री' इसी दिशा में एक आवश्यक कदम है । यह सहायक सामग्री कक्षा 9 से 12 के विद्यार्थियों के लिए सभी महत्वपूर्ण विषयों पर तैयार की गयी है । केन्द्रीय विद्यालय संगठन की 'विद्यार्थी सहायक सामग्री' अपनी गुणवत्ता एवं परीक्षा संबंधी सामग्री-संकलन की विशेषज्ञता के लिए जानी जाती है और अन्य शिक्षण संस्थान भी इसका उपयोग परीक्षा संबंधी पठन सामग्री की तरह करते रहे हैं । शुभ-आशा एवं विश्वास है कि यह सहायक सामग्री विद्यार्थियों की सहयोगी बनकर सतत मार्गदर्शन करते हुए उन्हें सफलता के लक्ष्य तक पहुंचाएगी ।

शुभाकांक्षा सहित ।

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Table of Content

CBSE | DEPARTMENT OF SKILL

EDUCATION CURRICULUM FOR SESSION 2024-2025

ARTIFICIAL INTELLIGENCE (SUB. CODE 417)

CLASS – IX

OBJECTIVES OF THE COURSE:

The objective of this module/**curriculum,** which combines both Inspire and Acquire **modules,** is to develop a readiness for understanding and appreciating Artificial Intelligence and its application in our lives. This module/curriculum focuses on:

1. Helping learners understand the world of Artificial Intelligence and its applications through games, activities and multi-sensorial learning to become AI-Ready.
2. Introducing the learners to three domains of AI in an age-appropriate manner.
3. Allowing the learners to construct the meaning of AI through interactive participation and engaging hands-on activities.
4. Revisiting AI domains, project cycle and Ethics
5. Introducing the learners to the importance of Math for AI, data literacy and generative AI
6. Introducing the learners to programming skills - Basic python coding language.

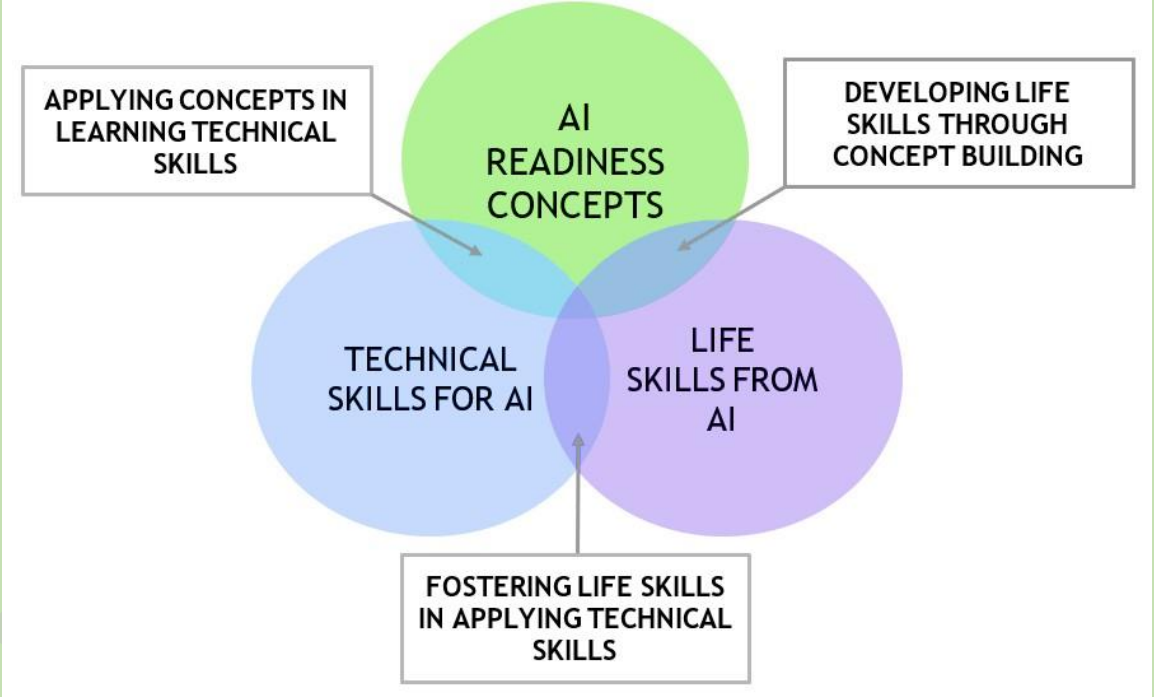
LEARNING OUTCOMES:

Learners will be able to:

1. Identify and appreciate Artificial Intelligence and describe its applications in daily life.
2. Relate, apply and reflect on Human-Machine Interactions to identify and interact with the three domains of AI: Data, Computer Vision and Natural Language Processing and Undergo assessment for analyzing their progress towards acquiring AI-Readiness skills.
3. Imagine, examine and reflect on the skills required for **a** futuristic job opportunity.
4. Unleash their imagination towards smart homes and build an interactive story around it.
5. Understand the impact of Artificial Intelligence on Sustainable Development Goals to develop responsible citizenship.
6. Research and develop awareness of **the** skills required for jobs **in** the future.
7. Gain awareness about AI bias and AI access and describe the potential ethical considerations of AI.

8. Develop effective communication and collaborative work skills.
9. Get familiar with and motivated towards Artificial Intelligence and Identify the AI Project Cycle framework.
10. 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.
11. Brainstorm on the ethical issues involved around the problem selected.
12. 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.
13. Use various types of graphs to visualize the acquired data.
14. Understand the types of modeling.
15. Understand the importance of Math for AI.
16. Learn the concept of data literacy and generative AI
17. Acquire introductory Python programming skills in a very user-friendly format.

SKILLS TO BE DEVELOPED:



SCHEME OF STUDIES:

This course is a planned sequence of instructions consisting of units meant for developing the employability and vocational competencies of students of Class IX opting for skill **subjects** along with other education subjects.

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

ARTIFICIAL INTELLIGENCE
(SUBJECT CODE 417)
CLASS – IX (SESSION 2024-2025)

Total Marks: 100 (Theory-50 + Practical-50)

	UNITS	NO. OF HOURS for Theory and Practical		MAX. MARKS for Theory and Practical
PART A	**Employability Skills**			
	Unit 1: Communication Skills-I	10		2
	Unit 2: Self-Management Skills-I	10		2
	Unit 3: ICT Skills-I	10		2
	Unit 4: Entrepreneurial Skills-I	15		2
	Unit 5: Green Skills-I	05		2
	Total	**50**		**10**
PART B	**Subject Specific Skills**			
		Theory	**Practical**	
	Unit 1: AI Reflection, Project Cycle and Ethics	30	25	10
	Unit 2: Data Literacy	22	28	10
	Unit 3: Math for AI (Statistics & Probability)	12	13	07
	Unit 4: Introduction to Generative AI	08	12	05
	Unit 5: Introduction to Python	01	09	08
	Total	**160**		**40**
PART C	**Practical Work**			
	Unit 5: Introduction to Python **Practical File (minimum 15 programs)**			15
	Practical Examination • Simple programs using input and output function • Variables, Arithmetic Operators, Expressions, Data Types • Flow of control and conditions • Lists **** Any 3 programs based on the above topics***			15
	Viva Voce			5
	Total			**35**
PART D	**Project Work / Field Visit / Student Portfolio** **** relate it to Sustainable Development Goals***			15
	Total			**15**

	GRAND TOTAL	**210**	**100**

DETAILED CURRICULUM/TOPICS FOR CLASS IX:

PART-A: EMPLOYABILITY SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills-I	10
2.	Unit 2: Self-management Skills-I	10
3.	Unit 3: Information and Communication Technology Skills-I	10
4.	Unit 4: Entrepreneurial Skills-I	15
5.	Unit 5: Green Skills-I	05
	TOTAL	**50**

NOTE: Detailed curriculum/ topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

PART-B – SUBJECT SPECIFIC SKILLS

- Unit 1: AI Reflection, Project Cycle and Ethics
- Unit 2: Data Literacy
- Unit 3: Math for AI (Statistics & Probability)
- Unit 4: Introduction to Generative AI
- Unit 5: Introduction to Python

UNIT 1: AI REFLECTION, PROJECT CYCLE AND ETHICS

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
AI Reflection	To identify and appreciate Artificial Intelligence and describe its applications in daily life.	Session: Introduction to AI and setting up the context of the curriculum
		• Recommended Activity: Make a statement about lighting and LUIS will interpret and adjust the house accordingly https://aidemos.microsoft.com/luis/demo

	To recognize, engage and relate with the three realms of AI: , Computer Vision, Data Statistics and Natural Language Processing.	Recommended Activity: The AI Game ● Learners to participate in three games based on different AI domains. – Game 1: Rock, Paper and Scissors (based on data) https://next.rockpaperscissors.ai/ – Game 2: Semantris (based on Natural Language Processing - NLP) https://research.google.com/semantris/ – Game 3: Quick Draw (based on Computer Vision - CV) https://quickdraw.withgoogle.com/
SUB-UNIT	**LEARNING OUTCOMES**	**SESSION / ACTIVITY / PRACTICAL**
AI PROJECT CYCLE	Identify the AI Project Cycle framework.	Session: Introduction to AI Project Cycle ● Problem Scoping ● Data Acquisition ● Data Exploration ● Modeling ● Evaluation ● Deployment
	Learn problem scoping and ways to set goals for an AI project.	Session: Problem Scoping Activity: Brainstorm around the theme provided and set a goal for the AI project. ● Discuss various topics within the given theme and select one. ● Fill in the 4Ws problem canvas and a problem statement to learn more about the problem identified in the community/ society ● List down/ Draw a mind map of problems related to the selected topic and choose one problem to be the goal for the project.
	Identify stakeholders involved in the problem scoped. Brainstorm on the ethical issues involved around the problem selected.	● Activity: To set actions around the goal. ● List down the stakeholders involved in the problem. ● Search on the current actions taken to solve this problem. ● Think around the ethics involved in the goal of your project.
	Understand the iterative nature of problem scoping for in the AI project cycle. Foresee the kind of data required and the kind of analysis to be done.	Activity: Data and Analysis ● What are the data features needed? ● How will the features collected affect the problem? ● Where can you get the data? ● How frequent do you have to collect the data? ● What happens if you don't have enough data? ● What kind of analysis needs to be done? ● How will it be validated? ● How does the analysis inform the action?

	Share what the students have discussed so far.	Presentation: Presenting the goal, actions and data. Teamwork Activity: ● Brainstorming solutions for the problem statement.
	Identify data requirements and find reliable sources to obtain relevant data.	Session: Data Acquisition Activity: Introduction to data and its types. ● Students work around the scenarios given to them and think of ways to acquire data. Activity: Data Features ● Identifying the possible data features affecting the problem. Activity: System Maps ● Creating system maps considering data features identified.

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
	To understand the purpose of Data Visualisation	Session: Data Exploration/ Data Visualisation ● Need of visualising data ● Ways to visualise data using various types of graphical tools. Quiz Time
	Use various types of graphs to visualise acquired data.	Recommended Activities: Let's use Graphical Tools ● Selecting an appropriate graphical format and presenting the graph sketched. ● Understanding graphs using https://datavizcatalogue.com/ ● Listing of newly learnt data visualization techniques. ● Top 10 Song Prediction: Identify the data features, collect the data and convert into graphical representation. ● Collect and store data in a spreadsheet and create some graphical representations to understand the data effectively.
	Understand modeling (Rule-based & Learning-based)	Session: Modeling ● Introduction to modeling and types of models (Rule-based & Learning-based)
	Understand various evaluation techniques.	Session: Evaluation Learners will understand about new terms ● True Positive ● False Positive ● True Negative ● False Negative
	Challenge students to think about how they can apply their knowledge of deployment in future AI projects and encourage them to continue exploring different deployment methods.	Session: Deployment Recommended Case Study: Preventable Blindness. Activity: Implementation of AI project cycle to develop an AI Model for Personalized Education.
	To understand and reflect on the ethical issues around AI.	Session: Ethics Video Session: Discussing about AI Ethics Recommended Activity: Ethics Awareness ● Students play the role of major stakeholders, and they have to decide what is ethical and what is not for a given scenario. ● Students to explore Moral Machine (https://www.moralmachine.net/) to understand more about the impact of ethical concerns
	To gain awareness around AI bias and AI access.	Session: AI Bias and AI Access ● Discussing about the possible bias in data collection ● Discussing about the implications of AI technology

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
	To let the students analyse the advantages and disadvantages of Artificial Intelligence.	Recommended Activity: Balloon Debate ● Students divide in teams of 3 and 2 teams are given same theme. One team goes in affirmation to AI for their section while the other one goes against it. ● They have to come up with their points as to why AI is beneficial/ harmful for the society.

UNIT 2: DATA LITERACY:

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
Basics of data literacy	● Define data literacy and recognize its importance Understand how data literacy enables informed decision-making and critical thinking ● Apply the Data Literacy Process Framework to analyze and interpret data effectively ● Differentiate between Data Privacy and Security ● Identify potential risks associated with data breaches and unauthorized access. ● Learn measures to protect data privacy and enhance data security	Session: Basics of data literacy ● Introduction to Data Literacy ● Impact of data Literacy ● How to become Data Literate? ● What are data security and privacy? How are they related to AI? ● Best Practices for Cyber Security Recommended Activity: Impact of News Articles Reference Videos: ● https://www.youtube.com/watch?v=yhO_t-c3yJY ● https://www.youtube.com/watch?v=aO858HyFbKI ● https://www.cbse.gov.in/cbsenew/documents/Cyber%20Safety.pdf
Acquiring Data, Processing, and Interpreting Data	● Determine the best methods to acquire data. ● Classify different types of data and enlist different methodologies to acquire it. ● Define and describe data interpretation. ● Enlist and explain the different methods of data interpretation. ● Recognize the types of data interpretation. ● Realize the importance of data interpretation	Session: Acquiring Data, Processing, and Interpreting Data ● Types of data ● Data Acquisition/Acquiring Data ● Best Practices for Acquiring Data ● Features of data and Data Preprocessing ● Data Processing and Data Interpretation ● Types of Data Interpretation ● Importance of Data Interpretation Recommended Activities: ● Trend analysis ● Visualize and Interpret Data

Project Interactive Data Dashboard & Presentation	● Recognize the importance of data visualization ● Discover different methods of data visualization	Session: Project Interactive Data Dashboard & Presentation ● Data visualization Using Tableau Reference Links ● https://public.tableau.com/en-us/s/download ● https://www.datawrapper.de/ Video Links: ● https://www.youtube.com/watch?v=NLCzpPRCc7U ● https://www.youtube.com/watch?v= M8BnosAD78

UNIT 3: MATH FOR AI (Statistics & Probability)

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
Importance of Math for AI	Analyzing the data in the form of numbers/images and find the relation/pattern between the them. Use of Math in AI.	Session: Importance of Math for AI ● Finding Patterns in Numbers and images. ● Uses of Math - ○ Statistics ○ Linear Algebra ○ Probability ○ Calculus
	Number Patterns Picture Analogy	Activity: ● observe the number pattern and find the missing number. ● To find connections between sets of images and use that to solve problems,
Statistics	Understand the concept of Statistics in real life.	Session : ● Definition of Statistics ● Applications ○ Disaster Management ○ Sports ○ Diseases Prediction ○ Weather Forecast
	Application in various real life scenarios	Activity: Uses of Statistics in daily life ● Students will explore the applications of statistics in real life .They collect data and can apply various statistical measures to analyze the data. Activity:Car Spotting and Tabulating Purpose:To implement the concept of data collection , analysis and interpretation. Activity Introduction: ● In this activity, Students will be engaged in data collection and tabulation. ● Data collection plays a key role in Artificial Intelligence as it forms the basis of statistics and interpretation by AI. ● This activity will also require students to answer a set of questions based on the recorded data.

Probability	Understand the concept of Probability in real life and explore various types of events.	Session: Introduction to Probability ● How to calculate the probability of an event ● Types of events ● understand the concept of Probability using a relatable example. Exercise: Identify the type of event.
	Application in various real life scenarios	Session : Applications of Probability ● Sports ● Weather Forecast ● Traffic Estimation Exercise: Revision time

UNIT 4: INTRODUCTION TO GENERATIVE AI:

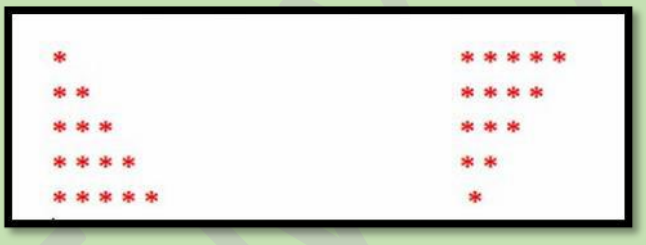
LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
Students will be able to define Generative AI & classify different kinds.	Recommended Activity: ● Activity: Guess the Real Image vs. the AI-generated image
● Students will be able to explain how Generative AI works and recognize how it learns. ● Applying Generative AI tools to create content. ● Understanding the ethical considerations of using Generative AI.	Session: ● Introduction to Generative AI ● Generative AI vs Conventional AI
	Session: ● Types of Generative AI ● Examples of Generative AI
	Session: ● Benefits of using Generative AI ● Limitations of using Generative AI
	Recommended Activities: ● Hands-on Activity: GAN Paint ● Generative AI tools
	Session: ● Ethical considerations of using Generative AI

UNIT 5: INTRODUCTION TO PYTHON:

LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
Learn basic programming skills through gamified platforms.	Recommended Activity: ● Introduction to programming using Online Gaming portals like Code Combat.
Acquire introductory Python programming skills in a very user-friendly format.	Session: ● Introduction to Python language ● Introducing python programming and its applications

	Theory + Practical: Python Basics ● Students go through lessons on Python Basics (Variables, Arithmetic Operators, Expressions, Comparison Operators, logical operators, Assignment Operators, Data Types - integer, float, strings, type conversion, using print() and input() functions) ● Students will try some simple problem-solving exercises on Python Compiler.
	Practical: Flow of control and conditions 1. Students go through lessons on conditional and iterative statements (if, for and while) 2. Students will try some basic problem-solving exercises using conditional and iterative statements on Python Compiler.
	Practical: Python Lists 3. Students go through lessons on Python Lists (Simple operations using list) 4. Students will try some basic problem-solving exercises using lists on Python Compiler.

PART-C: PRACTICAL WORK

UNIT 5: INTRODUCTION TO PYTHON: Suggested Program List	
PRINT	● To print personal information like Name, Father's Name, Class, School Name. ● To print the following patterns using multiple print commands-  ● To find square of number 7 ● To find the sum of two numbers 15 and 20. ● To convert length given in kilometers into meters. ● To print the table of 5 up to five terms. ● To calculate Simple Interest if the principle_amount = 2000 rate_of_interest = 4.5 time = 10
INPUT	● To calculate Area and Perimeter of a rectangle ● To calculate Area of a triangle with Base and Height ● To calculating average marks of 3 subjects ● To calculate discounted amount with discount % ● To calculate Surface Area and Volume of a Cuboid

LIST	● Create a list in Python of children selected for science quiz with following names- Arjun, Sonakshi, Vikram, Sandhya, Sonal, Isha, Kartik Perform the following tasks on the list in sequence- ○ Print the whole list ○ Delete the name “Vikram” from the list ○ Add the name “Jay” at the end ○ Remove the item which is at the second position. ● Create a list num=[23,12,5,9,65,44] ○ print the length of the list ○ print the elements from second to fourth position using positive indexing ○ print the elements from position third to fifth using negative indexing ● Create a list of first 10 even numbers, add 1 to each list item and print the final list. ● Create a list List_1=[10,20,30,40]. Add the elements [14,15,12] using extend function. Now sort the final list in ascending order and print it.
IF, FOR, WHILE	● Program to check if a person can vote ● To check the grade of a student ● Input a number and check if the number is positive, negative or zero and display an appropriate message ● To print first 10 natural numbers ● To print first 10 even numbers ● To print odd numbers from 1 to n ● To print sum of first 10 natural numbers ● Program to find the sum of all numbers stored in a list

PART-A: EMPLOYABILITY SKILLS

UNIT-1 COMMUNICATION SKILLS

- Communication skills are those skills which are needed to speak and write properly.
- One should have the ability to listen carefully, write and speak clearly in any situation.
- Listening, Speaking Reading and Writing skills are essential for effective communication.
- The word 'Communication' comes from the Latin word commūnicāre, meaning 'to share'.
- Communication is a two-way exchange of information, i.e., giving and receiving.
- Speaking and writing to someone are examples of giving information.
- Reading and listening to someone are examples of receiving information. (Repetition)

Elements of communication

Sender: Communication is a two-way exchange of information, i.e., giving and receiving (Fig. 1.2). Speaking and writing to someone are examples of giving information. Reading and listening to someone are examples of receiving information.

Message: The subject matter of communication is termed as messages. It includes ideas, feelings, suggestions, order, etc., which a sender wants to convey to the receiver.

Encoding: The process of converting messages into communication symbols, which may be understood by the receiver. It includes words, pictures, body language **gestures,** symbols, etc. Encoding translates the internal thought of the sender into a language which can be understandable.

Channel: The path, channel or medium through which encoded message is transmitted to the receiver is known as media. It is the carrier of the message. It can be in written form, face to face, through telephone, letter, internet, etc.

Decoding: The process of translating the encoded message into an effective language, which can be understood by the receiver is known as decoding. In this, the encoded symbols of the sender are converted.

Receiver: The person who receives the message of the sender is known as the receiver. E.g., Students are receivers in the classroom.

Factors affecting perspectives in communication

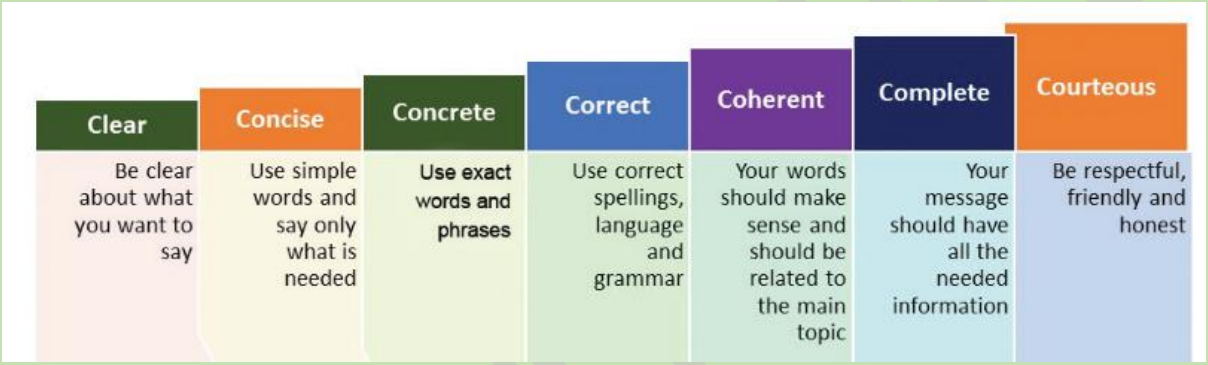
Sometimes, we are not able to communicate clearly because of barriers that stop us from sharing and understanding messages. Some of these are

Factor	How the factor can become a barrier
Language	In case of use of incorrect words, unfamiliar language and lack of detail, language can act as a barrier to communicate what one wishes to convey. For example, language can act as a barrier when an Indian who only knows Hindi and a Chinese who has the knowledge of Mandarin only wants to interact with each other.
Visual perception	Visual perception is the brain's ability to make sense of what we see through our eyes. For example, completing partially drawn pictures with visual perception whereas they may be something else.
Past experiences	Letting our earlier experience stop us from understanding or communicating clearly. For example, "This shopkeeper cheated me last time. Let me be careful or "I scored low marks in my Maths exam, so I am scared to ask and answer questions in class."
Prejudices	Fixed ideas, such as thinking "No one in my class likes me.
Feelings	Our feelings and emotions, such as lack of interest or not trusting the other person affect communication. For example "I am not feeling well, therefore, I don't want to talk."
Environment	Noise or disturbance in the surroundings may make communication difficult. Example, talking to a friend in a function where there is loud music being played by the orchestra.

Personal Factors	Personal factors include your own feelings, habits and ways of thinking. For example, fear, and low confidence may make communication difficult.
Culture	Signs' which have a different meaning in different cultures, such as showing a thumb may mean 'good job' done for some people but may be insulting to others.

Basic principles of professional communication skills.

These can be abbreviated as 7 Cs, i.e., Clear, Concise, Concrete, Correct, Coherent, Complete and Courteous.



Different Methods of Communication

There are different methods of communication, which include non-verbal, verbal and visual.

- **Verbal Communication**
- ✔ Verbal communication is the sharing of information by using words.
- ✔ It is what most people use as a method of communication.

Type of Verbal Communication

Oral or Spoken Communication: Communication which involves talking

Examples:

- Face-to-face conversation
- Talking on a phone
- Classroom teaching, business discussion and public speeches

Written Communication: Communication which involves written or typed words.

Examples: Writing letters, notes, email, etc

Advantages of verbal communication

- ✔ Verbal communication is easy and quick
- ✔ Effectively convey the message
- ✔ Fastest mode of Communication
- ✔ Useful for illiterates

Disadvantages:

- ✔ Less creative
- ✔ Require attention throughout
- ✔ Increases the chance of mistakes

Non-Verbal Communication

- ✔ Non-verbal communication is the message we send to others without using any words
- ✔ Non-verbal communication makes our message stronger.
- ✔ Using the right gestures while speaking makes our message more effective.
- ✔ Knowing non-verbal communication helps us understand our audience's reaction and adjust our behaviour or communication accordingly.

Types of Non-verbal communications

Type	What it implies	How to make use of non-verbal communication effectively?
Facial Expression	**A facial expression, many a time,** shows the feelings of a person. For example, when we are happy, we express it through a smile or when we are sad we show a gloomy face.	Keep your face relaxed • Try to match your expression with what you are saying • If you agree with something, you may nod while listening, which indicates that it has your assent
Posture	Postures are positions of the body. They show our confidence and feelings. For example, straight body posture is seen as confidence. Holding your head may be taken as tiredness.	• Keep your upper body relaxed and, shoulders straight • Sit straight, rest hands and feet in relaxed position • Keep hands by your sides while standing

Gestures or Body Language	Gestures describe movements of parts of the body, especially hands or head, to express an idea or meaning. This includes waving, pointing and using our hands **while** speaking. For example, raising a hand may mean asking a question. Biting nails show nervousness.	• Avoid pointing at people with your finger • Instead of keeping your hands in pocket while talking, try to keep your hands on the sides • Bend your head a little while talking or listening to show that you are paying attention.
Touch	We communicate a great deal through our touch, such as shaking hands and patting on the back. For example, a firm handshake shows confidence. Sports coaches pat on the back of the players to encourage the players.	• Shake hands firmly • Avoid other touch gestures, such as stroking your hair, scratching your nose, tugging on your clothes, etc., during **communication.**
Space	The space between two persons while communicating, generally depends on the intimacy or closeness between them.	• Maintain proper space' depending on the relationship, which could be formal or informal or the closeness with the person with whom you are talking
Eye Contact	Maintaining an eye contact with the person you are talking, indicates interest, whereas, looking away can make the other person feel ignored.	• Look at the person who is speaking • Keep a relaxed, pleasant look • Break the look every few seconds

Paralanguage	Paralanguage is the tone of our voice, speed and volume that makes a difference in the meaning of the communication. Speaking too fast may show excitement or nervousness. Speaking too slow may show seriousness, sadness or making a point.	• Use a proper tone and volume while speaking • Maintain a moderate rate (speed) of talking

Visual communication

Another important method of communication is visual communication, which involves sending and understanding messages only through images or pictures.
The main advantage of this type of communication is that you do not need to know any particular language for understanding it.

Examples of Visual Communication

- ✔ Traffic symbol which communicates not to blow horn
- ✔ Sign for ladies and gents toilet
- ✔ Sign for flammable substances

Writing Skills

- ✔ Writing skills include all the knowledge and abilities related to expressing ourselves through the written word.
- ✔ It is a sound understanding of language through grammar, spelling and punctuation.
- ✔ People with excellent writing skills can tailor their tone and word choice to different situations and people

Punctuation

It is a set of marks, such as the full stop and the comma, which help us separate parts of a sentence and explain its meaning.

Basic parts of speech

The part of speech indicates how the word functions in meaning as well as grammatically within **a** sentence.

There are eight basic parts of speech in the English language.

- noun,
- pronoun,
- verb,
- adjective,
- adverb,
- preposition,

- conjunction
- interjection.

- Nouns are words that refer to a person, place, thing or idea. These are 'naming words.'
- A pronoun is a word used in place of a noun
- **Adjectives are the words that describe the noun**.
- Verbs are **the** words that show action
- Adverbs are the words that add meaning to verbs, adjectives, or other adverbs. They answer the questions — How? How often? When? And Where?

Articles: The words 'a', 'an' and 'the' are known as articles. Articles are generally used before nouns.
'An' is used before words with a vowel (a, e, i, o, u) sound A is used before nouns with a consonant (all other alphabets) sound 'the' is used to refer to specific or particular words
Conjunctions: Conjunctions are **the** words that join two nouns, phrases or sentences. Some common conjunctions are 'and', 'or' and 'but'.
Prepositions connect one word with another to show the relation between them. They usually answer the questions 'where', 'when' and 'how'.
Sentences: A sentence means a group of words that makes complete sense. It begins with a capital letter and ends with a full stop. It always contains a finite verb. A sentence may be a statement, question, exclamation or command. It consists of a main clause and one or more subordinate clause **also.**

Parts of a sentence

- A **subject** is the person or thing that does an action
- A **verb** describes the action.
- **Object** is the person or thing that receives the action

Examples:

Sentence	**Subject**	**Verb**	**Object**
I ate an apple.	I	ate	an apple.
He cooked dinner.	He	cooked	dinner.
She kicked the football.	She	kicked	the football.

Dia and Sanjay broke the bottle.

Types of sentences

Sentences where the subject does an action are known to be in the Active voice
Sentences in which the subject receives an action are known to be in the Passive voice.

Example:

Active Voice	**Passive Voice**
She wrote a letter.	A letter was written by her.
He opened the door.	The door was opened by him.
Mohan played the flute.	The flute was played by Mohan

Pronunciation Basics

- Correct pronunciation will help us express ourselves in a clear and confident manner.
- It will also help others to understand our words easily.

Types of sounds

All English words are made of three basic types of sounds

Vowels: The English alphabet has five vowels (a, e, i, o and u) but 12 vowel sounds. This means most vowels can be pronounced in different ways. We make a vowel sound when we read a vowel in a word.

Diphthongs (combination sound of two vowels): We make a diphthong sound when we combine two vowels. Diphthongs start as one vowel sound and go to another.

Consonants: A consonant sound is any sound that is neither a vowel nor a diphthong sound.

