

**MID TERM EXAMINATION [NOVEMBER-2022]**

**THIRD SEMESTER [B.TECH]**

**CRITICAL REASONING AND SYSTEMS THINKING [AIDS/AIML-213]**

Time: 1.30 Hrs.

Note: Attempt Q.No.1 which is compulsory and any two more questions from remaining.

M.M: 30

**Q.1. Differentiate between the following:**

**Q.1. (a) Critical and uncritical reasoning.**

(2)

**Ans.** Critical reasoning is a process of analysing information and making decisions based on facts. While Uncritical reasoning is a process where people make decisions based on intuition or opinion.

Critical reasoning	Uncritical reasoning
1. Seek complete information to arrive at a decision	1. Make decisions based on partial or wrong information
2. Have a clear focus	2. Drift and easily get distracted
3. Base judgment on evidence and facts	3. Base judgment on preferences or self-interests
4. Control feelings and emotions	4. Get emotional
5. Make decisions with the head	5. Make decisions with the heart
6. Open-minded	6. Close-minded
7. Interested in hearing alternative views and opinions	7. Unwilling to entertain views and opinions of others
8. Realistic about their ability	8. Overestimate their ability
9. Validate Assumptions	9. Make assumptions which may not necessarily be true
10. Persevere	10. Easily give up

**Q.1. (b) Inductive and Deductive arguments.**

**Ans.** Deductive and inductive arguments are two types of arguments which are related to logical and analytical thinking.

Deductive Arguments	Inductive Arguments
<p>1. Deductive thinking is reasoning from abstract, general principles to a specific hypothesis that follows from these principles.</p> <p>For instance:</p> <p>Sylvia owns only white shirts and blue shirts.</p> <p>Sylvia is wearing a shirt today.</p> <p>So Sylvia is wearing either a white shirt or a blue shirt today.</p> <p>This is an example of a deductive argument.</p>	<p>1. Inductive thinking involves a complementary process of observing a number of specific events or instances and interfering with an abstract, general principle to explain those instances.</p> <p>For instance:</p> <p>The first cat is white.</p> <p>The second cat is white.</p> <p>The third cat is white.</p> <p>The fourth cat is white.</p> <p>So, all cats are white.</p> <p>This is an example of an inductive statement.</p>

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|--|---|
| 2. In a deductive argument, the inference or the conclusion is certain.                  | 2. In inductive argument, the inference or the conclusion is dependent on the evidence.   |
| 3. The deductive arguments are logical.  | 3. The inductive statements are based more on observation.                                |
| 4. In a deductive argument, if the evidence is false, it will lead to a false inference. | 4. In inductive argument the inference may be true even if some of the evidence is false. |

#### Q.1. (c) Valid and Invalid arguments.

**Ans.** An argument form is valid if whenever true statements are substituted in for the statement variables the conclusions is always true. To say an argument is invalid means that it is not valid. The main point regarding a valid argument is that it follows from the logical form itself and has nothing to do with the content. (2)

Valid Argument	Invalid Argument
1. A valid argument is one in which the conclusion logically follows from the premises.	1. An invalid argument is one in which the conclusion does not necessarily follow from the premises.
2. In a valid argument, if the premises are true, the conclusion must also be true.	2. In an invalid argument, even if the premises are true, the conclusion can still be false.
3. The validity of an argument depends on its logical form or structure rather than the actual truth of the premises or conclusion.	3. Invalidity is determined by finding counterexamples or situations where the premises are true, but the conclusion is false.
4. A valid argument can have both true or false premises and a true or false conclusion.	4. An argument can be invalid even if the conclusion happens to be true.
5. Validity is concerned with the relationship between the premises and the conclusion, ensuring that the conclusion logically derives from the premises.	5. Invalidity suggests a flaw in the logical structure of the argument.

