

# iNTELLiCODE

## Artificial Intelligence CBSE Code 417

### Teacher’s Reference Manual Class IX

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# **PART A: Employability Skills**

## **Unit 1: Communication Skills**

### **SESSION 1: Communication Cycle**

#### **Exercise**

**1. List the main components of communication process.**

The main components or elements of communication process are sender, message, encoding, communication channel, receiver, decoding and feedback.

**2. Who is responsible for the encoding of the message?**

Encoding of the message is done by the sender before sending it to the receivers.

**3. Who is responsible for decoding the message?**

Decoding of the message is done by the receiver after receiving the message.

**4. List 3 scenarios of technology-based communication?**

Three scenarios of technology communication are conversation over telephone, online chat and video conferencing.

**5. What do you mean by the channel of communication? Give some examples.**

The medium of communication is called communication channel such as oral, written, technology based.

#### **Exercise**

**1. Describe a scenario where all the major factors of effective communication come in effect.**

One such scenario is classroom. Sender and receiver are teacher and students respectively. The mutually accepted communication code is the discipline in the classroom wherein students will pay attention to what teacher is explaining. Teachers encodes the message ie simplifies the concept to be taught with her explanation. Students receive the message and with their attentive mind, try to understand the explanation given by the teacher (decoding). Then teacher enquired whether they understood the concept or not by asking questions. This is feedback.

**2. List any 4 most important characteristics of effective communication.**

1. Communication should be clear in content and purpose.
2. Communication should be complete with least scope of questions.
3. Communication should be based on right facts and should not be vague.
4. Effective communication leads to desired output and achievements.

**3. Relate a real-life scenario depicting communication barrier of environment.**

During summers, a hot classroom is there with students and teachers. Due to the heat, students find it difficult to concentrate on what teacher is explaining and teacher is also uncomfortable.

**4. Give real life example of communication barrier due to personality traits of the communicators.**

A person who is not well conversant in English is trying to sell an item to a customer who understands English only. Another example: two persons from vastly different culture say Japan and India, trying to exchange their ideas for the first time.

## **SESSION 2: Methods of Communication**

### **Exercise**

**1. Describe a scenario where oral communication is most effective as compared to written.**

Teacher's explanation in the classroom, a leader addressing a gathering of people, two persons discussing a matter to resolve a dispute between them.

**2. List any 3 scenarios where written communication is most effective.**

Written communication is most effective in formal setups like official orders, legal notices, agreement with terms and conditions, pact signed between two governments etc.

**3. List any 2 major advantages and disadvantages of non-verbal communication.**

Advantages of Non-verbal Communication

1. Non-verbal communication complements oral and audio visual communication.
2. It substitutes for the verbal communication like speaking with proper eye contact and tone.

Disadvantages of Non-verbal Communication

1. Sometimes non-verbal communication becomes vague and send wrong signals.
2. You cannot stop non-verbal communication.

**4. List any 3 major advantages and disadvantages of AV communication.**

Advantages of AV Communication

1. Use of internet and video conferencing saves cost incurred otherwise on scaling geographical barriers, physical movement of participants and other related expenses like lodging, food etc.
2. It is an effective way to explain complex ideas and concepts easily.
3. Technology makes it reusable and easy to distribute.

Disadvantages of AV Communication

1. It incurs a lot of cost in infrastructure.
2. It needs maintenance of equipment.
3. Technology and equipment can be complex to operate and learn.

## SESSION 3: Communication Perspectives

### Exercise

1. Describe a scenario where your visual perspective affected your decoding of a message.

Seeing a man in plain, simple clothes with ordinary personality and we assume that the person is not very bright and not sufficiently wealthy while actually he could be a learned college professor earning a handsome salary.

2. Relate an example where you interpreted a message depending on your past experiences.

After receiving a bad response from the customer care persons of the company which sold me a TV, I did not buy air conditioner from them.

3. What do you mean by prejudice?

Believing the information about someone without verifying the facts and disliking the person accordingly is called prejudice.

4. How our beliefs, emotions and environment influence our communication perspective?

We relate with people according to our value system and beliefs. During communication, our negative emotions affect the process badly. Reacting in anger spoils the conversation. Our environment determines how we communicate. When we are with friends on a picnic, our style of communication is different as compared to that in the classroom in front of teacher.

## SESSION 4: Basic Writing Skills

### Exercise

1. Types of Phrase: pleasantly surprised (adverbial), meeting her friend (verb), at the airport (prepositional), had been sitting (verb), the waiting lounge (noun), Lata spotted her (verb), both shared (verb), a lot of experiences (adjective), of their exciting lives (adjective), time flew very fast (noun, verb and adverb mix), boarded the same flight (verb), bound to Mumbai (noun).

- 2.

NOUN	PRONOUN	VERB	ADJECTIVE	ADVERB	PREPOSITION	CONJUNCTION	INTERJECTION
Girl	Her	Lived	Poor	Very much	On	Who	Wow
Anna	She	Thought	New	Suddenly	In	So	Alas
Mother		Loved	Useful		To	And	
Year		Thinking	Beautiful			Which	
Gift		Sew	Long			But	
Hair		Buying	Colourful				
hair ribbons		Wished	Too old				
Clothes		Buy	Shining				
Villagers		Did	Enough				

set of needles		Got	Short				
Threads		Called					
glass box		Said					
Money		Have					
Idea		Saying					
eve of new year		Removed					
Cap		Showed					
Barber		Bought					
		Selling					

## Exercise

### A. Fill in the blanks with the suitable article:

1. the    2. The    3. An    4. A    5. The    6. An,A    7. An, the    8. the

### B. Is there anything wrong with these sentences? Why?/ Why not?

“The” will not be used before nouns here.

- |  |                           |
|--|---------------------------|
| 1. My brother plays cricket.             | Abstract Noun             |
| 2. She likes chocolates.                 | Plural noun               |
| 3. Everything that glitters is not gold. | Name of metal             |
| 4. I returned the book to Ram.           | Proper noun - Ram         |
| 5. Breakfast is ready.                   | Abstract noun - breakfast |
| 6. My favourite colour is blue.          | Name of the colour        |

## Exercise

Traveling is fun with adventure. It is a good hobby as it presents opportunities to visit new places and meet interesting people. Travelling lets us make new friends in far places. We get to learn about various cultures, a variety of languages and cultures. Visit to different places enhances knowledge and we meet different people. It accounts for good health since a tourist is an active and dynamic person. Travelling keeps us fit. Travelling is also a good career option. One can write about the places travelled and publish them in the form of books, blogs and articles. When we meet different cultures and people, we develop an understanding about them. It inculcates good habits such as patience, care, love and concern for others. Overall benefit of travelling is that it improves personality. The only downside of travelling is that it is an expensive hobby. It needs money to travel to different places. Food, stay and other related expenses make it an exclusive hobby. It also claims a lot of time.

## Assessment

### 1. What do you mean by the term Communication? List the features of effective communication.

Communication is a process to give to and receive information from others. Interacting with others while exchanging information is called Communication. The features of effective communication are:

- Effective communication is clear, complete and based on right facts.
  - In written form, communication is be concise and to-the-point.
  - Good communication develops relationships, promotes confidence and creates goodwill.
  - Effective communication leads to desired output and achievements.
  - Effective communication establishes responsibility and accountability.
  - It provides right kind of persuasion, guidance and consultation.
2. **You need to prepare for a classroom presentation of 10 minutes. How will you ensure effective communication while presenting?**

Following points will ensure effective communication during presentation:

1. The purpose and objectives of presentation should be mentioned clearly.
2. The language of explanation should be simple and correct.
3. Explanation should cover right facts, clearly and in crisp manner.
4. The voice, expressions and gestures should reflect confidence.
5. There should be some time spared for audience to have their queries cleared.

3. **Describe any 2 communication barriers.**

1. Barriers to effective listening: We jump to conclusions. Mind gets lost in thoughts while listening. Our emotional state, our capacity of patience, our temperament, likes and dislikes are common barriers in effective listening. Sincere and attentive listening is required for receiving and decoding of the message successfully.

2. Barriers related to the personality traits of the communicators: We sometimes exhibit following behavioural or personal traits which act as barriers to effective communication:

- Behaviour due to age difference, attitude, gender, cultural and social differences etc.
- Proficiency of the sender and the receiver in the language they are using to communicate.
- Ailments, disappointments, personal grudges and hidden intentions.

4. **You are conversing with your friend about something important in a roadside open café in a crowded market. Your friend has to rush to receive his mother from the airport also. What are the communication barriers in this scenario? How these could have been taken care of?**

This is an example of situational barrier. Noise and other distractions are there. Friend is also in rush to airport. These barriers could have been avoided by fixing a prior appointment with the friend and deciding a quiet place to converse.

5. **Briefly explain the terms Coding and Decoding taking a simple example.**

Coding or encoding means how the message has been communicated by the sender. If the manner of the message is rude or offensive or if the message is not clear or incomplete then message is not encoded correctly.

For example:

Authoritative message - I want the report on my table first thing in the morning without any excuses.

Normal message – Please manage to get the report tomorrow for sure so that things are not delayed further.

Decoding means how the message has been interpreted by the receiver.

Authoritative message - I want the report on my table first thing in the morning without any excuses. – here, receiver feels offended and pinned down. He is demotivated to prepare the report and may not do it by inventing a genuine looking excuse.

Normal message – Please manage to get the report tomorrow for sure so that things are not delayed further. – here, message is levelled. It respects the receiver and prompts him to prepare the report.

### 6. Describe communication cycle with a simple example.

Communication Cycle involves following elements. Communication channel is oral, face-to-face.

Sender: Your article needs too many corrections and modifications before we send it to print. [Here message is not encoded effectively]

Receiver: I spent whole night, cutting on my sleep preparing this article. [Here, receiver has not taken the critique positively. He responds by giving an excuse. (Feedback)]

Sender: We really appreciate your effort in getting that article ready in such a short time but there are certain parts of it we need you to look at and revise before we get it into print. [Message is re-encoded in a better form after feedback from the receiver]

Receiver: Okay, let me know which parts and I shall redo it. [Receiver has decoded the message as desired since it was encoded well after the feedback]

### 7. How is oral communication different from written communication?

ORAL COMMUNICATION	WRITTEN COMMUNICATION
1. It is fastest and easiest hence more effective.	1. Time taking and more effort is required.
2. Sender and receiver are present in person.	2. Sender and receiver need not be present in person.
3. Suitable for formal and informal modes of conversation.	3. Mostly suitable for formal communication.
4. Creates lesser misinterpretation.	4. Written messages have no emotions and body language involved hence it can be misinterpreted.
5. Cannot be used as evidence.	5. Can be used as evidence of conversation.
6. Cannot be referred to later on.	6. Can be referred to later.

### 8. List the advantages of written communication.

- There is advantage of time for choosing suitable vocabulary and tone of the message. Message can be reviewed before sending.
- It has legal acceptance in most of the cases.
- Longer messages can be created.



- Can be referred to later.
- Written messages can be duplicated and distributed.
- Effective written messages help building good relations.
- With written messages comes responsibility.

**9. List any 4 body language features that influence our communication.**

Voice, gestures, posture, facial expressions.

**10. Explain briefly how verbal and non-verbal communication occur using Audio-visual aids.**

Any verbal or non-verbal communication that involves vision and auditory capability is called audio-visual communication. For example, telephonic conversation involves hearing while video conferencing involves both sense of sight and vision.

Such communication is supported by technology. Telephone equipment, smart phone, Internet, visual displays, speakers, microphones, communication channel, presentation software, models, visual aids, video and audio player software etc. constitute AV communication.

**11. You have to make a presentation on your achievements in school to a global audience including students of other cities over video conferencing. How will you take care of your effective communication?**

Following points will ensure effective communication during presentation:

1. Prepare well and rehearse if possible.
2. Body language should be positive.
3. State the objectives of the presentation first.
4. The language of explanation should be simple and correct.
5. Explanation should cover right facts, clearly and in crisp manner.
6. The voice, expressions and gestures should reflect confidence.
7. There should be some time spared for audience to have their queries cleared.

**12. What are the disadvantages of non-verbal communication?**

Disadvantages of Non-verbal Communication

- Sometimes non-verbal communication becomes vague hence misinterpreted.
- It cannot be stopped.
- It occurs too fast and simultaneously hence difficult to interpret.
- It has cultural and regional differences.

**13. Explain the importance of gestures and eye contact while you speak to someone in person.**

**Gestures:** Gestures make the major art of our body language. Gestures that occur in the control of our subconscious mind convey our state of mind like Movement of hands, fingers, legs. Gestures made consciously are pointing with finger, nodding, waving, envisaging using hands.

**Eye contact:** The way we make eye contact tells a lot about us. Right kind of eye contact reflects confidence and sincerity. Eye contact could be gentle, steady, formal for a few seconds, sweeping, stare or gaze.

**14. How does our attitude determine the effectiveness of our communication?**

Our attitude builds our behaviour and response to a message. Our positive attitude helps us in relating others easily and on good terms. This makes the base of effective and positive communication while out negative attitude builds a hostile environment. We cannot relate with others positively which leads to ineffective communication. A positive attitude means the person is cheerful, open, optimistic, confident and orderly while negative attitude means stubborn, hopeless, bad intent and lack of enthusiasm.

**15. Describe any two factors that influence our perspective in communication.**

**Visual Perspective:** We judge and make decisions on visual perspective like how someone looks and dresses up. Who the person is? How important or unimportant he or she is? etc. In accordance to this visual impression we decide to develop relationship with the person and communicate with him ir her.

**Perspective of language:** Words have different meanings depending on the context. A good listener catches the meaning and intent. Language and figures of speech give different meanings to the message. Synonyms and idioms change our perspective. We should understand the message in its context.

**16. What care should we take while we meet and talk to a person for the first time?**

First we should ensure that the environment and surroundings are suitable to communicate. Our perspective helps us understand people and situations. Our perspective determines how we encode a message as a sender and how we decode it as a receiver. While communicating with others we should use the simple ad suitable language, we should not judge the person through some preconceived notions, out attitude should be positive, and we should not carry any prejudice based on our past experiences. We should also show emotional intelligence.

**17. Ravi met a few people in a party and was mixing up well with those wearing expensive clothing and fair complexion. Which factors are influencing Ravi’s perspective towards the people?**

Visual perspective.

**18. How do our past experiences shape our communication perspective? Cite an example.**

Our personal experiences help us develop perspective. If I have a disappointing experience with a service company, I shall avoid using the service of that company in future. Any positive experience helps us meet and relate with people positively.

**19. How is a phrase different from a sentence? Give 2 examples.**

A set of words that indicates some object or action but does not makes complete sense is called a phrase while a group of words that makes complete sense is called a sentence. For example:

Phrase:	a beautiful frock	Sentence:	She is wearing a beautiful frock.
Phrase:	is eating	Sentence:	Raj is eating a mango.

**20. Giving 2 example each, explain Noun, Adjective, Verb and Adverb.**

Noun is name of a person, place, thing, event, animal or idea. For example, *Suman* goes to *school*. I am reading a *book*.

Verb is any action or state of being. Like, *Suman goes* to school. I am *reading* a book.

Adjective describes a noun or pronoun. E.g. I am reading an *old* book. He is wearing a *red* cap.

Adverb describes a verb, another adverb or adjective. E.g. He walked down the hill *quickly*. He looked at her *angrily*.

**21. What is preposition? Give 4 examples of preposition.**

Preposition shows the relationship of one noun, pronoun or noun phrase with other. For example, the dog is sitting *under* the table. There are two birds *in* the bush. I kept the pen *on* the table. There is a mango *among* the apples.