Multiple Choice Questions (1 mark each)

1. Which of the following methods are used to receive information from the sender through a letter?
   a) Listening
   b) Speaking
   c) Reading
   d) Writing
2. Which of these is a positive (good) facial expression?
   a) Staring hard Smiling
   b) Nodding while listening
   c) Wrinkled forehead
   d) Looking away from the speaker
3. **Which of these sentences use uppercase letters correctly?**
   a) I am Hungry.
   b) Divya and Sunil are reading.
   c) The bucket is Full of water.
   d) She lives in Delhi.
4. The process of converting messages into communication symbols, which may be understood by the receiver is called ----------

(a) Encoding
(b) Decoding
(c) Feedback
(d) compilation

5. Which of these sentences are punctuated correctly?
   a) Where are you going.
   b) I have a pen a notebook and a pencil.
   c) I am so happy to see **you!**
   d) This is Abdul's house.
6. Fill in the blank with correct articles
   He is ---------- University student
   a) the
   b) an
   c) a
   d) None of the above
7. Which of these sentences is in passive voice?
   a) They are watching a movie.
   b) The clock was repaired by Raju.
   c) He is sleeping in the room.
   d) My pet dog bit the postman.
8. Which of the following is NOT an element of communication?
   a) Sender
   b) Message
   c) Receiver
   d) Gateway
9. Sharing of information by using words is a _____ type of communication
   a) Verbal
   b) Non-verbal
   c) Visual
   d) All of the above
10. **Words that describe nouns are called ----------**
   a) Articles
   b) Adverbs
   c) Adjectives
   d) Verbs
11. Which of the following does not **come** under 7Cs of basic principles of communications
   a) Clear
   b) Complete
   c) Correct
   d) Clever
12. --------- is the brain's ability to make sense of what we see through our eyes.
   a) Visual perception

b) Past experiences
c) Feelings
d) Prejudices

13. "Speaking too fast may show excitement or nervousness"- is an example for which type of visual communications?
    a) Poster
    b) Touch
    c) Space
    d) Paralanguage
14. Identify the subject in the sentence, "The children played football."
    a) The children
    b) Children played
    c) Played
    d) Football
15. What are the different types of sounds used in English pronunciation?
    a) Vowel sounds
    b) Diphthong sounds
    c) Consonant sounds
    d) All of the above

ANSWERS:

1) d 2) a 3) d 4) a 5) d 6)c 7) b 8) d 9) a 10) c 11) d 12)a 13) d 14) a 15) d

SHORT ANSWER TYPE QUESTIONS (2 Marks each)

1. What are communication skills?
   Communication skills are those skills which are needed to speak and write properly. One should have the ability to listen carefully and write and speak clearly in any situation.
2. Write down the elements of communications?
   Sender, message, media, encoding, decoding, receiver and feedback
3. Write down the factors affecting perspectives in communication.
   Language, Visual perception, Past experiences, Prejudices, Feelings, Environment, Personal Factors and Culture
4. Explain briefly the 7Cs basic principles of communications
   1. Conciseness
      In formal communication, we should be very careful about the briefness/conciseness of the message. It is always helpful for both the sender and the receiver because it saves their time. Concise messages are helpful in getting the meaning.
   2. Correctness

Correctness means the accuracy of thoughts, figures, and words. If the given information is not correctly conveyed, the sender will lose reliability.

3. Concreteness

While communicating one should be very specific. Concreteness is an important aspect of effective communication. It is about being specific and definite rather than general.

4. Clarity

Clarity is one of the principles of formal communication. Whatever we speak/communicate should have clarity. The idea of the message should be very clear in the mind of the sender.

5. Completeness

Effective communication depends on the completeness of the message. Incomplete messages create ambiguity in the audience.

6. Consideration

It is an act of consideration. While sending a message the sender should look from the angle of the audience. The sender should understand the feelings and emotions of the receivers. It shows that in communication we should consider the audience.

7. Courtesy

Courtesy means polite behaviour. While communicating, everybody should show politeness towards others. It facilitates communication.

5. What are verbal communications? Give one example for oral communications

Verbal communication is the sharing of information by using words. It is what most people use as a method of communication.

Examples:

- *Face-to-face conversation*:
- Talking on a phone
- Classroom teaching, business discussion and public speeches

6. What are the advantages and disadvantages of verbal communications?

Advantages of verbal communication

- Verbal communication is easy and quick
- Effectively convey the message
- Fastest mode of Communication
- Useful for illiterates
- **Disadvantages:**
- Less creative
- Require attention throughout
- Increases the chance of mistakes

7. Define nonverbal communications?

Non-verbal communication is the message we send to others without using any words. Non-verbal communication makes our message stronger. Using the right gestures while speaking makes our message more effective. Knowing non-verbal communication helps us understand our audience's reaction and adjust our behaviour or communication accordingly

8. How to make use of eye contact communication effectively?

Look at the person who is speaking

Keep a relaxed, pleasant look

Break the look every few seconds

9. What are visual communications? Give examples

It is that type of communication, which involves sending and understanding messages only through images or pictures. The main advantage of this type of communication is that you do not need to know any particular language for understanding it.

Examples of Visual Communication

- Traffic symbol which communicates not to blow horn
- Sign for ladies and gents toilet
- Sign for flammable substances

10. What are conjunctions? Give examples

Conjunctions are words that join two nouns, phrases or sentences. Some common conjunctions are 'and', 'or' and 'but'.

11. Explain the different parts of a sentence

A sentence means a group of words that makes complete sense. It begins with a capital letter and ends with a full stop. It always contains a finite verb. A sentence may be a statement, question, exclamation or command. It consists of a main clause and one or more subordinate clauses.

Parts of a sentence

- A subject is the person or thing that does an action
- A verb describes the action.
- Object is the person or thing that receives the action

12. Do convert the following active voice in to passive voice.

a. She wrote a letter.
   A letter was written by her.
b. He opened the door.
   The door was opened by him.

13. Explain any two non-verbal communications.

Posture: Postures are positions of the body. They show our confidence and feelings.

For example, straight body posture is seen as confidence.

Gestures or Body Language: Gestures describe movements of parts of the body, especially hands or head, to express an idea or meaning. This includes waving, pointing and using our hands when speaking. For example, raising a hand may mean asking a question.

14. What is the importance of writing skills in communications?

Writing skills include all the knowledge and abilities related to expressing ourselves through the written word. It is a sound understanding of language through grammar, spelling and punctuation. People with excellent writing skills can tailor their tone and word choice to different situations and people.

15. What are the different types of sounds of words in English

All English words are made of three basic types of sounds

Vowels: The English alphabet has five vowels (a, e, i, o and u) but 12 vowel sounds. This means most vowels can be pronounced in different ways. We make a vowel sound when we read a vowel in a word.

Diphthongs (combination sound of two vowels): We make a diphthong sound when we combine two vowels. Diphthongs start as one vowel sound and go to another.

Consonants: A consonant sound is any sound that is neither a vowel nor a diphthong sound.

UNIT -2 SELF-MANAGEMENT SKILLS

INTRODUCTION TO SELF-MANAGEMENT

After writing an exam, have you ever felt that you should have studied more? Do you think that you could manageyour hobbies, interests, and studies better if you could manage your time well?

Self-management involves understanding yourself, understanding what your interests and abilities are, having a positive attitude and grooming yourself in order to develop self-confidence

Self-management can also help in:

- Developing good habits
- Overcoming bad habits
- Reaching your goals
- Overcoming challenges and difficulties being able to manage yourself helps you
- To avoid stress and provides opportunities to
- Get involved in fun activities.
- Self-management skills include the following:

Fig. 2.2: Self-awareness

Self-awareness
Knowing yourself as an individual – your values, likes, dislikes, strengths and weaknesses

Fig. 2.3: Self-control

Self-control
Ability to control your behaviour, discipline, etc.

Fig. 2.4: Self-confidence

Self-confidence
Believing in yourself that you can do any task that is given to you and not scared of taking risks

Fig. 2.5: Problem Solving

Problem solving
Understanding a problem and finding a solution using step-by-step method

Fig. 2.6: Self-motivation

Self-motivation
Doing tasks on your own without any external motivation


Fig. 2.7: Hygiene and grooming

Personal hygiene and grooming
Keeping oneself clean, healthy and smart

Fig. 2.8: Positive Thinking

Positive thinking
Expressing certainty or affirmation even in tough situations

Fig. 2.9: Teamwork

Team work
Working together with people to accomplish shared goals.

Fig. 2.10: Time management

Time management
Achieving tasks on time and according the plan

Fig. 2.11: Goal setting

Goal setting
Planning concrete goals to be accomplished within a set timeframe.

STRENGTH AND WEAKNESS ANALYSIS

Have you ever wondered why you get good marks in one subject and not so good in another subject? Knowing what you do well or not so well, will help you in converting your weaknesses into strengths and strengths into an exceptional performance. The strength and weakness analysis help you in this process. Strength and weakness analysis begin with knowing yourself first.

Knowing yourself

It means understanding who you are, what you like, what you do not like, what are your beliefs, what are your opinions, what is your background, what you do well and what you do not do well? It is important to know who you are, because only then can you measure your strengths and weaknesses

Strength and weakness analysis

Being 'self-aware' or understanding 'Who am I?' means looking outside our usual characteristics, such as our name, qualifications, and the relationship we have with others. It actually means knowing our inner strengths, hidden talents, skills and even weaknesses. Let us look at what could be our strengths and weaknesses.

Q.	Answer the given questions on Self-Management Skills (1 Mark each)	
1.	Dima believes that she can do any task and she is not afraid to take risks. This shows that she is_____ a) Self-motivated b) Self-aware c) Self-confident d) Self-regulated	1
2.	If you know yourself as an individual – your values, likes, dislikes, and weaknesses. It means that you are _____ a) Self-confident b) Self-controlled c) Self-motivated d) Self-aware	1
3.	_____ also known as "areas of improvement" are what we do not do well and are not good at. a) Weaknesses b) Strengths c) Abilities d) Interests	1
4.	_____ are the things that we enjoy doing. a) Weaknesses b) Strengths c) Abilities d) Interests	1
5.	_____ is an acquired or natural capacity that enables an individual to perform a particular task with considerable proficiency. a) Weaknesses b) Strengths c) Abilities d) Interests	1
6.	Aman is doing a project. To retain positive attitude, he should _____ a) Appreciate the good in others b) Observe and understand c) Constantly improving d) All the above	1
7.	Danish gets feedback on his project work from his class teacher. Which of these options demonstrates positive attitude in this situation a) Danish ignores the feedback b) Danish takes the feedback but doesn't use it c) Danish says others that the teacher is wrong d) Danish learns from the feedback and makes the project a better one.	1

8.	When you are under _____ for a prolonged period, it can cause health problems and mental issues as well. a) Stress b) Discipline c) Timeliness d) Goal – Setting	1
9.	_____ is the ability to plan and control how you spend the hours of your day well and do all that you want to do. a) Stress Management b) Time Management c) Goal Setting d) None of the above	1
10.	Physical exercise is used as a stress management technique because a) It improves blood circulation b) improves self-image c) make us feel better d) All of the above	1
11.	The feeling of self-awareness enhances our..... a) Self-confidence b) Self-monitoring c) Self-Regulation d) All of the above	1
12.	What is 'M' in the 'SMART' goal setting method? a) Must b) Meaning c) Measurable d) None of these	1
13.	Write Full form of 'SMART' a) Special, Method, Active, Rate, Time b) Specific, Measurable, Achievable, Relevant, Time-bound c) Specific, Active, Method, Relevant, Time-bound d) None of the above	1
14.	Staying with the current situation with new updated information and preparing yourself for new challenges is called _____. a) Responsibility b) Adaptability c) Time management d) Self-awareness	1
15.	Which of the following can be considered as external motivation? a) Reward b) Appreciations c) Recognition d) All of the above	1

SECTION B: SUBJECTIVE TYPE QUESTIONS

Q.	Answer the given questions on Self-Management skills (2 Marks each)	
1.	What do you mean by self-management skills?	2
2.	Write a short note on any of the four self-management skills.	2
3.	How can one build self-confidence?	2
4.	What is the importance of positive thinking?	2
5.	How personal hygiene is essential in one's life?	2
6.	What do you mean by self-grooming?	2
7.	What are the differences between interests and abilities?	2
8.	What are the factors that decrease our self-confidence?	2
9.	Define Goal setting.	2
10.	Describe stress and stress management in your own words.	2
11.	Write four steps of Self-motivation.	2
12.	Write the four steps for effective Time management.	2
13.	Write four qualities of those people who work independently.	2
14.	Write three steps to manage emotional intelligence.	2
15.	How self – management skills can help us?	2

ANSWERS

Q.	Answer the given questions on Self-Management Skills (1 Mark each)	
1.	c) Self-confident	1
2.	d) Self-aware	1
3.	a) Weaknesses	1
4.	d) Interests	1
5.	c) Abilities	1
6.	d) All of the above	1
7.	d) Danish learns from the feedback and makes the project a better one	1
8.	a) Stress	1
9.	b) Time Management	1
10.	d) All of the above	1
11.	a) Self-confidence	1
12.	c) Measurable	1
13.	b) Specific, Measurable, Achievable, Relevant, Time-bound	1
14.	c) Adaptability	1
15.	d) All of the above	1

Q.	Answer the given questions on Self-Management skills (2 Marks each)	
1.	Your ability to regulate and control your actions, feelings and thoughts is referred to as self-management skills. It also helps to achieve personal and academic goals.	
2.	Self-awareness – Ability to understand your values, strengths, weaknesses, likes, dislikes, etc. Self Confidence – Believe in yourself and don't be scared to take risks. Problem solving – Understanding a problem and finding the solution. Positive thinking – Expressing certainty or affirmation even in tough situations.	
3.	Following are the steps to build self-confidence: i.Appreciate achievements and accept failures ii.Set a goal and try to achieve it iii.Always focus on the positive side and maintain a positive outlook.	

4.	Positive thinking helps to be successful in life because it helps one to achieve the goal without worrying about the negative side. Positive thinking produces positive outcomes such as overcoming challenges, accepting failures etc.	
5.	Personal hygiene is very important in our life as it creates a good image of ourselves among others. It helps us to stay healthy and carry out our duties efficiently and effectively. It also improves our self-confidence.	
6.	Self-grooming is the act of making oneself appear neat, orderly and smart. It makes a good impression and improves our self-confidence.	
7.	Interests are the things that we enjoy doing, ability is the acquired or natural capacity that enables an individual to perform a particular task with considerable proficiency.	
8.	Some of the factors that decrease self-confidence are: i.Thinking of failure ii.Thinking of incapability iii.Anxiety iv.Negativity thoughts	
9.	Goal setting is a process that helps a person to decide what he wants to achieve in life. This will help them to decide where to put their efforts to achieve that goal. After deciding the goal or aim of life one can easily go through the process of achieving it. This gives them the motivation to work hard.	
10.	Stress is our emotional, mental, physical and social reaction to any perceived demands or threats. Stress Management is about planning to be able to cope effectively with daily pressures. You must make a suitable plan for your daily life routine so that it would not put hard pressure on you. If you are not able to manage the increasing pressure that will lead to stress. Our main goal is to maintain a balance between life, work, relationships, relaxation and fun. By doing this, we can manage stress-related problems in our daily life.	
11.	Four steps of Self-motivation are: i) Find out your strengths. ii) Focus on your goals. iii)Develop a plan to achieve your goals. iv)Stay loyal to your goals.	
12.	Four Steps for Effective Time Management are: a. Organize: We should plan our day-to-day activities. b. Prioritize: We should make our to-do-list c. Control: We should have control over our activities and time. d. Track: We should identify and note where we have spent our time.	

13.	Four qualities are: i.They are self-aware, self-monitored and self-correcting. ii.They take the initiative rather than being told what to do. iii.They could learn continuously. iv.They recognize their own mistakes.	
14.	Three steps to manage emotional intelligence are: i) Understand your emotions: Observe your behavior and then work on the things you need to improve. ii) Rationalize: Do not take decisions abruptly; be rational in your thinking. iii) Practice: Do meditation and yoga to keep yourself calm.	
15.	Self-management can help in the following areas: - i.Reaching your goals ii.Developing good habits iii.Overcoming challenges and difficulties iv.Overcoming bad habits	

UNIT-3 ENTERPRENEURIAL SKILLS

ENTREPRENEUR: Business is an economic activity for profit entities or non-profit organisations, which relates to the continuous and regular production and distribution of goods and services for satisfying the needs of humans and society.

When there is a gap between what is needed and is available, some people take this as an opportunity, manage risks and fill the gap by providing necessary products and services. Such people are entrepreneurs. Therefore, an entrepreneur is a self-employed person, willing to take a calculated risk and bring in a new idea to start a business. All self-employed persons are not entrepreneurs, as they need to put in their ideas to run a business.

ENTREPRENEURSHIP: It is defined as the process of developing a business plan, launching and running a business using innovation to meet customer needs and to make a profit.

ENTERPRISE: An enterprise is a project or undertaking that fulfils the need of society, which no one has ever addressed.

QUALITIES OF A SUCCESSFUL ENTREPRENEUR:

1. **Patience:** Success may not be achieved quickly and therefore, it is important for an entrepreneur to be patient in running the business.
2. **Positivity:** An entrepreneur has to think positively even when they take a big risk, face lots of difficulties and failures. Stay positive and continue to work hard, towards the goal even if there are losses at times.
3. **Hardworking, Never Giving Up and Perseverance:** Every new business goes through failures and therefore, an entrepreneur needs to work hard till it becomes successful, to meet their own and company's goals.
4. **Confidence:** An entrepreneur needs to be very confident and take decisions about their business. An entrepreneur needs to communicate confidently with the customers too.
5. **Open to Trial and Error**: An Entrepreneur needs to be open to new ideas and try them without fear of failure. They will have to use trial and error and experiment with different ideas to allow the improved product or service for the customer and help the business grow, and become successful.
6. **Creativity and Innovation:** An entrepreneur should be able to see a problem from different perspectives and come up with original and creative solutions recognising an opportunity in a problem and finding an innovative solution.

ROLE OF ENTREPRENEURSHIP:

1. Economic Development—Money in Circulation: More and more entrepreneurs create business opportunities, investors put money into their businesses and expect good returns. Entrepreneurs make cheaper products and services for customers, hence, the economy grows.

2. Social Development—Creation of Jobs: If a small business started by an entrepreneur becomes successful and grows, the entrepreneur expands the business. As the business grows, more work needs to be completed and it creates more jobs. Good quality jobs lead to more people earning money and having a good life.

3. Improved Standard of Living— More things available to live a comfortable life: When entrepreneurs sell products, it helps people live a more comfortable life.

4. Optimal Use of Resources: Entrepreneurs keep working on various natural resources present around us, renewable and non-renewable, to find the most optimal ways of using the resources to reduce costs and increase their profits.

5. More Benefits at Lower Prices Products and Services at Competitive Prices: As entrepreneurs compete in the market, prices of products come down.

CHARACTERISTICS OF ENTREPRENEURSHIP:

1. Ability to take up risks
2. Believe in hard work and discipline
3. Adaptable and flexible to achieve the goals of enhancing quality and customer satisfaction
4. Knowledge of the product and services and their need or demand in the market
5. Financial literacy and money management skills
6. Effective planning and execution.

POSITIVE IMPACT OF ENTREPRENEURSHIP ON SOCIETY:

- Emphasizes on economic Growth
- Fosters Creativity
- Stimulates Innovation and Efficiency
- Creates Jobs and Employment Opportunities
- Solves the problems of the society
- Encourages welfare of the society

Entrepreneurship also creates some adverse impact on society at times like:

- environmental degradation
- trade imbalance
- labour exploitation etc.

ROLE OF SOCIETY IN BOOSTING ENTREPRENEURSHIP:

- Creates needs and demands
- Provides raw materials
- Enables financial support
- Creates a need for education
- Catalyses policy formation and reform
- Facilitates networking
- Supports infrastructure development

MYTH ABOUT ENTREPRENEURSHIP:

a) Entrepreneurs are born, not made: It is an assumption that entrepreneurial qualities are inborn and that only people with certain natural talents can become entrepreneurs. Anyone can be an entrepreneur with the right skills, drive and passion.

b) It takes a lot of money to start a business: Certain amount of capital is required to take a business off the ground, and it varies depending on the business. Start with resources available and grow slowly and steadily.

c) Entrepreneurs take risk: Entrepreneurs take calculated risks and weigh risk versus reward. They do not necessarily put themselves in high-risk situations.

d) Businesses either skyrocket or fail

e) Great ideas are what makes entrepreneurs: They take existing ideas to make a business out of it. People who are able to execute the idea and turn it into a business are referred to as entrepreneurial.

f) One must know everything before starting a business: Entrepreneurs continuously learn. How fast one learns, matters.

g) Every business idea needs to be unique or special.

h) Only a person having a big business is an entrepreneur.

BENEFITS OF ENTREPRENEURSHIP:

- Do as per your interests: Do something using your hobbies and skills.
- Work for yourself, and not for others: Decide the kind of work to do and how to do it.
- Make profits for yourself: Decide how much money to earn and how to earn it.
- More risk, more profit: Decide on how much risk to take. The larger the risk, the bigger is the profit.

TYPES OF BUSINESS ACTIVITIES:

There can be three types of business activities:

- Product business
- Service business
- Hybrid business

Product business: A business where a seller and buyer exchange an item, which can be seen and touched, is called a product-based business. For example, a Textile Shop, Sports Shop etc.

Service business: A business where a seller helps the buyer to finish some work. For example, a cricket coaching center.

Hybrid business : A hybrid is the one where the business is doing both selling product and selling services.

Product Business	Service Business
Product can be seen and touched and customer pays for physical exchange of things.	Service cannot be seen or touched, hence, customer pays for an experience.
A product can be made and stored in a shop or a warehouse.	A service, cannot be stored, but provided to customers when they ask for it.

A product can be made at home or in a factory and then is transported to different places where shopkeepers sell it.	A service cannot be made or transported, but given to the customer at the time of delivery.
The quality and quantity of the product will be the same every time.	The quality and quantity of a service can be different at different times.

There are two types of product-based businesses:

(i) Manufacturing businesses: These are the businesses that make a product and sell it. Products are usually made in factories.

(ii) Trade businesses: These businesses buy and sell a product, transport the product from the factory to warehouses and then finally to shops near the customers. Examples of these businesses include wholesalers, distributors and retail shops.

ENTREPRENEURSHIP DEVELOPMENT PROCESS:

Entrepreneurship development is the process of improving the skills and knowledge of entrepreneurs.

It can take place through formal and informal learning system. In the formal learning system, training programmes are conducted to bring about awareness, knowledge and skills related to entrepreneurship.

Steps of starting a business:

1) Idea: The first step is to come up with a business idea. A business idea could be based on

(a) One's interest in doing

(b) A need that is seen in the market

2) Getting money and material: Start on a small scale with some money which will help in buying basic material.

3) Understanding customer needs: Once we start selling, we will find out what our customer likes and dislikes, what they want.

4) Improving Product/ service: Use this knowledge to know the customer likes and dislikes to improve the product.

ENTREPRENEURSHIP AS A CAREER OPTION

A career is a line of work that a person takes for life. There are two ways a person can earn a living.

- self-employment
- wage employment

Self-employed people are those who start businesses to satisfy the needs of people.

Wage employed people are people who work for a person or an organization and get paid for that work.

WAGE EMPLOYMENT

In wage employment, there are two parties:

(i) employer
(ii) employee

The wage employment does not involve too much risk but entrepreneurship involves taking certain amount of calculated risks. However, the continuity of the service in case of wage employment depends on the terms and conditions laid down in the contract between the two parties and also on the relationship between the employer and the employee.

A person who becomes an entrepreneur goes through a career process as given below:

1) **ENTER:** When an entrepreneur is starting, they are just entering the market to do business.
2) **SURVIVE:** There are many entrepreneurs in the market. The entrepreneur has to remain in a Competitive market.
3) **GROW:** Once the business is stable, an entrepreneur thinks about expanding his or her business.

Entrepreneurship as a career option:

1. Nurtures development of entrepreneurial skills and capabilities
2. Enables the application of an entrepreneurial mind-set
3. Develops the ability to handle failure and ambiguity
4. Enhances critical thinking and problem-solving ability

5. Provides early exposure to the real world
6. Inspires to think about one's career differently
7. Leads to create a difference in society

Entrepreneurship as a career option leads to:
• Entrepreneurs create products, services, companies and even industries.
• New Entrepreneurial venture creation includes launching a company, buying a business,
• Taking a franchise, starting a new venture in a family business.
• Join existing Entrepreneurial ventures as a working/investing partner.

• Enter partnership with start-ups, small business, educational ventures, research,
• Development sector, corporate Entrepreneur or strategic Entrepreneurial unit etc.
• Work with traditional companies as support/service provider.
• In a new start-up they draw up a business plan and decide a career path, source funds for the project from both private and government lenders, decide location suitable for the business and lease space, form a team of workers/partners and formerly launch a company.

1 MARK QUESTIONS:

1. _____ is the type of employment where one is running a business to satisfy the needs of people and looking for ways to make the business better.

a. Entrepreneurship
b. Entrepreneur
c. Business plan
d. entrepreneurism

2. Successful entrepreneurs have the _____ abilities.
a. They are confident
b. They keep trying new ideas
c. They are creative
d. All of the above

3. An _____ is a person who is self – employed, is willing to take a calculated risk, and brings in a new idea to start a business.
a. Software Engineer
b. Entrepreneur
c. Civil Engineer
d. Mechanical Engineer

4. The process of developing a business plan, launching and running a business using innovation to meet customer needs and to make a profit is the function of an _____.

a. Software Engineer
b. Entrepreneur

c. Civil Engineer
d. Mechanical Engineer

5. A self-employed person who is always trying to make his/her business better by taking risks and trying new ideas is an _____.

a. Business Man
b. Entrepreneur
c. Employer
d. None of the above

6. What do entrepreneurs do when she/he runs their business?

a. Fulfil Customer Needs
b. Use Local Materials
c. Create Jobs
d. All of the above

7. When a person begins a business, he or she may encounter several challenges and failures. Even while taking a significant risk, an entrepreneur must think _____.

a. Positively
b. Negatively
c. Both a) and b)
d. None of the above

8. It is necessary for an entrepreneur to continuously _____ towards his/her own and company's goals.

a. Work Hard
b. Always take rest
c. Not participate actively
d. None of the above

9. Entrepreneurs need to be open to _____and try them without fear of failure.

a. Invest all of money
b. New Ideas
c. Both a) and b)
d. None of the above

10. Experimenting with many ideas is a quality related to _____.

a. Perseverance

b. Confidence
c. Creativity
d. Trial and error

11. An entrepreneur should be able to see a problem from different perspectives and come up with original and_____.
a. Creative Solutions

b. New Ideas
c. Both a) and b)
d. None of the above

12. An entrepreneur should be willing to take a _____ and is always open to new ideas to make his/her business grow.
a. Satisfying human need
b. Product and Service
c. Calculated Risk
d. Regular Production

13. Ravi's customer comes to his store and starts shouting at him. He does not get angry. He listens to what his customer is saying. He is _____.
a. Hardworking
b. Confident
c. Patient
d. Prying new ideas

14. Susheela decides to sell her company tyres in Sri Lanka. It does not sell and she has a loss. She apologizes to the people who work for her. She says she will plan better next time. She _____.
a. takes responsibility for your mistakes
b. thinks before deciding
c. does not give up
d. is creative

15. A myth, or a misconception about entrepreneurship is _____.
a. To start a business we required lot of money
b. Business should be unique or special
c. entrepreneurs are born, not made
d. All of the above

ANSWERS
1 a 2 d 3 b 4 b 5 b 6 d 7 a 8 a 9 b 10 d 11 c 12 c 13 c 14 a 15 d

B. DESCRIPTIVE QUESTIONS

2 MARK QUESTIONS:

1. What do you mean by Entrepreneur?

Ans: Entrepreneurs are people with vision who recognize and pursue opportunity, create and establish business or new ventures, consider the risk involved by using available resources.

2. Explain any two roles of entrepreneurs?

Ans. **Innovator's Role:** Entrepreneurs innovate by bringing unique and new products and services into the market.

Risk assumption role: Entrepreneurs are not risk aversive and they realize that taking risks is a part of business.

Employment Generation role: Entrepreneur solves the problem of unemployment by generating jobs and employing people.

3. List any two qualities of an entrepreneur.

Ans. 1) They are confident. They believe in themselves and their abilities.
2) They keep trying new ideas in their business.
3) They are patient.
4) They are creative and think differently about business ideas.
5) They take responsibility for their actions.
6) They make decisions after thinking about them.
7) They work hard.
8) They do not give up when they face a difficulty.
9) Optimism, energetic, perseverant etc.

4. What do you think are the important functions of an entrepreneur? Write your answer giving suitable examples.

Ans. • **Making Decisions:** An entrepreneur makes decisions every day. This includes what to produce or sell, how much and where to sell.

• **Managing the Business:** An entrepreneur plans the future of their business by arranging for raw material, hires people for work, and instructing everyone what to do. They also check if the plan is being followed.

• **Divide Income:** The entrepreneur divides the business money into many groups and spends money to buy material, pays rent of the building and salaries to people.

• **Taking Risk:** Risk is the chance of something going wrong. An entrepreneur takes risks against fires, lost items and theft.

• **Create a new Method, Idea, or Product:** An entrepreneur is always trying new things to increase their importance and income.

5. **What do entrepreneurs do when they run their business? (Or) List the ways in which an entrepreneur affects a society.**

Ans. **a. Fulfil Customer Needs –** Entrepreneurs discover what people demand i.e. a product or service that people want is referred to as demand.
b. Use Local Materials – Entrepreneurs produce low-cost items by using the materials and people available to them.

c. Help Society – Entrepreneurs have a good interaction with the general public. They gain money by doing things that help society.
d. Create Jobs – They buy more material, also hire more people to work for them. Hence, more people get jobs.
e. Sharing of Wealth – As entrepreneurs grow their business, wealth increases i.e. gain enough money to live a comfortable life.
f. Lower Price of Products – The price of a product decreases when more entrepreneurs sell the same thing.

6. How do entrepreneurs contribute to society?
Ans. A business person, apart from making money for themselves, also help the society in many ways financially and socially. They contribute in form of donations, sponsorship, welfare programs, advisors to respective government, etc.

7. State any two benefits of Entrepreneurs to society.
Ans. a) Entrepreneurs provide new job opportunities
b) Entrepreneurs increase competition & boost productivity
c) Entrepreneurs create new business & new markets.
d) Entrepreneurs add national income.
e) Entrepreneurs introduce innovative technology and low cost products

8. "Entrepreneurs are born, not made." Do you agree with this statement? Justify your answer.

Ans. No, this is a myth/misconception about entrepreneurship.
Being an entrepreneur starts with a way of thinking. One must believe that anything is possible and it shall be achieved. It starts with thinking of an idea that one want to work on, making it different.

9. What is the difference between a businessman and an entrepreneur?
Ans. A businessman walks on the defined path, but an entrepreneur believes in making his own path, which becomes a guideline.

10. What do you mean by Entrepreneurship?
Ans: Entrepreneurship deals with organizing an enterprise to undertake a new production process, raising capital, arranging labour and raw materials, etc.

11. What do you mean by business plan?
Ans. A business plan is a document that thoroughly explains a business idea and how it will be carried out. It defines in detail a company's objectives and how it plans to achieve its goals.

12. List any difference between wage employed and self-employed people.
Ans. Wage employed people are people who work for a person or an organization and get paid for that work.
Self-employed people are those who start businesses to satisfy the needs of people.

13. How Entrepreneurship is helpful to society? Explain.
Ans: **a) Helps in Wealth creation and sharing:** By establishing Business entity, entrepreneurs invest their own resources and attract capital from investors, lenders and the public.
b) Creating Employment Opportunities jobs: Entrepreneurs are by nature and definition job creators, as opposed to job seekers.

c) Innovation: Entrepreneurs use businesses to create products and services that solve problems in innovative ways. There products and services must be functional and they must be designed to be cost effective.
d) Balanced Regional Development: Entrepreneurs setting up new businesses and industrial units help with regional development by locating in less developed and backward areas.
e) Improves Standards of Living of People: Entrepreneurs play a vital role in increasing the standard of living in a community - by creating jobs, developing and adopting innovation that led to improvement in the quality of life of their employees, customers and other stakeholders in the community, increase in the standard of living in a community and raising economic development.