#### Q.1. (d) Explanations and clarifications.

**Ans.** Explanation and clarification are both terms used to explain something, but they have different connotations and implications. (2)

Explanation	Clarification
1. Explanation is the act of analysing and interpreting a text or piece of literature in order to uncover its deeper meaning. It involves a close reading of the text and a thorough examination of its various elements, such as its themes, symbols, and language. The goal of explanation is to reveal the underlying significance of the text and to help readers gain a deeper understanding of its message.	1 Clarification, on the other hand, is the act of making something clearer or easier to understand. It involves providing additional information or context in order to help readers grasp a concept or idea. Clarification can be used in a variety of contexts, from explaining a complex scientific theory to providing instructions for a new product.

Q. An explanation can be a useful tool for literary analysis, as it allows readers to explore the intricacies of a text and to uncover the author's intended meaning. By breaking down the text into its various components and examining each one in detail, an explanation can reveal the layers of meaning that lie beneath the surface of the text.

2. The goal of clarification is to remove any confusion or ambiguity that may exist and to ensure that readers have a clear understanding of the topic at hand. This can be accomplished through the use of examples, analogies, or other forms of explanation that help to simplify complex ideas and make them more accessible to a wider audience.

**Q.1. (e) Scientific reasoning ans analytical reasoning. (2)**

**Ans.** **Scientific reasoning**, as the name implies, doesn't test your knowledge, but rather tests your ability to reason, as well as your ability to analyse and understand data. In other words, scientific reasoning has been defined as a problem-solving process that involves critical thinking in relation to content, procedural, and epistemic knowledge.

**Analytical reasoning**, refers to the ability to look at information, be it qualitative or quantitative in nature, and discern patterns within the information. Analytical reasoning involves deductive reasoning with no specialised knowledge, such as: comprehending the basic structure of a set of relationships; recognizing logically equivalent statements; and inferring what could be true or must be true from given facts and rules. Analytical reasoning is axiomatic in that its truth is self-evident.

**Q.2. (a) Explain different types of bias in reasoning. (5)**

**Ans.** There are hundreds of different types of bias that have been identified. These different categories of bias have multiple bias examples within them. Let's take a look at the main different types of bias.

**Cognitive bias:** This is the most common type of bias. Research suggests that there are more than 175 different types of cognitive bias. It refers to deviation from standards of judgement whereby you may create inferences, assessments or perceptions that are unreasonable. You may also recollect past experiences incorrectly. These perceptions may dictate a person's behaviour or attitude, either in a positive or negative way.

**Prejudices:** A prejudice is a pre-judgement or prior opinion that a person makes before they are given the relevant facts and information. When a prejudice takes place, this pre-judgement is usually negative or unfavourable. Prejudices are usually based on factors such as race, religion, gender, sexual orientation, age, disability, social class or language.

**Contextual bias:** This refers to when experts who have good intentions are vulnerable to making incorrect decisions, based on external influences or influences that are irrelevant or unrelated to the situation. This can result in a loss of objectivity and can cause the experts to develop subconscious expectations. Contextual biases can be found in academia, research, forensic analysis, publications and court situations. Contextual bias can also occur in the media. It can influence how stories are selected and reported.

**Unconscious or implicit bias:** This is related to implicit stereotypes and is when you unconsciously attribute certain qualities to certain social groups. This can then influence your perceptions, attitudes and behaviour towards this social group. There are many different types of unconscious bias.

**Statistical bias:** This is related to the process of data collection. Statistical bias can affect the way a research sample is selected or the way that data is collected. It can result in misleading results that differ from the accurate representation. Statistical bias

examples include forecast bias, the observer-expectancy effect, selection bias, reporting bias and social desirability bias.