**22. How does articles differ in usage for consonants and vowels? Explain with 2 examples.**

Article 'an' is used before vowel sounds and 'a' is used before a consonant sound. For example, He eats an apple daily. Butterfly is an insect. They bought a book. I saw an aeroplane.

**23. Cite 4 examples where article 'The' should not be used.**

Gold is an expensive metal.

Both Ravi and Raj went on a picnic today.

I like to eat fruits once a week.

I selected some fresh fruits from the basket.

**24. What are the basic rules of good paragraph writing?**

1. The topic on which the paragraph needs to be written should be clear.
2. A paragraph should begin with the topic sentence.
3. Major part of paragraph should include the sentences which elaborate on the topic more.
4. Paragraph should end properly with a closing sentence or conclusion.

**25. What do you mean by interjection and conjunction? Explain with 2 examples each.**

Interjection reflects strong emotions, followed by exclamation sign (!). Like, Oh!, Hey!, Wow!, Alas! Etc.

E.g. Hey! Where have you been so long? Wow! This idea of picnic sounds great.

Conjunction connects two words, phrases or sentences. Like: so, but, and, or, therefore etc.

E.g. I would have loved to come for the party, *but* I have my exam tomorrow.

He was down with fever, *so* he didn't come to the school yesterday.

**26. Write a paragraph to describe a train journey you took last.**

On our summer vacations, we planned to catch a late evening train to reach Lucknow overnight. On the day of journey, it was raining heavily. We took a taxi to the railway station. As we reached near the railway station, we got stuck in a thick traffic jam. Afraid of missing our train, we paid to the taxi driver and rushed with our luggage on foot towards the railway station in the heavy rain. Completely drenched in water, when we reached the railway station, found that train was already late by half an hour. We changed our clothes in the wash room in the waiting room. Finally, the train arrived, and we boarded the train. We reached Lucknow the next day early morning welcomed by a bright and pleasant weather.

**27. You need to write an essay about your favourite leader. Which basic writing skills would you apply in doing so?**

An essay includes more than one paragraph. We need to apply follow basic writing skills:

1. Correct usage of grammar.
2. Give brief introduction about the leader, describe his qualities as a great leader, his achievements and failures too. How he learnt from his failures. How he influenced people positively and other important incidents of his life.
3. Keeping the sentences simple and short.
4. End the essay with a brief conclusion.

**28. Identify parts of speech in the following paragraph:**

NOUN	PRONOUN	VERB	ADJECTIVE	ADVERB	PREPOSITION	CONJUNCTION
Deforestation	These	Remove	Large	Never	In	When
Humans		Clear				Or
Forest lands		Clearing				And
Areas		Is				Since
Ecosystem		Are				
Trees		Replanted				
Animals		Destroyed				
Living things		Endangered				

## **Unit 2: Self-Management Skills**

### **SESSION 1: Meaning and Importance of Self-Management**

#### **Exercise**

##### **1. What are the benefits of self-discipline?**

The benefits of self-discipline are as below:

- We have a pleasant personality.
- We inspire others too for self-discipline.
- We can think and plan clearly
- Ability to identify our weaknesses and improve upon them
- Realising our strengths and their use
- Self-respect and respect for others
- Understand importance of time
- Higher achievement rate
- People like and respect us.

##### **2. What do you mean by S.M.A.R.T target?**

SMART targets are clear, crisp and specific. The achievements of targets should be measurable. Targets should be achievable - not too difficult to achieve and too easy on efforts. Targets should be realistic – achievable with our abilities. Targets should be time-bound – they should be achieved in a set timeline.

##### **3. How is time management important in achieving targets?**

We plan our goals according to the available time and resources. Managing the time includes keeping track of how much time we utilise in achieving our targets and finishing our tasks. We should plan well to avoid spending more than required time on any task. Keeping track of time and utilising the time wisely helps us achieve our targets easily.

### **SESSION 2: Building Self-Confidence**

#### **Exercise**

##### **1. What are the possible reasons for low self-esteem?**

Common reasons behind lack of self-esteem or self-confidence are:

- Fear of the failure.
- Seeking other's approval instead of believing in self.
- Lack of efforts in overcoming weaknesses.
- Lack of initiative for any achievable task.
- Poor or incomplete preparation.
- Missing opportunities

- Not learning from failures.

## **2. List the factors that influence our self-confidence?**

The factors that influence our self-confidence are society, culture and community, exposure to media and physical factors.

## **3. List some steps that you will deploy to enhance your self-confidence.**

Steps to enhance our self-confidence are positive attitude, seek and face challenges, positive self-criticism, setting realistic goals, be helpful, keeping right company, emotionally intelligent and healthy use of social media.

## **Assessment**

### **1. What do you mean by the term self-management?**

Managing oneself in order to achieve desired goals and targets is called self-management.

### **2. Why is self-management important for us?**

Self-management help us in maintaining right kind of discipline to plan our goals and targets and achieve them with hard and smart work.

### **3. You need to prepare for the 100-meter race in the annual sports event of your school to be held after 3 months. Which self-management skills do you need for this?**

The self-management required in such scenario are organising self as per the set goals, controlling, reflecting, self-motivation, self-discipline and time management.

### **4. What does the term S.M.A.R.T. stand for?**

S.M.A.R.T stands for Specific, Measurable, Achievable, Realistic and Time Bound.

### **5. What do you mean by goal and target?**

Goal is our aspiration, dream or ambition to achieve something. Once goal is clear, it is divided into short-term SMART targets.

### **6. What is the meaning of a measurable and realistic target?**

Target should be measurable in such a way that we should be able to tell how much is achieved and how much is yet to be done. Realistic target is one that is possible for us to achieve considering our capabilities and ability.

### **7. You need to prepare for a computer quiz to be held next week out of your text book. Which SMART targets would you set for yourself?**

I will check how many chapters in the book need to be prepared. I will prioritise the chapters on the basis of their difficulty and length. Then, I will decide the number of chapters to be covered daily in 6 days.

SMART target:

I will cover N chapters in N hours each day for the quiz.

### **8. How does procrastination affect our progress towards our goals?**

Many a times we tend to keep on doing the tasks we like and ignore the other important ones. This is called procrastination. This unknowingly leads to wastage of time and irresponsible behaviour.

**9. How does identifying goals and setting targets ease our preparation in achieving something?**

Identifying goals gives us the clarity of what we need to achieve. It also gives us direction and focus. Targets help us achieving the goal by steadily working towards it. Goal is split into short term targets to be achieved one by one and finally reach the goal.

**10. After achieving a goal, how does reflection help you further?**

After achieving the goal, reflection helps us in improving further. It shows us the positive or negative difference. In case of negative difference, we shall look for what went wrong and a how to avoid it next time. Positive difference motivates us to do even better in future.

**11. What is the importance of time management? Why do we have a time table in school?**

Time management helps us understand the importance of time. We avoid activities that waste our time and instead utilise it in achieving our goals. Time table in school is the best example of time management. It helps to cover all the subjects in a given time period. It also ensures that students easily learn and understand the subjects and teachers can easily cover the course. Also, along with studies, other cocurricular and extra-curricular activities could be performed.

**12. How do prioritisation and self-discipline help us in managing time?**

Prioritisation helps us finish important tasks in time. Self-discipline helps us in working towards our goals sincerely.

**13. List any 4 major reasons behind lack of self-confidence.**

Four major reasons behind lack of self-confidence are fear of failure, making weaknesses an excuse, lack of initiative and not being prepared.

**14. How does preparation of something helps in retaining your self-confidence?**

When we are prepared, we know what we are supposed to do in achieving our goals. This naturally gives us self-confidence. Being well informed and suitably prepared is half the battle won. When we are prepared, we are confident. We must utilise time to prepare for what we have to achieve.

**15. Explain any 2 factors that build a person's self-confidence.**

Exposure to Media and Online Social Platforms: We learn a great deal about the outside world from media, movies and the internet. They mould our thoughts and influence our personality. Negative influences like cyber bullying, crime, violence badly affect our personality and the way we perceive the world. Positive influences like learning about other cultures, stories of achievements and inspirations, encourage us to develop a positive personality.

Physical Factors: Impressive physical appearance, pleasant personality and sound mental health are keys to the development of our self-confidence. Instead of worrying about our looks, we must focus on carrying ourselves well, etiquette and manners, confident and positive outlook.

**16. How does media influence our belief system and values?**

Our thoughts are influenced by what we from outside world through television, newspapers, magazines, movies and the internet. Movies, programs, news and online interactions mould our thoughts and influence our beliefs and personality. Negative influences like crime and violence badly affect our personality. Positive influences like cultures, stories of achievements and inspirations, sports, responsible use of social media encourage us to develop a positive and balance belief system and values.

**17. List certain ways to build one's self-confidence.**

Certain ways to build one's self-confidence are having a positive outlook and attitude, always look for new challenges, self-criticism for self-improvement, setting realistic goals and SMART targets, keeping positive people in company, being emotionally stable and controlled and responsible use of social media.

**18. How will you ensure preparedness while working towards a goal?**

Being well informed and suitably prepared is half the battle won. By right planning, setting clear goals and identifying SMART targets we can prepare well for our achievements. Practicing time management and self-discipline helps us prepare better.

**19. How does keeping right company and healthy use of social media shape your self-confidence?**

Feedback from people to learn is good but those who discourage us must be avoided. We should have company of positive people having positive mental framework.

Social media is a tool to learn, explore, meet others and stay friends. Do not let social media be a manipulating tool of yourself. Do not be addicted into spending unnecessary time online. Decide your priorities between amusement and work. Both are necessary so manage time between the two.

**20. What are the physical factors that enhance our self-esteem?**

Focus on clean appearance, carrying ourselves well, etiquette and manner in dealing with people, confident smile and positive outlook. Knowing our strengths and working on our weaknesses is the key to better personality. Personal hygiene, gentle outlook, positive smile, confident stride and elegant dress code.



## **Unit 3: Basic ICT Skills**

### **SESSION 1: Information and Communication Skills**

#### **Exercise**

#### **1. How do we use information in various ways?**

Information is dealt with by us in following ways:

1. Accessing the information: Various means like computers, communication networks, smart phones help us access information through world wide web.
2. Creation of information: Computers, digital cameras, digital recorders, smart phones, scanners etc. help us create information in various forms like text, audio-video and image.
3. Sharing and distributing information: The internet, communication networks and tools like video conferencing, video chat platforms, smart phones and computers are the tools to disseminate information.
4. Storing and managing information: Databases, computers, storage devices like disks, pen drives, online drives are the means to store and manage information.

#### **2. How are computers useful in our daily life?**

Computers help us in almost all aspects of life be it education, entertainment, travel, our profession, using various services, communication, using social media, health care, doing our business, doing financial transactions etc.

#### **3. How computers help in running various businesses and industries?**

All kinds of business operations are carried out very easily and accurately by computers. Database of all the business details are maintained by computers. Small shops, supermarkets, big companies, restaurants, small offices use computers for efficient service. People access the services and buy products from businesses online. New technologies like big data and cloud computing provide enormous capabilities to the computers for bright future of industries.

#### **4. Why ICT skills are necessary for us in today's world?**

World around us is impossible to believe without the presence of computers. To survive in out trade and profession, we must have necessary ICT skills. Information and communication technology skills make our lives easier by easing our tasks up to greater extent. Availing a domestic service, booking travel tickets, hotel room and flights, ordering food, finding a location using GPS, interacting with people, instant communication are the part of our daily life. It also helps us remain competitive in our career.

### **SESSION 2: Computer System**

#### **Exercise**

#### **1. What is the role of input and output devices in a computer system?**

Input devices are used to feed input to the computer in different forms like clicking on command with the mouse, typing data through keyboard, scanning image using scanner, feeding video through a web camera and recording audio with microphone.

Output devices generate result of processing in various forms like text, image and video on monitor, hard copy print by printer, maps by plotter, and audio through speaker.

**2. List differences between primary and secondary memory.**

Primary memory is usually not permanent. It loses data once power is switched off while secondary memory is permanent storage. Storage capacity of primary memory is very less as compared to permanent memory which can store data in bulk form. Primary memory is less expensive than permanent memory.

**3. How is RAM different from ROM?**

RAM is main working memory of the computer. It stores the working data of the user as long as computer is powered on while ROM contains permanent instructions. RAM is Read/Write memory as data can be read and written on it while ROM is Read Only memory. Storage capacity of RAM is higher than that of ROM. RAM is upgradable.

**4. What do you mean by peripheral devices?**

In addition to standard devices that form the actual computer system for standard input, output and processing operations there are additional devices which extend the functionality of a computer system such as printing out the content (printer), transmitting messages over network (modem), scanning images (scanner), recording voice and video (microphone and web camera).

## **5. Describe any 5 peripheral devices.**

1. **Printer:** It prints out the hard copy of the documents and images over variety of medium like paper, plastic sheets etc. Ranging from a simple deskjet printer to industry line printer used to print banners and posters, printers come in a wide variety to cater to various printing needs of various industries.
2. **Scanners:** This device is used to scan documents and store them in the computer for later use. A flatbed scanner can scan whole sheets of documents while handheld scanners are useful for quick scanning of a part of a document like a few lines or an image.
3. **Speakers:** Speakers are used to generate sound. They convert analog electric signals into air vibrations. Speakers are used to listen to music and sounds on the computer.
4. **Plotters:** They draw maps and designs. They are used for computer aided designing by architects and designers.
5. **Web camera:** It captures live video stream and still images. It is used in live chats, video conferencing and online classrooms.

## **6. Describe the functioning of processing unit.**

A CPU consists of Arithmetic and Logic Unit (ALU) and Control Unit (CU).

1. **Arithmetic Logic Unit (ALU):** The ALU performs all arithmetic operations and logic operations. Logic operations test various logical conditions encountered during processing and different actions to be taken.
2. **Control Unit (CU):** It coordinates the components of a computer system. The control unit manages the execution of program instructions by fetching instructions from memory, parsing those instructions as necessary and then scheduling the appropriate hardware components to act on those instructions.

## **SESSION 3: Basic Computer Operations**

### **Exercise**

#### **1. List the steps to switch on and shutdown a computer system.**

Switching a Computer System On

1. Switch on the UPS by a long press on its power button.
2. Press the power button on the CPU cabinet or system unit and switch on the monitor.

Shutting down the Computer

1. Click on Start button.
2. In the Start menu, click on Shutdown.
3. Switch off the monitor and then UPS.

#### **2. What is the use of operating system?**

Operating system controls entire functionality of the computer system. It allows the user to interface with the computer hardware and make use of other software applications on the computer. Common functions are managing hardware devices, managing software and scheduling programs, files and storage management and system security.

**1. What is the GUI?**

Graphical User Interface of any operating system or any application is composed of graphical components such as buttons, menus, windows, toolbars and dialog boxes etc. In GUI, the commands need not to be remembered and it is very easy to work with the help of mouse.

**2. What is the use of a file and folder?**

A file is a collection of related information. In other words, a file is a collection of data stored on a storage device. There are different types of files depending on the types of information they contain, like document, image file, music file, movie file, etc.

Folder contains files and other folders. Folders help us organise our data.

**3. List the main components of a GUI desktop.**

Desktop, icons, Start menu, Taskbar, Program Windows, Dialog boxes and Toolbars etc.