14. Write on Entrepreneurship as career option.
Ans: a) Nurtures development of entrepreneurial skills and capabilities.
b) Develops the ability to handle failure and ambiguity.
c) Enhances critical thinking and problem-solving ability
d) Provides early exposure to the real world
e) Leads to creating difference in society
f) Inspires to think about one's career differently

15. Write any four Functions of entrepreneurship?
Ans. Planning, organizing, decision making, managing, innovating, risk bearing, etc.

INTRODUCTION TO ICT

Information can be recorded or stored in many ways. It can be hand-written on paper, typed using a typewriter or a computer and so on. When information is stored and recorded on electronic devices, it takes on a 'digital' form. ICT devices are tablet, smartphones and laptops' as shown in Figure 3.1. As a student you should be able to identify and understand the functions of the main components of a typical information and/or communication system as well as the functions.

ICT at Workplace

ICT has become part of our workplace in all sectors of economy, right from carrying out money transactions through the online banking system to development of textbooks or research papers in educational institutions. At workplace, we use different computer software and applications to complete tasks like making documents, calculations, tables, graphs, etc. We can also use applications to do every day work, like buying things, booking train or bus tickets, Internet banking and making online payments. Modern ICT employs a variety of media forms, which includes text, graphics, animation, audio and video, etc.

It also involves creating, curating, managing images and documents; gathering and processing data and presenting them; working with audio and video tools to create media rich communications, etc. Therefore, employees are expected to possess a sound knowledge of all these to work independently on various software and computers.

ICT at Home

These days most of the people uses television for entertainment and phones for calling up other people. New devices, such as smartphones with an Internet connection are now being used to stay connected with family and friends on a regular basis through social media networks, such as Facebook, Instagram and Twitter. We use computers and mobile phones for talking to each other, sending and receiving information, watching videos and news, listening to music and playing games. You can visit the following sites and know about the ICT activities which are being carried out in various sectors

Smartphones

Mobile phones are ICT tools for talking to people but smartphones are more advanced. With a simple mobile phone you can only make phone calls and receive calls. With a smartphone (Figure 3.3), you can make calls and do things that you normally do using a computer, such as browsing the web, sending e-mails, making video calls, playing games, listening to music, watching movies and much more.

Smartphones are also called mobile phones as you can use them anywhere — at home, in office or on the road (Figure 3.4). They do not need a telephone line. They use wireless (mobile) networks to make calls and to connect to the Internet. Some of the popular operating systems for smartphones are Android OS, Apple iOS and Windows Mobile.

For some activities, such as reading a book for a long time, the screen of a mobile may be too small. For such activities, we can use a tablet

A tablet is a mini computer with input, output and processing functions that are all combined into one 'touchscreen', where you can do various tasks just by touching its screen. It is bigger than a smartphone and you can perform all the functions that one can perform on a computer or a smartphone.

ICT TOOLS: SMARTPHONES AND TABLETS — II

To operate your smartphone, you need to know about basic controls and functions and their uses.

Mobile Device Layout

Some of the basic controls you see on mobile device are as follows:

- Power button: This is used to start and shut down a mobile device.
- Screen: A screen on which we perform functions by touching with our fingers.
- Back button: You use the Back Button to go back to the previous screen in an application.
- Microphone: This is present at the bottom of the mobile and we speak into the microphone when we talk to someone.
  Menu button: This is used to show the options available in a particular app. This may not be present in all mobile devices.
- Home button: This brings you back to the Home Screen from wherever you are in your mobile, whether you are on another page

- or using an App.
- Earpiece: This helps you to listen to voice calls.
- Volume button: This helps you to increase or reduce the sound of your mobile

Basic Features of a Mobile Device

	**Bluetooth:** This is a short-range wireless technology which helps you connect with other devices that are within 30 feet of where you are. Once connected, you can send messages and songs.
	**Chargeable Battery:** This is a portable power pack which can be recharged. It allows you to use the device anywhere.
	**Wi-Fi:** This is a wireless network technology that helps you connect to the local area network. This is used to connect to the Internet and work with e-mails, social media and anything to do which requires internet.
	**Touch Screen:** The output display of a mobile device is a touch screen. This helps you to run apps and type anything into the mobile by simply touching different areas of the screen with your finger.
	**Camera:** Smartphones and Tablet have a front and back camera to capture pictures and videos.
	**Clock:** Every mobile device has a clock which can be set according to the time in your country.
	**Cellular network connectivity:** This provides the network through which you can make calls.
	**Global Positioning System:** It is a navigation (direction finding) system that helps you to navigate, find direction and maps to specific locations.

PARTS OF A COMPUTER AND PERIPHERALS

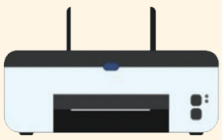
Parts of a computer

A computer system is a programmable machine designed to store and retrieve information and perform arithmetic and logical operations to produce meaningful results in desired format. It consists of three main units: Input Unit, Central Processing Unit (CPU) and Output Unit. Different computers have different ways in which the input, processing and output units are connected. In desktop computers, as shown in Figure, all three units are separate devices. It has:

(i) a keyboard, which is the input unit,

(ii) a box with the Central Processing Unit, which is the processing unit and
(iii) a monitor, which is the output unit. Input unit helps the user to enter raw data and instructions into the computer system, central processing
unit performs the required operations

Common Peripheral Devices

			
Keyboard: It is used to provide input to the computer on what to do, which could be in the form of typed letters, numbers, and symbols.	**Mouse**: We use it to go to different parts of the screen on the monitor.	**Microphone** : It is used to record voice on the computer, and communicat e.	**Projector**: It is used to project images or video from computer on a screen.
			
Monitor: It displays all the visual output that CPU produces after processing the input.	**Speakers**: It plays back all the sound-based output.	**Scanner**: It is a device that scans/ captures a paper image, document and converts it to digital file on computer.	**Printer**: It helps to print out the visual output on the paper, as displayed on the monitor.

Other peripheral devices and their functions

In large retail stores, a peripheral device commonly found is the barcode reader or barcode scanner. It is used for recording the items purchased in order to create the receipt/bill. In offices and homes, we

use a peripheral device known as scanner, and it is used to convert the information on a paper document into a digital information document.

Central Processing Unit

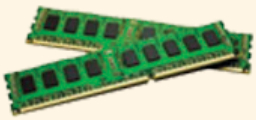
The Central Processing Unit (CPU) of the computer as shown in Figure 3.13, is like our brain. How does our brain work? Our eyes see (input) a mathematical problem and sends the details to the brain. The brain thinks (processes) and gets the result while the hand writes it on paper (output). In a similar way, the CPU also processes information received from the keyboard and gives the output to the monitor or the printer. Just as our brain can understand arithmetic and logical information, the CPU can also solve mathematical and logical problems.

There are 3 main parts of the CPU.

- **Control unit:** It acts like a receiver and a manager of a company. It receives inputs from user and controls different parts to do the operations required.
- **Processing unit:** It acts as an accountant of a company and performs all the mathematical and logical calculations.
- **Memory unit:** It acts as the storage room of a company, where data is stored temporarily (RAM) as well as for a long time (ROM).

Understanding RAM and ROM

Let us take the example of a kitchen to understand the meaning of RAM and ROM. If you are a cook, what would you keep on the kitchen counter? And what would you store away in the kitchen shelves? Well, all the things you need immediately and regularly will be on the counter. And things that you do not access often will be in the shelves. Random Access Memory (RAM) is like the kitchen counter to a computer that is switched on, and Read Only Memory (ROM) is like the storage shelf. Flash memory is usually an external device which is a mix of both RAM and ROM. Some key differences between various storage devices are given in Table

RAM	ROM	Flash Memory
		

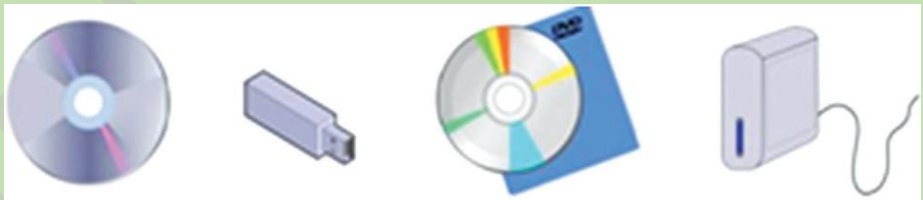
• When you are doing tasks on your computer, you use RAM	• Permanently stores information	• Can permanently store information
• Temporarily stores information • Information is lost when computer is switched off • Information can be changed easily.	• Information is stored when computer is off • Information cannot be changed easily • It is mainly used when starting the computer.	• Information is not lost when computer is switched off • Information can be changed on easily. It is mainly used in removable storage devices (like USB), and its usage is based on user's needs.

Motherboard

Motherboard, also referred to as a system board, is the main circuit board inside a computer. It connects input, processing and output devices. Some other important parts of a computer system are storage devices, ports and connections.

Storage devices

In order to transfer files from one computer to another one, you need smaller storage devices which you can carry easily from one place to another. These storage devices are used to store digital information. The commonly used storage devices are USB flash drive, hard disk, CD, DVD, etc., as shown in Figure.



Compact Disc USB Flash Drive DVD External Hard Disk

Storage Devices

They mainly differ in their storage capacity (how much data they can store).

You may have heard of a computer with data storage capacity of 500 MB or 2GB. What does that mean? Data is stored in the form of bits and bytes. Bit (Binary Digit, represented by 0 or 1) is the smallest storage unit. Eight bits combined together form a byte, which in turn represents a character (numerals/letters/symbols).

- 8 bits make a byte and 1024 bytes make a kilobyte (KB).
- 1024 KB make 1 megabyte (MB)

- 1024 megabyte make 1 gigabyte (GB)
- 1024 gigabyte make 1 terabyte (TB)

  Very simply, more the number of bytes, larger and more number of files can be stored.

Ports and connections

How do you think we connect our keyboard or mouse to the CPU? We do it with the help of wires. Where do you think the wires go in the CPU? The slots or channels into which we connect the mouse/keyboard/external hard disk wires are called ports. Thus, ports help us connect input, output and storage devices in a computer system.

There are several types of ports that you can use to connect a computer to an external devices and networks. These are:

- Universal serial bus or the USB port which connects peripheral devices, such as a mouse or a keyboard or a printer to a computer using the cable.
- Display port which connects the monitor, or any display unit, to the computer using the cable. These can be of different types, like Video Graphics Array (VGA) and High Definition Multimedia Interface (HDMI), depending on the requirement.
- Audio ports help to connect microphone, speakers, and headphones to a computer system. Often, the speaker and headphone port is called the line out port,

i.e., it is meant for sound output.

- Ethernet port is used for connecting the system to high speed Internet cable.
- Power port is used for connecting the computer system to the power supply.

		
USB Port	*RGB Display port(Left) and HDMI port (Right)*	*Audio Ports*
		
Ethernet Port	*Power port*	

Write short answers for the following: (2 marks each)

1. Define ICT and explain its importance in modern education.

2. Differentiate between hardware and software, giving examples of each.

3. Explain the concept of a file extension and give an example.

4. Describe the function of an operating system (OS) in a computer system.

5. What is the purpose of a web browser? Provide examples of popular web browsers.

6. Define RAM (Random Access Memory) and explain its role in a computer system.

7. What is a search engine, and how does it work? Provide an example of a popular search engine.

8. Describe the purpose of data backup in ICT.

9. Explain the concept of cloud computing and its advantages.

10. Define cyber security and list three common cyber security threats.

11. What is the role of an IP address in internet communication?

12. Explain the concept of encryption and its importance in data security.

13. Define ICT and provide examples of its components.

14. Describe the difference between application software and system software.

15. Mention two uses of ICT at home

ANSWERS:

1. Define ICT and explain its importance in modern education.
Answer: ICT stands for Information and Communication Technology. It encompasses technologies used to manage and communicate information and includes hardware, software, networks, and media. In education, ICT enhances learning through access to resources, collaboration tools, and interactive learning platforms.

2. Differentiate between hardware and software, giving examples of each.

Answer: Hardware refers to physical components of a computer system that you can touch, such as CPU, monitor, keyboard, and printer. Software refers to programs and applications that run on a computer, like operating systems (e.g., Windows), word processors (e.g., Microsoft Word), and web browsers (e.g., Google Chrome).

3. Explain the concept of a file extension and give an example.

Answer: A file extension is a suffix added to the end of a filename, indicating the format or type of data stored in the file. For example, ".docx" indicates a Microsoft Word document, and ".jpg" indicates a JPEG image file.

4. Describe the function of an operating system (OS) in a computer system.

Answer: An operating system manages computer hardware and software resources and provides common services for computer programs. It facilitates communication between software and hardware, manages memory and files, and provides a user interface for interaction.

5. What is the purpose of a web browser? Provide examples of popular web browsers.

Answer: A web browser is used to access and view websites on the World Wide Web. Examples include Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari.

6. Define RAM (Random Access Memory) and explain its role in a computer system.

Answer: RAM is a type of volatile memory that temporarily stores data and instructions that the CPU needs to perform tasks. It allows for quick access to data but loses its contents when the computer is turned off.

7. What is a search engine, and how does it work? Provide an example of a popular search engine.

Answer: A search engine is a web-based tool that allows users to search for information on the internet by entering keywords or phrases. Examples include Google Search, Bing, Yahoo Search, and DuckDuckGo. Search engines use algorithms to retrieve relevant web pages based on the user's query.

8. Describe the purpose of data backup in ICT.

Answer: Data backup involves creating copies of important data to protect against data loss due to hardware failure, human error, or cyber-attacks. It ensures that data can be restored in case of accidental deletion or system failure.

9. Explain the concept of cloud computing and its advantages.

Answer: Cloud computing refers to the delivery of computing services over the internet, including storage, processing power, and software applications. Advantages include scalability, cost-efficiency, accessibility from anywhere with internet access, and automatic updates and maintenance by the service provider.

10. Define cybersecurity and list three common cybersecurity threats.

Answer: Cybersecurity involves protecting computer systems, networks, and data from cyber threats. Common threats include malware (e.g., viruses, ransomware), phishing attacks, data breaches, and denial-of-service (DoS) attacks.

11. What is the role of an IP address in internet communication?

Answer: An IP address (Internet Protocol address) is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication. It uniquely identifies devices and allows them to communicate with each other over a network.

12. Explain the concept of encryption and its importance in data security.

Answer: Encryption is the process of converting plain text or data into a coded form (cipher text) that cannot be easily understood by unauthorized users. It ensures data confidentiality and protects sensitive information from unauthorized access or interception during transmission.

13. Define ICT and provide examples of its components.

Answer: ICT (Information and Communication Technology) refers to technologies used to manage, process, and communicate information. Components include hardware (e.g., computers, smartphones), software (e.g., operating systems, applications), networks (e.g., LAN, WAN), and the internet.

14. Describe the difference between application software and system software.

Answer: Application software performs specific tasks for users (e.g., word processing, web browsing), while system software manages and supports computer hardware and software (e.g., operating systems, device drivers).

16. Mention two uses of ICT at home

Two uses of ICT at home

A. Smartphones with internet connections for staying connected with friends and family through social media

ICT can contribute to universal access to education, equity in education, quality learning, and teaching to students at home. Other than students, ICT is also helpful for elders in texting messages, gathering information on various topics, etc.

SOCIETY AND ENVIRONMENT

People live together in villages, cities, states and countries, thus forming a 'Society'. Society interacts with the environment, and changes it at the same time. The interaction of the society with the environment sometimes affects the ecological balance in the environment. With the increase in population and economic activities, people's interference with nature has started destroying the environment. The industrial development and intensive agriculture that provides the goods for our increasingly consumer-oriented society uses up large amounts of natural resources, such as water, minerals, petroleum products, wood, etc.

Natural resources

A resource can be defined as any natural or artificial substance, energy or organism, which is used by human being for its welfare. Ever since the earth was inhabited, humans and other life forms have depended on things that exist freely in nature to survive. These things include water, land, soils, rocks, forests, animals, fossil fuels and minerals. They are called natural resources as they are the basis of life on earth. We use these resources to survive and also to function properly. Natural resources can be consumed directly or indirectly. For instance, humans depend directly on forests for food, biomass, health, recreation and increased living comfort.

Non-renewable Resources	Renewable Resources
	
Coal Coal is one of the cheapest sources of fuel.It is used in power houses, factories and houses for cooking and heating.	**Water** Only about 2.5 % of water on earth is fresh water. Energy from rivers is used to make electricity. Energy produced by tides in sea and oceans can also be converted into electricity.
Petroleum It includes petrol, diesel and mineral oils. It is used to run motor vehicles, furnaces and power-houses.	**Sun** Sun's energy can be used to generate electricity. These are used in calculators, street lamps, and even in room heaters and water heaters.

Reduce, Reuse, Recycle

There are three Rs which you can apply for saving the environment – Reduce, Reuse and Recycle. It is a concept of the modern waste management.

Reduce: Do not use what you do not need. If we reduce at source, there is a lesser chance of waste generation and the pressure on our already stretched natural resources is reduced. On an individual level we can reduce the use of unnecessary items while shopping, buy items with minimal packaging, avoid buying disposable items and also avoid asking for plastic carry bags. Use your own reusable cloth or jute bags instead of plastic bags.

Reuse: Reuse the materials for other purposes, such as making pillow covers or rags out of used shirts or ladies suits.

Recycling: Recycling is reusing some components of the waste that may have some economic value. Recycling has readily visible benefits, such as conservation of resources reduction in energy used during manufacture and reducing pollution levels. Some materials, such as aluminium and steel can be recycled many times. Metal, paper, glass and plastics are recyclable. Plastic items are recycled into new plastic products. Kitchen wet waste can be utilised to make compost that can be used as an organic fertiliser. To do this every house should segregate the waste into wet and dry garbage. Wet garbage includes most kitchen wastes, which can be used for preparing vermicompost. Most dry garbage is recyclable. Several technological breakthroughs have recently been made to recover material from industrial waste.

CONSERVING NATURAL RESOURCES

Conservation is the proper management of a natural resource to prevent its exploitation, destruction or degradation. Conservation is the sum total of activities, which can derive benefits from natural resources but at the same time prevent excessive use, which may lead to destruction or degradation. It means using them more efficiently and less wastefully

SUSTAINABLE DEVELOPMENT AND GREEN ECONOMY

What is sustainable development?

Sustainability is the development that satisfies the needs of the present without compromising the capacity. of future generations, guaranteeing the balance between economic growth, care for the environment and social

well-being. Sustainable development is a concept that appeared for the first time in 1987 with the publication of the Brundtland Report, warning of the negative environmental consequences of economic growth and globalisation.

I. Multiple Choice Questions:

1. The Sustainable Development Goals (SDGs) adopted by the United Nation in?

(a) 2015
(b) 2016
(c) 2017
(d) 2018

2. How many goals are there in SDGs?
(a) 15
(b) 16
(c) 17
(d) 18

3. How many countries have signed the SDGs?
(a) 163
(b) 173
(c) 183
(d) 193

4 Rain harvesting is a method of :
(a) soil conservation
(b). air conservation
(c). water conservation
(d). plant conservation

5 Water conservation Plants take in _____ gas that helps reducing air pollution.
(a) NH3
(b) H2
(c) CO2
(d) NO2

6 To protect and conserve the environment we should adopt:
(a) white economy
(b) black economy
(c) red economy
(d) green economy

7 Green Economy - Which of the following is not a natural resource?
(a). Coal
(b). Electricity
(c). Petroleum
(d). Soil

8. What is the 3rd goal of Sustainable Development Goal?
(a) End Poverty
(b) Zero Hunger
(c) Good Health & Well-being
(d) Gender Equality

9. Which of the following is not a feasible option any more to improve agriculture productivity?
(a) Precision farming
(b) Genetically modified seed varieties
(c) Expanding area under agriculture
(d) Using climate – resilient crop varieties

10. AI can change current education models. However, which of the following cannot be substituted by AI?
(a) Grading and assessment
(b) Content creating and content delivery
(c) Accessibility and affordability
(d) Emotional assistance

Answer the following Questions (2mark):
Q1 What is soil conservation?
Answer – Soil conservation means improving the soil fertility by adopting various methods.
1. Maintain the soil using natural fertilizers, adding manure and liquid fertilizer make the soil fertility healthy.
2. Grazing should be allowed only on the specified areas.

3. Reforestation on the open space which can reduce soil erosion.
4. Dividing the slope into several flat areas to control the rapid run of water.

Q2 What is a green economy?

Answer – In 1989 The Government of the United Kingdom introduced the 'Green Economy'. As per the UNEP definition the green economy one that results in reducing environmental risks, ecological scarcities, improved human well-being, ecological scarcities, and social equity.

Q3 What are the components of a Green Economy?

Answer – The Green Economy includes the following components.

· Renewable Energy
· Green Building
· Waste Management
· Water Management
· Land Management
· Well – Managed transportation

Q4 **What is the importance of green economy?**

Answer:

1. It respects planetary boundaries or ecological limits and scarcity of resources.
2. It helps to protect biodiversity and ecosystems.
3. It is resource and energy efficient and it promotes low carbon emissions.
4. It delivers poverty reduction, human well-being, livelihoods, social protection and access to essential services.

Q5 What is climate change?

Answer – Climate change means change in the environmental condition of the earth. Human activities are the largest contribution of climate change and earth temperature by burning fossil fuels, increasing livestock farming, Fertilizers containing nitrogen and cutting down trees.

Q6. How does harmful radiation affect climate change?

Answer – Ozone layer protects earth from harmful radiation from the sun, Ozone layer is made of a gas. Coolants in refrigerators, Air – conditioners and Cleaning chemicals directly affect the Ozone layer. When ozone layer affects the harmful radiation comes to earth and increases health disorders.

Q7. What are natural disasters?

Answer – Natural disasters depend on climate change, when the climate change earthquakes, floods, storms, landslides etc. affect the earth.
To save the earth and environment we need to educate people about the environment, through the environment and for the environment.

Q8 How to save the environment?
Answer – There are three things people need to do to save the environment.
a. **Reduce** – If you manage waste management properly, if you reduce the use of unnecessary products or items, buy items with minimal packaging, avoid buying plastic
bags or plastic products etc.
b. **Reuse** – Always try to reuse waste products in a different way or reprocessing. For
example, making pillow covers you can use old shirts or old ladies' suits.
c. **Recycling** – Reusing some components of the waste that may have some economic
value. Paper, Metal, glass and plastics are recyclable. You can recycle the plastic, metal, glass, and paper products.

Q9 What is energy conservation?
Answer – Conservation of energy means saving the energy and using it efficiently. We
use a lot of non-renewable energy resources for our needs. we have to save them –
1. Use LED bulbs instead of using Tube light or normal bulbs.
2. Switch of fans, TV, lights and other electrical appliances when it is not used.
3. Using a pressure cooker to make food will save energy.
4. Keep the bulb and tubes clean.

Q10 What is Green growth?
Answer – Green growth is an approach for achieving economic growth that is socially
inclusive and environmentally sustainable.
The Indian Government included Green growth in its vision, where 'poverty eradication'
and green growth is the focus point of the green economy.

Q11 What is a green economy?
Answer – In 1989 The Government of the United Kingdom introduced the 'Green Economy'. As per the UNEP definition the green economy one that results in reducing
environmental risks, ecological scarcities, improved human well-being, ecological scarcities, and social equity.
Q12 What are the components of a Green Economy?
Answer – The Green Economy includes the following components.
· Renewable Energy
· Green Building

· Waste Management
· Water Management
· Land Management
· Well – Managed transportation

Q13 **What are Green Jobs?**
Answer – Many companies create jobs to decrease environmental issues due to factories or waste management.
This company required a person to preserve or restore the environment in the natural way that is Green Jobs.

Q14 What are the Green Projects?
Answer – To Save the environment, many organizations are taking initiatives. They are implementing Waste management, Energy conservation, Biofuel use, Green sanitation, Green Building etc.

Q15 Explain 'Affordable and Clean Energy'.
• Using solar power i.e., power generated using the sun does not cause pollution as it does not require burning of non-renewable fuels, such as coal.
• Use of biogas is also an eco-friendly alternative to natural gas.

PART-B: SUBJECT SPECIFIC SKILLS

UNIT-1: AI Reflection, Project Cycle and Ethics

Artificial Intelligence (AI)

Definition:

Artificial intelligence is a technology that enables computers and machines to simulate human intelligence and problem-solving capabilities.

Components of AI:

Data and Algorithm makes a machine Artificially intelligent.

Features of AI:

- Mimics human intelligence
- Solves real-world problems
- Improves on its own from past experiences
- Predicts and make decisions on its own

Applications of AI:

- **Face Lock and Fingerprint Lock** in Smartphones protects user data.
- **Smart assistants** like Apple's Siri and Amazon's Alexa recognize patterns in speech, then infer meaning and provide a useful response.
- **Fraud and Risk Detection** by Banks and Finance companies through customer profiling, past expenditures, and other essential variables to analyse the probabilities of risk and default.
- **Medical Imaging** helps to understand patient's health condition and diseases.

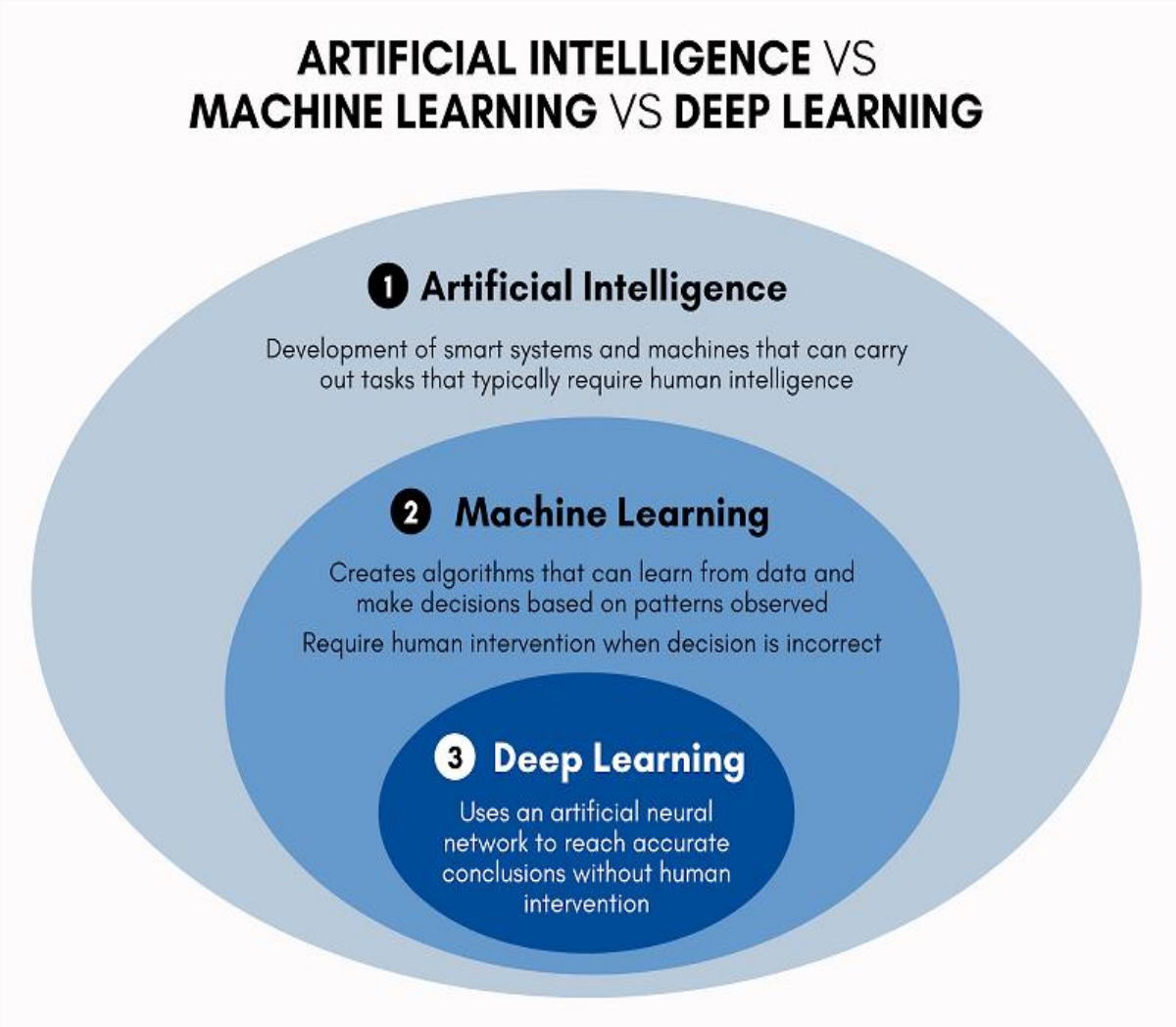
Machine Learning (ML):

Machine learning (ML) is a branch of AI that focuses on the using data and algorithms to enable AI to imitate the human skills of learning and gradually improving its accuracy. Machine learning may dependent on human intervention to learn.

Deep Learning (DL):

Deep learning is a subset of ML that uses multi-layered neural networks to simulate the complex decision-making power of the human brain.

Deep Learning does not need human intervention.



Domains of AI

There are 3 major domains in AI:

Data Science | **Computer Vision** | **Natural Language Processing**

1. Data Sciences (DS)

Data sciences is a domain of AI related to data systems and processes where the system collects numerous data, maintains data sets and derives meaning or sense out of them. The information extracted through data science can be used to make a decision about it.

Application of Data Science:

Price Comparison Websites like PriceGrabber, PriceRunner, Junglee, Shopzilla, DealTime etc.

2. Computer Vision (CV)

Computer Vision is a domain of AI that enables a machine to get and analyse visual information and predicts or decides about it.

The entire process involves image acquiring, screening, analysing, identifying and extracting information from photographs and videos captured through thermal or infrared sensors, indicators or other sources.

Application of Computer Vision:

Self-Driving cars/ Automatic Cars, Face Lock in Smartphones, etc.

3. Natural Language Processing (NLP)

Natural Language Processing is a branch of AI that deals with the interaction between computers and humans using the natural language. NLP attempts to extract information from the spoken and written words using algorithms.

The objective of NLP is to read, decipher, understand, and make sense of the human languages.

Application of Natural Language Processing:

Email filters / Spam filters, Smart assistants like Alexa, Siri etc.

AI Ethics

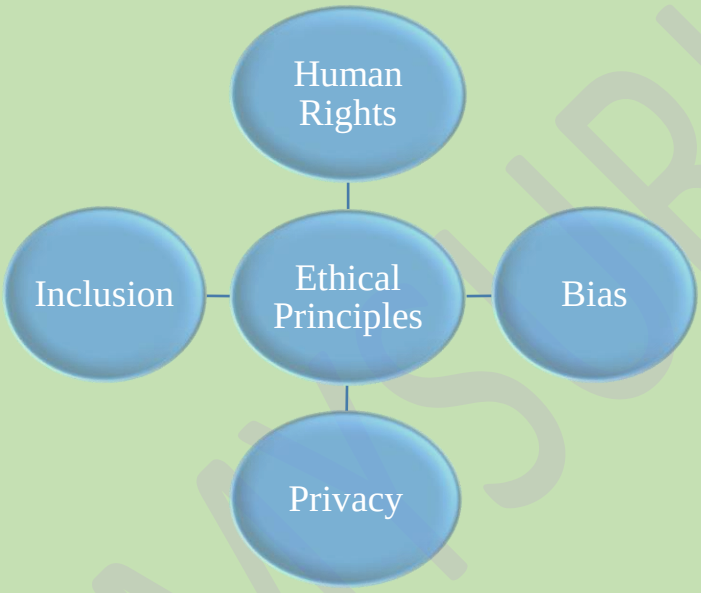
Difference between Morals and Ethics:

Morals	Ethics
▪ The beliefs dictated by our society.	▪ The guiding principles to decide what is good or bad.
▪ Morals are not fixed and can be different for different societies.	▪ These are values that a person themselves chooses for their life.
▪ Examples: ▪ Always speak the truth ▪ Always be loyal ▪ Always be generous	▪ Examples: ▪ Is it good to speak the truth in all situations? ▪ Is it good to be loyal under all circumstances? ▪ Is it necessary to always be generous?