**Q.2. (b) What is critical reasoning. Explain the principles and concepts of critical reasoning.**

**Ans.** Critical reasoning is all about identifying, analysing and solving problem systematically. Critical reasoning involves the ability to actively and skillfully conceptualize, analyse, question and evaluate ideas and beliefs. (5)

### PRINCIPLES OF CRITICAL REASONING

#### The 7 Basic Principles of Critical Reasoning

##### 1. Understand the structure of an argument.

First, you must know how arguments are structures, so that you can know how to break them down into their core components. When we use the word argument, we don't mean a conversation where 2 people are shouting at each other. An argument in Critical Reasoning means any piece of text where an author puts forth a set of ideas and/or a point of view, and attempts to support it.

Every argument is made up of two basic parts:

- The conclusion (the point that the author is trying to make)
- The evidence (the support that the author offers for the conclusion)

There is no general rule about where conclusion and evidence appear in the argument—the conclusion could be the first sentence, followed by the evidence, or it could be the last sentence, with the evidence preceding it.

##### 2. Preview the question.

Before you read the stimulus, look over the question. This will give you some idea about what you need to look for as you read. It gives you a jump on the question.

##### 3. Paraphrase the author's point.

After you read the stimulus, paraphrase the author's main argument to yourself. That is, restate the author's ideas in your own words. Frequently, the authors in Critical Reasoning say pretty simple things in complex ways. So if you mentally translate the verbiage into a simpler form, the whole thing should be more manageable.

##### 4. Judge the argument's persuasiveness.

You must read actively, not passively. Active readers are always thinking critically, forming reactions as they go along. They question whether the author's argument seems valid or dubious. Especially when you are asked to find flaws in the author's reasoning, it's imperative to read with a critical eye.

##### 5. Answer the question being asked.

One of the most disheartening experiences in Critical Reasoning is to understand the author's argument full but then supply an answer to a question that wasn't asked. If you're asked for an inference supported by the argument, selecting the choice that paraphrases the author's conclusion will earn you no points. Neither will select a choice that looks vaguely like a summary of the author's evidence if you're asked for an assumption.

The classic example of this error occurs on "Strengthen/Weaken" questions. When you're asked to strengthen or weaken an argument, you can be sure that there will be one, tow, even three answer choices that do the opposite of what's asked. Choosing such a wrong choice is less a matter of failing to understand the argument than of failing to remember the task at hand.

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**6. Try to "pre-phrase" an answer.**

This principle, which is really an extension of the last one, is crucial. You must try to approach the answer choices with at least a faint idea of what the answer should look like. That is, "prephrase" the answer in your own mind before looking at the choices. This isn't to say you should ponder the question for minutes—it's still a multiple-choice test, so the right answer is on the screen. Just get in the habit of framing an answer in your head.

Once you have pre phrased, scan the choices. Sure, the correct choice on the exam will be worded differently and will be more fleshed out than your vague idea. But if it matches your thought, you'll know it in a second. And you'll find that there's no more satisfying feeling in Critical Reasoning than prephrasing correctly, and then finding the correct answer quickly and confidently.

**7. Keep the scope of the argument in mind.**

When you're at the point of selecting one of the answer choices, focus on the scope of the argument. Most of the wrong choices on the section are wrong because they are "outside the scope." In other words, the wrong answer choices contain elements that don't match the author's ideas or that go beyond the context of the stimulus.

Some answer choices are too narrow, too broad, or have nothing to do with the author's points. Others are too extreme to match the argument's scope—they're usually signaled by such words as all, always, never, none, and so on. For arguments that are moderate in tone, correct answers are more qualified and contain such words as usually, sometimes, probably.

**CONCEPTS IN CRITICAL REASONING****(a) ANALYSING**

The argument is a set of statements of which it is claimed that one of those statements the premises supports the conclusion. To begin that analyze an argument the students need to do is identify its premises and conclusion.

**(b) EVALUATING REASONING**

Evaluative reasoning is a building block in evaluation. It is used throughout the evaluation to synthesize information necessary to draw evaluative conclusions. This is done in two ways, by combining:

(i) Evidence about performance on a particular dimension and interpreting it relative to definitions of 'how good is good' to generate a rating of performance on that dimension

(ii) Ratings of performance on several dimensions to come to an overall conclusion about how good performance is for a particular site, project, programme, policy or other 'evaluand' (a generic term for that which is being evaluated).