## **SESSION 4: Performing Basic File Operations**

**Exercise – all practical exercises**

## **SESSION 5: Internet and Its Applications**

**Exercise**

**1. What do you mean by the terms Homepage and Web page?**

A web page generally consists of text, images, audios, videos, links, animations, etc. The homepage is the first web page of a website. It provides introductory information and the links to the other pages of the website.

**2. What is the role of browser in accessing internet?**

A web browser is an application software that is used to access the information (websites) on the web. Mozilla Firefox, Internet Explorer, Google Chrome, Safari, Opera are some commonly used browsers.

**3. What is electronic mail? What are its advantages over traditional mail?**

The term e-mail refers to Electronic Mail. E-mail is a communication system that sends and receives messages through the internet by using specific e-mail addresses or e-mail IDs.

Advantages of e-mail

E-mail offers many advantages over traditional mailing system listed below:

1. Sending and receiving e-mail is very fast. It is received and delivered within seconds across the world.
2. E-mail is an affordable means of communication as compared to other systems.
3. Sending and receiving e-mail is very easy and convenient. Any type of files can be sent as an attachment through e-mail.

#### **4. Write the steps to compose and send a simple mail without any attachment.**

Compose Mail

The steps to compose or create a new mail and send are:

1. Click on Compose button located on the left side pane. A Compose mail frame appears.
2. Type the e-mail address in the To box.
3. Type the subject name in the Subject box to send it with message.
4. Type your message in the message box.
5. Click on Send button.

#### **5. What is the difference between replying a mail and forwarding a mail?**

When we reply a mail, the message goes back to the original sender of the email. Forwarding means sending the mail received from someone to other recipients.

### **Exercise**

#### **1. What is the difference between a blog and a standard website?**

Blog, earlier known as Weblog, is an online platform which allows a person to post his/ her views on a particular topic or issue in the form of an online article for other people to visit and go through. Readers can post their comments on the article and this way threads of interaction and dialogues begin. Blog is maintained by blogger or blog writer. Blogs may be the part of a web site.

Website is a huge collection of web pages linked together and identified by a web url. They are maintained by team of professionals and showcase products and services of an organisation.

#### **2. How a Facebook post different from a Tweet?**

Facebook post has no word limit. Tweet is 280 characters max. Posts can be shared. Tweets are forwarded as retweets.

#### **3. Describe the features of Twitter and Whatsapp.**

Twitter is social media website where users can post short messages including videos, links and text called Tweets. It needs user account name called Twitter handle. Username is preceded by @ sign.

People can be followed on Twitter Twitter timeline displays all the Tweets which are updating amongst your connections. This is called Twitter feed.

WhatsApp is a messaging application that you can download to your smartphone and use to easily send messages to other people's mobile phones freely. It also allows video calls freely by using your phone's data connection. WhatsApp allows creating groups of your contacts. WhatsApp allows video calling too for all Android versions 4.1 and above.

#### **4. Go to a blogging website and create a simple blog telling about yourself.**

Practical assignment.

#### **5. List salient features of FaceBook and Youtube.**

Facebook

Timeline or wall, Page, Events, Photo Albums, News Feeds, Privacy Settings, Profile picture and Cover Picture etc.

## Youtube

It is an online platform dedicated to video sharing. People can shoot videos and upload them on Youtube. It lists the most trending or popular videos. You can search videos or click on the video thumbnails to watch them. Youtube Channel, video playlist, restricted viewing by applying parental control and safety mode.

### **6. What do you mean by a Youtube channel?**

Youtube Channel: People who are regular users of Youtube and upload videos on it are recommended to create a channel. Channel is simple a series or collection of related videos. The advantage of having a channel for creator is that popularity of multiple videos can analysed as one channel. It is easier to manage a channel as compared to individual videos. For users, it is easier to subscribe the channel so that they get reminder about any new video updated by the channel owner.

### **7. What is Digital India campaign? List its 4 main initiatives.**

To ensure that government services and government schemes' information reaches to masses online easily, government of India (GoI) launched Digital India campaign in July 2015.

Connecting rural areas over high speed internet connection to bring the remote areas of the country into mainstream and improve digital literacy is the ambitious objective of the campaign.

Its 4 main initiatives are:

1. Access to mygov.in portal that lists details of all the government services and schemes.
2. Multi channel, multi-lingual, multi-service mobile app Unified Mobile Application for New Age Governance (UMANG) to access all government services over handheld devices.
3. Adhaar number has enable to access digital signature service e-Sign.
4. People can keep digital copies of their important documents over DigiLocker.

### **8. Go to [www.mygov.in](http://www.mygov.in) and find out various schemes launched by government.**

Practical assignment

### **9. How Whatsapp is different from Twitter? Describe briefly.**

Twitter is social media website where users can post short messages including videos, links and text called Tweets. It needs user account name called Twitter handle. Username is preceded by @ sign.

People can be followed on Twitter Twitter timeline displays all the Tweets which are updating amongst your connections. This is called Twitter feed.

WhatsApp is a messaging application that you can download to your smartphone and use to easily send messages to other people's mobile phones freely. It also allows video calls freely by using your phone's data connection. WhatsApp allows creating groups of your contacts. WhatsApp allows video calling too for all Android versions 4.1 and above.

## Assessment

### 1. In what ways do we deal with information. Explain very briefly.

Information is dealt with by us in following ways:

1. Accessing the information: Various means like computers, communication networks, smart phones help us access information through world wide web.
2. Creation of information: Computers, digital cameras, digital recorders, smart phones, scanners etc. help us create information in various forms like text, audio-video and image.
3. Sharing and distributing information: The internet, communication networks and tools like video conferencing, video chat platforms, smart phones and computers are the tools to disseminate information.
4. Storing and managing information: Databases, computers, storage devices like disks, pen drives, online drives are the means to store and manage information.

### 2. Explain any 2 roles of ICT in our personal daily life.

Entertainment: Presentation of content today has gained completely a different level. Entertainment, news and field of journalism are greatly supported by computers. Sports, online games, movies, songs, web series, video interaction with others have taken the entertainment to a next level.

Social Media: Sharing ideas, information, your personal views, achievements, setbacks or any news with almost anyone and everyone across the globe in moments over internet is due to the World Wide Web running on networks of computers. Integrated chat services, photo sharing services, video uploads and video interactions are a routine today. Facebook, Whatsapp, Snapchat, Skype and YouTube have entirely changed the way we connect with people. Writing, photography, filmmaking, singing, video editing, video consulting, online coaching, relationship advice are new opportunities today.

### 3. In which 2 industrial or business areas ICT is playing an important role and how?

Health Care: Online diagnostic services, creatively designed medical equipment, consultancy services, personal doctor on-call, personal online physical trainer etc. are the examples of ICT intervention in health care.

Banking Industry: Entire financial industry all over the world relies and runs over computers and sophisticated communication infrastructure. Computers are used by banks to maintain the financial database, customers and day to day transactional details. Instant online transactions, secured transfer of funds, encrypted communication of data, verifying authenticity, efficient customer support, reaching out with financial schemes to mass – this all has been greatly revolutionised using computers.

### 4. Why is keyboard called standard input device?

Most of the input is given in the form of commands and text to the computer. Since the advent of modern computers, keyboard has been the device used to give input to the computer hence it is called the standard input device which completes the computer system.

### 5. What is swift triple mouse click?

Swift triple mouse click selects the whole paragraph.

## 6. How do ALU and CU aid in data processing by computer?

The arithmetic-logic unit (ALU) performs all arithmetic operations and logic operations. Logic operations test various logical conditions encountered during processing.

Control Unit (CU) is the circuitry that issues commands to other hardware components to execute programs. It manages the execution of program instructions by fetching instructions from memory, parsing those instructions as necessary and then scheduling the appropriate hardware components to act on those instructions.

## 7. List any 2 main functions of CPU.

Functions of CPU

1. The CPU accesses and stores the relevant data and instructions during processing.
2. The CPU controls the sequence of operations.

## 8. Why ROM and RAM called primary memory?

RAM is used to store primary working data of the user and ROM stores instructions required to start up and boot the computer. Without these two, computer cannot start up and function hence they are called primary memory.

## 9. How is ROM different from RAM?

RAM is main working memory of the computer. It stores the working data of the user as long as computer is powered on while ROM contains permanent instructions. RAM is Read/Write memory as data can be read and written on it while ROM is Read Only memory. Storage capacity of RAM is higher than that of ROM. RAM is upgradable.

## 10. Why printer is called a peripheral device while not the keyboard?

Computer can still work in absence of a printer. If a printout is required, printer can be attached and installed with the computer anytime. Printer only extends the functionality of the computer but it is not very necessary part of it.

## 11. Explain any 2 storage devices.

### Digital Card Reader-Writer

Digital card readers are found in devices like laptops, digital cameras and smart phones. These devices have slots to read from and write on the memory cards. These cards are available in various storage capacities ranging from 16 GB to 1 TB.

### External Hard Drives

In addition to computer's main storage device – Hard disk there are external hard drives available. They can be easily connected with the computer through USB port. External drive is the best suited device for keeping backup of the computer data since it can store data in the range of 500 MB to 2 TB or even more in near future.

## 12. Explain the optical disks briefly.

Optical discs can store information or data like video, audio, text, images, games, software etc. Various types of optical discs are available which can store up to 8 GB data.

CD-ROM stores data for distribution for example, music CDs. It is read-only storage media. It stores data up to 700 MB.

There are following types of CDs:



CD-R (Compact Disc Recordable): Data can be written once but read many times from it.

CD-RW (Compact Disc Re-Writable): It allows us to erase previous data and write new data on them.

**13. What is the basic difference between a printer and a plotter?**

Printer prints out the hard copy of the documents and images over variety of medium like paper, plastic sheets etc. while plotters draws or plots building maps or product designs. It is used by architects and product designers. A Plotter prints high-quality graphics or drawings.

**14. What is operating system? List any 2 functions of operating system.**

Operating system controls entire functionality of the computer system. Operating system allows the user to interface with the computer hardware and make use of other software applications on the computer.

Two Functions of Operating System

Managing hardware devices: Controls functioning and interaction among devices.

Managing software and scheduling programs: Keeps track of installed software and allocates/ deal locates memory to the required programs.

**15. Describe any 4 types of operating system.**

Single User OS: Such operating systems allow one user at a time on a system. Examples: DOS and Windows 95

Multi-User OS: Such operating systems support more than one user at a time on the same computer. Examples: Windows 7, Windows 10, Linux, Unix.

Command Line User Interface OS: Such operating systems provide command line interface for user to type the commands. E.g. DOS, Unix

Mobile OS: This operating system controls hand-held devices such as smartphones and tabs. E.g. iOS, Android.

**16. How is application software different from an operating system?**

Application software are used to perform various tasks in a variety of fields while operating system controls the functioning of the computer system.

**17. Why operating system needs to be loaded first in computer's memory when it is switched on?**

Operating system controls entire functionality of computer system, it manages other software applications on the computer, devices connected to it and memory. It also provides user an interface to work with computer. Until the operating system is loaded in computer's memory, user cannot work on the computer therefore operating system should load very first.

**18. List any 4 parts of a GUI.**

Desktop, Start Menu, Task bar, Icons, windows etc.

### **19. What do you see on a desktop generally?**

Every GUI component appears over the desktop. On the desktop, icons of shortcuts of various programs, Recycle Bin, Computer and Network are seen. In the background either colour is set or a wallpaper is there. At the bottom, Taskbar is situated.

### **20. What is the role of folders?**

Folders store files and other folders called sub-folders. They help us organise our data in various folders.

### **21. Describe the use of taskbar in Windows.**

Taskbar is usually found on the bottom of the desktop and displays Start button and system tray. Various parts of the taskbar are:

1. **Start Button:** The Start button is found on the left side of the taskbar. When we click on the Start button, a menu appears which is known as the Start menu. We can find and open all the programs from the Start menu.
2. **Quick Launch toolbar:** The Quick Launch toolbar provides an easy access (in single-click) to our favourite programs. These programs can be opened in one click.
3. **Middle Section:** The Middle Section shows us the programs and files we have opened and allows us to quickly switch between them.
4. **System Tray:** The System Tray is used to show the date and time and various other notifications.

### **22. List the advantages of email over traditional mail.**

E-mail offers many advantages over traditional mailing system listed below:

1. Sending and receiving e-mail is very fast. It is received and delivered within seconds across the world.
2. E-mail is an affordable means of communication as compared to other systems.
3. Sending and receiving e-mail is very easy and convenient. Any type of files can be sent as an attachment through e-mail.

### **23. What is the structure of an email address? Give an example.**

E-mail addresses or E-mail ID identifies the receiver. It has username followed by @ sign and then name of the email service provider website. info@eduitspl.com is an example of an e-mail address.

### **24. How will you forward an email along with an attachment?**

Steps to forward the mail are:

1. Click on mail, which you want to forward.
2. Now, click on arrow next to the Reply option. A menu appears.
3. Select Forward option. A new frame appears below the mail details, to forward the message.
4. Type the email address of the recipients in *To* text box and type the text in the message.

5. Click on the *Attachment* The File Upload dialog box appears after clicking on Attachment option to select the attachments.

6. Click on Send button.

### **25. What is a blog?**

Blog is an online platform which allows a person to post his/ her views on a particular topic or issue in the form of an online article for other people to visit and go through. Readers can post their comments on the article and this way threads of interaction and dialogues begin. Blog is an excellent way to showcase your writing and reporting talents or just to share your thoughts and views in an structured way. A person who writes and maintains a blog is called blogger.

Any person who has basic computer knowledge and has drafting skills can create a blog. Some popular blog services are Wordpress, Blogadda, Blogger, Tumblr etc.

### **26. How is facebook a popular social media platform?**

Facebook is one of the most popular social website that allows people interact with each other for free. Sending and accepting friend requests, sharing videos, pictures and posts, creating pages, events and photo albums and online chat are some exciting features which make Facebook popular.

### **27. In what manner can you interact with people on Facebook?**

We can post comments on other people's posts. We can share videos, pictures, pages and events with others. We can respond with likes and other responses to other's posts. Facebook chat is another way to interact with others.

### **28. What is tweeting and re-tweeting? What do you mean by #savetreescampaign?**

A post on Twitter is called tweet. Someone reposting anybody's tweet is called retweet.

### **29. Explain Youtube channel and its advantage.**

Youtube channel allows people to create a collection of uploaded videos. Channel is a series or collection of related vidoes. The advantage of having a channel for creator is that popularity of multiple videos can analysed as one channel. It is easier to manage a channel as compared to individual videos. For users, it is easier to subscribe the channel so that they get reminder about any new video updated by the channel owner.

Users can create a playlist of their favourite channels depending on their interests like education, sports, cookery etc.

### **30. How is Whatsapp different from Twitter?**

Twitter is social media website where users can post short messages including videos, links and text called Tweets. It needs user account name called Twitter handle. Username is preceded by @ sign.

People can be followed on Twitter Twitter timeline displays all the Tweets which are updating amongst your connections. This is called Twitter feed.

WhatsApp is a messaging application that you can download to your smartphone and use to easily send messages to other people's mobile phones freely. It also allows video calls freely by using your phone's data connection. WhatsApp allows creating groups of your contacts. WhatsApp allows video calling too for all Android versions 4.1 and above.

**31. What are various Digital India initiatives taken by Indian government?**

1. Multi channel, multi-lingual, multi-service mobile app Unified Mobile Application for New Age Governance (UMANG) to access all government services over handheld devices.
2. Adhaar number has enable to access digital signature service e-Sign.
3. People can keep digital copies of their important documents over DigiLocker.
4. E-Hostpital application to for enquiring about blood donation services, appointments for checkup diagnostics, registration and payment for fees of the service availed.
5. Swachh Bharat Mission app to promote cleanliness as a nationwide mission.
6. e-Sampark application to promote communication in regional language.
7. Pradhanmantri Digital Saksharta Abhiyan to make rural households digitally literate.