AI Ethics:

Ethical principles need to be applied by the organisations developing and implementing AI Systems regarding the volume and types of data need to be collected from the users in order to provide optimal customised services. The privacy and secrecy of the users needs to be maintained.

Principles in AI Ethics:



- **Human Rights:** The users of AI Systems should not loose personal and financial independence. The must not face any discrimination.

- **Bias:** Bias is said to be the partiality or preference for one over others. AI bias may often come from the collected data which may affect the results. For example, AI should represent all sections of the society and must not exclude anyone.
- **Privacy:** AI Systems should not disclose individual and private data. It should not breach one's safety and security.
- **Inclusion:** AI must discriminate against a particular group of population, causing them any kind of disadvantage.

Ethical scenarios faced while building AI solutions

Scenario 1: If a driverless car finds someone crossing the road, takes a turn to avoid hitting the person and instead smashed the car in a wall / tree nearby

causing serious injury to the passengers, is it a fault in the development on moral ground.

Scenario 2: If any Automated or Driverless Car hits someone standing in the middle of a road, who needs to be held responsible; whom should be penalised.

AI bias

The biased mentality of the developers may result in the presence of bias in the AI System. Bias might not be negative always but it may reflect the social norms and common facts.

Examples of AI Bias:

- All the virtual assistants have a female voice.
- If searching is done for Salons on Google, the resultant list mostly contains female salons.
- Searching for images of Nurse gives the pictures of female nurses mostly.

AI Access

Since AI Systems are emerging technology and expensive, all cannot get access to AI and get benefitted. AI may create unemployment if not implemented carefully and with compassion.

Access of AI to kids must be limited for their effective cognitive development. Smart Assistants can be used for fun, but problem-solving software like ChatGPT should not be used for solving math and science related problems.

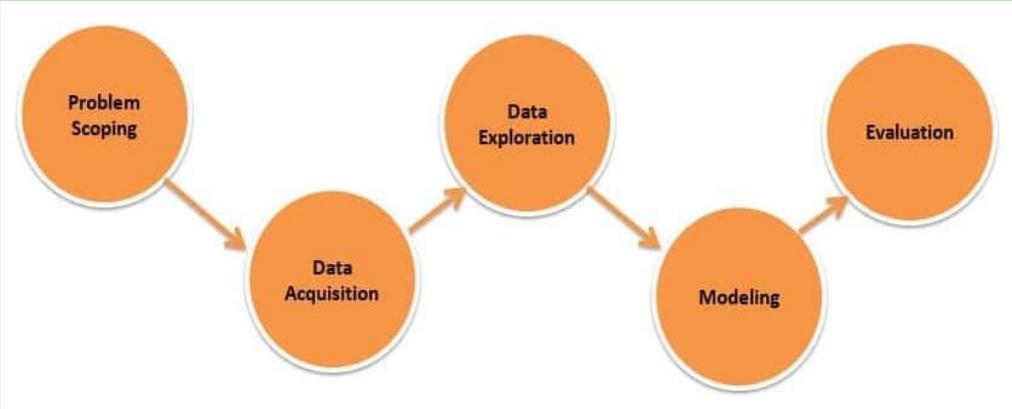
AI Project Cycle

Project Cycle is a step-by-step process to solve problems using AI and drawing inferences about them.

Importance of the AI project cycle:

- Understandability: Understand the process and its each step better
- Modularity: Break down process into small parts for ease of development.
- Efficiency: Make better, faster and more effective AI solution in less effort

Fig: AI Project Cycle



Stage 1: Problem Scoping

Selection of a problem to solve with the help of AI is said to be Problem Scoping.

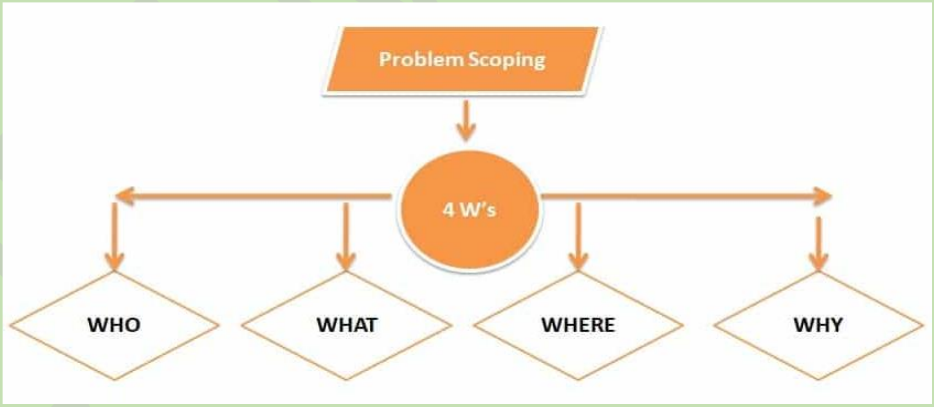
Step 1: Selection of theme.

Step 2: Find root cause of the problem.

Step 3: Select GOAL of the AI project.

Step 4: Identify 4 critical parameters using 4Ws Problem Canvas to solve.

Step 5: Problem Statement template can be used to frame the 4Ws to define the problem and summarize the key elements.



Who – Stakeholders of the Problem – Person or people facing the problem.

What –

I. Identify the nature of the problem
II. Assess whether it is actually a problem to the stakeholders
III. Evidence in support of the problem

Where – Finding the following details about the problem:

Location, Context, Situation, Frequency

Why – Finding root cause of the problem.

Stage 2: Data Acquisition

Data are the piece of facts and information collected for reference or analysis.
Data must be accurate, reliable and traceable.
Data acquisition refers to collection of correct data from reliable source.

AI system must be trained with Training Data Set. Based on Historical / Training data, the AI system can predict next level of data set which is called Testing Data.

Data can be acquired in the various formats – Coordinates, texts, photos, videos etc. Data feature refers to the type of data i.e., attributes / fields.
Data acquisition methods:

Surveys	Web Scraping	Sensors	Cameras	Observations	APIs

Only public data should be acquired that is available in open-source websites or government portals. General Data Protection Right (GDPR) must not be violated as it's punishable offense. Example of such website: data.gov.in, india.gov.in, etc.

Stage 3: Data Exploration

Visual representation of data helps in analyzing data in the following ways:

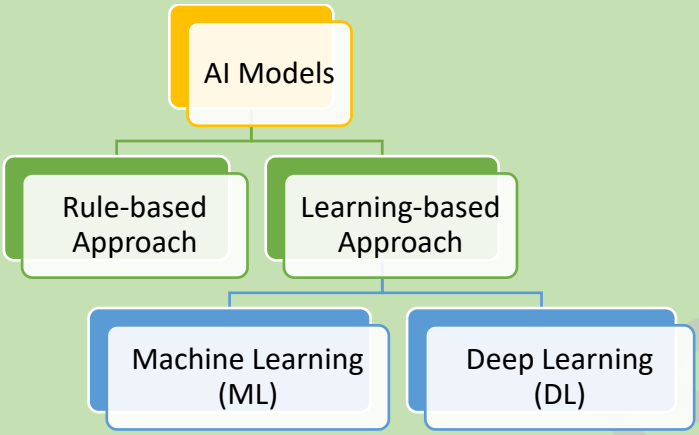
- Quickly comprehend the trends, relationships, and patterns within data
- Define strategy and choose model
- Communicate information to others

Different types of graphs can be used: Line graph, Bar Graph, Pie chart etc.

Stage 4: Data Modelling

For developing project in AI the model or algorithm can be chosen to predict output based on the set of inputs in any one of the following manners:

- Designing own model
- Choose a pre-existing model



A. Rule-based AI Approach:

Relationships or patterns in data are predefined and algorithm follows the rule or instructions mentioned and perform the tasks accordingly. The data along with rules are fed to the machine during training and then the machine become able to predict answers for the same.

Example:

Step 1: Train system with training data fed into the system.
[Dataset containing 1000 images of onions and carrots with labels]
Step 2: Feed a testing data [Say one image of onion]
Step 3: Compare training data with testing data as per rules
[Compare image of onion with all others]
Step 4: Identify the correct output [Determine its onion]

Advantage:

The algorithms are simple and easy to implement. Number of data required is limited. Hence training machine is easy.

Limitation:

This learning is static. The machine once trained, does not take into consideration any changes made in the original training dataset. That is, if you try testing the machine on a dataset which is different from the rules and data you fed it at the training stage, the machine will fail and will not learn from its mistake. Once trained, the model cannot improvise itself based on feedbacks.

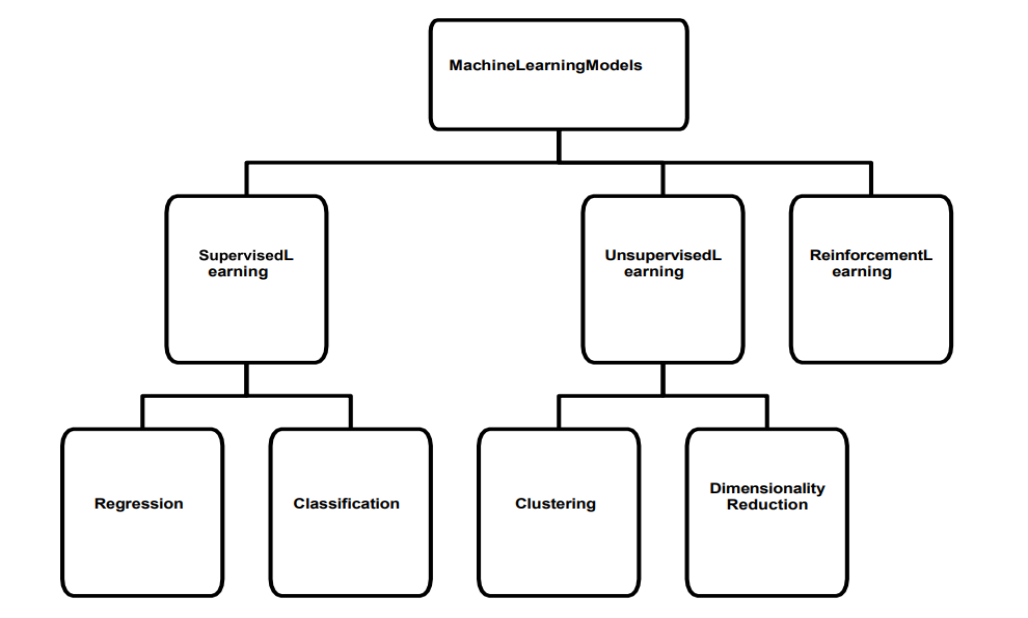
B. Learning-based AI Approach:

In Learning based AI model, the machine gets trained on the data fed to it and then can design a model, adaptive to the change in data. Implementation through: Classification of images, used in Computer Vision.

Advantage:
It is a dynamic model. If the model is trained with a type of data and the machine designs the algorithm around it, the model would adjust itself according to the changes in the data to handle the exceptions.

Disadvantage:
Huge amount quality of data is required for training the machine. Large storage and efficient algorithm is required. It is expensive and time taking to implement.

Example:
Step 1: Random data is fed into the system. [10,000 images of people in a city]
Step 2: Machine analyses data. [to identify sick and healthy people]
Step 3: System tries to extract similar features. Algorithm needs to derive relationship in data. [Identify facial expressions and emotions]
Step 4: Cluster same data together. [Form group with identical facial expressions]
Step 5: Output is the broad trends observed in the data set. [Identify whether a given picture belong to a sick or healthy person]

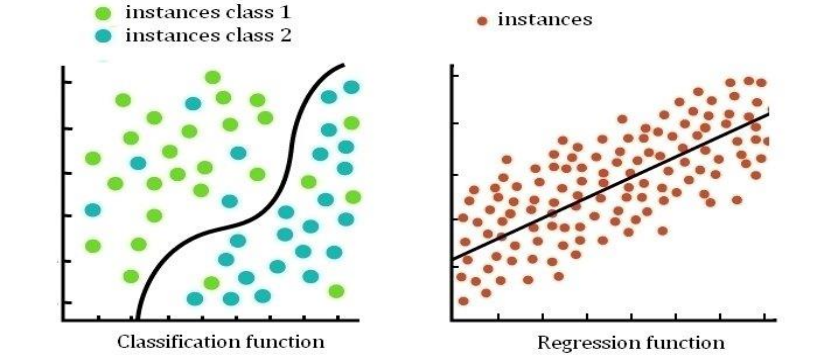


Supervised Learning

In a supervised learning model, the dataset which is fed to the machine is labelled. A label is some information which can be used as a tag for data.

i. **Regression:**
Algorithm generates a mapping function from the given data, represented by a line. It helps to predict or forecast future data. Regression works with continuous data.
e.g. – Prediction of marks in the next exam based on historical data.

ii. **Classification:**
Algorithm classifies the data according to the labels and sorted as per labelling is done. It works on discrete data sets.
e.g. – Classify image of men and women where numerous images of men and women in different structures and formats are fed as training data.



Unsupervised Learning

An unsupervised learning model works on unlabelled dataset. Data fed to the machine is random. The unsupervised learning models are used to identify relationships, patterns, and trends out of the training data. It helps the user in understanding what the data is about and what are the major features identified by the machine in it.

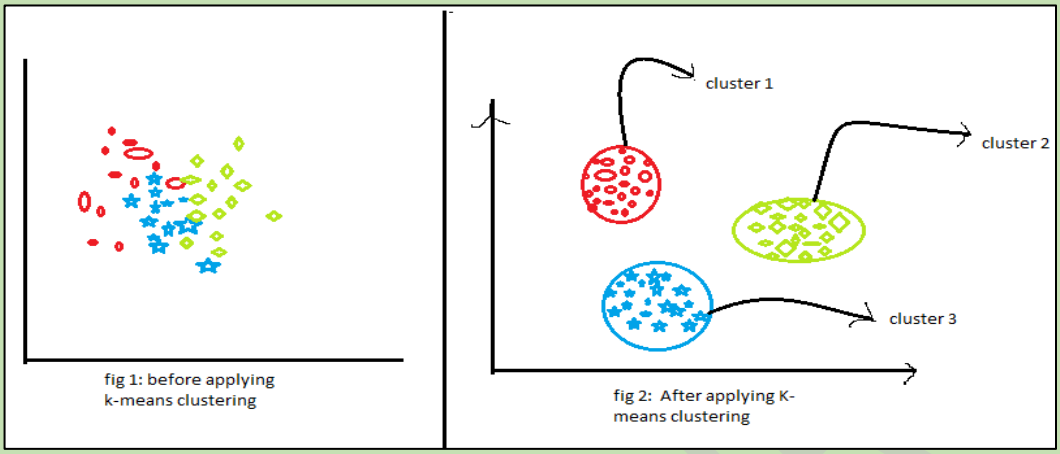
Example

A random data of 1000 dog images are fed into the system and some pattern can be found out of it, like colour, size of dogs etc.

i. Clustering:

This unsupervised learning algorithm can cluster the unknown data according to the patterns or trends identified out of it. Cluster works in random, unlabelled, and

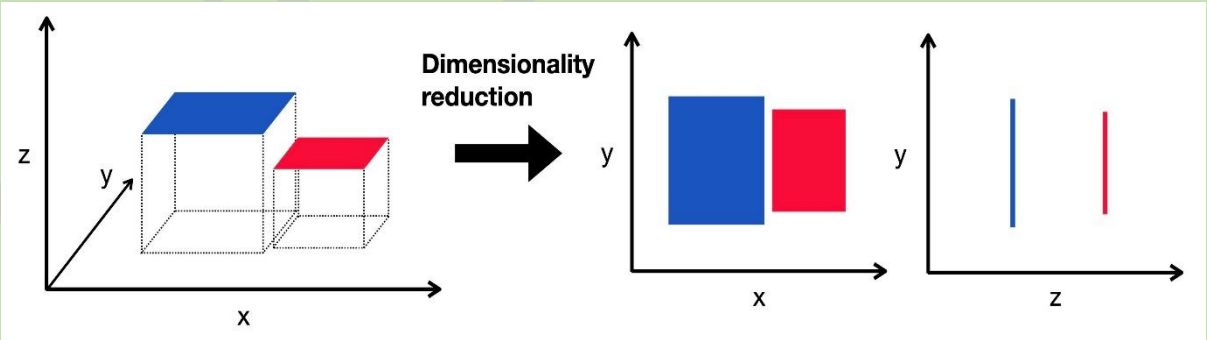
discrete data sets. The patterns observed might be the ones which are known to the developer or it might even come up with some unique patterns out of it.



ii. Dimensionality Reduction:

Human beings are able to visualise upto 3-Dimensions only. But according to lot of theories and algorithms, there are various entities which exist beyond 3-Dimensions. Dimensionality reduction algorithm is used to reduce dimensions and still make sense out of data.

The information gets distorted with reducing dimensions. At least 50% of the information is lost after reducing one dimension.

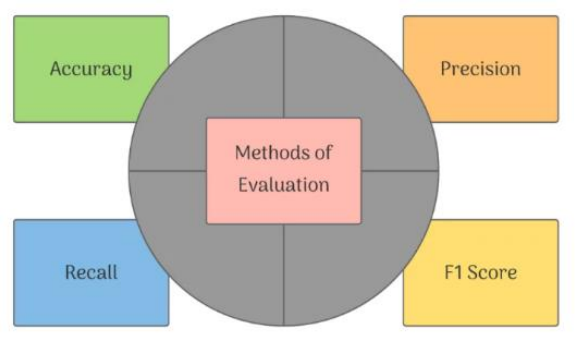


Reinforcement Learning:

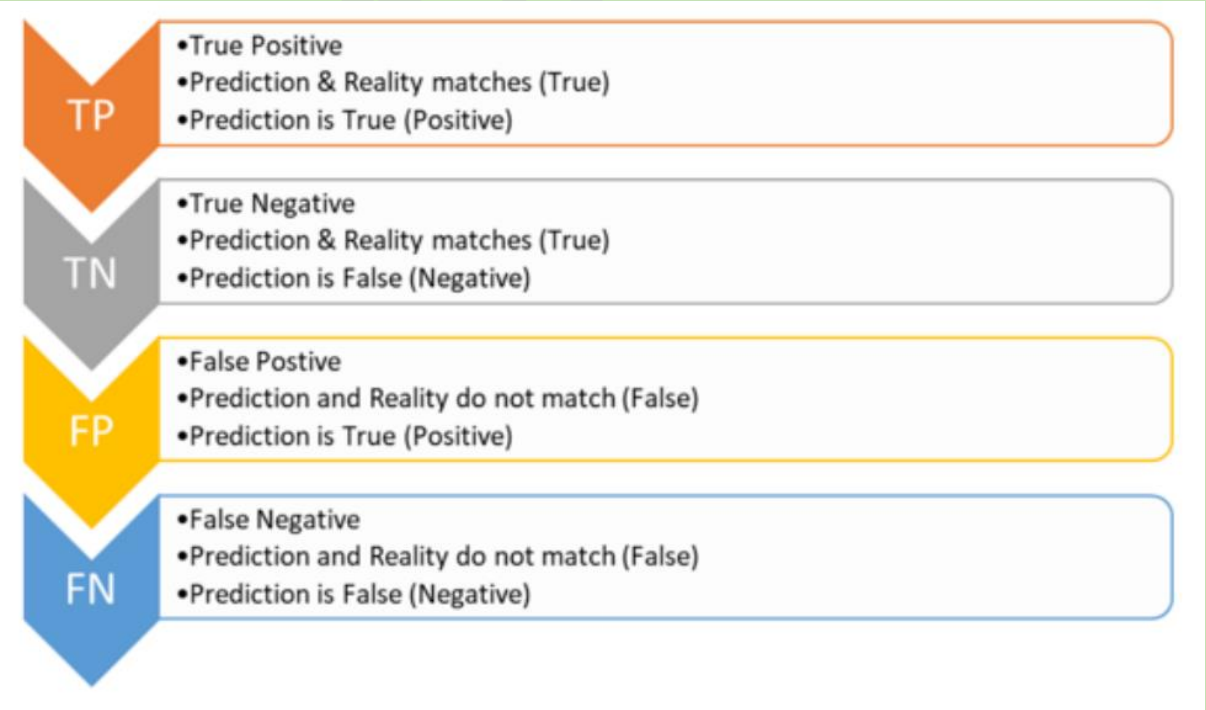
Reinforcement learning is a machine learning technique that trains software to make decisions to achieve the most optimal results. It mimics the trial-and-error learning process that humans use to achieve their goals. This uses a reward-and-punishment paradigm as they process data.

Stage 5: Evaluation

After completing all the steps of AI Project Cycle, the model needs to be evaluated to ensure correctness of results generated from new data.
Once a model has been made and trained, it needs to go through proper testing so that one can calculate the efficiency and performance of the model. Hence, the model is tested with the help of Testing Data (acquired during Data Acquisition stage) and the efficiency of the model is calculated based on the parameters mentioned below:

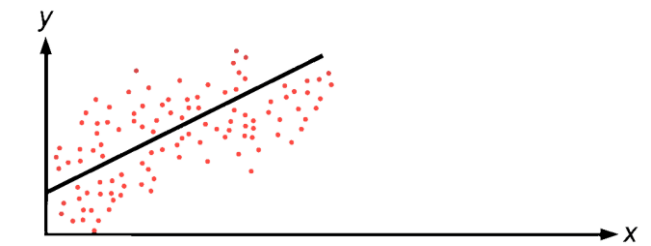


If there is any variance between Training data set and Test data set, the model needs to be improved by means of iteration.
Receiver Operator Characteristics (ROC) is a metric used to find out the accuracy of a model.



Check your Progress

	20 questions of 1 mark each (20 x 1 = 20)
1.	State True / False Machine Learning is a subset of Deep Learning.
2.	Which of the following is not a domain of AI? (a) CV (b) DS (c) SN (d) NLP
3.	Spam filter is an application of _____. (a) Natural Language Processing (c) Computer Vision (b) Data Science (d) Segmentation
4.	_____ (AI Ethics / AI Access) needs to be ensured so that everyone can afford the benefit of AI.
5.	Searching for a Chef's photo in the web browser mostly give men's images. This is an instance of _____. (a) AI Access (b) AI Bias (c) AI Domain (d) AI Ethics
6.	Which of the following is not a responsibility of AI developers? (a) User data protection (b) Maintaining Dignity of users (c) Class Segregation (d) Maintain price performance ratio
7.	Choose the five stages of AI project cycle in correct order: a. Evaluation -> Problem Scoping -> Data Exploration -> Data Acquisition -> Modelling b. Problem Scoping -> Data Exploration -> Data Acquisition -> Evaluation -> Modelling c. Data Acquisition -> Problem Scoping -> Data Exploration -> Modelling ->Evaluation d. Problem Scoping -> Data Acquisition -> Data Exploration -> Modelling ->Evaluation
8.	Which of are the advantages of developing an AI Project Cycle? i. Understandability ii. Modularity iii. Cost Effective iv. Time saving (a) i & iv (b) ii & iii (c) i & ii (d) iii & iv
9.	4W's problem canvas does not consider _____ (a) When (b) Where (c) Why (d) Who
10.	_____ summarises all the key points of a problem as a single format.
11.	AI system must be fed with _____ Data and it can predict next level of data called _____ Data.

12.	Which of the following is not a correct method of Data Collection? (a) Survey (b) Prediction (c) Observation (d) API
13.	Data Exploration can be done through: (a) Bar Graph (b) Histogram (c) Flowcharts (d) All of these
14.	State True / False: Deep Learning is not a part of Rule Based AI model.
15.	The AI System development takes place in the _____ stage of AI Project Cycle.
16.	A System surveillance wherein we categorize whether the system's current state can be marked as "Protected," "Threat" or "Vulnerable" is an example of: a. Classification b. Clustering c. Regression d. Dimensionality Reduction
17.	Which of the following is a problem of Learning based AI approach? (a) Adjusting (b) Limited data (c) Slower Outcome (d) Inaccurate
18.	Identify the data modelling technique.  a)Regression b) Classification c) Clustering d) Dimensionality reduction
	Q19 and 20 are ASSERTION AND REASONING based questions. Mark the correct choice as (a) Both A and R are true and R is the correct explanation for A (b) Both A and R are true and R is not the correct explanation for A (c) A is True but R is False (d) A is false but R is True
19.	Assertion: Rule based AI model is a static model. Reasoning: Rule based model can evolve over changing data set.
20.	Assertion: Dimension Reduction is used in higher dimension problems. Reasoning: Reducing dimension of a problem causes huge data loss.
	15 questions of 2 marks each (15 x 2 = 30)
21.	Write down some applications of AI in daily life.
22.	How should AI system maintain privacy of user data?
23.	State the requirement of NLP. Give example.
24.	Why is ethics important while developing AI application? Justify your answer.
25.	How can biasness influences AI systems? Give suitable example.

26.	What do you mean by AI project cycle? State its advantages.
27.	Name the stages of AI project cycle.
28.	Explain the concept of 4W's problem canvas.
29.	Sunita needs to collect data for her AI project. Please suggest her any 4 methods of Data Acquisition.
30.	Distinguish between Training data and Testing data.
31.	Ravi needs to represent data. State any two data visualization techniques during data exploration.
32.	Differentiate between Supervised and Unsupervised Learning.
33.	How Reinforcement Learning implemented?
34.	Write down the importance of Evaluation in AI project cycle.
35.	Name any two methods of AI project evaluation.
	5 questions of 4 mark each (5 x 4 = 20)
36.	Define AI, ML and DL. Also state the relation among them.
37.	What do you mean by Data Science and Computer Vision. Give suitable examples for each.
38.	Distinguish between Rule based AI and Learning based AI.
39.	Explain the concept of Regression and Classification. Give examples for each.
40.	How clustering is different from classification? When is dimensionality reduction useful?

Solutions

1. False	2. c	3. a	4. AI Access	5. b
6. c	7. d	8. c	9. a	10. Problem Statement Template
11. Training, Testing	12. b	13. d	14. True	15. Data Modelling
16. a	17. c	18. a	19. c	20. b

Answers of 2 Marks Questions

21.	a) AI can recommend products or services based on the browsing history, past purchases, and preferences of the users. b) AI can provide personalized experience, assessment, and feedback. c) AI user face recognition system for protecting devices and data. d) AI analyses vast amounts of medical data, assist doctors in diagnosing diseases and recommend personalized treatment plans.

	Or any other correct answer
22.	a) Restrict data collection to what is strictly necessary. b) Secure data by identifying risk, stop misuse or leakage of data with encryption and password protection. c) Take permission from user while collecting their personal information and clearly state their usage. Provide control to user over their individual information.
23.	NLP helps computers understand, interpret and manipulate human language. The objective of NLP is to read/listens, decipher, understand, and make sense of the human languages or producing human language from textual data. e.g. – Spam filtering, Smart Assistants, Text-to-Speech converter etc.
24.	The AI System must abide by social ethics like maintaining human rights, freedom, emotions, dignity, privacy, and safety. AI must consider the well-being of mankind.
25.	If bias is present in the data and algorithm provided to the AI system, it produces biased results that reflects human biases within a society, including historical and current social inequality. e.g. – Searching image of Nurse gives images of Female Nurses mostly.
26.	AI project cycle is a structured method for developing and deploying AI projects to solve real-world problems. Advantages: a) Improve success rate and quality of result b) Reduce risks during development c) Increases Efficiency and productivity d) Modular approach eases understandability and development
27.	Problem Scoping => Data Acquisition => Data Exploration => Data Modelling => Evaluation
28.	4W Problem Canvas is a Problem Scoping framework prepared to understand scope of the project and prepare Problem Statement Template. It has 4 components – who, what, where, why * Who are the stakeholders facing the problem and need solution? * What is the nature of the problem and its severity? * Where is the Location, Context, Situation and Frequency of the

<table>
<tr><td></td><td>problem?
* Why is the problem occurring?</td></tr>
<tr><td>29.</td><td>Surveys, Web Scraping, Interviews, Observations, APIs (Any two)</td></tr>
<tr><td>30.</td><td>
<table>
<tr><th>Training Data</th><th>Testing Data</th></tr>
<tr><td>i. Used to train the machine learning model</td><td>i. Used to test performance of a trained model</td></tr>
<tr><td>ii. Input to the system</td><td>ii. Outcome from a system</td></tr>
<tr><td>iii. Larger data set for better knowledge and accuracy</td><td>iii. Smaller data set obtained after evaluation</td></tr>
</table>
</td></tr>
<tr><td>31.</td><td>Line graph, Bar graph, Area graph, Pie chart, Histogram, Scatter plots, Flowchart (Any Two)</td></tr>
<tr><td>32.</td><td>
<table>
<tr><th>Supervised Learning</th><th>Unsupervised Learning</th></tr>
<tr><td>i. Uses Known and Labelled Data as input</td><td>i. Uses Unknown Data as input</td></tr>
<tr><td>ii. Less Computational Complexity</td><td>ii. More Computational Complex</td></tr>
<tr><td>iii. Uses off-line analysis</td><td>iii. Uses Real-Time Analysis of Data</td></tr>
<tr><td>iv. Accurate and Reliable Results</td><td>iv. Moderate Accurate and Reliable Results</td></tr>
<tr><td>v. Training data and testing data is given</td><td>v. Training data and testing data is not given</td></tr>
<tr><td>vi. Not possible to learn larger and more complex models</td><td>vi. It is possible to learn larger and more complex models</td></tr>
<tr><td>vii. Can test the model</td><td>vii. Cannot test the model</td></tr>
</table>
</td></tr>
<tr><td>33.</td><td>Reinforcement Learning uses a trial-and-error learning method which is implemented by collecting feedback. It uses Reward-Punishment paradigm.</td></tr>
<tr><td>34.</td><td>➢ Evaluation ensures that the model is operating correctly and optimally.
➢ It determines whether efficiency and performance of the model is acceptable or needs to improve.</td></tr>
<tr><td>35.</td><td>Accuracy, Precision, Recall, F1 Score (Any two)</td></tr>
</table>

4 Marks Questions

36.

- ♣ AI enables machines to mimic human intelligence for decision making and problem solving.
- ♣ ML imitates the human skills of learning, performing the task and improving its accuracy over time. It may need human intervention.
- ♣ DL uses multi-layered neural networks to simulate the complex decision-making power of the human brain by using large data sets. It does not need human intervention.

AI > ML > DL

37.

- Data Science allows the system to collect numerous data, maintains data sets and derives meaning or sense out of them.
  e.g. - Price Comparison Websites like PriceGrabber, Price Runner

- Computer Vision enables a machine to get and analyse visual information from images, videos etc. and predicts or decides.
  e.g. – Self driving cars, Face lock

38.

Rule based AI	Learning based AI
i. Static model	i. Dynamic model
ii. Lacks Adaptability - Does not incorporate changes in data	ii. Adaptable - Evolves according to changing data
iii. May have bias or ambiguity	iii. Can overcome complex situations by learning
iv. Easy to implement	iv. Difficult to implement
v. Development time is less	v. Development is time taking
vi. Cheaper	vi. Expensive

39.

- ♦ Regression – Regression is a Supervised Learning model that predicts based on the continuous labelled data sets.
  e.g. – Predicting future score, price, salary, age, etc

- ♦ Classification – Classification is a Supervised Learning model that accepts discrete data sets and divides them into different classes based on some parameters.

	e.g. – Filtering Boys/Girls, Healthy/Sick, Marking Spam emails etc.
40.	