**(c) INTEGRATED REASONING**

Integrated Reasoning (IR) is a relatively new section (launched in 2012) designed to test the ability of a candidate to analyse the data presented in various formats and solve related problems.

The questions belong to 4 different types:

1. Graphical interpretation
2. Analysis
3. table analysis
4. multi-source reasoning

**Q.3. (a) What is argument. Explain the structure of argument by giving appropriate example.**

**Ans.** An argument in Critical Reasoning means any piece of text where an author puts forth a set ideas and/or a point of view, and attempts to support it. (5)

Every argument is made up of two basic parts:

- The conclusion (the point that the author is trying to make)
- The evidence (the support that the author offers for the conclusion)

There is no general rule about where conclusion and evidence appear in the argument-the conclusion could be the first sentence, followed by the evidence, or it could be the last sentence, with the evidence preceding it.

**EXAMPLE:** Consider the stimulus (in other words, a passage):

The Brookdale Public Library will require extensive physical rehabilitation to meet the new building codes passed by the town council. For one thing, the electrical system is inadequate, causing the lights to flicker sporadically. Furthermore, there are too few emergency exits, and even those are poorly marked and sometimes locker.

Suppose that the author of this argument was allowed only one sentence to convey her meaning. Do you think she would waste her time with the following statement? Would she walk away satisfied that her main point was communicated?

The electrical system [at the Brookdale Public Library] is inadequate, causing the lights to flicker sporadically.

Probably not. Given a single opportunity, she would have to state the first sentence to convey her real purpose:

The Brookdale Public Library will require extensive physical rehabilitation...

That is the conclusion. If you pressed the author to state her reasons for making that statement, she would then cite the electrical and structural problems with the building. That is the evidence for her conclusion.

But does that mean that an evidence statement like, "The electrical system is inadequate" can't be a conclusion? No, we're just saying it's not the conclusion for this particular argument. Every idea, every new statement, must be evaluated in the context of the stimulus in which it appears.

For the statement above to serve as the conclusion, the stimulus would be:

The electrical wiring at the Brookdale Public Library was installed over 40 years ago, and appears to be corroded in some places (evidence). An electrician, upon inspection of the system, found a few frayed wires as well as some blown fuses (evidence). Clearly, the electrical system at the Brookdale Public Library is inadequate (conclusion).

To succeed in Critical Reasoning, you have to be able to determine the precise function of every sentence in the stimulus. Use structural signals when attempting to isolate evidence and conclusion. Key words in the stimulus-such as because, for, since-usually indicate that evidence is about to follow, whereas therefore, hence, thus, and consequently usually signal a conclusion.

**Q.3. (b) The cellular service quality has dropped significantly in India ten years ago, there were no instances of call drop or no connectivity. There is also a decrease in the speed and reliability of service.**

All of the following would tend to strengthen the conclusion of the argument above except:

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- A. The volume of connections handled by the Mobile operators has increased dramatically over the last ten years.
- B. Unprecedented increases in the cost as well as scarce availability of spectrum for mobile services have put severe pressures on the Mobile companies.
- C. Mobile services have diversified from carrying mere voice data to a whole range of internet data such as downloading, video-calling, data sharing, etc.
- D. The opposition to negative externality of cellular radiation has obstructed increase of network services in response to the increasing subscriber base.

**Justify your answer.**

**Ans.** Option C

Understand the question carefully. The question is asking for an option that will weaken our conclusion. The conclusion in the given argument is 'The cellular service quality has dropped significantly in India'. Option A, B and D are strengthening the conclusion but option C is weakening the conclusion.