**32. How Digital India campaign will help in rural digital literacy and how will it help in serving masses in a better way? Give your general idea citing some examples.**

To be answered by student after discussion with the teacher.

**33. What do you mean by cybercrime, cyber bullying and cyber stalking? What rae their measure?**

Any act of unauthorised or illegal activity against the set ethics and law online is called cybercrime. E.g. fraudulent transactions, identity theft, cyberbullying and cyber stalking etc. Cyberbullying refers to any act that is purposely done to harass, threaten or embarrass someone online through unsolicited messages, images, videos, gossips with an intention to destroy someone's reputation and against dignity.

Cyber stalking is the act to intrude someone's privacy without one's permission, visiting online profiles, sending unsolicited messages and trying to get in touch with someone online without his/her approval.

**34. How cyber addiction affects our lives adversely and how can we control it?**

Spending longer hours online with too much of screen time is called cyber addiction. Cyber addicts do not leave their device away and tend to check messages every moment and get anxious if a desired message or response is not coming in. This eats away the useful time we need to complete our important tasks and studies. This makes the person obsessive, anxious, stressed and unhealthy. Prevention needs strict discipline in using online media, parental guidance and self-realisation of the ill effects.

**35. What do you mean by the terms hacking, spamming, phishing and pharming?**

Accessing someone's computer or network with malicious intent is called hacking. Hackers steal useful data and sensitive information which can be misused in many ways.

Sending bulk, unsolicited emails/messages frequently to someone is called spamming.

Phishing is the act to impersonate a real website to make the user fill in sensitive information mistaking it as the genuine website.

Pharming is a technique to redirect the actual url to another fake web address by manipulating server settings.

## Unit 4: Entrepreneurial Skills

### SESSION 1: Types of Business and Business Activities

#### Exercise

**1. What is the difference between corporation and cooperative?**

A corporation is a business organization that has a separate legal personality from its owners. Ownership in a stock corporation is represented by shares of stock. The owners enjoy limited liability but have limited involvement in the company's operations. The board of directors, an elected group from the stockholders, controls the activities of the corporation.

A cooperative is a business organization owned by a group of individuals and is operated for their mutual benefit. The persons making up the group are called members. Some examples of cooperatives are water and electricity cooperatives and housing cooperatives.

**2. List any 4 essential business activities.**

Human resources, customer service, accounting and sales.

**3. Describe any 3 business activities necessary to run the business briefly.**

#### Accounting

Accounting is to tracking the money taken in and the money spent by the business. Retail businesses with a high number of transactions use daily accounting. Keeping up to date on expenditures and income allows you to see where you earn and where your business loses money.

#### Budgets and Finance

Implementing a budget helps us control costs. For smaller businesses, budgets may consist of little more than a monthly allotment to cover overhead, insurance and payroll. Larger businesses need to set out big budget on an annual basis. Budget includes expected revenue and costs that is updated regularly.

#### Sales

Sales are the heart of all businesses. Depending on the industry sales is done by dedicated sales teams that develops prospects into clients, performs demonstrations and maintains contact with the existing client base.

### SESSION 2: Entrepreneurship: Meaning and Characteristics

#### Exercise

**1. How entrepreneurs positively contribute to society?**

Entrepreneurs create opportunities for jobs. Entrepreneurs always look for the ideas to transform the world around them. Entrepreneurs often do more for the greater good than the average person. They make honest money with great struggle and pay for taxes and public services thereby contributing and returning to the economy. Many of them take green initiatives for environment and contribute to the charities for social causes.

## **2. How is an entrepreneur different from businessman?**

Entrepreneurs build up the business process to address a problem with some innovative and useful solution. They constantly improve using the feedback. They usually use public wealth in doing business and thus directly contribute to the economy. They maintain smaller efficient teams. They usually manage a smaller business entity that can be managed with continuous innovations. They take manageable risks.

## **3. List the steps of entrepreneurship development program.**

Various steps involved in Entrepreneurship development process are:

1. Setting up concrete objectives of the development program
2. Identifying and nominating valid and genuine candidates
3. Program designs focus on local talents and markets
4. Choosing the right location
5. Program impact analysis for future programs

## **4. List main characteristics of entrepreneurship.**

Economic and dynamic activity

Continuous innovations

Opportunities and potential for growth and profits

Taking and tolerating risks

## **5. Write a short note explaining rewards of entrepreneurship.**

The rewards of entrepreneurship are that the approach of risk-reward opens new doors of growth in the form of opportunities. Despite responsibilities there is greater independence in working. More democratic teams are created. Other rewards are flexible schedules and processes, creativity and productivity with recognition and fame.

## **Assessment**

### **1. List the various forms of business ownership.**

Sole Proprietorship, Partnership, Corporation, Limited Liability Company, Cooperative.

### **2. How sole proprietorship is different from Corporation?**

A sole proprietorship business is owned by only one person. A corporation is a business organization that has a separate legal personality from its owners.

SP is suitable for small businesses and least costly among all forms of ownership. The liabilities of entire business are faced by the owner. In corporation, ownership in a stock corporation is represented by shares of stock. The owners enjoy limited liability but have limited involvement in the company's operations.

### **3. What do you mean by LLC?**

Limited Liability Company has characteristics of both a corporation and a partnership. An LLC is not considered a corporation but the owners enjoy limited liability like in a corporation. An LLC can decide how it will be taxed as a sole proprietorship, a partnership, or a corporation.

#### **4. How cooperative is different from corporation?**

A cooperative is a business organization owned by a group of individuals and is operated for their mutual benefit. The persons making up the group are called members. Some examples of cooperatives are water and electricity cooperatives and housing cooperatives.

A corporation is a business organization that has a separate legal personality from its owners. Ownership in a stock corporation is represented by shares of stock. The owners enjoy limited liability but have limited involvement in the company's operations. The board of directors, an elected group from the stockholders, controls the activities of the corporation.

#### **5. How is manufacturing different from Merchandising?**

A manufacturing business buys products and uses them to make new products while Merchandising business buys products at wholesale price and sells the same at retail price.

A manufacturing business combines raw materials, labor, and factory overhead in its production process while a merchandising business sells a product without changing its form.

#### **6. What do you mean by hybrid business type?**

Hybrid businesses are companies that may be classified in more than one type of business. A restaurant, for example, combines ingredients in making a fine meal (manufacturing), sells a cold bottle of wine (merchandising), and fills customer orders (service).

#### **7. Describe any two business activities.**

##### Human Resources

Human resources are the employees of the company. They are managed under human resource department. Conducting interviews, hiring applicants and determining benefit packages, addressing interpersonal conflicts etc. are some of HR tasks..

##### Customer Service

Customer service helps to secure new clients and promotes referrals from your existing clients. Customer-service departments provide existing customers with a direct contact that offers solutions to issues with bills, faulty products or shipping errors.

#### **8. What do you mean by human resource?**

All the employees that work in an organisation as various teams are called human resource. It is generally the largest resource of all in the company. HR is managed by a dedicated HR department in larger corporations.

#### **9. How customer service is important for business?**

Customer service helps to secure new clients and promotes referrals from your existing clients. Customer-service departments, unlike front-line staff, provide existing customers with a direct contact that offers solutions to issues with bills, faulty products or shipping errors.

#### **10. What do you mean by sales and marketing?**

Sales is the heart of all businesses. It is done by a dedicated sales team that develops prospects into clients, performs demonstrations and maintains contact with existing client base.

Marketing promotes the business. Very few businesses can survive without marketing. In large businesses, a good marketing plan uses mass marketing via television commercials or specifically targeting clients via trade magazines.

**11. What do you mean by a service and a product? Explain with an example.**

Service is an intangible form of product which is given to the clients in various ways like consultancy, repairs, hospitality, schools, banks etc.

Product is a tangible entity which is manufactured and sold to the customer. It has some life span.

**12. Why entrepreneurship development program required?**

Entrepreneurship development programs are required to promote and support entrepreneurship. This is achieved by deploying various training programs focusing on developing entrepreneurial skills. The process of entrepreneurship development aids the entrepreneurs to develop their skills by applying what they learn in the training for improved business activities.

**13. How do entrepreneurs aid in promoting nation's economy?**

Entire entrepreneurship approach is focused on economic activities since all the activities are centrally focused on creation of wealth and value for organisation. All operations are planned in such a way that ensures optimum utilisation of all available resources. Since entire system works on the foundation of uncertainty and adapting to constant challenges, entrepreneurship is regarded as a dynamic force.

**14. List the features of an entrepreneurship development program.**

1. Clear objectives to cover for entrepreneurs' training.
2. Identifying valid and eligible prospective candidates who need training.
3. Focus on talents and markets.
4. Choosing suitable locations for training programs.
5. Meeting the skill requirements of the candidates.
6. Program impact analysis for future improvements.

**15. Describe any 4 characteristics of entrepreneurship.**

1. Entire entrepreneurship approach is focused on economic activities since all the activities are centrally focused on creation of wealth and value for organisation. Since entire system works on the foundation of uncertainty and adapting to constant challenges, entrepreneurship is regarded as a dynamic force.
2. Entrepreneurship has the process of looking for new, viable ideas. and improvements in the existing modes of business operations.
3. Due to constant innovations and improvements in the process entrepreneurs have more potential for further growth and return on investments.
4. Being ready to take risks and looking at them as potential opportunities is the essence of entrepreneurship.



**16. How entrepreneurs benefit from taking risks in business?**

Being ready to take risks and looking at them as potential opportunities is the essence of entrepreneurship. Willingness to tolerate the problems posed by risks, finding the ways to overcome them with new ideas and implement the learning in the growth of the business is the basic strategy of every entrepreneurial entity.

**17. Discuss the roles of entrepreneurship in brief.**

1. Entrepreneurs invest their own resources and arrange for capital and investments. The source of funding may be investors, lenders and the public. This mobilizes public wealth and benefits people as well as all stakeholders.
2. Entrepreneurs are job creators. This job creation by new businesses is very rewarding for nation's economy as it addresses problem of unemployment up to some extent.
3. Entrepreneurs set up new businesses and industrial units in less developed and backward areas. The growth of industries and business in these areas leads to infrastructure improvements like better roads and rail links, airports, stable electricity and water supply, schools, hospitals, shopping malls and other public and private services.
4. Contribution in economic growth. India's MSME sector, accounts for over 35% of the country's GDP.
5. Entrepreneurs play a key role in increasing the standard of living in a community. They create jobs and also develop and adopt innovations leading to improved quality of life of their employees, customers, and other stakeholders in the community.
6. Entrepreneurs aid in community development like education and training, healthcare, and other public services. And help build the pool of educated and skilled workers.

**18. List any 6 rewards of entrepreneurship.**

1. Entrepreneurs are the captain of their business with full independence.
2. Flexible schedules and processes.
3. Do what you believe.
4. Lead enthusiastic teams
5. Stay creative and productive.
6. Recognition and fame.

**19. How do entrepreneurs contribute to industrial and social development?**

Entrepreneurs give to society. Entrepreneurs often do more for the greater good than the average person. They make honest money with great struggle and pay for taxes and public services thereby contributing and returning to the economy. Many of them take green initiatives for environment and contribute to the charities for social causes.

Entrepreneurship, in its core, has the process of looking for new, viable ideas. Working environment of an entrepreneur entity encourages regular reviews and analyses of the processes and their outcomes. Such constant evaluations lead to the birth of innovative ideas and improvements in the existing modes of business operations.

**20. How can you say that entrepreneurs are innovative and independent?**

Entrepreneurship, in its core, has the process of looking for new, viable ideas. Working environment of an entrepreneur entity encourages regular reviews and analyses of the processes and their outcomes. Such constant evaluations lead to the birth of innovative ideas and improvements in the existing modes of business operations.

Despite responsibilities there is greater independence since entrepreneurship invites abilities to work independently yet in coordination with flexible decision-making system.

## **Unit 5: Green Skills**

### **SESSION 1: Environment, Natural Resources and Conservation**

#### **Exercise**

##### **1. Define the terms environment and ecosystem.**

Our environment is everything that surrounds us- from the trees, mountains, roads, buildings, things and even people. It is a combination of both natural and human-made elements.

Community of living and non-living organisms living interdependently with each other is called ecosystem. like, Forest, Pond etc. An ecosystem is a dynamic entity with constant interactions occurring among the organisms and with the surroundings.

##### **2. How does pollution affect environment?**

The contamination of the surrounding environment by the addition of foreign/unwanted substances is known as pollution.

Air Pollution is posing a serious threat to both flora and fauna. Air pollution is believed to end lives of over 20 lakh people every year. Incurable respiratory diseases among animals, aorist rainfall, acid rain, global warming, depletion of ozone layer, the rise in temperature, withering of plants, drought-like conditions, the grimy appearance of buildings etc. are only because of air pollution.

Because of pollution and misuse of resources water table has already depleted from its normal level and the water which is available is again in impure from which can cause serious diseases like cholera, diarrhoea, typhoid, retarded growth and stomach/peptic ulcers etc.

### **3. What are the ill effects of deforestation and global warming?**

Deforestation is when humans remove or clear large areas of forest lands and related ecosystems for non-forest use. In these cases, trees are never re-planted. Since the industrial age, about half of world's original forests have been destroyed and millions of animals and living things have been endangered.

Removal of green cover and excessive industrialisation increases global warming due to ozone layer depletion and UV rays entering earth's atmosphere. Increase in Carbon dioxide and chloro-floro carbons increase earth's temperature leading to global warming.

### **4. How can we prevent ill effect of man's actions on environment?**

Human greed, heavy industrialisation, rampant over exploitation of natural resources has brought the humans and environment to the brink of destruction. The Green Economy is an alternative vision for growth and development and sustainable development. Green Economy can promote safer economic, environmental and social well-being. Green economy addresses low carbon emissions, efficient use of resources, and social benefits.

## **SESSION 2: Green Economy**

### **Exercise**

#### **1. What do you mean by green economy? Explain briefly.**

The Green Economy is an alternative vision for growth and development and sustainable development. Green Economy can promote safer economic, environmental and social well-being. Green economy addresses low carbon emissions, efficient use of resources, and social benefits. Green economy improves social well-being, equity and reduces environmental risks. It is a viable alternative to today's economic structures, which encourage waste and threats to the environment. The concept of the green economy is emerging as a priority for government for sustainable and environment-friendly growth.

#### **2. Describe the importance of green economy in the modern world in brief.**

Green economy addresses low carbon emissions, efficient use of resources, and social benefits. Better and steady growth in income, proper employment opportunities and related activities need to be more public oriented and prevent the damage to biodiversity and ecosystem.

Improved energy security and environmental and public health have greater scope to implement green initiatives. This is a priority for government for sustainable and environment friendly economy.

#### **3. List the steps we can deploy to achieve green economy.**

Will power and commitment of the government.

Laws and legal framework.

Green policies

Support renewable technology

Innovations in energy sector

#### **4. How green policies and political commitments achieve green economy?**

Policy makers should put proper mechanisms in place to prevent natural resource abuse. Secondly, government bodies need to promote funding for entrepreneurs that provide innovative solutions to energy issues. Government needs to promote green investment and research.

Political bodies of government should commit to the green growth path for economy.

This could include better research and development, resorting to innovative renewable technologies and renewable energies.