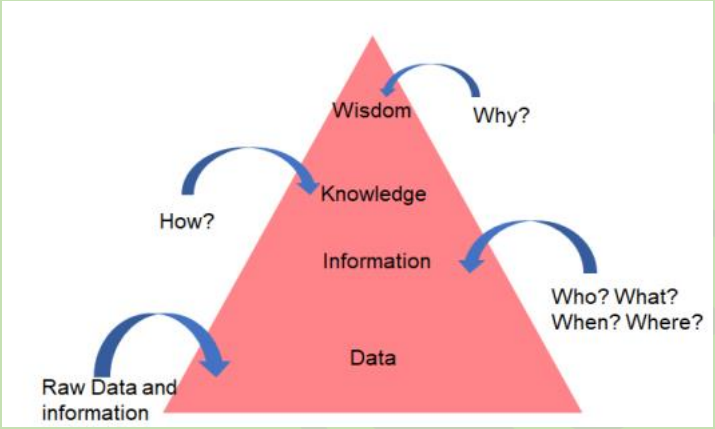
Classification	Clustering
i. Supervised Learning Model	i. Unsupervised Learning model
ii. Labelled Datasets	ii. Unlabelled Data sets
iii. Group instances as per labels	iii. Group instances as per similarity of data
iv. Verify model with Training and Testing Data	iv. No need of Training and Testing Data
v. Not flexible – No. of classes are fixed.	v. Flexible – No. of classes depends on variety of data
vi. Complex as many levels of classification phase	vi. Simple as only grouping is done.

UNIT-2: DATA LITERACY

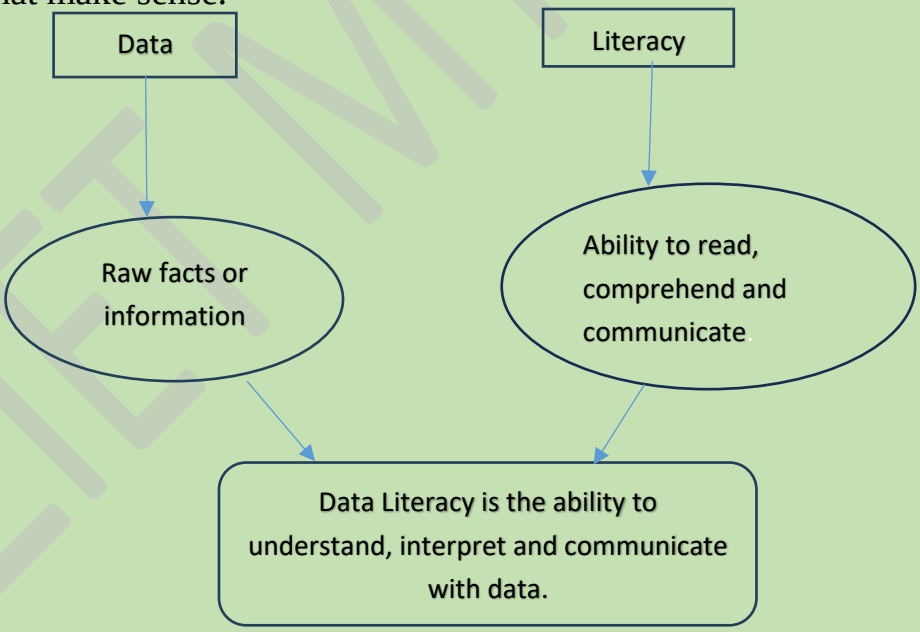
SECTION I-Gist of the chapter

Data: It is a collection of raw facts and figures.

Data Pyramid:



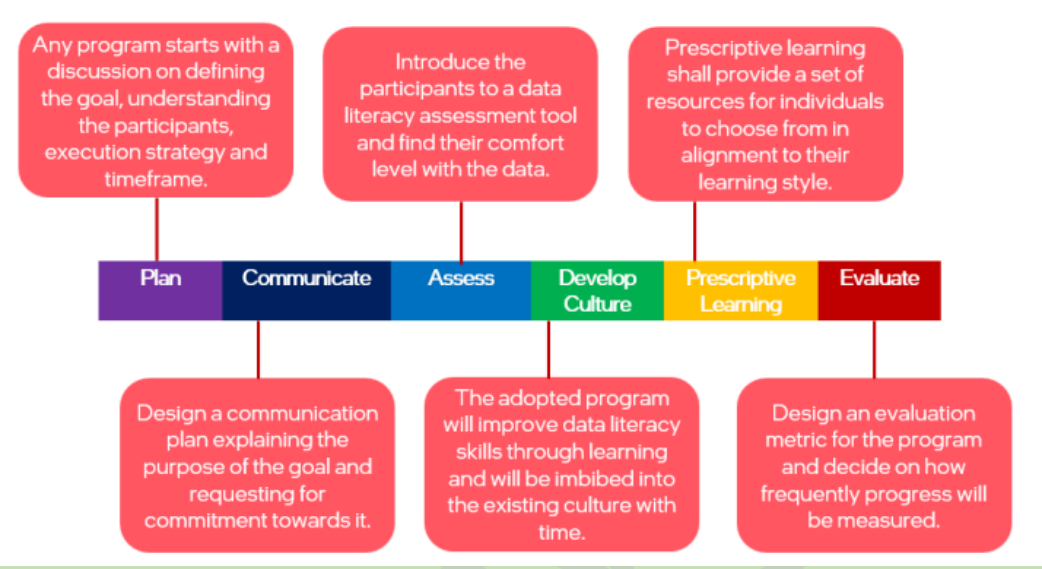
Basics of Data Literacy -Data literacy means knowing how to understand, work with, and talks about data. It's about being able to collect, analyze, and show data in ways that make sense.



Data literacy is essential because it enables individuals to make informed decisions, think critically, solve problems, and innovate.

Data Literate is a person who can interact with data to understand the world around them. E.g. Data Literacy helps people research about products while shopping over the internet and decide which is the cheapest product, most liked product and whether particular product meet all requirements.

Data Literacy Process Framework



Data Security and Privacy

Data Privacy-It referred to as information privacy is concerned with the proper handling of sensitive data including personal data and other confidential data, such as certain financial data and intellectual property data, to meet regulatory requirements as well as protecting the confidentiality and immutability of the data.

Data Security-It is the practice of protecting digital information from unauthorized access, corruption, or theft throughout its entire lifecycle.

Potential risks associated with data breaches and unauthorized access

Due to the rising amount of data in the cloud there is an increased risk of cyber threats. Hence, we should control and protect the transfer of sensitive or personal information at every known place. The most possible reasons why data security is more important now are:

• Cyber-attacks affect all the people

• The fast-technological changes will boom cyber attacks

Cyber security involves protecting computers, servers, mobile devices, electronic systems, networks, and data from harmful attacks.

Do's

• Use strong, unique passwords with a mix of characters for each account.

• Activate Two-Factor Authentication (2FA) for added security.

• Download software from trusted sources and scan files before opening.

• Prioritize websites with "https://" for secure logins.

• Keep your browser, OS, and antivirus updated regularly.

• Adjust social media privacy settings for limited visibility to close contacts.

• Always lock your screen when away.

• Connect only with trusted individuals online.

• Use secure Wi-Fi networks.

• Report online bullying to a trusted adult immediately

Don't 's

• Avoid sharing personal info like real name or phone number.

• Don't send pictures to strangers or post them on social media.

• Don't open emails or attachments from unknown sources.

• Ignore suspicious requests for personal info like bank account details.

• Keep passwords and security questions private.

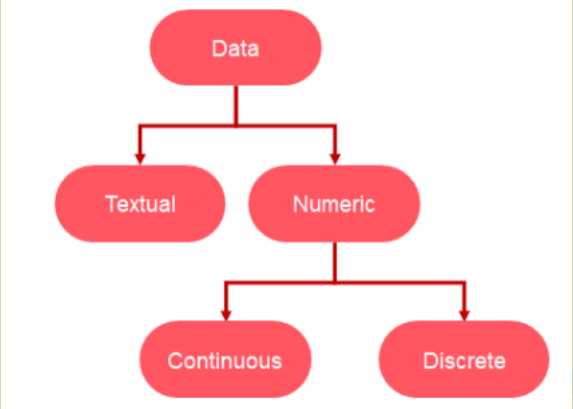
• Don't copy copyrighted software without permission.

• Avoid cyberbullying or using offensive language online.

Acquiring Data, Processing, and Interpreting Data

Data can be acquired through various online sources, interview, questionnaire, surveys etc

Types of data:



Numeric Data is further classified as:

● **Continuous data** is numeric data that is continuous. e.g., height, weight, temperature, voltage

● **Discrete data** is numeric data that contains only whole numbers and cannot be fractional e.g. the number of students in the class – it can only be a whole number, not in decimals

Types of Data used in three domains of AI:

Computer Vision-Visual data like images and videos

Natural Language Processing-Textual data like document and pdf files

Data Science-Numeric data like tables and excel sheets

Data Acquisition/ Acquiring Data

Data Acquisition, also known as acquiring data, refers to the procedure of gathering data. This involves searching for datasets suitable for training AI models. The process typically comprises three key steps:

1. Data Discovery- searching for new datasets
2. Data Augmentation-adding more data to the existing data by slight change of existing data
3. Data Generation-generating data if data is not available.

Sources of Data:

Primary Data sources: surveys, interviews, experiments etc

Secondary Data sources: External data sources like Kaggle, Google, .gov datasets etc.

Best practices for Acquiring data:

1. Good Data: well structured, accurate, consistent, presentable and relevant.
2. Web Scraping: collecting data from websites with permission.
3. Unbiased: Avoiding any preferences or partiality in data.
4. Consent: taking necessary permissions before collecting or using individual's data
5. Transparency: without hiding intentions
6. Anonymity: protecting the identity of the person as source of data
7. Accountability: Taking responsibility for actions related to data

Features of Data and Data Preprocessing

Data features are the characteristics or properties of the data. e.g. in student records table features are like student's name, age or grade. For a photo features like colors in image, height and width etc.

For AI models there are two types of features:

1. **Independent features**: It include the information or input we provide to make predictions
2. **Dependent features**: It includes the output or result of the model, that we are trying to predict.

Usability of data depends upon the structure of data, cleanliness of data and its accuracy.

Data Processing and Data Interpretation

Data Processing: Operating on raw data to produce meaningful information using computers.

Data Interpretation: Analyzing data using com to arrive at meaningful decisions.

Methods of Data Interpretation:

There are two methods of Data Interpretation

1. **Quantitative Data Interpretation**: Interviews, Polls, Observations, Longitudinal studies, survey
2. **Qualitative Data Interpretation:** Record keeping, Observation, case studies, Focus groups, Longitudinal studies, One to one interview

Types of Data Interpretation:

There are three ways in which data can be presented:

1. **Textual DI**: The data is in textual form, usually in paragraph suitable for small data which can be easily comprehended by reading but unfit for large data.
2. **Tabular DI**: Data is represented systematically in rows and columns where columns headings contain the description of information contained in columns.
3. **Graphical DI**: Data is represented using Bar graph, Pie chart and Line graph etc

Importance of Data Interpretation:

1. Informed decision making
2. Reduced cost
3. Identification of needs

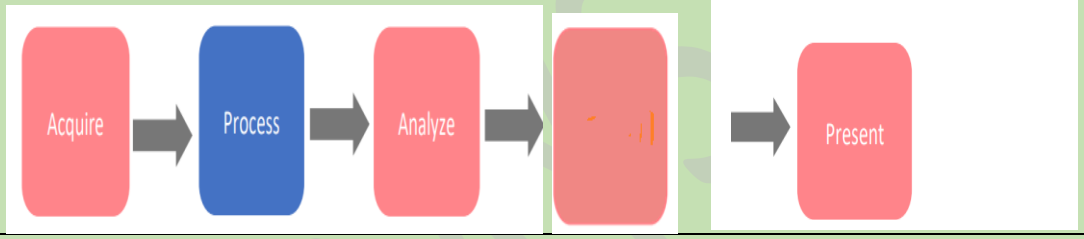
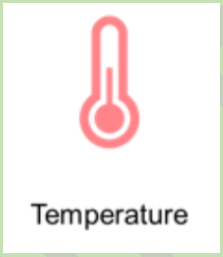
Project Interactive Data Dashboard & Presentation

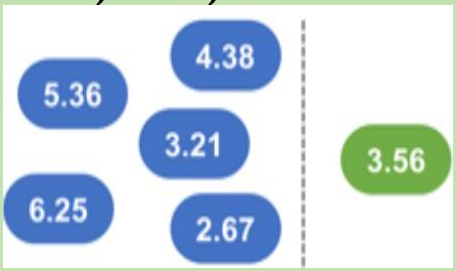
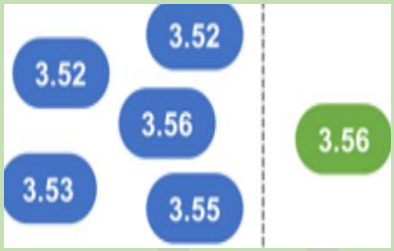
Data can be collected and can be visualized using visual data analytics platform like tableau or MS Excel or Datawrapper using which graphs or chart can be prepared on the basis of collected data which aids in decision making like which is the highest yield grain in India among wheat, rice, jowar, barley etc.

SECTION II-QUESTION BANK

Sno.	1 Mark Questions
1.	**What is the meaning of Data?** Information b) Arranged figures c) Raw facts d) processed information
2.	**Which is the highest form of data as per the Data Pyramid?** Data Wisdom Information Knowledge
3.	**Downloading an unverified mobile application leads to the issue of:** Data privacy Data Literacy Both None

4.	**Data security is the practice of protecting digital information from:** a) unauthorized access b) corruption c) theft d)all of the above
5.	**What is not a good practice for cyber security?** a) Activate Two Factor Authentication b) Sending pictures to strangers or post them on social media. c)Download software from trusted source d)prioritize websites with https:// for secure logins
6.	**The framework which provides guidance on using data efficiently and with all levels of awareness.** Data security framework Data literacy framework Data Privacy framework Data acquisition framework
7.	**Height, weight, temperature, voltage are examples of** : Discrete data Continuous data None Both
8.	**Which domain makes the use of Numeric data like tables, excel sheets etc**. a) NLP b) Computer Vision c) Data Science d)All
9.	**Adding more data to the existing data by slight change of existing data is called as:** a) Data discovery b) Data Augmentation c) Data Generation d)None
10.	**The process of collecting data from websites is called** a) Web screening b) Web scraping c)Web browsing d) Web surfing
11.	**Analyzing data to arrive at meaningful decisions is termed as** a) Data Processing b) Data Literacy

	c)Data privacy d)Data Interpretation
12.	**Pie charts, Bar graphs, Line graphs are examples of** a) Textual Data Interpretation b) Graphical Data Interpretation c)Tabular Data Interpretation d) None
13.	**What is not the advantage of Data interpretation** a) Informed decision making b) Reduced cost c)Identification of needs d) Record keeping
14.	**Name some graphs which can be used as a tool for Data visualization**?
15.	**Name the missing element?** 
16.	**Measuring temperature is qualitative or quantitative?** 
17.	**Name the following chart prepared using Tableau software?**  a)Bar chart b)Pie chart c)Histogram

	d)Packed Bubble chart
18.	**Out of a) and b) which is considered as accurate data?** a)  b) 
19.	**Quantitative data is numerical in nature. State True or False.**
20.	**Tableau software is tool for** a)Data Acquisition b)Data Exploration c)Data Visualization d)None

S.No	**2 Mark questions**
1.	What is Data Literacy?
2.	Who is a Data Literate?
3.	What is Data Privacy?
4.	What is Data security?
5.	Name the stages of Data Literacy Process Framework.
6.	Write any two best practices which can be adopted for cyber security.
7.	Differentiate between discrete data and continuous data with examples.
8.	Differentiate between qualitative and quantitative Data Interpretation.
9.	Explain the term Data Discovery.
10.	Explain the term Data Augmentation.
11.	Explain the term sample Data Generation.
12.	Differentiate between independent and dependent features of data.
13.	Explain the term Data processing and Data Interpretation.
14.	What are the features of Good Data?
15.	Name some different types of charts which can be used for Graphical Data Interpretation.
S.no.	**4 mark questions**
1.	Explain the types of Data?
2.	Explain the process of Data Acquisition.
3.	Explain the different features of data.
4.	Explain the types of Data Interpretation.
5.	Explain about any one Data Visualization tool and how it aids in analysis of data.

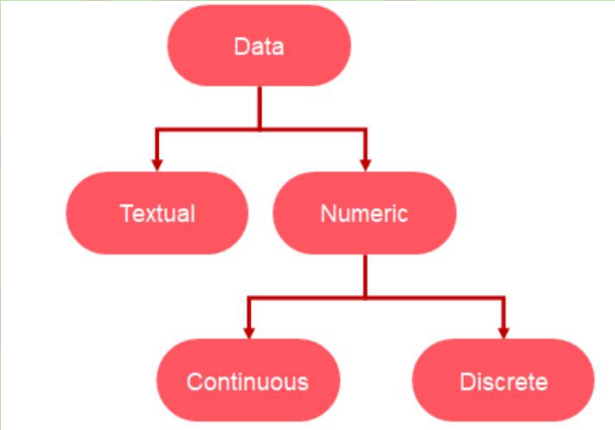
Answers of Question Bank

Sno.	Answers of 1mark questions
1.	Raw facts
2.	Wisdom
3.	Data Privacy
4.	All of the above
5.	Sending pictures to strangers or post them on social media.
6.	Data Literacy framework
7.	Continuous data
8.	Data Science
9.	Data Augmentation
10.	Web scraping
11.	Data Interpretation
12.	Graphical Data Interpretation1
13.	Record keeping
14.	Bar graph, Line graph, Histogram, Pie chart etc
15.	Interpret
16.	Quantitative
17.	Packed Bubble Chart
18.	(b)
19.	True
20.	Data Visualization

S.No.	Answers of 2 marks questions
1.	Data literacy means knowing how to understand, work with, and talks about data. It's about being able to collect, analyze, and show data in ways that make sense. Data literacy is the ability to understand, interpret and communicate with data.
2.	Data Literate is a person who can interact with data to understand the world around them. E.g. if a person needs to buy a product online, he/she will look for specific features as per his/her requirement, make use of price filters and look for user ratings and review with respect to that product.
3.	Data privacy referred to as information privacy is concerned with the proper handling of sensitive data including personal data and other confidential data, such as certain financial data and intellectual property data, to meet regulatory requirements as well as protecting the confidentiality and immutability of the data. E.g. agree to terms and conditions without reading, while downloading an app in the mobile may leads to data privacy issue.

<table>
<tr><td>4.</td><td colspan="2">Data security is the practice of protecting digital information from unauthorized access, corruption, or theft throughout its entire lifecycle. Due to cyber-attacks and fast technological changes, data security became very important concern.</td></tr>
<tr><td>5.</td><td colspan="2"> 
</td></tr>
<tr><td>6.</td><td colspan="2">a) Use strong, unique passwords with a mix of characters for each account.
b) Activate Two-Factor Authentication (2FA) for added security.
c) Download software from trusted sources and scan files before opening.
d) Prioritize websites with "https://" for secure logins.</td></tr>
<tr><td>7.</td><td colspan="2">Continuous data is numeric data that is continuous. E.g., height, weight, temperature, voltage
Discrete data is numeric data that contains only whole numbers and cannot be fractional E.g. the number of students in the class – it can only be a whole number, not in decimals</td></tr>
<tr><td>8.</td><td>Qualitative Data Interpretation
1. Categorical
2. Provides insights into feelings and emotions
3. Answers how and why
4. Methods – Interviews, Focus Groups
5. Example question – Why do students like attending online classes?</td><td>Quantitative Data Interpretation
1. Numerical
2. Provides insights into quantity
3. Answers when, how many or how often
4. Methods – Assessment, Tests, Polls, Surveys
5. Example question – How many students like attending online classes?</td></tr>
<tr><td>9.</td><td colspan="2">Data discovery-It refers to searching of a new database e.g. for making a CV model for self-driving cars, collection of pictures of roads and objects on roads etc. is called as Data discovery.</td></tr>
<tr><td>10.</td><td colspan="2">Data Augmentation-It means increasing the amount of data by adding copes of existing data with small changes’. adding parameters like color and brightness to the existing image.</td></tr>
<tr><td>11.</td><td colspan="2">Data Generation-It refers to generating or recording data using sensors. E.g. recording temperature of a building is an example of Data generation.</td></tr>
<tr><td>12.</td><td colspan="2">Independent features are the input to the model which consists of the information we provide to make predictions.
Dependent features are the outputs or results of the model that we are trying to predict.</td></tr>
</table>

	e.g. In a google map application, we input current location and destination location and in turns application shows us the route, distance and time to be taken on the basis of destination and current location entered. Here current location, destination location are independent features given as input to the application And route to the destination, distance to the destination and time taken will be dependent features which we want through the application.
13.	**Data processing:** Data processing helps computers understand raw data. It uses computers to perform different operations on data. **Data Interpretation:** It is the process of making sense out of data that has been processed. The interpretation of data helps us answer critical questions using data.
14.	**Good Data** is accurate, consistent, well-structured and cleanly presented and contains information which is relevant to our requirement.
15.	Following types of graphs are used for **Graphical Data Interpretation** **Bar Graph**: data is represented using vertical and horizontal bars. **Pie Charts**: It has the shape of a pie and each slice of the pie represents the portion of the entire pie allocated to each category. **Line Graphs**: It is created by connecting various data points. It shows the change in quantity over time.

S.No.	Answers of 4 marks questions
1.	Artificial Intelligence is crucial, with data serving as its foundation. We come across different types of information every day. Some common types of data include: 

Textual Data (Qualitative Data)	Numeric Data (Quantitative Data)
• It is made up of words and phrases • It is used for Natural Language Processing (NLP) • Search queries on the internet are an example of textual data • Example: "Which is a good park nearby?"	• It is made up of numbers • It is used for Statistical Data • Any measurements, readings, or values would count as numeric data • Example: Cricket Score, Restaurant Bill

Numeric Data is further classified as:

Continuous data is numeric data that is continuous. E.g., height, weight, temperature, voltage

Discrete data is numeric data that contains only whole numbers and cannot be fractional E.g. the number of students in the class – it can only be a whole number, not in decimal

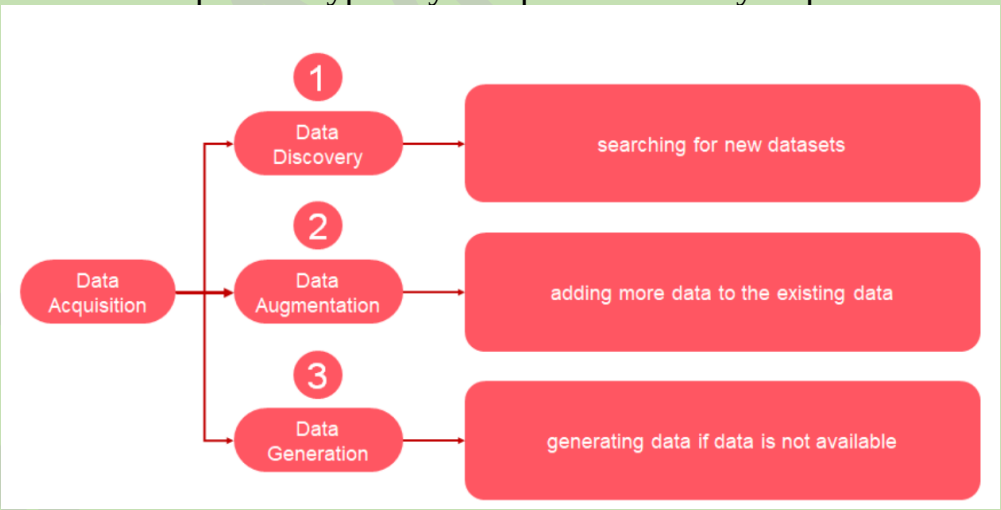
Types of Data used in three domains of AI:

CV domain collects visual data like images, videos

NLP domain collects Textual data like documents, pdf files etc.

Data Science collects numeric data like data from tables, excel sheets etc.

2. **Data Acquisition**, also known as acquiring data, refers to the procedure of gathering data. This involves searching for datasets suitable for training AI models. The process typically comprises three key steps

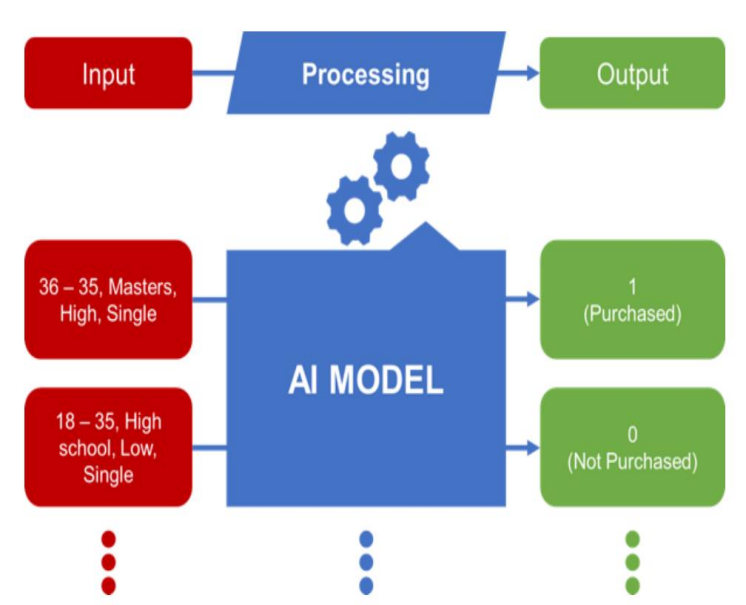


Acquiring Data – Sample Data Discovery: E.g. If we want to collect data for making a CV model for a self-driving car, we will require pictures of roads and the objects on roads. We can search and download this data from the internet. This process is called data discovery

Acquiring Data – Sample Data Augmentation: Data augmentation

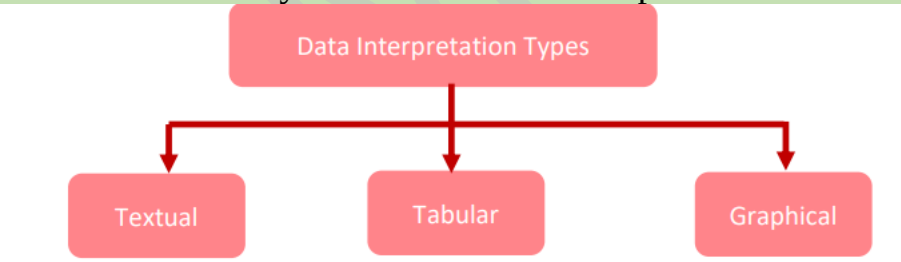
	means increasing the amount of data by adding copies of existing data with small changes. The image given here does not change, but we get data on the image by changing different parameters like color and brightness. New data is added by slightly changing the existing data **Acquiring Data – Sample Data Generation**: Data generation refers to generating or recording data using sensors. Recording temperature readings of a building is an example of data generation. Recorded data is stored in a computer in a suitable form **Sources of Data** Various Sources for Acquiring Data: **Primary Data Sources** — Some of the sources for primary data include surveys, interviews, experiments, etc. The data generated from the experiment is an example of primary data. **Secondary Data Sources**—Secondary data collection obtains information from external sources, rather than generating it personally. Some sources for secondary data collection include: google search, .gov datasets, Kaggle etc.
3.	Data usability depends on following factors: 1. **Structure**-It defines how data is stored. Data stored in tabular format is more structured compared to data stored in text document. 2. **Cleanliness**- Clean data is free from duplicates, missing values, outliers and other anomalies that may affect its reliability and usefulness for analysis. 3. **Accuracy**-It indicates how well the data matches real world values, ensuring reliability. Accurate data closely reflects actual values without errors, enhancing the quality and trustworthiness of the dataset. **Features of Data** Data features are the characteristics or properties of the data. They describe each piece of information in a dataset. For example, in a table of student records, features could include things like the student's name, age, or grade. In a photo dataset, features might be the colors present in each image. These features help us understand and analyze the data. In AI models, we need two types of features: **Independent and Dependent.** **Independent features** are the input to the model—they're the information we provide to make predictions.

Dependent features, on the other hand, are the outputs or results of the model—they're what we're trying to predict.



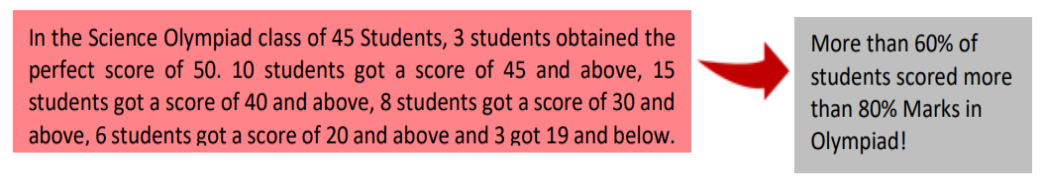
Here whatever input given is I**ndependent feature** of the data
And whatever output we get is **Dependent feature** of the data.

4. Types of **Data Interpretation:**
There are three ways in which data can be presented:



Textual DI

- The data is mentioned in the text form, usually in a paragraph.
- Used when the data is not large and can be easily comprehended by reading.
- Textual presentation is not suitable for large data.
- Example:



Tabular DI

▪ Data is represented systematically in the form of rows and columns.

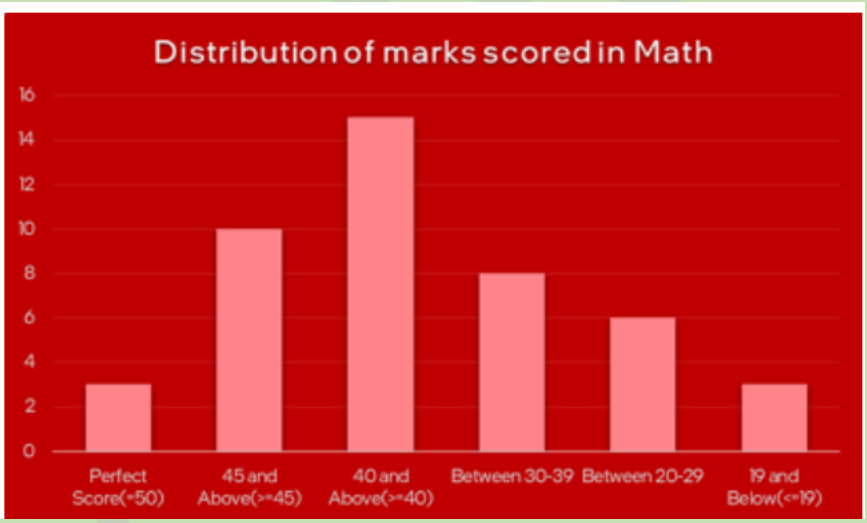
▪ Title of the Table (Item of Expenditure) contains the description of the table content.

▪ Column Headings (Year; Salary; Fuel and Transport; Bonus; Interest on Loans; Taxes) contains the description of information contained in columns

Year	Item of Expenditure				
	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

Graphical DI

Bar Graphs- In a Bar Graph, data is represented using vertical and horizontal bars.