**Q.4.(a) Statement:** Should those who receive dowry, despite the law prohibiting it, be punished.

**Arguments:**

I. Yes, those who violate the law, must be punished.

II. No, dowry system is firmly rooted in the society since time immemorial.

**Justify whether the argument I or argument II is strong with explanation.**

**Ans.** Argument I is strong.

Clearly, laws are made to ensure that no person pursues the practice. So, persons who violate the laws need to be punished. Thus, argument I holds. A wrong practice, no matter how firmly rooted, need to be ended. So, argument II is vague.

**Q.4. (b) (i)** Failure is like the original sin in the biblical narrative: everyone has it. Regardless of class, caste, race, or gender, we are all born to fail, we practise failure for as long as we live, and pass it on to other. Just like sin, failure can be disgraceful, shameful and embarrassing to admit. And did I mention ugly? Failure is also ugly as sin, as they say. For all its universality, however, failure is under-studied, when not simply neglected. It's as if even the idea of looking at failure more closely makes us uneasy; we don't want to touch it for fear of contagion.

**A. Identify the correct summary of the paragraph**

(2)

**B. What were the key conclusions.**

**Ans.** Since the failure is inevitable and universal, therefore we should not be disheartened by it and learn to take it in our step towards success.

**Q.4.(b) (ii)** Reading is thinking, with someone else's head instead of one's own. But to think for oneself is to endeavour to develop a coherent whole, a system, even if it is not a strictly complete one. Nothing is more harmful than, by dint of continual reading, to strengthen the current of other people's thoughts. These thoughts, springing from different minds, belonging to different systems, bearing different colours, never flow together of themselves into a unity of thought, knowledge, insight, or conviction, but rather cram

the head with a Babylonian with them and is deprived of all clear insight and almost disorganised. This condition of things may often be discerned in many men of learning, and it makes them inferior in sound understanding, correct experience, conversation, and a little reading, have acquired a little knowledge from without, and made it always subordinate to and incorporated it with their own thoughts.

A. What assumptions, stated or hidden were made by writer?

B. Did you observe any biases? If, yes, elaborate.

C. Do you agree with the key conclusion(s) of the writer? Give reasons.

**Ans. (B):** Key conclusions are:

(i) Failure is inevitable and universal.

(ii) We have to take lesson from our failure for better life.

**Ans A.** When we continuously read other people's thoughts, springing from different minds, belonging to different systems, bearing different colours, they cram the head with Babylonian confusion of tongues, consequently, the mind becomes overcharged with them and is deprived of all clear insight and almost disorganised.

**Ans B.** Yes,

1. Illiterate men are wiser than well-read men.

2. Reading leads to subversion of thoughts.

**Ans C.** Yes, I agree that learning through experience, conversation and a little reading makes one more knowledgeable than learning through other people's thoughts.

## END TERM EXAMINATION [FEB-2023]

### THIRD SEMESTER

### CRITICAL REASONING AND SYSTEMS THINKING [AIML-213]

M.M: 75

Time: 3 Hrs.

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.

Q.1. Answer the following questions:- ( Any six)

Q.1. (a) List at least four different types of obstacles to Critical Thinking.

Describe each obstacle in at least two lines. (2.5)

Ans. The following are the barriers to critical thinking that prevent us from thinking critically.

1. **Egocentric behaviour:** It is the tendency of a person to relate everything to himself and leads to the inability to evaluate others' perspectives and feelings. He cannot tolerate anything beyond his philosophy. He wants others to think of an issue in the same way he thinks. As a result, he cannot broaden his thinking, and the Peoples surrounding him dishearten to think, critically.

2. **Group thinking:** It is another harmful thing or one of the barriers to Critical thinking. In this case, most of the group people don't give their views or ask any questions. They remain idle and support whatever other says without any argument. To overcome this obstacle, each group member should stand apart and question and argue ideas and opinions presented before him and give his thoughts, beliefs, and ideas.