### **Assessment**

#### **1. What do you mean by environment?**

Environment is a combination of both natural and human-made elements. These elements are divided into two types: Biotic and Abiotic. Biotic elements are all the living organisms. Abiotic elements include all the non-living things. Land, air, water, plants and animals all comprise the natural environment.

#### **2. Which components is our environment made of?**

Our environment is mainly made of the lithosphere - the hard top layer of the earth, the Hydrosphere — various sources of water and different types of water bodies, the atmosphere — the thin layer of air that surrounds the earth and the biosphere that includes all life.

#### **3. What is Ecosystem?**

Community of living and non-living organisms living interdependently with each other is called ecosystem. Like, Forest, Pond etc. An ecosystem is a dynamic entity with constant interactions occurring among the organisms and with the surroundings.

#### **4. Give an example of an ecosystem and briefly explain it.**

In a river, members of ecosystem are fish, aquatic plants, insects, insect eating birds, amphibians like frog, microorganisms of soil and water etc. Fish and water animals release carbon dioxide used by aquatic plants and plants release oxygen for animals to absorb.

#### **5. List any 5 disastrous effects on environment caused by human activities.**

1. Rapid endangerment of rare animals and plants species due to extensive poaching.
2. Greater demand for precious animal parts and ornamental goods made from them.
3. Erosion of soil and deterioration of soil fertility.
4. Water pollution due to fertilisers, pesticides, domestic and industrial waste.
5. Air pollution due to toxic industrial emission and fuel combustion.

## 6. What do you mean by deforestation? What are its causes and effects?

Deforestation is when humans remove or clear large areas of forest lands and related ecosystems for non-forest use. These include clearing for farming purposes, ranching and urban use. In these cases, trees are never re-planted. About half of world's original forests have been destroyed so far and millions of animals and living things have been endangered.

### Causes:

- Trees are cut down (deforestation) for many reasons including
- To be used, sold or exported as timber, wood or fuel (charcoal). This is called logging.
- To be used for farming purposes (grazing fields for livestock, or large-scale farming activities)
- To make room for human settlement and urbanization (these include making space for shelter, industries, and roads)
- To make room for mining.

### Effects:

- Global warming.
- Irregular rains.
- Floods
- Soil erosion.
- Draught.

## 7. What are the effects of air pollution and possible solutions?

Air Pollution is a serious threat to both flora and fauna. Respiratory diseases among animals, acid rain, global warming, depletion of ozone layer, the rise in temperature, drought-like conditions, etc. are because of air pollution.

If the rate at which pollution is increasing right now continues then soon quality air for breathing will cease to exist and the whole ecosystem will be disturbed.

**Solution:** The industries should be set up far from residential areas and proper filters should be used to check out toxic emissions from the industries. Deforestation should be stopped and afforestation should be promoted. Power Plants emissions should be controlled. Migrating towards cleaner sources of energy like solar and wind energy.

## 8. What are the effects of water pollution and possible solutions?

If the misuse of water is not stopped then pure drinking water won't be available for consumption. Due to misuse of water, water table has already depleted from its normal level and the water which is available is impure from which can cause serious diseases like cholera, diarrhea, typhoid, retarded growth and stomach/peptic ulcers etc.

**Solution:** The domestic and sewage water should be recycled by correctly mixing it with soil which increases the fertility of the soil. The industrial toxic waste, on the other hand, should not be disposed of directly in the water bodies at all. Alternative disposable techniques should be developed or should be disposed of after proper treatment. The use of pesticides and insecticides should be minimized.

### **9. What is global warming?**

Global warming occurs when carbon dioxide (CO<sub>2</sub>) and other air pollutants and greenhouse gases collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface. Ozone layer depletion is done by Chloro-fluoro-carbons. Extreme heat waves, melting of glaciers, and severe droughts cause water shortages and increase the risk of wildfires.

Rising sea levels will cause flooding in coastal areas. Forests, farms, and cities face heat waves, heavy downpours and floods. All these damage and destroy agriculture and fisheries. Diseases like allergies, asthma and infections outbreaks are becoming more common.

### **10. How have human activities endangered animal species?**

Humans are largely responsible when animals become extinct, endangered or threatened. Humans destroy precious habitat—the natural environment of a living thing—when they fill swamps and marshes, dam rivers and cut down trees to build homes, roads and other developments. Oil spills, acid rain and water pollution have been devastating for many species of fish and birds. Humans have over hunted and over harvested species, leading to their endangerment, and often, extinction. Habitat loss due to forest fires, deforestation, pollution, over killing and poaching has led to the extinction of rare animal species.

### **11. Name a few endangered species.**

Some endangered species are: giant panda, tiger, whooping crane, blue whale, Asian elephant, sea otter, snow leopard and gorilla.

### **12. How is radioactive waste and Electronic waste dangerous for environment?**

Radioactive waste is nuclear fuel that is produced after being used inside of a nuclear reactor. This is very dangerous and remains this way for thousands of years. It must be handled in the right manner. Industries like mining, defense, medicine, scientific research, nuclear power generation which produce by-products that include radioactive waste.

Electronic wastes include discarded electronic devices like old cell phones, computers, batteries etc. They degenerate very slow and are hazardous.

### **13. What do you understand by the concept of green economy?**

Human greed, heavy industrialisation, over exploitation of natural resources has brought the humans and environment to the brink of destruction. Green Economy is an alternative vision for growth and development. Green Economy promotes safer economic, environmental and social well-being. Green economy addresses low carbon emissions, efficient use of resources, and social benefits. It improves social well-being, equity and reduces environmental risks.

### **14. Which problems does green economy address?**

Green Economy can promote safer economic, environmental and social well-being. An inclusive green economy improves social well-being, equity and reduces environmental risks. It is a viable alternative to today's dominant economic structures, which encourages waste, cause resource scarcities, and which are threats to the environment.

### **15. Explain briefly how we can achieve green economy?**

Certain general steps that can be taken to achieve green economy are:

Political commitment: Government bodies should commit to the green growth path for economy. This could include better research and development, resorting to innovative renewable technologies in industry.

Legal and regulatory framework: Policies for green regulatory systems to prevent climate change. Laws must be enforced with heavy hand to eliminate the damages to environment.

Green policies: Policy makers should introduce mechanisms to prevent natural resource abuse. Government needs to promote funding for entrepreneurs that provide innovative solutions to energy issues. Government need to promote and support green efforts in private industry.

Technology viability: Use public funds to support renewable technology.

Institutional setup: Institutional adjustments to adopt innovative solutions and attract new investments for clean energy, biogas, windmills etc.





### **C. Short answer type questions.**

#### **1. What do you mean by browser fingerprinting?**

Browser fingerprinting is the technique using which the online movements, behaviour and habits of the users are tracked to analyse their interests and inclinations towards various services, products and other offerings by various online businesses and service providers.

#### **2. What is McVarcthy's definition of AI?**

According to John McCarthy – 'AI is the science and engineering of making intelligent machines.'

#### **3. List any 2 challenges in achieving true AI for machines.**

The 2 challenges in achieving true AI are:

- i. Retain the facts as knowledge
- ii. Think, analyse and apply logic.

#### **4. What do you mean by sensing and reasoning?**

We receive a variety of stimulus constantly from our surroundings. Perceiving such stimuli is called sensing. Receptive organs help in sensing. Comparing facts and deriving conclusions is called reasoning. If conclusions are guaranteed after analysis then it is called deductive reasoning, if not, then it is called inductive reasoning.

#### **5. List main capabilities of AI.**

Main capabilities of AI are analysis of simple and complex immense data and perform predictions, check anomalies, classify data values etc., recognise faces, objects and images, smart search and natural language processing features such as speech recognition.

#### **6. What is NLP? How does it help in education and customer support fields?**

Natural Language Processing (NLP) is the technique used in AI field to understand and process speech and voice. NLP is useful in education field to develop interactive courses and assessments, voice-based research systems, voice command-based educational systems, multi-lingual courses and smart teaching in classrooms etc.

In customer support field NLP is used as smart voice response systems and chatbots which understand what has been spoken. They answer structured questions and understand the intent of the customer faster and accurate.

#### **7. Briefly list the ways on which AI can help in E-commerce industry.**

E-Commerce industry has immense amount of data for AI systems to process and perform useful forecasts and predictions. They are used to recommend ad promote products through digital marketing and develop better customer relations. AI can be used to create better shopping experience for customers and address to their problems faster and accurately.

#### **8. How do NLP, Data Vision (computer vision) and machine learning help in research and development fields?**

Research and development field is almost an endless ocean of data in any field. AI can help in smart search based on text, voice and image, categorise and compile the search results and information, summarise the information. Machine learning and deep learning systems can be used to create 3-D designs.

#### **9. List 4 real-life examples of enormous data generation.**

Four real-life examples of enormous data generation are customer data on an E-commerce portal, financial transactions on a bank website, medication data of patients in a large hospital and pollution data of a state.

**10. Why is it necessary for an AI system to be fed with enormous amount of data to learn its task?**

An AI algorithm needs to be trained with data to make it capable for analysing data in future and identify trends and patterns then doing forecasts. Such data used to train an AI algorithm is called testing data. Thus, performance of AI system is based primarily on the bulk of data. Higher the amount of data, better would be the training of AI algorithm. This is the reason enormous amount of rich data (with a variety of variables) is required to train AI algorithms.

**11. How are three domains of AI are related together?**

Be it computer vision or NLP, data is the common domain that is required for learning by AI algorithms. If that data is in the form of images and visuals then it is Computer Vision and if the data is in the form of spoken language or audio then it relates to NLP. This way the 3 domains – data, Computer Vision and Natural Language Processing are related together. For example, an AI algorithm creating a summary of a news clip.

**12. Briefly list any two examples of Computer Vision and NLP integration.**

The 2 examples of Computer Vision are object identification in an image and face recognition. The 2 examples of NLP are voice based chatbots and question-answer based voice operated assistant. Other examples are Alexa, Cortana and Siri.

**Case study/Scenario-based questions.**

A. I. Vision (eyes), Listening (ears)

II. a

III. Robot must find its way around the furniture items without any collision.

IV. c

V. Reasoning is the trait of intelligent. Intelligence makes us capable to reason and make decisions. For a machine, to be able to reason, it must acquire suitable intelligence from the rich data it is given to analyse.

B. I. Demography and environment.

II. Population and environment.

III. Speed of processing and ability to analyse bulk of data.

IV. AI can analyse hunger data to reveal hidden trends and patterns that help in devising effective policies to fight hunger.

V. AI can analyse the weather data to predict adverse weather conditions, suggest suitable crops to sow, apply effective agricultural practices and methods.

C. I. Analysing satellite images to predict or detect forest fire.

II. Regenerating new music compositions, identifying fake news or hate speech.

III. c

IV. A printout is the visual from of data. So, the machine should have computer vision capability to process the image of printout and then, to analyse the text written in it, machine should have natural language processing capabilities also. So, it is an example of CV and NLP combined.

V. This is an example of natural language processing domain of AI since entire interaction is occurring in natural human language.

D. I. CV

II. NLP

III. As we use an AI-enabled smart device, it analyses the data as it is trained. With every new batch of data, it enhances its learning and becomes better in due course of time.

IV. False

V. IoT device is useful for automation. It can perform a task smartly for which it is programmed but it cannot learn like an intelligent machine unless it has the capabilities in the form of an AI-enabled algorithm.

## **CHAPTER 3: PURPOSE & CHAPTER 4: POSSIBILITIES**

### **A. Choose the correct answer.**

1. d                      2. c                      3. a                      4. b

### **B. Fill in the blanks.**

1. Data                      2. Data-vision                      3. Predictive analytics                      4. Object detection                      5. NLP

### **C. State whether True or False**

1. False                      2. True                      3. False                      4. True                      5. True

### **D. Very short answer type questions.**

#### **1. Give few examples of complex data on social and environmental data sets.**

Social complex data: population, ethnic data, medical and health data.

Environmental complex data: weather related data, flood and drought related data, space research data, agricultural data in the form of satellite images.

#### **2. Which 3 powers of AI make it capable to help in achieving SDGs faster and better?**

Ability to process bulk data faster, accurate forecasts and predictions and ability to learn from the data.

#### **3. What is the prime issue among all the SDGs to achieve?**

Poverty is the prime issue among all the SDGs to achieve since addressing poverty may solve many social issues.

#### **4. How AI-enabled LMS may help children in better learning?**

AI-enabled learning management system can learn from the interactions of the learners and accordingly provide content to the learners depending on their needs and pace of learning.

#### **5. How AI can be helpful in industries?**

All industries rely on the data analysis to make informed decisions. Ability of machine learning and AI techniques helps in analysing bulk data faster to meet productive purposes of businesses.

### **E. Short answer type questions.**

#### **1. List any 5 AI features that may help in addressing sustainable development issues.**

Five AI features helpful in addressing sustainable development issues are:

- i. Ability to process huge amount of data such as data related to climate, population and pollution etc.
- ii. Faster processing speed to accomplish analyses in a few hours as compared to days or even months.
- iii. Ability of accurate forecasts to raise alarms and preventive alerts.
- iv. Ability to learn from the data to evolve autonomous algorithms that save a lot of human effort.
- v. Ability to process complex data such as images (Computer Vision) and language (Natural Language Processing).

#### **2. How CV and NLP may prove helpful in addressing sustainable development issues?**

AI's Computer Vision and Natural Language Processing help in developing sustainable and effective educational systems, ability to process bulk data and forecast results help in analysing bulk data related to illiteracy and unemployment to help devise better policies for education for all and skill development for self-employment and to address problem of unemployment. Help physically challenged people in self-paced learning and gain skills to earn their livelihood with least help from others – this way promoting equality, helping people learn new skills faster.

### **3. How AI can help in understanding educational needs?**

Identifying trends and patterns in bulk learning data, accurate predictions, AI systems can derive patterns that can help in understanding the educational needs. For example, AI can help in creating customised educational material as learners need. Predicting future performance by analysing current data. Teachers can also be empowered for efficient teaching through better feedbacks on students' achievements.

### **4. In what way AI can address environmental issues?**

Environment has many problem areas such as pollution, natural calamities, agriculture-related problems, problems related with various ecosystems, environment-related researches etc. AI can help in visualising and analysing bulk environmental data to forecast problems and give insight into trends which are usually not seen. This all can help in devising better strategies to prevent or counter environmental related problems.

### **5. How can AI help reduce inequality and in fair consumption?**

One of the serious social issues is inequality at many levels. There are haves and have-nots in education, employment, public services, opportunities and social justice. There are privileged people who have all the resources to enjoy while there is huge population struggling with hunger and poverty. AI-enabled analysis of data can help devise policies which bring social equality and fairness to all by allocating equal opportunities to all.

### **Case study/Scenario-based questions.**

I. Poverty is prime social issue because if this is taken care of then many problems can be addressed such as unemployment, illiteracy and healthy living.

II. a

III. True

IV. AI systems can match the employment opportunities with qualifications and skills to let the deserving people get better jobs. Good job opportunities lead to reduced poverty.

V. AI can help analyse bulk and complex environment data faster for accurate forecasts and rich data-views. This will help policymakers make better policies and strategies to address issues.

VI. Better employability opportunities enhance the social and living standard of the people as they start earning money, they can grow socially and economically, get their children educated and this way social upliftment can be achieved.

VII. Smart cities provide conducive conditions for living and working with energy-efficient and environment-friendly facilities.