Pie Charts

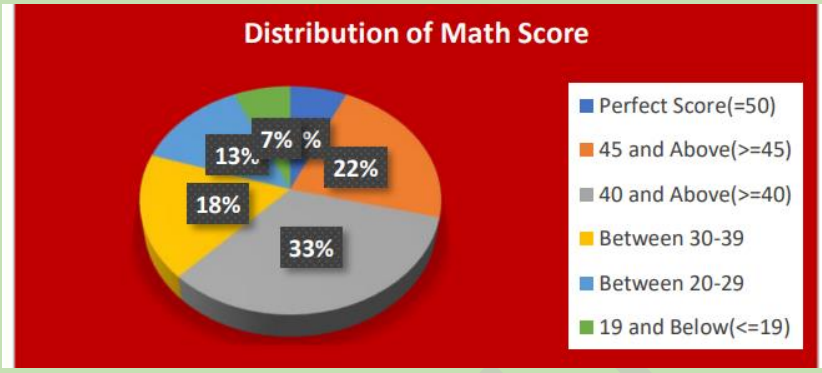
▪ Pie Charts have the shape of a pie and each slice of the pie represents the portion of the entire pie allocated to each category

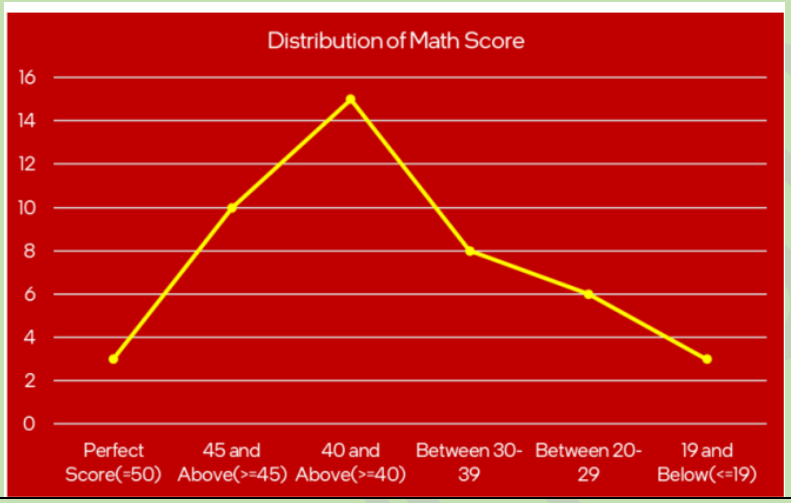
▪ It is a circular chart divided into various sections (think of a cake cut into slices)

▪ Each section of the pie chart is proportional to the corresponding value

Line Graphs

- A line graph is created by connecting various data points.
- It shows the change in quantity over time.





5. **Data Visualization using Tableau**

Students in a class

Instructions:

- Draw a grid with 4 columns as shown.

CLASS	TOTAL STUDENTS ENROLLED	NO. OF STUDENTS PRESENT	NO. OF STUDENTS ABSENT
I	32	20	12
II	40	31	9
III	43	32	11
IV	45	30	15
V	42	39	3

- Title the columns as Class, Total students enrolled, No. of students present, No. of students absent
- For this activity, we're going to collect data about class enrolment

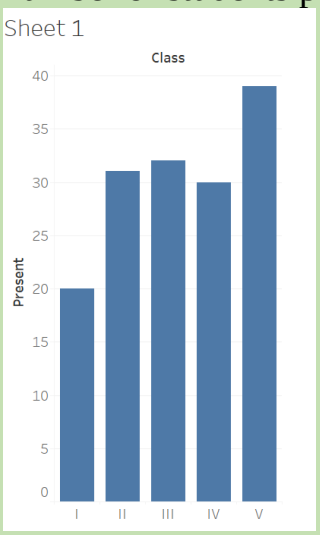
● Add those headings to your table.

Let's visualize

● Make a bar chart to visualize the number of students present in each class.

● We will get a graph as shown in the image.

● Looking at the data visualization, we can tell which class has maximum number of students present.



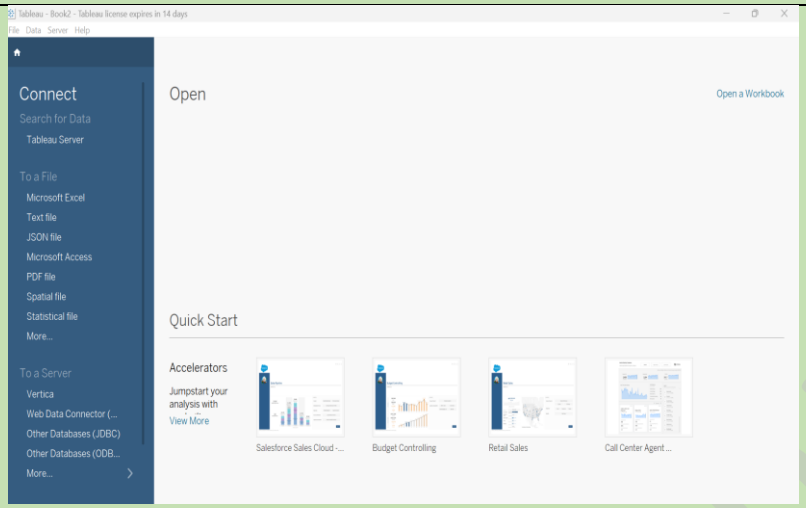
Let's see how Tableau makes it faster and easier for us to present data
Instructions

▪ Download Tableau public with the help of an adult using this link - https://public.tableau.com/en-us/s/download

▪ Install the package via the install wizard.

▪ Once installed, double click the program to open the Tableau Public Desktop application.

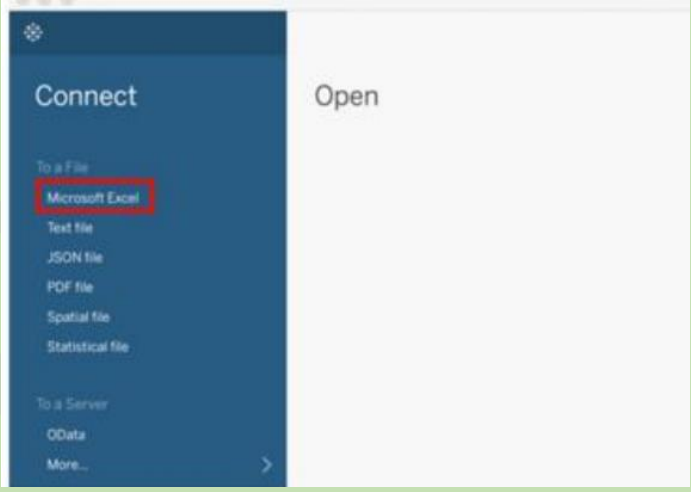
Once opened, this is what we see



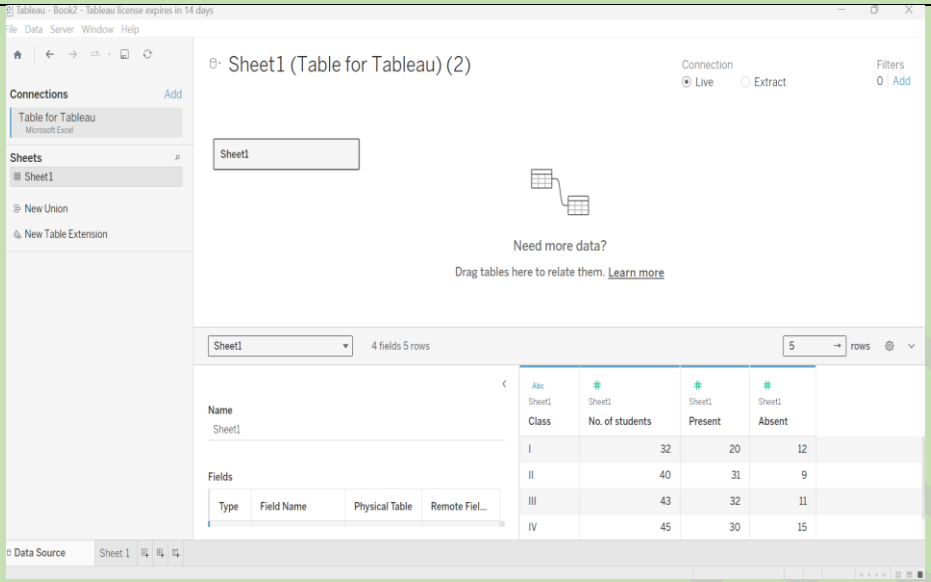
Now we are ready to pull the data
Make sure that data is filled in the Excel to be used.

CLASS	TOTAL STUDENTS ENROLLED	NO. OF STUDENTS PRESENT	NO. OF STUDENTS ABSENT
I	32	20	12
II	40	31	9
III	43	32	11
IV	45	30	15
V	42	39	3

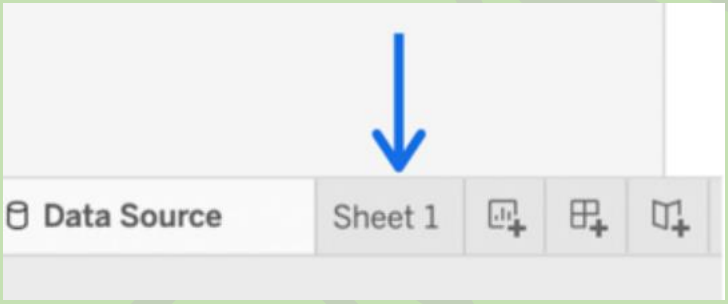
▪ To pull in the data, click on Microsoft Excel in the top left corner.



▪ Now drag the sheet with your data to Drag tables here section.

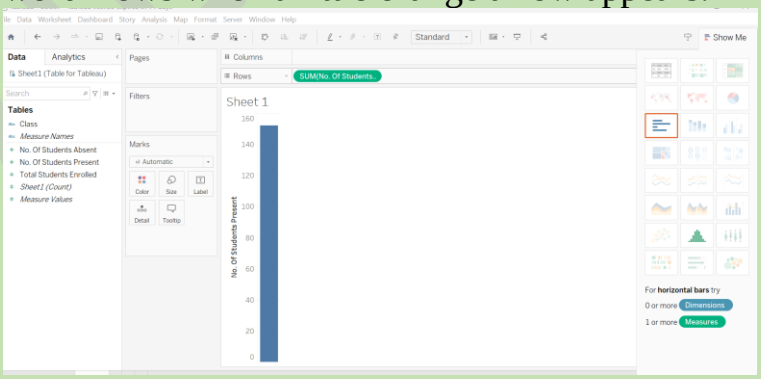


First, let's recreate the bar chart we made to visualize the number of students present in each class
Click Sheet1 in the bottom left corner of the screen



▪ Hover over the term No. of students present. We will notice a blue oval appear behind it.

Click and drag “No. of students” up and to the right, releasing it next to the word Rows when a little orange arrow appears.



▪ Now drag “Class” to Columns following the same steps as above. ▪ “

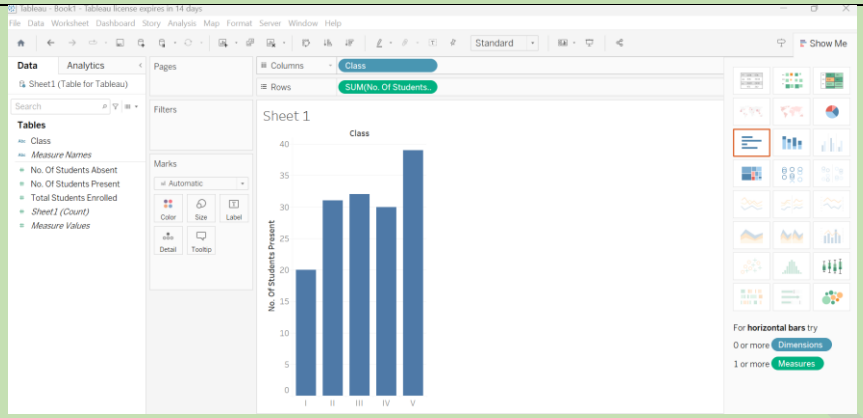


Tableau made us a bar graph!

- What if you want to make each bar a different colour?
- Simply click and drag "No. of students present" out to where it says Colour.

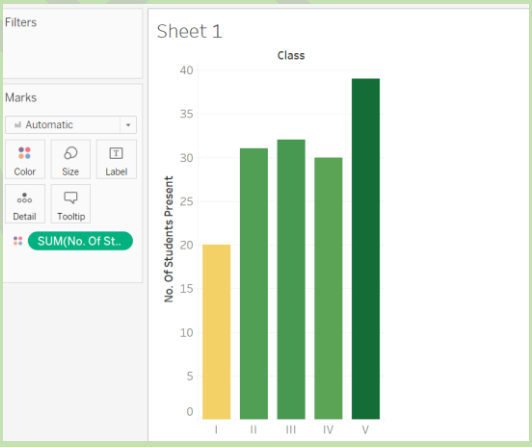
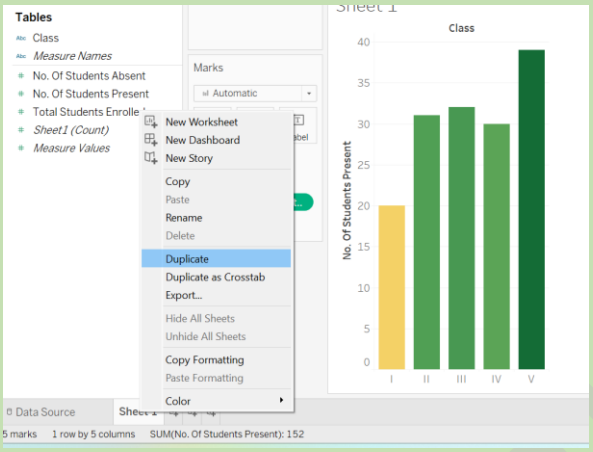


Tableau coloured our "No. of students present" for us

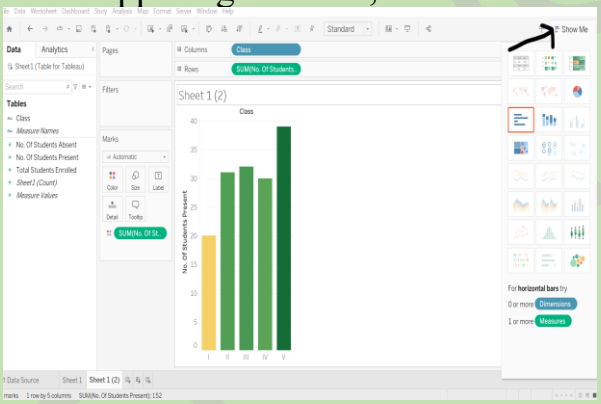
Let’s explore another way of visualization

▪ First, we'll start by duplicating our current bar chart sheet.
This will create an exact copy in a new sheet.

▪ You'll do this by right clicking "Sheet 1" and selecting "Duplicate".



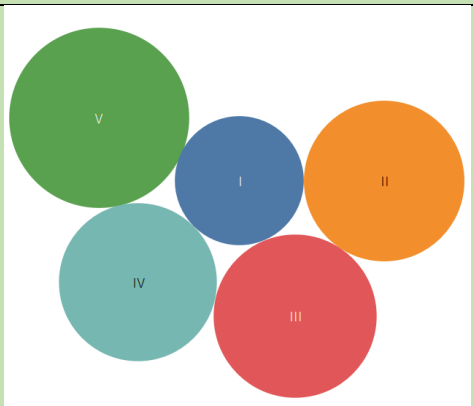
In the upper right corner, click "Show Me”.



▪We will see all of the different types of visualizations that Tableau can create using “No. of students present and Sheet Count 1.

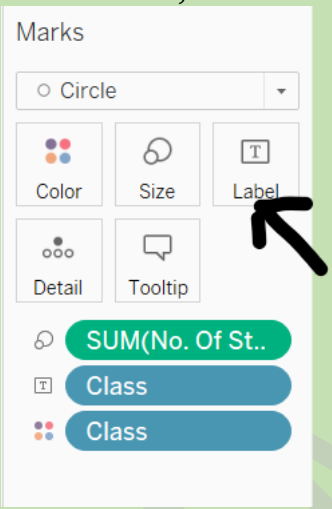
Select “Packed Bubbles”.

Tableau quickly transformed our bar chart to a chart of bubbles.
Class V has maximum No. of students present because it is the biggest circle.



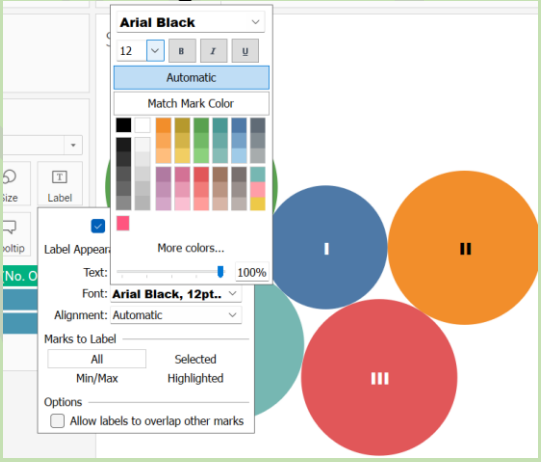
We can make the text a little more fun and easier to read.

▪ To do that, click the label square.

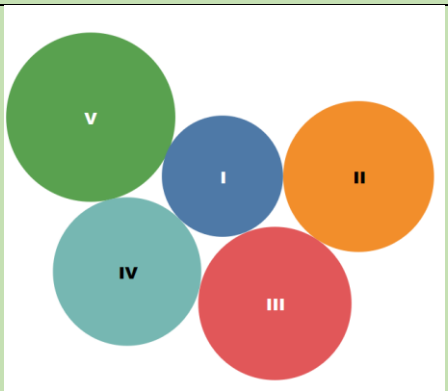


This opens up a box that allows us to change the font and text size.

▪ Let's change the font size to 12 and the font to "Arial Black”



▪ **We have our complete bubble chart now!**



Useful Videos to watch
https://www.youtube.com/watch?v=NLCzpPRCc7U
https://www.youtube.com/watch?v=_M8BnosAD78

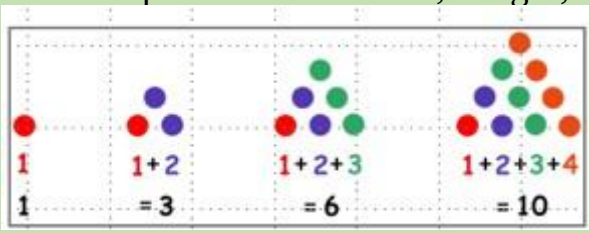
Note: You may also use Ms Excel or Data wrapper (https://www.datawrapper.de/) for the data visualization instead of Tableau.

UNIT-3: Math for AI (Statistics & Probability)

How are Math and AI related?

Math is the study of patterns

- To solve the puzzles, you identify an order/arrangement in the list of numbers or the images.
- This arrangement is called a pattern.
- These patterns exist all around us.
- We have patterns in numbers, images, and language.



Ask learners if they can identify any patterns around themselves.

AI is a way to recognize patterns

- AI can learn to recognize patterns, like human beings.
- AI can see patterns in different types of data - numbers, images, and speech and text.

Say "Just like we can recognize patterns in numbers, words, pictures, etc., AI can also recognize similar patterns."

Hence,

- Math is the study of patterns
- AI is a way to recognize patterns in order to take decisions
- AI needs Math to study and recognize patterns in order to take decisions

Can you identify any pattern in the image given below?

1 x 9 + 2 = 11
12 x 9 + 3 = 111
123 x 9 + 4 = 1111
1234 x 9 + 5 = 11111
12345 x 9 + 6 = 111111
123456 x 9 + 7 = 1111111
1234567 x 9 + 8 = 11111111
12345678 x 9 + 9 = 111111111
123456789 x 9 + 10 = 1111111111

Understanding math will help us to better understand AI and its way of working, but what kind of math is needed for AI?

Let us take a look!

Essential Mathematics for AI

Let's think and answer the following questions:

- 11, 22, 33, 44, 55 – Can you find out the middle value from the given numbers?

- A has 2 plants, B has 3 plants, C has 1 plant, D has 7 plants. How many plants are there in total?

AI uses Math for:

- **Statistics (Exploring data**): Example – What is the middle value of the data? Which is the most common value in the data?
- **Calculus (training and improving AI model**): Example – which line is more slanted? Which figure covers more area?
- **Linear Algebra (finding out unknown or missing values**): Example – How many plants are there in total? How many cars are there in a city?
- **Probability (predicting different events**): Example – what will be the possible results of a coin toss? Will it rain tomorrow?

Statistics

Ask learners to answer some or all of these questions as an assignment. Meanwhile, take dummy numbers and walk the learners through the questions.

Can you find out the total weight of your family members?

Can you find out the total number of students in your school?

Can you find out the maximum temperature in your city during the last month?

Definition of Statistics*:" Statistics is used for collecting, exploring, and analyzing the data. It also helps*

in drawing conclusions from data."

- Data is collected from various sources.
- Data is explored and cleaned to be used.

- Analysis of data is done to understand it better.
- Conclusions and decisions can be made from the data.

Applications of Statistics:

- Predict the performance of sports teams
- It can be used to find out specific things such as:
  - the reading level of students
  - the opinions of voters
  - the average weight of a city's resident
  - Probability

Purpose: To understand the possibility of occurrence of an event.

Introduction to probability

Probability is a way to tell us how likely something is to happen. For example – When a coin is tossed, there are two possible results or outcomes:
heads (H) or tails (T) The probability equation defines the likelihood of the happening of an event. It is the ratio of favorable outcomes to the total favorable outcomes. The probability formula can be expressed as,

$$P(A) = \frac{\text{Number of favorable outcomes to A}}{\text{Total number of possible outcomes}}$$

Probability of an Event =
Number of Favorable Outcomes / Total Number of Possible Outcomes

We say that the probability of the coin landing H is ½ and the probability of the coin landing T is ½ When we talk about probability, we use a few terms that help us understand the chances for something to happen.
Probability can be expressed in the following ways:

- Certain events: An event will happen without a doubt
- Likely events: The probability of one event is higher than the probability of another event
- Unlikely events: One event is less likely to happen than another event
- Impossible events: There's no chance of an event happening
- Equal Probability events: Chances of each event happening is same

The probability of an event occurring is somewhere between impossible and certain.

- If an event is certain or sure to happen, it will have a probability of 1.

For example, the probability that it will rain in the state of Florida at least once in a specific year is 1.

- If an event will never happen or is impossible, it will have a probability of 0.

For example, the probability that you can pick a red ball from a bag containing only blue balls is 0.

1-mark questions

1) What is the probability of an impossible event?
   a) 1
   b) 0
   c) Insufficient data
   d) Not defined
   Ans: b) 0
2) What does probability mean?
   a) The total number of possible outcomes in an event
   b) The ratio of favourable outcomes to all outcomes
   c) The chance of an event happening
   d) How certain an event will occur
   Ans. b)
3) What is the probability of getting an even number when a dice is thrown?
   a) 1/6
   b) ½
   c) 1/3
   d) ¼

Ans: b) ½

4) If we throw two dice simultaneously, what would be the probability that we get a 10 or 11?
   a) 5/36
   b) 5/12
   c) 1/7
   d) 1/3
   Ans: a. 5/36
5) If P (E) = 0.30, then the probability of event E not occurring will be
   a) 0.30
   b) 0.70

c) 0.50
d) 0.60

Ans: 6.

6) A batsman hits boundary for 5 times out of 40 balls. Find out the probability that he did not hit the boundaries.

a) 1/5
b) 7/8
c) 2/5
d) 1/8

Ans: b. 7/8

7) Find the median of data: 155,160,145,149,150,147,152,144,148:

a) 149
b) 150
c) 147
d) 144

Ans: a. 149

8) 8. Which two are examples of descriptive statistics?

a) median and correlation
b) mean and standard deviation
c) mode and regression analysis
d) variance and hypothesis testing

Ans: b.

9) Solve for x in the equation 3x+5=20

a) 3
b) 4
c) 5
d) 6

Ans: c. 5

10) What is the probability of getting a king or ace from the deck of 52 cards?

a) 1/26
b) 2/13
c) 3/26
d) 1/52

Ans: b. 2/13

11) Find the mode of the call received on 7 consecutive day 11,13,13,17,19,23,25

a) 11

b) 13
c) 17
d) 23

Ans: b. 13

12) The most frequently occurring value in a data set is called the:

a) Mean
b) Median
c) Mode
d) Range

Ans: c. Mode

13) Simplify the expression $4(x-2)$.

a) 4x - 2
b) 4x - 8
c) x - 8
d) 4x + 8

Ans: B.

14) A coin is tossed once. What is the probability of getting heads?

a) 0.0
b) 0.25
c) 0.5
d) 1.0

Ans: c. 0.5

15) In a class of 30 students, 18 are girls. What is the probability of selecting a girl?

a) 0.50
b) 0.60
c) 0.40
d) 0.33

Ans: B. 0.6

16) What is the probability of rolling an even number on a six-sided die?

a) 0.16
b) 0.33
c) 0.50
d) 0.66

Ans: c. 0.5

17) What is the mean of the data set {3, 6, 9, 12, 15, 18}?

a) 10

b) 11
c) 10.5
d) 11.5

Ans: C. 10.5

18) A bag contains 7 black, 2 white, and 6 green balls. What is the probability of drawing a green ball?

a) 0.20
b) 0.30
c) 0.40
d) 0.50

Ans: C. 0.40

19) In a class of 25 students, 10 students wear glasses. What is the probability that a randomly selected student wears glass?

a) 0.20
b) 0.30
c) 0.40
d) 0.50

Ans: C. 0.40

20) What is the range of the data set {16, 20, 24, 28, 32}?

a) 10
b) 12
c) 14
d) 16

Ans: D. 16

2-mark question

1. A bag contains 5 red balls, 3 blue balls, and 2 green balls. A ball is drawn at random. Calculate the probability of drawing a blue ball.
2. Two dice are rolled. Find the probability that the sum of the numbers on the dice is 7.
3. A box contains 4 red marbles, 5 blue marbles, and 3 green marbles. Two marbles are drawn at random without replacement. Calculate the probability that both marbles are blue.

4. In a game, a spinner with 6 equal sections (numbered 1 to 6) is spun twice. Find the probability that the sum of the numbers spun is less than 7.
5. A card is drawn from a standard deck of 52 cards. Find the probability that the card drawn is a face card (jack, queen, or king).

7. The heights (in cm) of students in a class are recorded as follows: 160, 165, 170, 155, 175. Calculate the mean height.
8. The following data represents the number of siblings of students in a class: 0, 1, 2, 3, 4. Find the median number of siblings.
9. The scores of 10 students in a test are: 85, 78, 92, 70, 88, 75, 82, 90, 79, 84. Calculate the mode of the scores.
10. The weights (in kg) of 8 students are: 55, 60, 65, 70, 55, 75, 60, 65. Find the range of the weights.
11. The ages (in years) of 12 students are: 14, 15, 16, 14, 17, 15, 16, 15, 14, 17, 16, 15. Calculate the standard deviation of the ages.
12. A survey of students' favourite sports yielded the following results: football 25%, basketball 30%, soccer 20%, and tennis 25%. Calculate the probability that a randomly selected student prefers basketball or tennis.
13. The number of cars passing through a toll booth in 10 minutes is recorded as follows: 28, 32, 25, 30, 35, 27, 29, 31, 33, 26. Calculate the mean number of cars passing through the toll booth per minute.
14. The time (in minutes) taken by 15 students to complete a test are: 40, 45, 50, 35, 55, 40, 42, 48, 38, 52, 46, 44, 50, 47, 41. Find the median time taken to complete the test.
15. The scores (out of 50) of 20 students in a quiz are: 42, 35, 48, 40, 36, 45, 50, 38, 44, 47, 39, 42, 43, 41, 37, 49, 46, 34, 43, 40. Calculate the interquartile range (IQR) of the scores.
16. The number of hours students spend on homework per week is recorded as follows: 5, 8, 6, 7, 9, 4, 10, 7, 6, 5. Calculate the variance of the number of hours spent on homework per week.

4 marks question

1. A bag contains 3 red balls, 4 blue balls, and 5 green balls. If a ball is drawn at random from the bag, what is the probability that it is not blue?
2. The heights (in cm) of students in a class are recorded as follows: 160, 165, 170, 155, 175. Calculate the median height.
3. A fair six-sided die is rolled. What is the probability of rolling a number less than 4?
4. The following data represents the ages (in years) of students in a class: 14, 15, 16, 14, 17, 15, 16, 15, 14, 17, 16, 15. Calculate the mode of the ages.
5. Two cards are drawn at random without replacement from a deck of 52 cards. What is the probability that the first card drawn is a heart and the second card drawn is a diamond?

Answers/ Solutions

2- mark question

1. A bag contains 5 red balls, 3 blue balls, and 2 green balls. A ball is drawn at random. Calculate the probability of drawing a blue ball.
   A: 3/10
2. Two dice are rolled. Find the probability that the sum of the numbers on the dice is 7.
   A: 1/6
3. A box contains 4 red marbles, 5 blue marbles, and 3 green marbles. Two marbles are drawn at random without replacement. Calculate the probability that both marbles are blue.
   A: 5/33
4. In a game, a spinner with 6 equal sections (numbered 1 to 6) is spun twice. Find the probability that the sum of the numbers spun is less than 7.
   A: 5/12
5. A card is drawn from a standard deck of 52 cards. Find the probability that the card drawn is a face card (jack, queen, or king).
   A: 12/52
6. The heights (in cm) of students in a class are recorded as follows: 160, 165, 170, 155, 175. Calculate the mean height.
   A: 165
7. The following data represents the number of siblings of students in a class: 0, 1, 2, 3, 4. Find the median number of siblings.
   A: 2

8. The scores of 10 students in a test are: 85, 78, 92, 70, 88, 75, 82, 90, 79, 84. Calculate the mode of the scores.
   A: Since all numbers appear with the same frequency (once), there is no mode for this data set.
9. The weights (in kg) of 8 students are: 55, 60, 65, 70, 55, 75, 60, 65. Find the range of the weights.
   A: 20 Kgs
10. The ages (in years) of 12 students are: 14, 15, 16, 14, 17, 15, 16, 15, 14, 17, 16, 15. Calculate the standard deviation of the ages.
   A: approximately 1.22471.22471.2247
11. A survey of students' favourite sports yielded the following results: football 25%, basketball 30%, soccer 20%, and tennis 25%. Calculate the probability that a randomly selected student prefers basketball or tennis.
   A: 55/100
12. The number of cars passing through a toll booth in 10 minutes is recorded as follows: 28, 32, 25, 30, 35, 27, 29, 31, 33, 26. Calculate the mean number of cars passing through the toll booth per minute.
   A: 29.6
13. The time (in minutes) taken by 15 students to complete a test are: 40, 45, 50, 35, 55, 40, 42, 48, 38, 52, 46, 44, 50, 47, 41. Find the median time taken to complete the test.
   A: 45
14. The scores (out of 50) of 20 students in a quiz are: 42, 35, 48, 40, 36, 45, 50, 38, 44, 47, 39, 42, 43, 41, 37, 49, 46, 34, 43, 40. Calculate the interquartile range (IQR) of the scores.
   A: IQR=Q3−Q1=45.5−38.5=7
15. The number of hours students spend on homework per week is recorded as follows: 5, 8, 6, 7, 9, 4, 10, 7, 6, 5. Calculate the variance of the number of hours spent on homework per week.
   A: Variance = 4.83

4 marks question

1. A bag contains 3 red balls, 4 blue balls, and 5 green balls. If a ball is drawn at random from the bag, what is the probability that it is not blue?
   A: the probability that a ball drawn is not blue is 2/3
2. The heights (in cm) of students in a class are recorded as follows: 160, 165, 170, 155, 175. Calculate the median height.
   A: 165
3. A fair six-sided die is rolled. What is the probability of rolling a number less than 4?

A: the probability of rolling a number less than 4 is 1/2

4. The following data represents the ages (in years) of students in a class: 14, 15, 16, 14, 17, 15, 16, 15, 14, 17, 16, 15. Calculate the mode of the ages.
   A: Since 15 appears most frequently, the mode of the data set is 15.
5. Two cards are drawn at random without replacement from a deck of 52 cards. What is the probability that the first card drawn is a heart and the second card drawn is a diamond?
   A: the probability that the first card drawn is a heart and the second card drawn is a diamond is13/204.