VIII. Object detection is a computer vision AI technique to identify an object in an image among multiple objects.

IX. IoT

X. This paragraph is talking about SDGs 1 (Poverty), 2 (Zero hunger), 11 (Sustainable cities and communities)

## CHAPTER 5: AI ETHICS

### A. Choose the correct answer.

1. b    2. d    3. c    4. d    5. b

### B. Mark the following statements as Traditional Computing or AI Development.

Traditional computing: 1, 5, 7, 8

AI development: 2, 3, 4, 6

### C. Very short answer type questions.

#### 1. What do you mean by the term ethics?

The principles and morals that govern our behaviour are called ethics. They serve as a guideline for us to distinguish between right and wrong.

#### 2. Mention one core difference between traditional programming and AI development.

The traditional program is based on algorithm developed to perform specific tasks while AI algorithms are dynamic and designed to learn from the data.

#### 3. Define the term “bias”.

Discriminating on the basis of gender, race, colour, region etc. is called bias.

#### 4. Name any three ethical issues related to AI.

- i. Humans will be replaced by AI leading to job losses.
- ii. AI will be biased leading to unfair results and decisions.
- iii. How AI will take care of human dignity and rights?

#### 5. List 4 ways in which good AI can work.

- i. Enhancing human potential.
- ii. Bringing and maintaining equality.
- iii. Uplifting harmony.

#### 6. Name any 3 ethically aligned design principles for AI systems.

- i. Human rights
- ii. Transparent AI systems
- iii. Accountability

### D. Short answer type questions.

#### 1. Explain briefly why ethics is important AI development?

Ethics help us distinguish between right and wrong. Artificial intelligence involves faster processing and a remarkable impact (both positive and negative) on industries, society and environment. It has the ability to go out of control if not monitored properly through stringent policies and great care. Unethical use of AI may lead to great many threats to human rights, equality issues (biases), life threats, social conflict and negative effect in the application area instead of providing intended benefit. This is the reason addressing ethical issues and devising their preventive plans are important.

**2. Briefly, discuss different types of bias.**

Discriminating on any basis (gender, colour, race, religion, social standard, etc.) is called bias. There are pre-existing biases in the system due to the social structure. Incomplete social data leads to pre-existing biases. Software systems have technical biases due to logical bugs or flaws. Emergent biases are discovered when system comes in use by different users in different ways.

**3. List any 5 differences between traditional programming and AI development.**

1. Traditional Programming vs AI Development (5 differences) are:

<b>TRADITIONAL PROGRAMMING</b>	<b>AI DEVELOPMENT</b>
The program is based on a finalized algorithm which is fixed for one or more versions of the program.	Algorithms are dynamic and designed to learn from the data.
Data is required to be processed for desired output.	Data is needed for two purposes broadly: i. to train the machine and ii. To analyse.
Data is mostly structured and well classified.	Data is unstructured with several variables needed to train the system.
Forms a vast field of computer science and computer applications.	Integrates computer science, data science, statistics, math, research and business intelligence.
Deals with a limited size of data. Bulk data is processed in batches.	Deals with complex, dynamically changing and growing immense amount of data collectively called Big Data.

**4. List any 5 ethical characteristics of good AI.**

Five ethical characteristics of good AI are enriching human life, working towards equity, easing conflicts and promoting harmony, addressing un-addressable problems and addressing environmental abuse.

**5. Briefly explain transparency and bias issue related with AI.**

Think of a self-learning and evolving AI system. There should be enough and appropriate guidelines and process to determine the ethics of action taken by such an AI system. The accuracy and suitability of data used to train it needs stringent checks. Ethical guidelines need to be in place to ensure that AI enabled system is taking decision and serving in a transparent manner avoiding any sort of bias on any basis such as gender, race, ethnicity, region, financial and social status etc. For such biases, proper accountability guidelines need to be devised. This all will ensure an ethical AI-based service system.

**6. Name any 4 major ethical challenges related to AI and briefly explain any 2 of them.**

Four major ethical challenges related to AI are accountability, biases, privacy and human values.

Accountability: There should be rational guidelines to govern the working of AI system and the its ability to make decisions.

Human values: All AI systems should respect, promote and protect human rights.

**7. List any 4 ethical framework principles for AI and briefly explain any 2 of them.**

The 4 ethical framework principles are human rights, Well-being, rights related to data and transparency.

Human rights: AI system should be developed in such a way that it should not compromise on human dignity and values. It should respect and protect human right.

Rights related to data: People should have rights and ways to control their data. They should decide with whom to share the data. AI systems should respect the right to individual identity.

**8. Briefly, explain how a policy framework for good AI will help in establishing ethical AI.**

Ethical or good AI framework promotes respect and protection of human rights and values. It recommends AI systems that should ensure that the users are not harmed in any way while using AI-based applications and products. People should have right to decide how their data must be shared and used. Their privacy should not be breached in any way. AI systems should be effective in functioning, transparent and responsible for every outcome. No one should be able to misuse AI system and it should be developed by competent developers.

**Case study/Scenario-based Questions.**

- I. Super-intelligence is the intelligence that surpasses human intelligence.
- II. False
- III. c
- IV. If people are in control of their data, then they will not be vulnerable to surveillance, hacking, cybercrimes etc.
- V. Before having me registered on their website the company must inform me how they are going to use my data and that my data is safe and secure.
- VI. Data privacy and data protection are important to prevent our sensitive data fall into unauthorised ownership for misuse.

## UNIT 2 – AI PROJECT CYCLE

### CHAPTER 1: AI PROJECT CYCLE: AN INTRODUCTION

**A. Choose the correct answer.**

1. c    2. d    3. b    4. b    5. a    6. b    7. d    8. b    9. a    10. d  
 11. a    12. d    13. a    14. b    15. a    16. d    17. c    18. d    19. c    20. c  
 21. a    22. c    23. a    24. c    25. b    26. a    27. a    28. b    29. a    30. b

**B. Fill in the blanks.**

1. Solution    2. Project    3. Goals    4. Scope    5. Data    6. Stakeholders  
 7. Where    8. Why    9. Data exploration    10. Spreadsheet    11. Complex  
 12. Web scraping    13. Bias    14. ANNs    15. ML, AI  
 16. Rule    17. Learning    18. Prediction    19. Bottom    20. Top

**C. State whether True or False**

1. True    2. False    3. True    4. True    5. False    6. False  
 7. False    8. True    9. False    10. False    11. False    12. True

**D. Match the AI Project Cycle Stages with their purpose.**

1. b    2. c    3. e    4. a    5. d

**E. Match the Purpose with correct data visualisation tool.**

1. f    2. d    3. c    4. a    5. g    6. f    7. b    8. h

**F. Very short answer type questions.**

**1. What do you mean by data features and data formats?**

Data features refer to various data types such as text, date, number, etc. Data formats means that same data can exist in different formats such as dates in various patterns (12-Nov-25, 12-11-25).

**2. What do you mean by data acquisition?**

Process of acquiring data from various sources such as databases, files, websites, surveys, etc. is called data acquisition. This is the second step of AI project cycle and follows Project scoping.

**3. Name any 4 sources to gather data in AI Project.**

Spreadsheets, databases, web scraping of websites, survey forms.

**4. What is web scraping?**

Process of going through all the pages of a website and gather details about the web site structure and other useful data is called web scraping.

**5. Give 3 examples of structured data.**

Spreadsheets, tables, CSV files.

**6. Give 3 examples of unstructured or complex data.**

Images, scanned pages, audio.

**7. What is the use of system map?**

A system map is used to show the interaction of various parts of a system to show how the system works.

**8. What do you mean by data exploration?**

Data exploration stage follows data acquisition stage. The data acquired is explored and visualised in graphical form through various tools to prepare suitable training and testing data for AI algorithm.

**9. Give one consequence of missing value in the training data.**

Dure to missing value (such as no posting of a newly joined employee or no class allocation of a new student), the training of AI model is not done properly and bias may occur in its learning.

**10. What do you mean by feature engineering?**

Feature engineering is the process of deriving meaningful information, trends and facts from the data.

**11. List any 4 types of data visualisation and their use.**

Bar and column charts – comparative analysis

Pie and bubble charts – see the distribution of data values

Flowcharts – to show process flow or sequence of steps

Line chart – to analyse trends and patterns

**12. How are ML and DL related to AI?**

Machine learning and deep learning are the part of the field Artificial Intelligence. Machine learning is used to train the machines and in deep learning machines are trained using artificial neural networks.

**13. Give two examples of a rule-based learning system.**

Chat bot and game playing machine such as IBM Deep Blue.



#### **14. Give two examples of learning-based learning system.**

Educational systems with adaptive learning experience, expert systems that are enable by AI to learn from interactions.

#### **15. Name the final stage of AI project cycle. What is the use of this stage?**

The final stage of AI project cycle is Evaluation. In this stage a machine is tested using testing data to evaluate if the machine is trained as desired to deploy in real-life scenario.

#### **G. Short answer type questions.**

##### **1. Briefly describe the stages of AI Project Cycle. What is the use of training data and testing data?**

**Problem scoping:** This is the initial stage that defines the goals to be achieved through AI system and the problems it will address.

**Data acquisition:** Collecting and compiling the relevant data in such a way that it is used to train the AI system.

**Data exploration:** Analysing the data for some useful information that can be derived out of it. Preparing training and testing data sets.

**Modelling data:** Using the data to train the various AI systems to be selected using the training data.

**Evaluation:** Gauge and analyse the outputs (predictions) of the AI systems using testing data sets and select the best suited AI system to be deployed.

##### **2. Briefly explain any 4 factors that determine data quality.**

**Relevance:** Data should not be out of context. This ensures that only the data values relevant to the problem are acquired.

**Age:** Data should not be too historic or too recent. There has to be a balance to it.

**Accuracy:** All the data values should be correct and in proper format.

**Volume:** Higher the volume of data, better would be the training of the machine.

##### **3. What is the significance of data explorations after data acquisition?**

Data acquisition is a complex task due to variety of data and data sources. Data gathered or acquired from various sources cannot be used immediately, as it is, to train AI algorithm. Data Exploration is used to “tidy up” the raw data collected from various sources and through various techniques. This “tidied up” data is finally used as training data for AI model. Data exploration is used to obtain basic understanding of data to determine its suitability for training AI algorithm. Final purpose of data exploration is to look for useful information locked in the data-sets -identify patterns, trends and logical relationships among data values. The best way to visualise them is to create their graphical representation data for following purposes:

- Comparing the values
- Establishing relationships
- Distributions and compositions

##### **4. Discuss data feature and explain structured and complex data with examples.**

Basically, there are three features of data which are also called data types:

- Characters or individual letters, symbols, marks. E.g. a, A, @, \*, ! etc.

- Strings of letters, also called text. E.g. “India”, “Ravi”, “House”
- Numbers. E.g. 10, 1, -9, 200

There are variations to these three basic data types:

- Phrases and sentences – variations of strings.
- Numbers with decimal places
- Dates

How data is presented or stored is determined by various formats. Numbers with decimal places may have the decimal places defined in a system that they can store as many decimal places only. For example, monetary figures have 2 decimal places while scientific notations may have more than 10 decimal places.

Dates can be presented in various formats like 12-29-2022, 29-Dec-2022 and 29-12-2022 etc.

Text can be in various cases like UPPERCASE, lowercase etc.

Structured data: This is usually found in symmetrical documents such as xml files, simple tables, spreadsheets and database tables. They store the data under fixed number of fields. There are sets of horizontal records. Structured data is easiest to explore and refine as training data.

Unstructured data does not have a predefined, fixed model. Such data is not organised in a predefined manner. For example, pieces of text, photographs, maps or satellite images, audio clips and video clips. Handling unstructured data demands higher level of expertise in exploring it for preparing training data.

Complex Data Types: There are some other complex data types which are stored in specialised files. These are audio, video, audio-video, images, 3 dimensional (3D) objects such as the model of a house. Complex data types are presented in a variety of formats like audio is coded as mp3, wav etc.; video as mpeg, mp4 etc.; images as jpg, gif, png etc.

### **5. Discuss any 5 factors of data quality.**

**Relevance:** Data should not be out of context. That is the reason, why it is important to identify the context of the problem during problem scoping stage. This ensures that only the data values relevant to the problem are acquired.

**Age:** Data should not be too historic or too recent. There has to be a balance to it. For example, using data from 30 decades before to train a new AI algorithm is not recommended.

**Accuracy:** Data values should be correct and in proper format. We must check for required negative/positive numbers, spelling mistakes, too higher value of numbers or too low, number ranges – any out of the way value should be validated.

**Volume:** Amount or bulk of data is another factor. Higher the volume of data, better would be the training of the machine. That is why, AI algorithms of E-Commerce portals get intelligent by the time.

**Format:** In many AI applications different data formats also help in better training of the machine. For example, an AI system using natural language processing, needs letters, text, symbols and voice in different notations, accent, tones, etc.

### **6. Why is it not suitable to use unstructured data directly to train an AI model?**

Data is acquired from a variety of sources and by applying various methods. If we use the same data to train the AI model, it will not be trained in desired manner due to following reasons which is why we need to tidy up the data before making training and testing data sets.

Data which is relevant to the context in which problem is being solved, is said to be quality data or useful data. Data acquired may have following problems to be dealt with:

1. Data may be out of context. It is important that the data values relevant to the problem are considered.
2. Data should not be too old or too recent. There has to be a balance to it. Specially, older data may have become obsolete or out of context.
3. Data values should be correct and in proper formats.
4. Amount of data should not be too less. Higher the volume of data, better would be the training of the machine.
5. Variety of data values in the data set makes it better for model training. There are chances of having a variety of data values in a bulk lot of data.
6. In many cases same data is found in different formats which makes it unfit for the AI model.
7. Data accuracy depends on the source from which the data is collected. For example, data collected from public domain like Internet may not be authentic while data collected from an authorised source such as a government or certified organisation.
8. Visual data like images may be blur or dirty or may be too large or small in size.
9. Audio data may have unwanted noise in it.

**7. Briefly, discuss the various ways to handle the problem of missing values and their impact on training the AI model.**

Missing values in a data set can be handled in various ways depending on the other values of the data set. If missing values have no impact on the training of the AI model then we can remove the records that contain missing values. If we can find the missing values and fill the gaps, we can do so. We can fill missing values from other similar records or calculate from the existing data. In certain cases, we can predict missing value after careful analysis of present data. Any missing values in the training data set for any AI model leave gaps in the information which affects the reliability and accuracy of the model in establishing relationship among data points. For example, if there are no marks for a student in a test he/she missed then the gap may be translated into zero which will affect the overall percentage/average performance of the student. This will affect any predictions done by the system regarding that student's performance which is unfair.

**8. Briefly discuss the use of some data visualisations in comparing, establishing relationships and analysing distribution.**

Comparing: Bar charts and column charts can be used to compare the data by looking at the length of the columns and bars. Column and bar charts are used for this purpose.

Establishing relationship: The purpose of establishing relationship between data values is to see how change in one data value affects another value. This is called finding correlation between the data values. On analysing there could be a possibility that no correlation is found among the data values. To do this type of analysis, Scatter and Bubble charts are most suitable.

Analysing distribution of data means looking at each piece of data and see how it becomes the whole part of the data set. We see the percentage distribution of each value on the whole. Pie charts, Tree Maps and 2D Scatter charts are suitable for this analysis.

**9. Discussing the two types of learning approaches, give 2 basic differences between them.**

Rule-based model is fed with data along with a set of rules and labels to guide it for data analytics. Rule-based model follows a predefined set of rules in its algorithm. Learning based model is more advanced than rule-based model as it is not fed with the guidelines or rules as to how to deal with the data. It is programmed to make its own deductions of trends and relationship between data points on its own.

**10. Briefly discuss the application of rule-based model and learning-based model.**

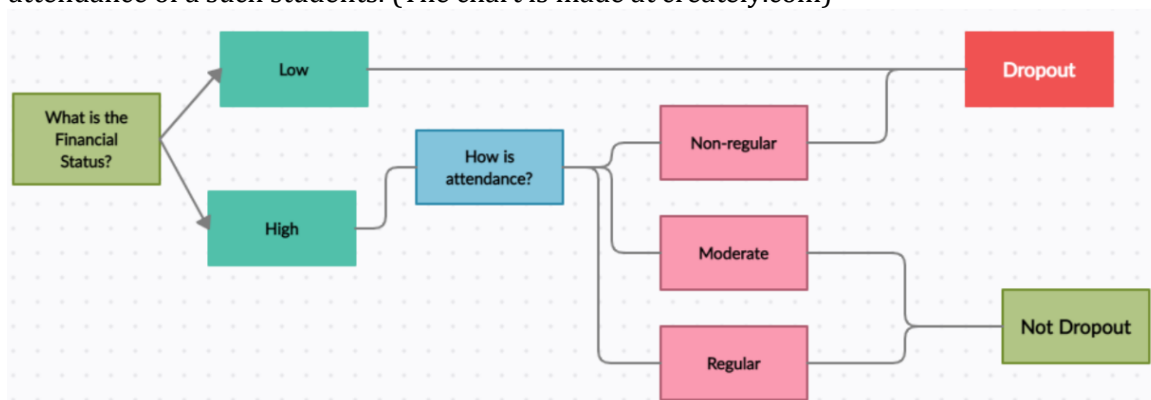
Rule-based models are suitable for limited specific tasks such as translation, finding vehicle route, playing a game. They are useful for intelligent automation of the system. Learning-based approach is suitable where step-by-step rule-based learning cannot be applied easily. It is useful where useful predictions are based on a number of factors which are difficult or not possible humanly. Predicting customer behaviour, monitoring financial transaction for frauds, medical diagnostics, legal research and advise etc. are the application areas for learning-based approaches.

**11. Giving a simple example, explain the structure of decision tree.**

Consider the following dataset. We need to depict this using a decision tree to predict if a student would be a dropout on the basis of his/her attendance and financial status.

Attendance (1=regular 2=moderate, 3=nonregular)	Financial Status (0=low, 1=high)	Dropout from course?
1	0	YES
2	1	NO
2	0	YES
1	1	NO
3	0	YES
3	1	YES

Decision tree begins with a root that mentions a question. Two or more branches come out of it in the form of answers. These branches either connect to another node asking another question or decision (prediction) of the tree. The ending nodes which do not connect to another node via any branch are called leaves. Below is the decision tree for the above scenario. Notice that due to low financial status, students were dropping out irrespective of attendance so there is no need to check for attendance of a such students. (The chart is made at creately.com)



**Competency-based Questions**

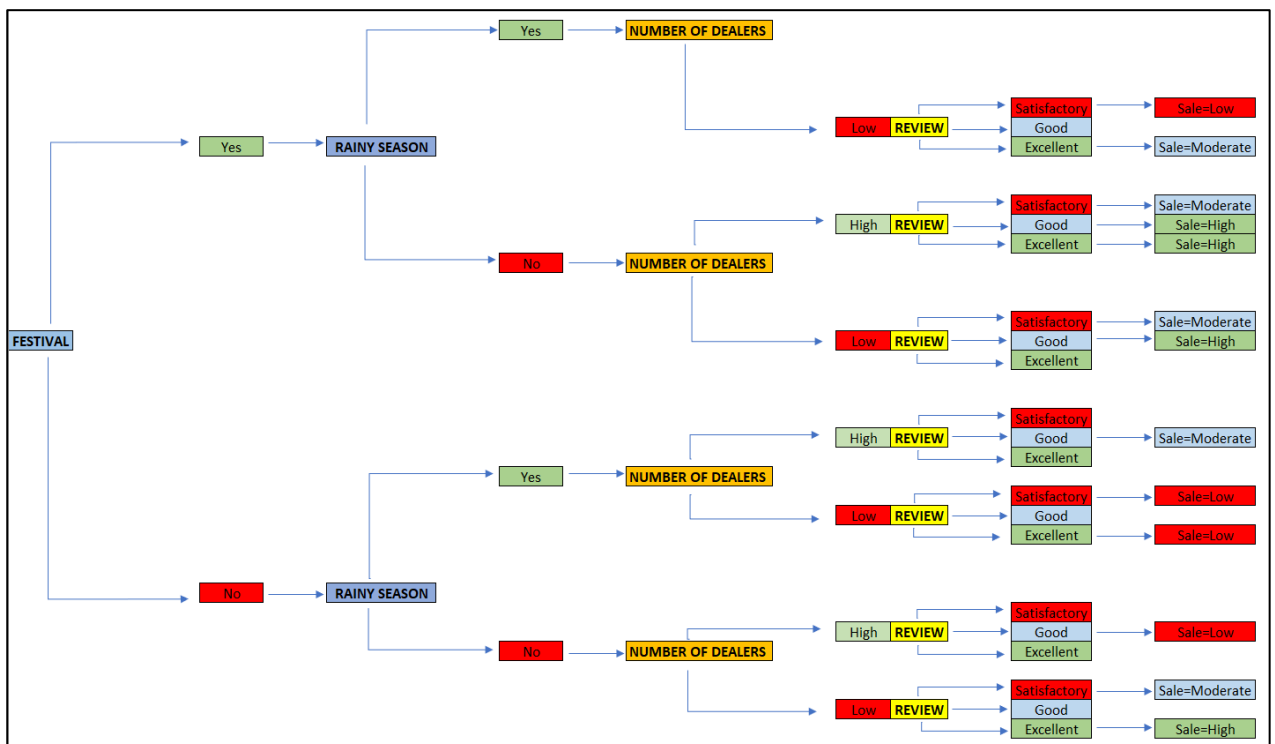
A. 1. The 4W Template is as below:

Our	STAKEHOLDERS Students	WHO
are facing a problem that	PROBLEM STATEMENT They find it difficult to revise several topics in the huge course since it takes a lot of time and effort to browse through the books .	WHAT

Occurs when/ while	<b>CONTEXT</b> During exam, it is limited time to revise course quickly and easily.	<b>WHERE</b>
The ideal solution would be	<b>SOLUTION AND ITS BENEFITS</b> Deploy a smart system which helps student revise the concepts without having to search the topics and chapters themselves. It is a mobile app to which students can ask questions regarding topics. It will learn from the questions asked to relate the topics and display the links to other related topics also with the previously asked questions.	<b>WHY</b>

2. Major data features are text (since all content is text-based), number (for topic numbers) and speech.

B. Decision tree:



**Case study-based questions.**

A. 1. Data exploration.

2. Modelling

3. Problem scoping and Evaluation respectively.

4. False

5. Problem scoping and data acquisition have not been discussed here.

B. 1. Due to rising number of cataract patients in hundreds, hospital is not able to deal with all the cases timely.

2. The cases will be closed quickly and efficiently. The process will also be enhanced in its effectiveness.

3. Web scraping

4. 2 lakh records in hospital database.
5. 80,000 records.
6. Due to missing value, there will be errors in diagnosis report and expert system will suggest incorrect medication which may lead to severe consequences such as loss of vision for the patients.

## UNIT 3 – NEURAL NETWORKS

### CHAPTER 1: COMMON AI MODELS

**A. Choose the correct answer.**

1. a    2. d    3. a    4. d    5. a    6. c    7. d    8. c    9. a    10. b

**B. Fill in the blanks.**

1. Positive    2. Continuous    3. Discrete    4. Counted, Measured    5. Numerical  
 6. Machine    7. Node    8. Input, Output    9. Unsupervised    10. Supervised

**C. State whether True or False**

1. True    2. True    3. True    4. False    5. False  
 6. False    7. False    8. False    9. True    10. True

**D. Match Column A with Column B.**

1. e    2. a    3. c    4. b    5. D

**E. Very short answer type questions.**

**1. What is regression?**

Regression is the rule-based model used to find hidden information in the continuous values.

**2. Give 2 basic differences between classification and clustering.**

Classification is used to categorise the observations (values) into various classes depending on some criteria while clustering categorises the observations on the basis of their similarities.

Classification is a supervised learning algorithm while clustering is used in unsupervised learning.

**3. Name 2 AI models based on supervised learning.**

Regression and classification.

**4. Name 2 AI models based on unsupervised learning.**

Clustering and artificial neural network.

**5. Define classification and give its 2 examples.**

In classification AI algorithm, the observations are categorised on the basis of some criteria or rule. For example, in a dataset, analysis of some features may tell the algorithm to put the observation into Category1 otherwise into Category2. For example, should the loan be sanctioned to the applicant or is the given image of Item-A or Item-B.

**6. Define clustering and give its 2 examples.**

Clustering is an unsupervised learning algorithm that is used to group the observation on the basis of some similar features. For example, grouping of search results and grouping of similar objects in an image.

**7. Name the parts of an artificial neural network.**

Artificial neural network is composed of neural nodes arranged in input layer, hidden layers and output layer.

**8. In which layers of ANN, computations do not occur?**

In an ANN, computations do not occur in input and output layers.

**9. What is an activation function?**

In an ANN, any function that is executed by a node for computation due to a particular input value is called activation function.

**10. Give one difference and one similarity between perceptron and an ANN.**

A perceptron is an ANN with just one artificial neural node with no input and output layers while an ANN has input layer, inner layers and output layer. The working of perceptron and ANN are same.

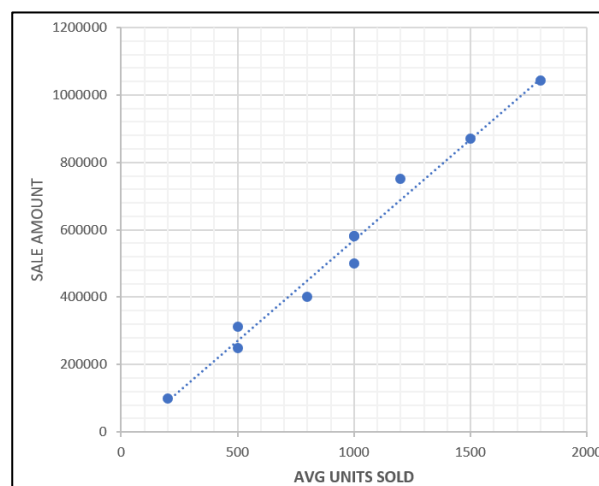
**F. Short answer type questions.**

**1. Giving a small example, explain the concept of regression.**

Regression helps estimate or predict future values. Such values are referred to as predicted variables. They are also called dependent or response variables. Prediction is always dependent on certain other variables which are called predictor variables. They are also called independent variables.

For example, consider this data-set showing the average number of chairs sold per month over a period of 10 months and their total sale amount.

UNITS PRICE OF CHAIR	AVERAGE # UNITS SOLD	SALE AMOUNT
500	500	250000
500	1000	500000
500	800	400000
500	200	100000
580	1000	580000
580	1500	870000
580	1800	1044000
580	1000	580000
625	500	312500
625	1200	750000



If next sale amount is to be predicted then “sale amount” will be predicted variable Y and the variable whose values are affecting Y is average units sold so “average units sold” will be predictor variable X. Notice the scatter plot made on X and Y. The regression is shown through the dotted line. In the correlation, for every increase in X, Y is also increasing so it is a positive correlation. The plotted points lie very near to the dotted line so it is a strong positive correlation.

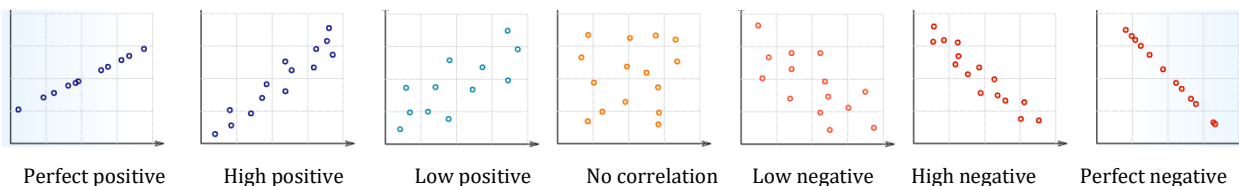
## 2. What do you mean by dependent and independent variables? Give an example.

Regression helps estimate or predict future values. Such values are referred to as predicted variables. They are also called dependent or response variables. Prediction is always dependent on certain other variables which are called predictor variables. They are also called independent variables.

In school assessment example, if we have to predict Expected Marks then Expected Marks is predicted variable and Marks Secured is predictor variable. Variable Maximum Marks is going to be constant for all students.

- Predicted variable is statistically denoted by Y.
- Predictor variables are statistically denoted by  $X_n$  ( $X_1, X_2, X_3, \dots$ ).
- The change in X may cause some change in the value of Y. This is called correlation. If Y increases or decreases as X goes up and down then it is called positive correlation. If inverse happens (Y decreases when X increases and vice versa) then it is called negative correlation. Correlation is not said to be existing when Y remains unchanged with any change in X.

### 2. Draw diagrams of 6 types of linear correlations.



## 4. Why regression and classification models are called supervised learning models?

They both are called supervised learning models because they are provided with the details of the data values such as their labels and also what are they supposed to do with the data values. The requirement is also provided by the developer.

## 5. What is the significance of classification? Explain with an example.

Classification is the AI model which works on rule-based learning. When data-values need to be grouped on the basis of certain criteria (rules) then classification is done. Classification is useful in predicting cancer, identifying images, identifying objects in images, predicting classes such as female customers who like a particular cosmetic brand or male customers who like a particular brand of watch.

## 6. Giving a real-life example, explain the use of clustering model.

Clustering is an unsupervised learning technique to group the data values on the basis of common properties. It is used in machine-based approach of modelling. In this approach, the data values are analysed and then depending on the common properties, they are categorised into various groups. The basic criteria for grouping is the common properties found. For example, restaurants located in same area, customer buying same kind of products etc.

## 7. Briefly, discuss the difference between classification and clustering.

CLASSIFICATION	CLUSTERING
Used in supervised learning (rule-based approach)	Used in unsupervised learning (learning-based approach).
In training data, data-values are identified with predefined labels or properties.	No training data provided to machine. Data values do not have any labelling or properties.



	properties. Machine has to identify properties itself.
Used to group the instances on the basis of differences. E.g. High performing and low performing students.	Used to group the instances on the basis of similarity. E.g. All students who got distinction in all subjects.
The basis of classification is known beforehand.	The basis of identification not known since similarity among instances are identified.

### 8. Giving the analogy of a biological neuron, explain the working of an ANN.

The concept of artificial neural network is analogous with human brain which contains millions of neurons. An Artificial Neural Network has a layered arrangement of nodes. A node is an artificial neuron. In deep learning model, an ANN is in the form of layers of hundreds or thousands of nodes (neurons). The bottom or front layer is called the input layer, top most or back is output layer and in between these two, are multiple layers called *hidden* layers. Each hidden node is capable of performing some sort of computation called *function* on the input it receives. Input layers take the data and weightage to pass it on to the first hidden layer and output layer presents the output of the processing received from the last hidden layer.

### 9. Which model does deep learning algorithm use? Why?

In deep learning model, an ANN is in the form of layers of hundreds or thousands of nodes (neurons). The bottom layer (in certain illustrations it is kept on left) is called the input layer, top most (right most in certain illustrations) is output layer and in between these two, are multiple layers called hidden layers. So, a deep learning ANN can be visualised as a stack of layered nodes. Since, in deep learning, multiple layers are involved hence it has got the name “deep learning”.