UNIT-4: Generative Artificial Intelligence

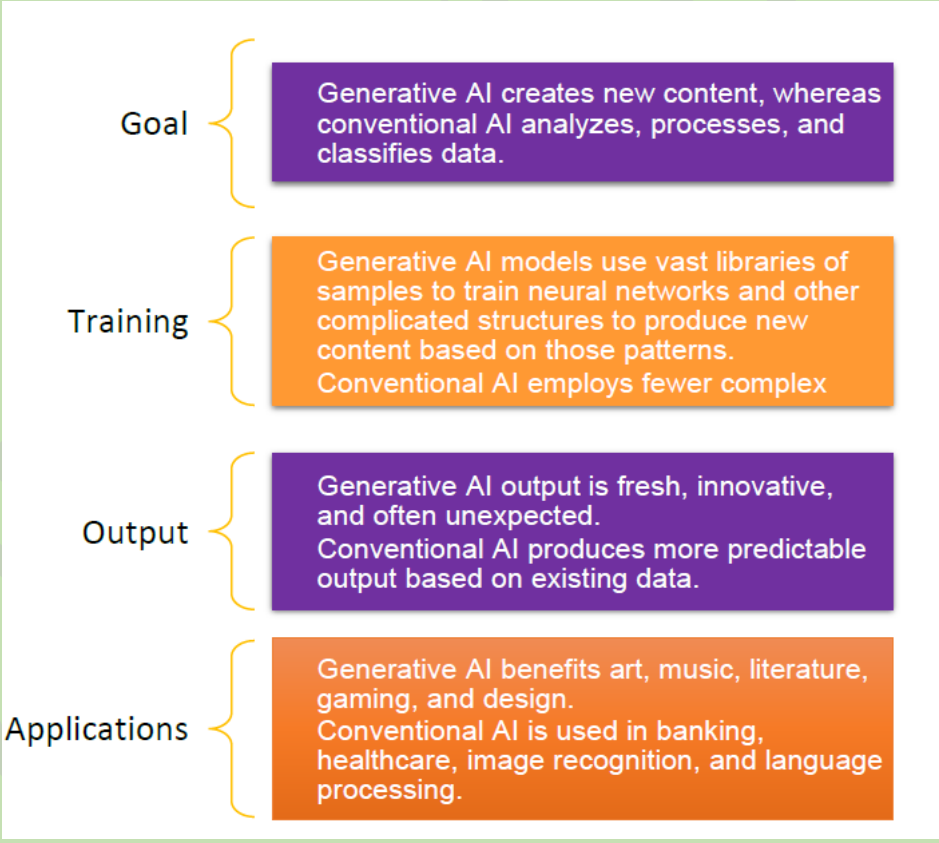
Introduction to Generative AI

What is Generative AI?

- Generative artificial intelligence (AI) refers to the algorithms that generate new data that resembles human-generated content, such as audio, code, images, text, simulations, and videos.
- This technology is trained with existing data and content, creating the potential for applications such as natural language processing, computer vision, the metaverse, and speech synthesis.

Generative AI vs Conventional AI

In contrast to other forms of AI, Generative AI is specially made to produce new and unique content rather than merely processing or categorizing already-existing data. Here are some significant variations:



Types of Generative AI

Generative AI comes in a variety of forms, each with unique advantages and uses. Some of the most typical varieties are listed below:

1. **Text Generation:**
   Language Models: These generate coherent text based on prompts. Examples include OpenAI's GPT-3 and GPT-4, Google's BERT, and T5.

   Chatbots: AI designed to simulate conversation with users. Examples include OpenAI's ChatGPT and Google's Meena.

2. **Image Generation**:

   GANs (Generative Adversarial Networks): These generate realistic images from random noise. Examples include StyleGAN and BigGAN.

   VAEs (Variational Autoencoders): These generate images by learning the distribution of input data.

   Diffusion Models: These iteratively refine noise to generate images, such as DALL-E 2 and Stable Diffusion.

3. **Audio Generation**:

   Music Generation: AI that composes music. Examples include OpenAI's MuseNet and Jukedeck.

   Speech Synthesis: Converts text to natural-sounding speech. Examples include Google WaveNet and Amazon Polly.

4. **Video Generation**: DeepFakes: AI-generated videos that can superimpose faces. Examples include DeepFaceLab and FaceApp.
   Generative Video Models: AI that creates new video content. Examples include VQ-VAE and MoCoGAN.

5. **3D Object Generation**:

   3D GANs: Generate three-dimensional objects. Examples include 3D-GAN and PointNet.

6. **Code Generation**:

   AI Code Assistants: These generate or autocomplete code. Examples include GitHub Copilot and OpenAI Codex.

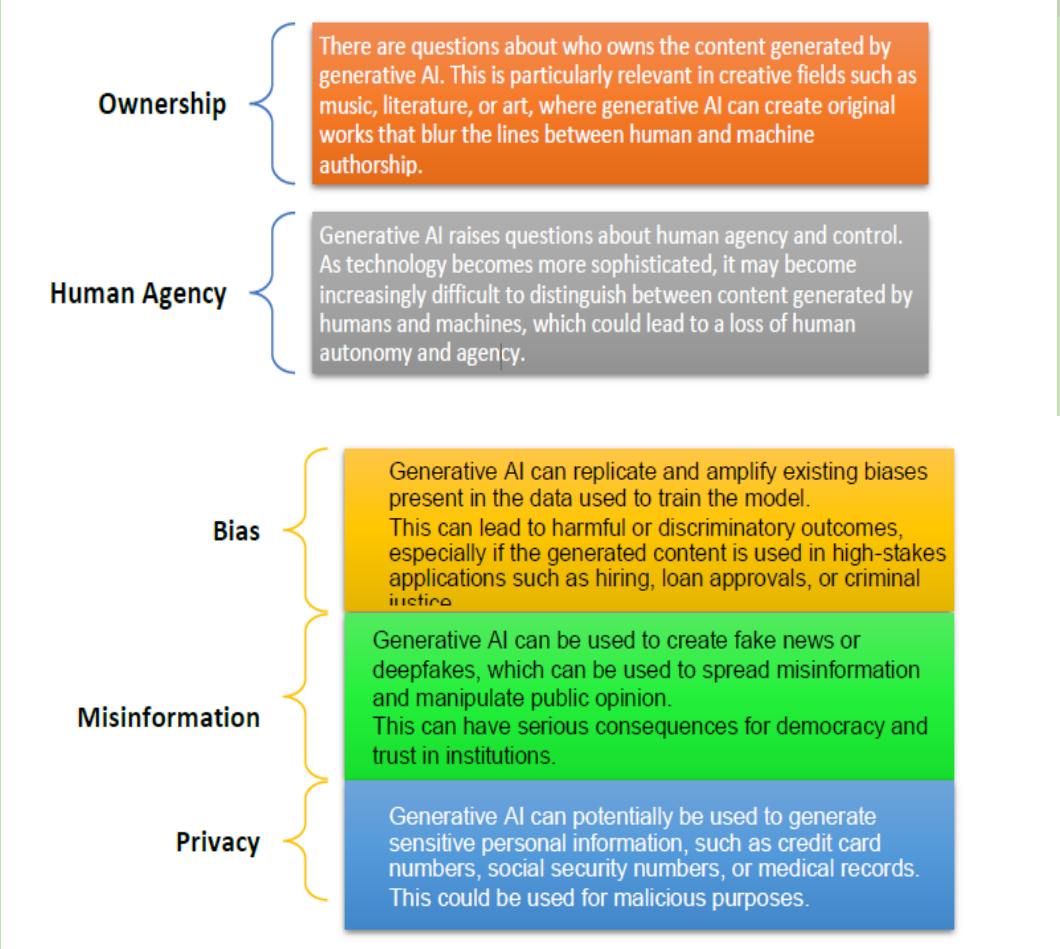
Benefits of using Generative AI

Limitations of Using Generative AI

- **Ethical Concerns**: The creation and spread of fake content, such as deep fake videos, fake news articles, and forged documents, by generative AI can deceive and manipulate people, leading to misinformation, identity theft, and privacy breaches. Robust regulations and ethical guidelines are needed to address these issues.
- **Bias and Fairness**: Generative AI models can inherit biases from their training data, resulting in discriminatory outcomes and perpetuating biases against certain groups. Developers need to actively work on mitigating bias to ensure fairness and equity in AI systems.

- **Data Dependency**: These models require vast amounts of data to generate content effectively. They struggle in situations with scarce or unrepresentative data, limiting their usefulness in niche domains.
- **Energy Consumption**: Training large generative AI models demands significant energy and computing resources, raising concerns about the environmental impact and sustainability of AI, particularly in data centers. Researchers are striving to develop more energy-efficient AI models, but this remains a significant limitation.
- **Cost of Development**: The development and training of generative AI models can be extremely expensive, requiring access to high-quality data, powerful hardware, and expertise in machine learning. This creates a digital divide, limiting the democratization of AI technology.

Ethical considerations of using Generative AI



The Potential Negative Impact on Society

- Generative AI can be used to create fake news or deep fakes that can spread misinformation and manipulate public opinion.
- Lead to job displacement for humans who previously performed these tasks.

- Generative AI has the potential to generate sensitive personal information, such as social security numbers or medical records, which could be used for malicious purposes.

Responsible Use of Generative AI

- Ensuring that the training data used are diverse and representative.
- The outputs are scrutinized for bias and misinformation.
- Prioritizing user privacy and consent,
- Having clear guidelines around ownership and attribution of generative content.
- Engaging in public discussions around the social and ethical implications of this technology to ensure that it is developed and used in ways that are beneficial to society.

1 Mark questions		
1	What is Generative AI? a) An AI that analyzes data b)An AI that generates new data c)An AI that only classifies data d)An AI that only processes existing data	1
2	Which of the following is an example of a generative model? a)Decision Trees b)Support Vector Machines c)Generative Adversarial Networks (GANs) d)Random Forest	1
3	What is the primary purpose of Generative Adversarial Networks (GANs)? a)To minimize the error in classification tasks b)To predict the next word in a sequence c)To generate new, synthetic instances of data that resemble a training set d)To perform clustering of data points	1
4	Which of the following applications can be powered by generative AI? a)Image synthesis b)Music composition c)Text generation d)All of the above	1
5	What is Conventional AI primarily used for? a)Generating new and unique data b)Analyzing and making decisions based on existing data c)Creating art and music d)Developing video games	1
6	Which of the following is a characteristic of Generative AI?	1

	a)It can only classify data b)It generates new data similar to the data it was trained on c)It cannot learn from data d)It is used for numerical calculations only	
7	Which AI technology would you use to create a new image based on existing images? a)Conventional AI b)Generative AI c)Spreadsheet software d)Database management systems	1
8	Which of the following is an example of Conventional AI? a)Image generation b)Natural language processing for chatbots c)Creating realistic videos d)Developing new music compositions	1
9	Which type of AI would be most suitable for creating a new song in the style of a famous musician? a)Conventional AI b)Generative AI c)Statistical analysis software d)Search engine algorithms	1
10	What is the main goal of Conventional AI systems? a)To generate realistic images b)To solve specific problems using existing data c)To create new languages d)To invent new scientific theories	1
11	What is a key difference between Generative AI and Conventional AI? a)Generative AI cannot learn from data, while Conventional AI can b)Generative AI creates new data, while Conventional AI analyzes existing data c) Conventional AI generates new data, while Generative AI only analyzes data d)There is no difference; they are the same	1
12	Which of the following is a task that Conventional AI can perform? a)Creating new pieces of art b)Diagnosing diseases from medical images c)Writing novels d)Generating new human faces	1
13	What does Generative AI typically use to create new data? a)Random number generation b)Mathematical calculations	1

	c)Patterns learned from training data d)Predefined templates	
14	Which application is known for using generative AI to produce text similar to human writing? a)Google Translate b)OpenAI's GPT-3 c)Netflix recommendation system d)Microsoft Excel	1
15	Which generative AI model can be used to generate new video game levels? a)GANs b)RNNs c)CNNs d)KNNs	1
16	Which of the following is an example of generative AI in natural language processing? a)IBM Watson b)OpenAI's ChatGPT c)Amazon Alexa d)Google Maps	1
17	What is a primary advantage of using generative AI in art and design? a)It can replace human artists entirely b)It allows for quick creation of unique artworks c)It restricts creativity d)It only works with traditional media	1
18	What is a significant challenge faced by generative AI in creating realistic images and videos? a)It requires extensive computational power b)It cannot generate images at all c)It only works with text data d)It restricts creativity	1
19	Which of the following is a concern regarding the ethical use of generative AI? a)It promotes fair decision-making processes b)It ensures data privacy and security c)It raises issues of copyright infringement and misuse d)It decreases reliance on human labour	1
20	Which ethical issue is associated with bias and fairness in generative AI algorithms? a)It ensures equal access to resources for everyone	1

	b)It perpetuates societal biases present in training data c)It limits the scope of AI applications d)It improves decision-making processes	
	2 Marks questions	
1	Compare and contrast Generative AI and Conventional AI, providing examples of each.	2
2	What are the ethical considerations surrounding the use of generative AI.	2
3	Describe one limitation of generative AI in the context of creating realistic images or videos	2
4	How does generative AI contribute to personalized content recommendation systems in entertainment platforms?	2
5	What do you understand about generative AI?	2
6	Give a few examples of generative AI.	2
7	What do you know about Deep Fake?	2
8	Explain the role of the 'Discriminator' in a Generative Adversarial Network (GAN) and its importance in generating realistic data.	2
9	What is GAN?	2
10	What are the benefits of Generative AI?	2
11	What are the limitations of using Generative AI?	2
12	What are the negative Impacts of generative AI on Society	2
13	Write any two AI tools each for the following- ▪ Generative AI image generation tools ▪ Generative AI text generation tools	2
14	Name two popular generative AI frameworks or libraries used in machine learning.	2
15	What is the purpose of generator in a Generative Adversarial Network?	2
	4 Marks questions	
1	Considering the ethical challenges associated with generative AI, what are your thoughts on establishing guidelines or regulations to ensure responsible use of these technologies? How can we balance the potential benefits and risks?	4
2	How do you think generative AI can revolutionize the creative industry, such as art and fashion, by enabling the generation of unique and innovative designs?	4
3	What is the difference between supervised learning and generative AI? Provide examples of each	4
4	Explain the benefits and limitations of using generative AI.	4
5	Discuss the potential impact of generative AI on the job market and workforce dynamics, considering both positive and negative aspects.	4

ANSWERS

	1 mark	
1	b) An AI that generates new data	
2	c) Generative Adversarial Networks (GANs)	
3	c) To generate new, synthetic instances of data that resemble a training set	
4	d) All of the above	
5	b) Analyzing and making decisions based on existing data	
6	b) It generates new data similar to the data it was trained on	
7	b) Generative AI	
8	b) Natural language processing for chatbots	
9	b) Generative AI	
10	b) To solve specific problems using existing data	
11	b) Generative AI creates new data, while Conventional AI analyzes existing data	
12	b) Diagnosing diseases from medical images	
13	c) Patterns learned from training data	
14	b) Open AI's GPT-3	
15	a) GANs	
16	b) Open AI's Chat GPT	
17	b) It allows for quick creation of unique artworks	
18	a) It requires extensive computational power	
19	c) It raises issues of copyright infringement and misuse	
20	b) It perpetuates societal biases present in training data	
	2 mark question answers	
1	Generative AI creates new data similar to existing data, while discriminative AI classifies or predicts outcomes based on data. For example, GANs (Generative Adversarial Networks) generate realistic images, whereas discriminative models like CNNs (Convolutional Neural Networks) identify objects in images.	
2	1.Ownership 2.Human agency 3.Bias 4.Misinformation 5.Privacy	
3	One limitation of generative AI in creating realistic images or videos is the challenge of ensuring consistency and coherence over time and complex scenarios. While generative models can produce highly detailed and realistic single frames, maintaining the same level of realism and continuity in a sequence of frames (as in a video) or across various elements within a complex scene can be difficult. This can lead to artifacts, inconsistencies, or unnatural transitions, especially in dynamic environments or when depicting intricate interactions between objects and characters.	
4	Generative AI enhances personalized content recommendation systems in	

	entertainment platforms by: 1. Creating Personalized Content: Generates tailored playlists, summaries, or articles based on user preferences. 2. Analyzing User Behavior: Processes viewing history and interactions to predict user interests. 3. Enhancing Metadata: Produces detailed descriptors (genre, mood, etc.) to refine recommendations. 4. Dynamic Personalization: Adapts recommendations in real-time based on recent user activities. 5. Content Summarization: Creates summaries or highlight reels for users with limited time.	
5	Generative AI is a type of artificial intelligence that creates new content by learning from existing data. It can produce text, images, music, and videos. Generative AI works by using an ML model to learn the patterns and relationships in a dataset of human-created content. It then uses the learned patterns to generate new content.	
6	OpenAI (Code generation), Art creation, content generation(chatGPT), AIVA (music creation), Alpha3D (3D Modelling)	
7	Deep fakes are a synthetic media created by machine-learning algorithms named for the deep-learning methods used in the creation process and the fake events they depict.	
8	The discriminator in a GAN is simply a classifier. It tries to distinguish real data from the data created by the generator. It could use any network architecture appropriate to the type of data it's classifying	
9	A generative adversarial network (GAN) is a deep learning architecture. It trains two neural networks to compete against each other to generate more authentic new data from a given training dataset. For instance, you can generate new images from an existing image database or original music from a database of songs.	
10	Automates and Innovates Content Generation: Enhances Customer Experience through Personalization: Optimizes Product Designs: Advances Healthcare Research: Improved Customer Service: Fosters Market Innovation:	
11	1. Quality Control: The generated content may contain errors or unrealistic elements, requiring human review. 2. Data Dependence: The quality of the output depends heavily on the quality and diversity of the training data, which can lead to biased or low-quality results if the data is flawed.	
12	1.Misinformation and deep fakes	

	2.privacy concerns 3.Job displacement 4.Bias and discrimination	
13	▪ Generative AI image generation tools- DALL-E,GAN ▪ Generative AI text generation tools- GPT-4,BERT	
14	Popular AI frameworks such as TensorFlow and Py Torch are used for developing machine learning models. These frameworks provide a comprehensive set of tools that enable developers to easily create and deploy ML models.	
15	The generator's primary role is to generate data. Initially, this data is likely to be random noise because the generator starts without much knowledge about the true data distribution. Over time, as the GAN is trained, the generator learns to produce data that approximates the real data distribution.	
	4 Mark question answers	
1	Establishing guidelines or regulations for the responsible use of generative AI is crucial to navigate its ethical challenges effectively. 1. **Ethical Principles and Frameworks**: Develop ethical principles that guide the development and deployment of generative AI. These could include principles such as fairness, accountability, transparency, and privacy. Frameworks like the IEEE's Ethically Aligned Design can serve as a starting point. 2. **Regulatory Oversight**: Introduce regulations that ensure compliance with ethical standards. This might involve regulatory bodies setting guidelines for specific sectors where generative AI is used, such as healthcare, finance, and criminal justice. 3. **Risk Assessment and Mitigation**: Conduct thorough risk assessments to identify potential harms associated with generative AI systems. Mitigation strategies can then be implemented to minimize these risks, such as robust testing, validation procedures, and continuous monitoring. 4. **Public and Stakeholder Engagement**: Involve the public and relevant stakeholders in discussions about the use of generative AI. This can help ensure that diverse perspectives are considered and that the benefits and risks are weighed appropriately. 5. **Education and Awareness**: Promote understanding of generative AI technologies among policymakers, developers, and the general public. This can help mitigate fears and misconceptions while fostering informed decision-making. 6. **International Collaboration**: Foster international collaboration on guidelines and standards for generative AI. Given the global nature of AI development and deployment, international cooperation can help create	

	consistent ethical standards and regulations. 7. **Adaptive Approach**: Recognize that AI technologies evolve rapidly, requiring guidelines and regulations to be adaptive and flexible. Continuous review and updates based on technological advancements and societal impacts are essential. Balancing the potential benefits and risks of generative AI involves a nuanced approach that acknowledges its transformative potential while mitigating potential harms. By implementing thoughtful guidelines and regulations, we can harness the benefits of generative AI while safeguarding against its misuse.	
2	Generative AI has the potential to revolutionize the creative industries like art and fashion by significantly speeding up design iterations and production processes. This acceleration allows designers to explore a broader range of ideas quickly, reducing time-to-market and enabling more efficient innovation and creativity. By automating repetitive tasks and offering rapid prototyping capabilities, AI frees up designers to focus on more complex and visionary aspects of their work, pushing the boundaries of artistic expression and fashion design. This transformative technology also democratizes access to creative tools, empowering a broader range of artists and designers to participate in and contribute to these industries, fostering a more diverse and dynamic creative landscape.	
3	1. **Supervised Learning**: In supervised learning, the algorithm learns from a labelled dataset where each input example is associated with a corresponding target or output. The goal is to learn a mapping function from input to output based on the provided examples. Examples include classification tasks (where the output is categorical) and regression tasks (where the output is continuous). 2. **Generative Learning**: Generative learning focuses on learning the underlying distribution of the data to generate new samples that resemble the original data distribution. Generative models do not require explicit labelling of the data; instead, they aim to capture the joint probability distribution p(x,y)p(x, y)p(x,y) where xxx is the input and yyy is the output (if any). Generative models are often used for tasks such as image generation, text generation, and anomaly detection. Supervised learning is concerned with learning a mapping from inputs to outputs based on labeled data, while generative learning involves learning the underlying data distribution to generate new data samples. These approaches have different objectives and are applied in different contexts within machine learning.	

4	**Benefits** 1. **Creativity and Content Generation**: • **Text**: Generates human-like text for writing assistance, content creation, storytelling, and more. • **Images**: Produces original artwork and designs. • **Music**: Composes original pieces of music. 2. **Automation and Efficiency**: • **Customer Service**: Chatbots and virtual assistants can handle common queries, freeing human agents for complex tasks. • **Data Analysis**: Automates data summarization, report generation, and even some aspects of data interpretation. 3. **Personalization**: • **Marketing**: Creates personalized marketing messages and campaigns. • **Education**: Tailors educational content to individual learning styles and needs. 4. **Prototyping and Ideation**: • **Product Design**: Assists in brainstorming and developing new product ideas. • **Creative Industries**: Provides inspiration and preliminary drafts for writers, artists, and other creatives. 5. **Accessibility**: • **Language Translation**: Improves real-time translation and language learning tools. • **Accessibility Tools**: Enhances tools for people with disabilities, such as speech-to-text and text-to-speech applications. **Limitations** 1. **Quality and Accuracy**: • **Factual Errors**: May produce incorrect or misleading information. • **Coherence**: Generated content can sometimes lack coherence or logical consistency. 2. **Bias and Ethics**: • **Bias**: Models can inherit and propagate biases present in the training data. • **Ethical Concerns**: Issues related to deep fakes, misinformation, and the potential for misuse. 3. **Resource Intensive**: • **Computational Power**: Requires significant computational resources for training and deployment. • **Environmental Impact**: High energy consumption associated with	

	large-scale models. 4. **Lack of Understanding**: • **Context**: AI may not fully understand context, nuance, or cultural references. • **Empathy**: Cannot genuinely understand or empathize with human emotions and experiences. 5. **Dependence and Job Displacement**: • **Dependence**: Over-reliance on AI can lead to skill degradation in humans. • **Job Displacement**: Potential to replace certain jobs, leading to economic and social challenges. 6. **Security and Privacy**: • **Data Security**: Risk of sensitive data exposure through interactions with AI systems. • **Privacy Concerns**: Potential misuse of generated content for malicious purposes.	
5	Generative AI impacts the job market and workforce dynamics with both positive and negative aspects: Positive Impacts 1. **Automation**: Frees workers from routine tasks, boosting efficiency and productivity. 2. **New Jobs**: Creates roles in AI development, maintenance, and ethical oversight. 3. **Innovation**: Enhances creativity and problem-solving in various industries. 4. **Personalization**: Improves customer service and educational experiences. 5. **Skill Enhancement**: Supports professional development through personalized training. **Negative Impacts** 1. **Job Displacement**: Automates jobs, especially low-skill roles, leading to potential unemployment. 2. **Skill Gaps**: Requires significant reskilling and upskilling efforts. 3. **Economic Inequality**: Risks widening the gap between high- and low-skill jobs. 4. **Reliability Issues**: Necessitates human oversight to ensure AI output quality. 5. **Ethical Concerns**: Potential for bias and privacy issues in workplace surveillance.	

UNIT-5: INTRODUCTION TO PYTHON

- Python is an open-source, high level, interpreter-based language that can be used for a multitude of scientific and non-scientific computing purposes.
- Comments are non-executable statements in a program.
- An identifier is a user defined name given to a variable or a constant in a program.
- Process of identifying and removing errors from a computer program is called debugging.
- Trying to use a variable that has not been assigned a value gives an error.
- There are several data types in Python — integer, Boolean, float, complex, string, list, tuple, sets, None and dictionary.
- Operators are constructs that manipulate the value of operands. Operators may be unary or binary.
- An expression is a combination of values, variables, and operators.
- Python has input () function for taking user input.
- Python has print () function to output data to a standard output device.
- The if statement is used for decision making.
- Looping allows sections of code to be executed repeatedly under some condition.
- for statement can be used to iterate over a range of values or a sequence.
- The statements within the body of for loop are executed till the range of values is exhausted.
- List is a mutable datatype in python. Elements are stored in a list using square brackets [ ] . Elements of a list are accessed using its index.

1 mark Questions	
1	Who developed Python Programming Language? a) Wick Van Rossum b) Rasmus Lerdorf c) Guido Van Rossum d) Niene Stom
2	In Python, which of the following characters is used to create single line comment a) // b) # c) ! d) /*
3	An identifier cannot start with a _____ a) Number b) Character c) Underscore d) None of the above
4	_____ has a specific meaning in python program a) Constant b) Variable c) Keyword d) Identifier
5	Write the output of the following python statement print(10//3) a) 3 b) 3.33 c) 1 d) 0
6	Which of the following is the valid Python file extension? a) . python b) . pl c) . py d) . p
7	Numbers with fractions or decimal points are called _____ datatype.

	a) Integer b) String c) Float d) None of the above
8	_____is an ordered sequence of letters/characters. They are enclosed in single quotes (‘ ’) or double (“ ”). a) String b) Integer c) Float d) None of the above
9	_____ are a sequence of values of any type, and are indexed by integers. They are immutable and enclosed in (). a) String b) Lists c) Tuples d) All of the above
10	_____ function is used to display given output in python. a) printf() b) print() c) scan() d) None of the above
11	_____ function is used to take input from the user in python. a) input() b) insert() c) store() d) None of the above
12	The data type of 14.5 is _____ **a)** int **b)** float **c)** string d) list
13	_____ operator gives the remainder in Python. a) % b) / c) // d) *

14	_____ operator is used to find the square of a number a) ^ b) * c) ** d) //

15	What does the following code print?
	if 4 + 5 == 10:
	print("TRUE")
	else:
	print("FALSE")
	a) TRUE
	b) FALSE
	c) None of them
	d) TRUE FALSE

16	What will be the datatype of following variable? A= "100" a) int b) float c) string d) list
17	Smallest element of python coding is called _____ a) Identifiers b) Tokens c) Keywords d) Delimeters
18	Find the invalid variable among the following: a) 1st_place b) my_place c) _first d) Fun
19	T=[10,20,30,40] is a type of which datatype in python a) int b) string c) list d) tuple
20	The _____ mode of python gives instant result of typed statement

	a) Interactive mode b) Script mode c) Combination of interactive and script mode d) All of these
2 mark Questions	
1	What is the Difference between Interactive mode and script mode?
2	What are the basic datatypes in Python?
3	What is a variable?
4	What are the arithmetic operators in Python?
5	What are lists in python?
6	What will be out of the following? for I in range(1,10,2): print(I)

7	What does the following code print?
	if 4 + 5 == 10:
	print("TRUE")
	else:
	print("FALSE")

8	L=[10, "New", 34.5,30,40] print(L[1]) L[2]=50 print(L)
9	What will be the output of the following print ("hello \n") print("Class 9\n Artificial Intelligence")
10	State True or False a) Python is case sensitive programming language b) A variable's value once assigned cannot be changed
11	Identify the datatype in the following a) 15.3 b) "123" c) "CBSE" d) K=[1,2,3,4]

12	Write the output of the following A,B=10,20 A,B=B,A print(A.B)
13	To print the following patterns using multiple print commands * * * * * * * * * * * * * * *
14	Write program to generate the following output 5 10 15, 20…..100
15	Rewrite the following by correcting the errors Sname=int(input("Enter Name")) M=int(input("Enter Mark") if M>33 print("Pass") otherwise: print("Fail")
4 Mark Questions	
1	Define the following terms a) Identifiers : A token is the smallest individual unit in a python program. All statements and instructions in a program are built with tokens b) Keywords c) Expression d) Tokens
2	Write a program to enter Marks in 5 subjects, Calculate and display total and average marks
3	Create a list in Python of children selected for Sports with following names Arjun, Sonakshi, Vikram, Sandhya, Sonal, Isha, Kartik Perform the following tasks on the list in sequence- • Print the whole list • Display the name "Vikram" from the list • Add the name "Jay" at the end • Remove the item which is at the second position
4	Write a program to calculate Area and Perimeter of a rectangle

5	Write a program to print sum of first 10 natural numbers

ANSWERS TO QUESTIONS

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7	Numbers with fractions or decimal points are called _____ datatype. e) Integer f) String **g) Float** h) None of the above
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9	_____ are a sequence of values of any type, and are indexed by integers. They are immutable and enclosed in (). e) String f) Lists **g) Tuples** h) All of the above
10	_____ function is used to display given output in python. e) printf() **f) print()** g) scan() h) None of the above
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15	What does the following code print?
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16	What will be the datatype of following variable ? A= "100" e) int f) float **g) <u>string</u>** h) list
17	Smallest element of python coding is called _____ e) Identifiers **f) <u>Tokens</u>** g) Keywords h) Delimiters
18	Find the invalid variable among the following: **e) <u>1st_place</u>** f) my_place g) _first h) Fun
19	T=[10,20,30,40] is a type of which datatype in python e) int f) string **g) <u>list</u>**

	h) tuple
20	The _____ mode of python gives instant result of typed statement **e) <u>Interactive mode</u>** f) Script mode g) Combination of interactive and script mode h) All of these
	2 mark Questions
1	What is the Difference between Interactive mode and script mode?
Ans	Interactive mode is where you type commands and they are immediately executed. Script mode is where you put a bunch of commands into a file (a script), and then tell Python to run the file.
2	What are the basic datatypes in Python?
Ans	The basic datatypes are int – to represent integers float - to represent floating point numbers string – to represent sequence of characters Boolean – to represent True or False list- to represent collection of elements in [ ] tuple – to represent collection of elements in ( ) dictionary – to represent the elements as key and value pairs in { }
3	What is a variable?
Ans	A Python variable is a reserved memory location to store values Eg: V=10, here V is variable
4	What are the arithmetic operators in Python?
Ans	+ for addition (eg: print(5+5) gives 10 - for subtraction(eg: print(5-4) gives 1

	* for multiplication (eg: print(5 * 4) gives 20 / for division (eg: print(7/2) gives 3.5 // for floor Division (eg: print(7//2) gives 3 % for reminder (eg: print(7%2) gives 1 ** for Exponentiation (eg: print(3**2) gives 9
5	What are lists in python?
Ans	Lists are mutable datatypes in python which can be used to store elements within square brackets [ ] Eg: L=[1, 3.5, "New", [1,2,3]]
6	What will be out of the following? for I in range(1,10,2): print(I)
Ans	1 3 5 7 9

7	What does the following code print?
	if 4 + 5 == 10:
	print("TRUE")
	else:
	print("FALSE")

Ans	FALSE
8	L=[10, "New", 34.5,30,40] print(L[1]) L[2]=50 print(L)
Ans	New [10, 'New', 50, 30, 40]
9	What will be the output of the following print ("hello") print("Class9 \nArtificial Intelligence")

Ans	hello Class9 Artificial Intelligence
10	State True or False c) Python is case sensitive programming language d) A variable's value once assigned cannot be changed
Ans	a) True b) False
11	Identify the datatype in the following e) 15.3 f) "123" g) "CBSE" h) K=[1,2,3,4]
Ans	a) float b) string c) string d) list
12	Write the output of the following A,B=10,20 A,B=B,A print(A,B)
Ans	20 10
13	To print the following patterns using multiple print commands * * * * * * * * * * * * * * *
Ans	print(" * ") print(" * *") print("* * *") print("* * * *") print("* * * * *")
14	Write program to generate the following output 5 10 15, 20…..100
Ans	# Program to generate the given series of numbers

	for I in range(5,101,5): print(I, end= “ ”)
15	Rewrite the following by correcting the errors Sname=int(input(“Enter Name”)) M=int(input(“Enter Mark”) if M>33 print(“Pass”) otherwise: print(“Fail”)
Ans	Sname=**input(“Enter Name”)** M=int(input(“Enter Mark”)**)** if M>33**:** print(“Pass”) **else:** print(“Fail”)
	4 Mark Questions
1)	Define the following terms a) Identifiers b) Keywords c) Expression d) Tokens
Ans	a) Identifier: A token is the smallest individual unit in a python program b) Keywords: Keywords are words that have some special meaning or significance in a programming language. They can’t be used as variable names or function names c) Expression: an expression is a combination of values, variables, and operators that evaluates to a single value d) Tokens: It is the smallest unit of a program
2)	Write a program to enter Marks in 5 subjects, Calculate and display total and average marks

Ans	# Program to calculate total and average marks
	m1 = int(input("Enter first subject marks: "))
	m2 = int(input("Enter second subject marks: "))
	m3 = int(input("Enter third subject marks: "))

	m4 = int(input("Enter fourth subject marks: ")) m5 = int(input("Enter fifth subject marks: ")) avg = (m1 + m2+ m3+ m4 + m5) / 5; print("Average Marks =", avg)
3)	Create a list in Python of children selected for Sports with following names Arjun, Sonakshi, Vikram, Sandhya, Sonal, Isha, Kartik Perform the following tasks on the list in sequence- • Print the whole list • Display the name "Vikram" from the list • Add the name "Jay" at the end • Remove the item which is at the second position
Ans	Sports=["Arjun", "Sonakshi", "Vikram", "Sandhya"," Sonal", "Isha", "Kartik"] print(Sports) print(Sports[2]) Sports.append("Jay") Sports.pop(2)
4)	Write a program to calculate Area and Perimeter of a rectangle
Ans	length = int(input("Enter the length of the rectangle: ")) width = int(input("Enter the width of the rectangle: ")) area = length * width perimeter = 2 * (length + width) print("The area of the rectangle is:", area) print("The perimeter of the rectangle is:", perimeter)
5)	Write a program to print sum of first 10 natural numbers

Ans	# Program to find sum of first 10 natural numbers
	sum = 0
	for i in range(1, 11):
	  sum = sum+ i
	print(sum)

SAMPLE PAPER I

SESSION 2023-24
SESSION ENDING EXAMINATION 2023-24

CLASS: IX **SUBJECT: ARTIFICIAL INTELLIGENCE**

MAX MARKS: 50 TIME ALLOWED: 2HRS

	Section A (Objective Type Questions)
1	Answer any 4 out of the given 6 question on Employability skill (1X4=4 Marks)
i	Physical exercise is used as a stress management technique because it improves blood circulation b) improves self-image makes us feel better d) all of the above
ii	seema is having a list of softwares, she wants to find out the system software, help her by finding out which of the following is a system software facebook messenger b) MS Office c) Operating System d) Adobe photoshop
iii	Rhea gas to draw the basic diagram of Computer. she has drawn the CPU but forgot the units inside the CPU to be mentioned in the diagram. find out the correct units to help her: ALU and Output unit b) CU and input unit c) CU and ALU d) CU and output unit
iv	Economic development of country means: Circulation of money b) improved standard of living none of the above d) more and more jobs
v	Living environment includes: a) plants, animals, human beings and other living organisms. b) oil,rock, c) air,water d) sun
vi	_____are the resources that are constantly replaced and usually less polluting: a) inexhaustible resources c) renewable resources b) exhaustible resources d) None of the above resources
2	Answer any 5 out of 6 the given question (1X5=5 marks)
i	_____ allows computers and systems to extract useful information

	from digital photos, videos, and other visual inputs. a. Data Science c. Computer Vision b. Natural Language Processing d. All of the above
ii	Which of the following is not a stage of AI Project cycle? a) Problem Scoping b) Prototyping c) Modelling d) evaluation
iii	which of the following is not a way to collect data? a) Survey b) Sensors c) Camera d) none of these
iv	_____part helps us understand and identify the nature of the problem and how we get to know what helps to get us to know the evidence: a) Who b) What c) Where d) why
v	The point of contact between an axon of one cell and a dendrite of another cell is called a _____. a) soma b) synapse c) dendrites d) Axon Terminal
vi	which one of the following is a valid identifier in python? a) file.exe b) file1# c) int d) myfile1
3	**Answer any 5 out of 6 the given question (1X5=5 marks)**
i	Who is known as father of Artificial Intelligence. a) John McCarthy b) Charles babbage c) Alan Turing d) None
ii	AI plays an important role in _____ technologies: a) Self-Driving cars b) metro c) both a and b d) None of these
iii	For better efficiency of an AI project, the _____should be authentic and relevant to the problem statement scoped. ans: training data
iv	in a neural network how, many hidden layers can exist: a) 5 b)0 c) 1 d) to be defined by programmer
v	Which of the following is not a decision-making statement in python? a) if b) if…else c) if …elif d) for
vi	Write the python statements to print the entire list L1 a) print(L1) b)print(L1[4]) c) L1[2]="Mangoes" d)print(L1[2])
4	**Answer any 10 out of the given11 question (1X10=10 marks)**
i	which of the following in not a virtual assistant : a) Alexa b) siri c) cortana d) sophia
ii	Which of the following is not an application of AI: a) Remote controlled drone b) Self driving car c) Self-serving kiosk d) Self watering plant system
iii	This domain is enabling computer to identify and process images like

	humans do: a) Data Science b) NLP c) Computer Vision d) None of these
iv	Choose the five stages of AI project cycle in correct order from the choices given below a. Evaluation → Problem scoping → Data exploration → Data acquisition → Modelling b. Problem scoping → Data exploration → Data acquisition → Evaluation → Modelling c. Data acquisition → Problem scoping→ Data exploration → Modelling → Evaluation d. Problem scoping → Data acquisition → Data exploration → Evaluation → Modelling
v	A_____is an Artificial intelligence strategy for teaching computers to analyze data in the same way the human brain does: a) Brain Network b) Cell Network c) Neural Network d) Human Nervous System
vi	Write the python statements to change “Oranges” with “Mangoes” in the list given below: ListOfFruits=[“Banana”,"Apple","Orange","Pears","Watermelon "] a)print(ListOfFruits) b)print(ListOfFruits[4]) c) ListOfFruits[2]="Mangoes" d)print(ListOfFruits[2])statement
vii	The application/applications of Artificial Intelligence is/are: a)Expert Systems b)Gaming c)Vision Systems d)All of the above
viii	what does NLP stands for in AI a) Neuro Linguisting Programming b)Natural language processing c) Neural Logic Presentation d)Natural Learning projection
ix	in a neural network how many input layers can exist: a) 5 b)0 c) 1 d) infinite
x	Which of the following shows the types of learning algorithm: a) supervised,machine,reinforcement b) supervised,unsupervised,regression c) supervised ,unsupervised ,reinforcement d) machine ,regression,unsupervised
xi	Write the python statements to print the last item of list given below: List1=[“Agra”,"Bengaluru","Chennai","Delhi","Ernakulam "] a) print(List1) b)print(List1[4])

	c) List1[2]="Mangoes" d)print(List1[2])
	SECTION- B **Descriptive type Questions** **Write in 20-30 words each**
	Answer any 3 out of 5 given questions on employability skill. (2X3=6 marks)
5	What is nonverbal communication? Give any two examples of it
6	Give any two factors for improving self-confidence.
7	What is utility software? Name any two.
8	Write any four characteristics of an entrepreneur.
9	What is sustainable development? write the number of Sustainable development goals set by the UN.
	Answer any 4 out of 6 given questions in 20-30 words each. (2X4=8 marks)
10	What are the three domains of AI? Explain any two.
11	a) When anyone searches about nurses on the internet, the picture of a female appears. Why it happens. b) What should be done to avoid it
12	Neeta has been working on an AI Project. She has completed the problem scoping, but she has forgotten the next stage. help her by listing all the remaining steps in the sequence.
13	Explain 4 W's of 4W Canvas?
14	Write any two applications of Neural Network.
15	predict the output list = [12,14,16,18] print(list[2]) list[-1]=30 print(list[-1])
16	**Answer any 3 out of 5 given questions in 50-80 words each. (4X3=12 marks)**
	Explain any four applications of Artificial Intelligence.
17	Why the selection of data sources is important in AI? Name two reliable data sources.
18	Write all the stages of AI Project Cycle. Explain any three.
19	a) Expand ANN b) Explain input layer c) Explain output layer d) Draw the diagram of ANN.

20	Write a python program to accept the marks of 2 subjects of a child in a test from the user and calculate the percentage.also print that the child has passed or not in the test. PS: Maximum marks for each subject is 100 and the pass percentage is 33%.

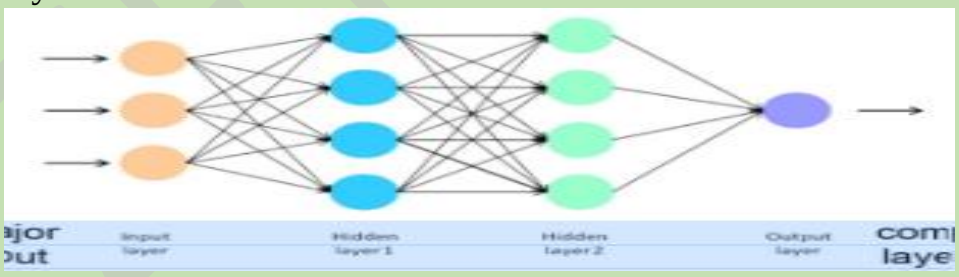
MARKING SCHEME

	Section A (Objective Type Questions)
1	Answer any 4 out of the given question on Employability skill(1X4=4Marks)
i	Physical exercise is used as a stress management technique because d)all of the above
ii	seema is having a list of softwares ,she wants to find out the system software ,help her by finding out which of the following is a system software c) Operating System
iii	Rhea gas to draw the basic diagram of Computer. she has drawn the CPU but forgot the units inside the CPU to be mentioned in the diagram. find out the correct units to help her: c) CU and ALU
iv	Economic development of country means: Circulation of money
v	Living environment includes: a) plants, animals, human beings and other living organisms.
vi	_____are the resources that are constantly replaced and usually less polluting: c) renewable resources
2	Answer any 5 out of 6 the given question (1X5=5marks)
i	_____ allows computers and systems to extract useful information from digital photos, videos, and other visual inputs. c. Computer Vision
ii	Which of the following is not a stage of AI Project cycle? b) Prototyping
iii	which of the following is not a way to collect data? d) none of these
iv	_____part helps us understand and identify the nature of the problem and how we get to know what helps to get us to know the evidence: b) What
v	The point of contact between an axon of one cell and a dendrite of

	another cell is called a _____. b) synapse
vi	which one of the following is a valid identifier in python? d)myfile1
3	Answer any 5 out of 6 the given question (1X5=5 marks)
i	Who is known as father of Artificial Intelligence. a) John McCarthy
ii	AI plays an important role in _____ technologies: a) Self-Driving cars
iii	For better efficiency of an AI project, the _____should be authentic and relevant to the problem statement scoped. ans: training data
iv	in a neural network how, many hidden layers can exist: d) to be defined by programmer
v	Which of the following is not a decision-making statement in python? d) for
vi	Write the python statements to print the entire list L1 a) print(L1)
4	Answer any 10 out of 11 the given question (1X10=10 marks)
i	which of the following in not a virtual assistant? d) sophia
ii	Which of the following is not an application of AI? a) Remote controlled drone
iii	This domain is enabling computer to identify and process images like humans do: c) Computer Vision
iv	Choose the five stages of AI project cycle in correct order from the choices given below. d. Problem scoping → Data acquisition → Data exploration → Evaluation → Modelling
v	A_____is an Artificial intelligence strategy for teaching computers to analyze data in the same way the human brain does: c) Neural Network
vi	Write the python statements to change “Oranges” with “Mangoes” in the list given below: ListOfFruits=[“Banana”,"Apple","Orange","Pears","Watermelon "] c) ListOfFruits[2]="Mangoes"

vii	The application/applications of Artificial Intelligence is/are: d)All of the above
viii	what does NLP stands for in AI b)Natural language processing
ix	a) in a neural network how many input layers can exist: b) c) 1
x	Which of the following shows the types of learning algorithm: c) supervised ,unsupervised ,reinforcement
xi	Write the python statements to print the last item of list given below: List1=[“Agra”,"Bengaluru","Chennai","Delhi","Ernakulam "] b)print(List1[4])
	SECTION- B **Descriptive type Questions** **Write in 20-30 words each**
	Answer any 3 out of 5 given questions on employability skill.(2X3=6 marks)
5	What is non verbal communication ? Give any two examples of it in non verbal communication, information is exchanged by using all other things except words. 1 mark example gestures, body language, facial expressions ,eye gaze etc any two. 1 mark
6	Give any two factors for improving self-confidence. Social Factor,cultural factor ,physical factor any two
7	What is utility software? Name any two. A utility program is used to perform maintenance work on a system or on the components of the computer. 1 Examples of Utility programs are;- antivirus software, file management programs, etc. ½ mark of one utility software name
8	Write any four characteristics of an entrepreneur. takes initiative,systematic,purposeful and lawful activity, risk bearer or any other valid characteristics (any four)
9	What is sustainable development? write the number of Sustainable development goals set by the UN. Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.1 mark 17 SDG are set by UN 1 mark
	Answer any 4 out of 6 given questions in 20-30 words each.(2X4=8 marks)
10	What are the three domains of AI. Explain any two

	Data Sciences, Computer Vision and NLP 1 mark brief explanation ½ mark each
11	a) When anyone searches about nurses on the internet ,the picture of a female appears.Why it happens . b) What should be done to avoid it AI Bias. training data should be unbiased. ½ mark each
12	Neeta has been working on an AI Project. She has completed the problem scoping but she has forgotten the next stage. help her by listing all the remaining steps in the sequence . data acquisition ,data exploration, modelling, evaluation ½ mark each stage
13	Explain 4 W's of 4W Canvas?. 4 W CANVAS 1. Who – Who are the ones for which the solution is to be developed; the stakeholders. The stakeholders are the directly or indirectly affected people who are facing the problem and will benefit from the solution. 2. What –What is the nature of the problem 3. Where – Where does the problem arise 4. Why – Why this problem should be solved and how it will benefit the stakeholders. ½ mark each W
14	Write any two applications of Neural Network. Speech recognition Character recognition Spell checking any two
15	predict the output list = [12,14,16,18] print(list[2]) list[-1]=30 print(list[-1]) 16 30 one mark each line
16	Answer any 3 out of 5 given questions in 50-80 words each.(4X3=12 marks)
	Explain any four applications of Artificial Intelligence. AI in E-Commerce(Personal shopping,AI Virtual Assistant, Fraud prevention), Social Media, Robotics, Agriculture. Any 4 with brief explanation

17	Why the selection of data sources is important in AI. Name two reliable data sources. The data is the foundation of the project .Therefore ,the acquired data should be authentic,reliable and correct. Also the acquisition methods should be authentic so that the project will not conflict with anyone. 1 mark data.gov.in, india.gov.in or any other reliable source. 1 mark for each source
18	Write all the stages of AI Project Cycle .Explain any three. Components of the AI Project Cycle : Problem Scoping:Understanding the problem,Data Acquisition:Collecting accurate and reliable data, Data Exploration:Arranging the data uniformly,Modelling:Creating Models from the data, Evaluation:Evaluating the project. write name correctly in sequence 1 mark explanation of three stages 1 mark each
19	a) Expand ANN b) Explain input layer c) Explain output layer d) Draw the diagram of ANN. Expand ANN :Artificial neural network 1mark Input layer – It communicates with external environment that present a pattern to the neural network. Its job is to deal with all the inputs only. This input get transferred to the hidden layer 1 mark Output layer – It collects and transmits the information accordingly in a way it has been designed to give. The final output is extracted from the previous hidden layers 1 mark .  diagram 1 mark
20	Write a python program to accept the marks of 2 subjects of a child in a test from the user and calculate the percentage also print that the child has passed or not in the test.PS: Maximum marks for each subject is 100 and the pass percentage is 33%. m1=int(input("Enter the marks of sub1"))

	m2=int(input("Enter the marks of sub2"))
	per=(m1+m2)/2
	if per>=33:
	  print("Passed")
	else:
	  print("not Passed")
	or any similar logic
	1 mark for taking inputs
	1 mark for calculation of percentage
	1 mark for if and print
	1 mark for else and print

SAMPLE PAPER II

General Instructions:

a) **Please read the instructions carefully.**
b) **This Question Paper consists two sections: Section A & Section B.**
SECTION A - OBJECTIVE TYPE QUESTIONS (24 MARKS):
SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):

SECTION-A: OBJECTIVE TYPE QUESTIONS

Q.I	Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)	
1	When we believe in our ability to achieve in anything we undertake in life, we develop the quality of _____ a. Self-confidence b. Self-awareness c. Self-control d. Positive attitude	1
2	ICT stands for _____ a. Information and Communication Technology b. Internet and Communication Technology c. Inter Connect Technology d. Information Community Technology	1
3	Which of the following shortcut key is used to paste the contents copied from a location a. CTRL+C b. CTRL+V c. CTRL+X d. CTRL+P	1
4	_____ is a person who is self-employed, is willing to take a calculated risk and brings in a new ides to start a business a. Software Engineer b. Entrepreneur c. Civil Engineer d. Mechanical Engineer	1

<table>
<tr><td>5</td><td>What are the sustainable development goals?
a. End Poverty
b. Protect the Planet
c. All people enjoy the peace and prosperity
d. All of the above</td><td></td></tr>
<tr><td>6</td><td>_____ is a concept of modern waste management
a. Reduce
b. Reuse
c. Recycle
d. All of the above</td><td>1</td></tr>
<tr><td>Q.II</td><td>Answer any 20 out of the given 23 questions (1 x 20 = 20 marks)</td><td></td></tr>
<tr><td>1</td><td>_____ is the ability of machines to do cognitive tasks such as thinking, perceiving, learning, problem solving and decision making
a. Nero Science
b. Artificial Intelligence
c. Data Package
d. None of the above</td><td>1</td></tr>
<tr><td>2</td><td>This language is easy to learn and is one of the most popular language for AI
a. C++
b. Python
c. Ruby
d. Java</td><td>1</td></tr>
<tr><td>3</td><td>Match column A with Column B
<table>
<tr><th>Column A</th><th>Column B</th></tr>
<tr><td>1. Expert System partner.</td><td>A. Simulate how a human would behave as a conversational</td></tr>
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<tr><td>4. self-driving car</td><td>D. Works on various mobile platforms</td></tr>
</table>
a) 1 -> B; 2 -> A; 3 -> D; 4 -> C
b) 1 -> A; 2 -> B; 3 -> C; 4 -> D
c) 1 -> D; 2 -> A; 3 -> B; 4 -> C</td><td>1</td></tr>
</table>

	d) 1 -> C; 2 -> A; 3 -> D; 4 -> B	
4	What does NLP stands for in AI? a. Neutral Learning Projection b. Neuro-Linguistic Programming c. Natural Language Processing d. Neural Logic Presentation	1
5	Who is known as “Father of Artificial intelligence”? a. Fisher Ada b. Alan Turing c. Allen Newell d. John Mccarthy	
6	This is a system of programs and data structures that mimics the operation of the human brain a. Intelligent Network b. Decision Support System c. Neural Network d. Genetic Programming	1
7	With the help of AI, the farmer can identify defects and nutrient deficiencies in the soil with the help of _____. a. Machine Learning applications b. Natural Language Processing c. Expert System d. Computer Vision	1
8	What does “IoT” mean in terms of artificial intelligence? a. Internet of Things b. Intelligence of Technology c. Input of Text d. Internet of Training	1
9	The method of collecting correct and dependable data to work with is known as ___ a. Problem Scoping b. Data Acquisition c. Data Exploration d. Modeling	1
10	What are the different types of data _____ a. Structured Data	1

	b. Unstructured Data c. Both a) and b) d. None of the above	
11	_____ is **not** a stage of AI Project cycle a. Problem Scoping & Data Acquisition b. Data Exploration & Modeling c. Evaluation d. Debugging	1
12	How you can identify the problem scoping in the project? a. Understand why the project was started b. Define the project's primary objectives c. Outline the project's work statement d. All of the above	1
13	_____ element helps us to understand and categorize who is directly and indirectly affected by the problem a. Who b. What c. Where d. Why	1
14	What are the various types of learning algorithms? a. Supervised learning b. Unsupervised Learning c. Reinforcement Learning d. All of the above	1
15	Artificial Neural Network is used for_____ a. Classification b. Clustering c. Pattern recognition d. All of the above	1
16	_____enables machines to improve at tasks with experience a. Machine learning b. Deep Learning c. Neural Network d. None of the above	
17	What are the features of a Neural Network _____ a. The human nrain and nervous system are used to model neural	

	network b. They can automatically extract features without the programmer's input c. Every node in a neural network is a machine learning algorithm d. All of the above	
18	Which learning involves training the machine using data? a. Supervised b. Unsupervised c. Rule based d. Learning based	
19	Who developed Python Programming Language? a. Wick Van Rossum b. Rasmus Lerdorf c. Guido Van Rossum d. Niene Stom	1
20	In Python, which of the following characters is used to create single line comment a. // b. # c. ! d. /*	1
21	An identifier cannot start with a _____ a. Number b. Character c. Underscore d. None of the above	1
22	_____ keyword is used to accept data from user a. print b. accept c. input d. output	1
23	Write the output of the following python statement print(10//3) a. 3 b. 3.33 c. 1	1

	d. 0	

SECTION-B: SUBJECTIVE TYPE QUESTIONS

Q.III	**Answer any 3 out of the given 6 questions (2 x 3 = 6 marks)**	
1	Define any two types of Communication.	2
2	Write any four self-management skills.	2
3	Write in brief about files and folders in a computer system.	2
4	Write any four qualities of successful entrepreneurs.	2
5	Write in very short about sustainable development and Green Skill.	2
Q.IV	**Answer any 4 out of the given 6 questions (2 x 4 = 8 marks)**	
1	Name at least two domains of Artificial Intelligence.	2
2	Write a short note on Smart Home.	2
3	Write the name of 4 W's of Problem Scoping.	2
4	Define the term Data Acquisition in AI.	2
5	Define the term Neural Network.	2
6	What are the data types in python?	2
Q.V	**Answer any 3 out of the given 5 questions (4 x 3 = 12 marks)**	
1	What are the application of Artificial Intelligence	4
2	Explain the stages of AI Project Cycle	4
3	Define the following terms i) Deep learning ii) Machine learning	4
4	What is Artificial Neural Network? Write any 3 Applications of Artificial Neural Networks.	4
5	Write a python program to enter marks in 2 subjects and your program should calculate and display total marks of two subject and average marks in two subjects.	4

MARKING SCHEME

SECTION A: OBJECTIVE TYPE QUESTIONS

Q.I	Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)	
1	When we believe in our ability to achieve in anything we undertake in life, we develop the quality of _____ a. Self-confidence	1
2	ICT stands for _____	1

<table>
<tr><td></td><td>a. Information and Communication Technology</td><td></td></tr>
<tr><td>3</td><td>Which of the following shortcut key is used to paste the contents copied from a location
b. CTRL+V</td><td>1</td></tr>
<tr><td>4</td><td>_____ is a person who is self-employed, is willing to take a calculated risk and brings in a new ides to start a business
b. Entrepreneur</td><td>1</td></tr>
<tr><td>5</td><td>What are the sustainable development goals?
d. All of the above</td><td></td></tr>
<tr><td>6</td><td>_____ is a concept of modern waste management
d. All of the above</td><td>1</td></tr>
<tr><td>Q.II</td><td>Answer any 20 out of the given 23 questions (1 x 20 = 20 marks)</td><td></td></tr>
<tr><td>1</td><td>_____ is the ability of machines to do cognitive tasks such as thinking, perceiving, learning, problem solving and decision making
b.Artificial Intelligence</td><td>1</td></tr>
<tr><td>2</td><td>This language is easy to learn and is one of the most popular language for AI
b.Python</td><td>1</td></tr>
<tr><td>3</td><td>Match column A with Column B
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<tr><th>Column A</th><th>Column B</th></tr>
<tr><td>1. Expert System partner.</td><td>A. Simulate how a human would behave as a conversational</td></tr>
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<tr><td>3. Digital Assistant</td><td>C. Autonomous vehicle</td></tr>
<tr><td>4. self-driving car</td><td>D. Works on various mobile platforms</td></tr>
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a) 1 -> B; 2 -> A; 3 -> D; 4 -> C</td><td>1</td></tr>
<tr><td>4</td><td>What does NLP stands for in AI?
c. Natural Language Processing</td><td>1</td></tr>
<tr><td>5</td><td>Who is known as “Father of Artificial intelligence”?
d. John Mccarthy</td><td></td></tr>
<tr><td>6</td><td>This is a system of programs and data structures that mimics the operation of the human brain
c. Neural Network</td><td>1</td></tr>
<tr><td>7</td><td>With the help of AI, the farmer can identify defects and nutrient deficiencies in the soil with the help of _____.
a.Machine Learning applications</td><td>1</td></tr>
<tr><td>8</td><td>What does “IoT” mean in terms of artificial intelligence?
a.Internet of Things</td><td>1</td></tr>
</table>

9	The method of collecting correct and dependable data to work with is known as ___ b.Data Acquisition	1
10	What are the different types of data _____ c.Both a) and b)	1
11	_____ is **not** a stage of AI Project cycle d. Debugging	1
12	How you can identify the problem scoping in the project? d. All of the above	1
13	_____ element helps us to understand and categorize who is directly and indirectly affected by the problem a.Who	1
14	What are the various types of learning algorithms? d.All of the above	1
15	Artificial Neural Network is used for_____ d.All of the above	1
16	_____enables machines to improve at tasks with experience b.Deep Learning	
17	What are the features of a Neural Network _____ d.All of the above	
18	Which learning involves training the machine using data? a.Supervised	
19	Who developed Python Programming Language? c.Guido Van Rossum	1
20	In Python, which of the following characters is used to create single line comment b. #	1
21	An identifier cannot start with a _____ a. Number	1
22	_____ keyword is used to accept data from user c. input	1
23	Write the output of the following python statement print(10//3) a. 3	1

SECTION B: SUBJECTIVE TYPE QUESTIONS

Q.III	**Answer any 3 out of the given 6 questions (2 x 3 = 6 marks)**	
1	Define any two types of Communication. There are main 3 types of communication methods	2

	a) Verbal Communication b) Non-Verbal Communication c) Visual Communication (define any 2, 1 mark each)	
2	Write any four self-management skills. Self awareness Self Control Self Confidence Problem Solving Self motivation Personal Hygiene (any four, ½ m1rk each)	2
3	Write in brief about files and folders in a computer system. File is a collection of information of different types. Every file has a filename and extension that identifies the type of file Folder is a collection files (1 +1 mark)	2
4	Write any four qualities of successful entrepreneurs. Patience Positivity Hardworking Confidence Creativity and Innovation open to trial and error (any 4, ½ mark each)	2
5	Write in very short about sustainable development and Green Skill. Sustainble development is the development which doesn't compromise the capacity of the future generation to satisfy their needs the skills required for promoting the green economy are known as green skills for example sewer treatment,renewable energy,climate resilient cities, gren construction, solid waste management etc. (1+1 mark)	2

Q.IV	**Answer any 4 out of the given 6 questions (2 x 4 = 8 marks)**	
1	Name at least two domains of Artificial Intelligence. a) Data Science b) Natural Language Processing c) Computer Vision (any 2, 1mark each)	2
2	Write a short note on Smart Home.	2

	A smart home is a flexible house setup in which appliances and devices may be managed using a mobile or other networked device from anywhere with an internet connection (2 marks)	
3	Write the name of 4 W's of Problem Scoping. The 4 W's of problem scoping are Who- helps us to understand and categorize who is directly affected by the problem What- analysing and recognizing the nature of the problem Where- What is the situation and where does the problem arise Why- refers to why we need to address the problem (½ mark each)	2
4	Define the term Data Acquisition in AI. The method of collecting correct and dependable data to work with is known as data acquisition. Data can be in the form of text, video, photos, audio and so on and it can be gathered from a variety of places such as websites, journals and newspapers (2 marks)	2
5	Define the term Neural Network The neural network is an artificial intelligence strategy for teaching computers to analyze data in the same way that the human brain does. (2 marks)	2
6	What are data types in python? Data types are used to denote the type of data int- represents integers string- repreesents strings float- represents floating point numbers list- list of elements enclosed in [ ] tuple- list of elements enclosed in () dictionary- list of key-value pair enclosed in { } (any 4 data types , ½ mark for each data type)	2

Q.V	**Answer any 3 out of the given 5 questions (4 x 3 = 12 marks)**	
1	What are the application of Artificial Intelligence E-Commerce a) Personalized Shopping b) AI powered assistants c) Fraud Prevention Automobiles a) Self driving automobiles Social Media	4

	a) Facebook b) Twitter Agriculture Robotics (Any 4 applications, 1 mark each)	
2	Explain the stages of AI Project Cycle Problem Scoping Data Acquisition Data Exploration Modeling Evalution (4 marks)	4
3	Define the following terms i) Deep learning ii) Machine learning i) Deep learning is a part of Artificial intelligence that uses neural networks with multilayer. Deep learning analyzes the data, learns the data and solves the problem the same as human. Deep learning requires the machine to be educated with a large quantity of data in order to train itself ii) Machine learning is a part of artificial intelligence in which we give data to the machine and allow them to learn for themselves. It is essentially getting a machine to accomplish something without being specifically programmed to do so. (2 marks each)	4
4	What is Artificial Neural Network? Write any 3 Applications of Artificial Neural Networks. The term "Artificial Neural Network" is derived from Biological neural networks that develop the structure of a human brain. Similar to the human brain that has neurons interconnected to one another, artificial neural networks also have neurons that are interconnected to one another in various layers of the networks Applications of ANN 1. Facial Recognition. 2. Stock Market Prediction. 3. Social Media. 4. Aerospace. 5. Defence. (2 marks for definition, 2 marks for application)	4
5	Write a python program to enter marks in 2 subjects and your program should calculate and display total marks of two subject and average	4

	marks in two subjects. # Program to calculate total and average marks
	sub1=int(input("Enter marks in subject1"))
	sub2= int(input("Enter marks in subject2"))
	tot=sub1+sub2
	avg=tot/2
	print("Total marks",tot)
	print("Average marks",avg)
	(1 mark for input, 1 mark for total, 1 mark for average, 1 mark for display)	

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