**10. The two input values for an ANN are 20 and 12. Their weights are 0.5 and 0.3 respectively. If bias is 0.2 then calculate the output. Using this example, explain the working of ANN.**

$$\begin{aligned} \text{Output} &= (\text{value1} * \text{weight1} + \text{value2} * \text{weight2}) + \text{bias} \\ &= (20 * 0.5 + 12 * 0.3) + 0.2 \\ &= 13.8 \end{aligned}$$

## UNIT 4 – INTRODUCTION TO PYTHON

### CHAPTER 1: PYTHON BASICS

#### A. Choose the correct answer.

1. a    2. c    3. c    4. a    5. b    6. c    7. b    8. b    9. a    10. a

#### B. Fill in the blanks.

1. \*\*    2. Last    3. First    4. Interpreter    5. Compiler

#### C. State whether True or False

1. False    2. False    3. True    4. True    5. False

**D. Answer the following questions in short.**

**1. What is the basic difference between compiler and interpreter?**

Python is both compiler and interpreter-based language. Compiler checks the source code (written by programmer) and reports any errors in it. Once all the errors are fixed then it compiles the script into an executable code called bytecode that is run by the python interpreter. Interpreter checks the code one line at time and executes that line instantly. If, still, any runtime error is encountered in any line, the program halts and error is reported to the developer. Python program is executed by the interpreter line-by-line.

**2. What is the difference between 100 and "100"? Explain.**

Any value enclosed in quotes in Python is treated as a string. So, 100 is an integer type value on which arithmetic operations can be performed while "100" is a string on which arithmetic cannot be done.

**3. Explain the importance of comments with a small example.**

Comments are a way to document the script or put explanatory remarks to your script. Any line in Python code that begins with # sign is treated as a comment by the Python interpreter and it is not executed. For example:

```
#Following script displays greeting to the user
```

```
''' This program is accepting
```

```
Salary of 10 employees and preparing their
```

```
Salary sheet.'''
```

Here, first line is a single line comment (preceded by # sign) and second line is multi-line comment enclosed in ''' and ''.

**4. What is a variable? What should we consider while naming a variable?**

A variable is a named identifier of program data. It stores one value at time. When a new value is stored in a variable the earlier value gets overwritten. As a program runs, the values in a variable might change hence the term variable. A variable is given a unique name to identify it.

Variable names should begin with letters A-Z or a-z or an underscore. The names can contain numbers, more letters, underscores. Special characters like @, #, % etc., punctuation characters, arithmetic operators etc. are not allowed.

**5. How integers are different from floats?**

Integers are numbers without decimal places while floats are numbers with decimal places. This is the reason that floats represent precise values while numbers may contain approximate values.

**6. What is the similarity between Booleans and integers?**

Booleans represent either of the two values namely true or false. True is denoted by 1 while false by 0. This way, Booleans are similar to integers.

**7. Explain the use of \*\* and // operators with small example.**

\*\* is used to calculate the power-of. E.g. 5 \*\* 2 will return 25. // operator performs division but discards the decimal places in the result. E.g. 16//5 will return 3 not 3.2.

## 8. What do you mean by implicit data conversion?

During an arithmetic operation, if required, Python automatically does data conversion known as implicit data type conversion. For example:  $a = 2 * 3.5$ . This will result into a float type of value (7.0 not 7) since data conversion is automatically done by Python.

### E. Answer the following questions.

#### 1. Describe any 5 main features of Python.

Five main features of Python are:

- i. The language syntax is closer to simple English and **easy to follow**. That is why Python can be taken up to begin learning programming.
- ii. Python is an **opensource, free programming language**. Its code can be accessed, modified and distributed freely under flexible open source licences.
- iii. Python is **portable**. It means that programs developed in Python run on all popular and advanced platforms such as Windows, Linux, MacOS etc. It also runs on smart handheld devices as well as sophisticated web servers.
- iv. Python is **high level programming language**. Here, level refers to its proximity with the hardware. While developing Python programs you do not need to bother with hardware technicalities such as memory management and different devices. You just code what you need and run it.
- v. Python has a **rich and diverse set of modules available** as Python library. This library provides coding features to develop variety of programs quickly and easily. For example, scientific calculations, GUI development, software development, operating system utilities, networking etc.

#### 2. What is Python IDLE? What is the difference between interactive and script mode?

IDLE is Python's Integrated Development and Learning Environment. It allows interactive as well as script modes to work with Python interpreter. It provides an editor to write and edit your scripts (programs) and to save them. Python shell is built into IDLE which interprets the commands and scripts submitted to it.

In interactive mode, user keys in one command at a time and in response to that command, Python shell executes the command and displays the output. Any errors are also displayed to the user. Python shell functions as command interpreter. It takes one command at a time and executes it. The commands are issued at Python command prompt denoted by `>>>`.

In script mode, the python commands are saved in a logical order to get the desired output. This logical set of instructions is called script (program). Once the script is saved, it can be executed anytime.

#### 3. Explain how will you create, save and run a script in Python IDLE.

The script editor can be opened using Python shell window. Click File > New File (or press Ctrl+N). A separate window of script editor will open. Type the desired Python program.

To save the script, you need to use the File menu of the script editor now (not that of shell). Click File > Save (or press Ctrl+S). In the Save As dialog box, enter the usual details (file location and name) and save the script. Script will be saved as .py file.

To run the script, click Run > Run Module (or press F5).

#### 4. Describe integer, float and string data types in Python.

##### Numbers or Integers

Numbers are not enclosed in any quotes. So, 123 is one hundred twenty three. 17 is seventeen.

There are certain variants of number type like int, long and complex.

**Int:** These are plain positive or negative whole numbers like your age, your height, distance between your house and your school etc.

For example:

age = 12

height = 10

marks = 83

Integers occupy 4 bytes in the memory to represent the value. So, all the variables above are of 4 bytes size.

**Long:** Numbers with huge values like distance between the earth and the sun, long scientific numbers are treated as long. Long integers occupy as much space in memory as the system on which the script runs allows. To denote that a number should be treated as long, the values should be suffixed with letter L.

For example: distance\_from\_sun = 149L

Here, the variable distance\_from\_sun will be allocated more than 4 bytes by the system.

**Complex:** The fields of engineering, advanced science and advanced mathematics deal with complex numbers. They are used in the scientific description of the phenomena and world around us. Complex numbers have no relevance at this level here so we shall leave complex numbers out.

**Boolean:** A Boolean value is either true or false. Booleans are treated as integers by the computer. False is denoted by 0 and True as 1.

### Floats

Numbers with decimal places are called floats or floating point numbers.

They are also called real numbers since they can store the precise numeric values. Floats store values up to 15 decimal places which is quite sufficient for majority of fields of computer programming.

The distance between the sun and earth is 149.6 million kilometers but in previous example of integers, we could only store 149 which is approx. value. A floating point type variable can store precise value: distance\_from\_sun = 149.6

Numbers with scientific notations like exponents indicating power of 10 are also represented by floating point numbers:  $x = 7.8e3$ . This translates to  $7.5 \times 10^3$

### Text or strings

In computer programming terminology, text is called string. Strings are always enclosed in double quotes. When computer or Python interpreter encounters any value that is in double quotes, it treats it as string. For example:

"I am a Python fan"

"My country India"

"123"

## 5. Describe any 5 arithmetic operators with distinct examples.

Operator	Type	Explanation	Example
+	Binary	Addition operator	$a = 5 + 2$
-	Binary	Subtracts the two number	$a = 5 - 2$
*	Binary	Multiplication	$a = 5 * 2$
/	Binary	Division	$a = 5 / 2$ (will return float 3.5) $b = 4 / 2$ (will return integer 2)
//	Binary	Division and discards decimal places in result	$a = 5 // 2$ (will return integer 2) $b = 23 // 5$ (will return integer 4)
%	Binary	Modulus (pronounced: modulo returns remainder of the division)	$a = 3 \% 2$ (will return 1) $b = 4 \% 2$ (will return 0)
**	Binary	Exponentiation (to the power of)	$a = 5 ** 2$ (will return 25)

## 6. Explain how + operators plays dual role.

We know that + operator is an arithmetic operator to perform addition. But, with strings, it works as *concatenation* operator. In simple terms, it joins the strings.

For example, consider the script given here. What should be its output if user enters first number as 23 and second as 12?

```
a = input("Enter a number:")
b = input("Enter another number:")
print(a + b)
```

Here, 23 entered by the user will be returned by input() into the variable *a*. Value 12 will be stored in variable *b*. Notice the output. Instead of performing addition, + operator has combined the two numbers to make them 2312. The reason is, input() returns every value as a string and + operator has *concatenated* (joined) the two.

## CHAPTER 2: PYTHON DECISION MAKING AND LOOPS

This chapter has only LAB activity to be done in lab.

## CHAPTER 3: PYTHON DATA STRUCTURES: LISTS

### A. Choose the correct answer.

1. c    2. b    3. b    4. c    5. d    6. a

### B. Answer the following questions in short.

#### 1. What do you mean by data structure?

A data structure stores multiple values in memory in an organized fashion and all the values are identified by a single name given to the data structure. A particular value in a data structure is referred to as *item* and it is located by the help of its position which is called *index*.

#### 2. How is a dictionary different from a list?

Dictionary is an unordered collection of data while list is an ordered collection. In a dictionary, each data element has two parts – *key* and *value*. If the key is known then its value can be accessed. In lists, values or items are accessed by zero-based index or slicing (range of indices). Dictionary is useful to simulate a small database table while list is useful in simulating stacks and queues.

In a list, the items are located from index 0 onwards. When we access a particular item in the list by its index then it is called accessing the list by indexing. Indexing allows accessing one particular item in the list at a time. E.g. `mylist[3]` will return fourth item in the list.

#### 3. What is slicing? How is it different from indexing?

In a list, the items are accessed on the basis of zero-based index. Indexing allows accessing one particular item in the list at a time. E.g. `mylist[3]` will return fourth item in the list.

Slicing means accessing a range of consecutive indices in a list. E.g. `mylist[2:5]` will return items on indices 2, 3 and 4. The **range operator** : (colon) is used for this purpose. : is preceded by the *index* of starting item and followed by the *count of items* from the first element.

For example, in a list

```
[23, 'apple', 53.4, 'India', 5, 54.16, 'Singapore', 'zebra']
print(mylist[2:6])
```

This means, index 2 (third item) till 6<sup>th</sup> item counting from first element.

```
[53.4, 'India', 5, 54.16]
```

If second limit after : is omitted then all the items till last are accessed.

For negative ranges, that is accessing list from reverse direction, remember that elements are counted from -1 backwards (i.e. -2, -3 and so on).

```
[23, 'apple', 53.4, 'India', 5, 54.16, 'Singapore', 'zebra']
print(mylist[-5:-2])
```

This means counting from last element backwards fifth item (i.e. India) to second last item (54.16)

```
['India', 5, 54.16]
```

#### 4. What is the significance of range operator :?

The range operator : (colon) is used for slicing. : is preceded by the *index* of starting item and followed by the *count of items* from the first element. For example, `mylist[0:3]` will return items on indices 0, 1 and 2. `mylist[3:4]` will return item on index 3 that is fourth item.

## 5. How can a list be accessed in reverse order?

To access a list on reverse, -1 backwards is used to access elements. -1 denotes last element, -2 second last and so forth. If a list mylist is as given below:

```
[23, 'apple', 53.4, 'India', 5, 54.16, 'Singapore', 'zebra']
```

then, `print(mylist[-2])` will return Singapore.

## 6. What is a nested list?

A list within another list is called nested list. The items in a nested list are accessed through two dimensions. One dimension is the index of the nested list in the container list and second dimension is the index of the desired item within the nested list. E.g. in the list below:

```
bookshelf = [[book1, book2, book3], [book4, book5, book6, book7], [book8, book9]]
```

to access book6 we need to consider first dimension as the index of the nested list i.e. 1 and index of item book6 in the nested list i.e. 2, so we shall refer to it as `bookshelf[1][2]`.

### C. Answer the following questions.

#### 1. How are data structures significant in the field of artificial intelligence?

Python provides means to store a set of multiple values as a single unit. These units are called data structures. In the field of artificial intelligence, data structures play a significant role since they are used to represent data-sets programmatically. For example, marks of students, salaries of employees, population data of a region etc. can be easily loaded in computer's memory by the help of data structures. Data structures provide a variety of methods to manage and manipulate the data such as reversing, sorting, inserting, removing and accessing data values stored in them. Data structures can be adjusted easily in size as the values are added to or removed from them. That makes the handling of data-set in a data structure easier and efficient.

#### 2. Discuss different ways to create a new list and populate it with initial values.

An empty list can be created as `items = []`.

Empty list can also be created by `list()` as `items = list()`.

`list()` can take a string to fill its letters in the list as `vowels = list("AEIOU")`

A list can be created with same or different types of values as

```
vals = [2, 'earth', 'moon', 5.72, 'sun']
```

Lists can be initialised with same values in all elements using replication operator `*` such as `scores = [0] * 11`. This will create a list of 11 elements, all having value 0.

#### 3. Discuss indexing and slicing with a few distinct examples.

In a list, the items are accessed on the basis of zero-based index. Indexing allows accessing one particular item in the list at a time. E.g. `mylist[3]` will return fourth item in the list.

Slicing means accessing a range of consecutive indices in a list. E.g. `mylist[2:5]` will return items on indices 2, 3 and 4. The **range operator** : (colon) is used for this purpose. : is preceded by the *index* of starting item and followed by the *count of items* from the first element.

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```
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```

If second limit after : is omitted then all the items till last are accessed.

For negative ranges, that is accessing list from reverse direction, remember that elements are counted from -1 backwards (i.e. -2, -3 and so on).

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[23, 'apple', 53.4, 'India', 5, 54.16, 'Singapore', 'zebra']
print(mylist[-5:-2])
```

This means counting from last element backwards fifth item (i.e. India) to second last item (54.16)

```
['India', 5, 54.16]
```

#### 4. How is extend() different from append(). Give example.

append() adds the item in the end of the list either one item at a time or a whole list. But if a list is appended to an existing list then the new list is appended as a nested list. For example, a list is created as book = ['index', 'chapters'].

If we need to append multiple items to book as :

```
book.append(['exercises','bibliography', 'supplement'])
```

then list will look like this:

```
['index', 'chapters', ['exercises', 'bibliography', 'supplement']]
```

But we needed to append the 3 items separately. To do this, we need to use extend() as:

```
book.extend(['exercises','bibliography', 'supplement'])
```

This way, list will have the items appended separately as shown here:

```
['index', 'chapters', 'exercises', 'bibliography', 'supplement']
```

#### 5. The height and weight of 5 students needs to be stored in a list. How do you propose a nested list structure for this? Suggest a way so that if user enters the index number starting from 1, the height and weight of that student are displayed.

The code is given here:

```
#height in inches, weight in kg
```

```
#assuming students are in sequence of their roll numbers
```

```
Student = [ ["Ravi",60,60],["Anuj",56,60],["Mamta",58,45],["Anup",61,58],["Jaya",59,72]]
```

```
rollno = input("Enter roll number:")
```

```
rollno = int(rollno)
```

```
rollno = rollno - 1
```

```
print(student[rollno][0])
```

```
print("Height: ",student[rollno][1], " inches")
```

```
print("Weight: ",student[rollno][2], " Kgs")
```