3. **Drone mentality:** It can be described as a person's inability to pay attention to what's going on around him. These kinds of people cannot be attentive in a class meeting or discussion. It becomes a habit for them, and as a result, they cannot think so much. This habit grows when a person gets exhausted from working a long time and find work tedious. To overcome this barrier, Teachers, supervisors, or hosts should aware of their audience or officials, make things interesting to them, change topics and tasks.

4. **Social condition:** The society we live in has some values, thoughts, and assumptions prevailing. Therefore many of us think in a particular way. Their thinking is related to society's values, beliefs, and assumptions. Usually, it is challenging for them to think beyond this spectrum. Only social and cultural awareness can help to overcome this barrier. .

5. **Personal Biases:** Personal Biases hinder Critical thinking because they influence a person's justice, and it also prevents one from using experience, reasoning, and common sense to make correct decisions. To overcome this decision, everyone should practice honesty and integrity.

6. **Work pressure:** We often are swamped in the workplace. We don't have much time to accomplish the work assigned. It does affect our skill of critical thinking awfully. When the time is short, and the deadline is knocking the door, most of us walk in a way that does not involve any strategic thinking to complete the job. And here is when the barrier arises to think critically. To overcome this barrier, we should have a plan and schedule for each job, whether small or big. Also, we should not keep work piled for the future.

7. **Fear:** It hinders the overall growth and development of a person. As an effect, it is also a barrier to critical thinking. Fear makes a person unconfident and demotivated, and he is not willing to think beyond his circle. To remove fear from people's minds, managers, supervisors, or heads of the workplace can play an essential role by ensuring the right working environment.

**Q.1. (b) Explain what is an argument with the help of an example.** (2.5)

**Ans.** An argument is a group of statements some of which, the premises, are offered in support of another statement, the conclusion. You can think of the premises of an argument as reasons that are given in support of a view, which is expressed in the conclusion of the argument.

Let's see a very simple example of an argument:

Stan was driving his truck over the speed limit. He had no excuse for driving over the speed limit. Furthermore, he was intoxicated. Therefore, Stan was breaking the law.

We can easily isolate the conclusion:

Stan was breaking the law.

Notice that we do not include the word 'therefore' when we state the conclusion. The word 'therefore' is not part of the statement that forms the conclusion.

All other statements are premises. We have:

Stan was driving his truck over the speed limit.

Stan had no excuse for driving over the speed limit.

Stan was intoxicated.

The word 'therefore' is what we call a conclusion indicator. It is very common to use a conclusion indicator to stress the part of an argument that is being argued for.

**Q.1. (c) Write an example of a well-defined problem statement. Why do you believe that the example given is a well-defined problem statement.** (2.5)

**Ans.** Well defined problems are those that contain a clear specification of three elements of problem space: the initial state (the problem situation), the set of operators (rules and strategies) to solve the problem, and the goal state (the solution). For example, finding the shortest path between two points on a map is a well-defined problem, because you know where you start, where you want to go, and what roads or paths you can use.

**Q.1. (d) List any two different techniques for idea generation using Lateral Thinking. Explain each of them in 3-5 sentences.** (2.5)

**Ans. (i) The Reversal Method:** This technique involves turning a problem or situation on its head to see it from a new angle. It's about questioning why things are the way they are and considering what might happen if the opposite were true.

**(ii) Brainstorming:** This is a group creativity technique where participants come up with as many ideas as possible within a given time frame. The key is to encourage free thinking and suspend judgment.

**Q.1. (e) Explain the concept of Abilene Paradox.** (2.5)

**Ans.** In the Abilene paradox, a group of people collectively decide on a course of action that is counter to the preferences of many or all of the individuals in the group. It involves a common breakdown of group communication in which each member mistakenly believes that their own preferences are counter to the group's and, therefore, does not raise objections, or even states support for an outcome they do not want. A common phrase relating to the Abilene paradox is a desire to not "rock the boat". This differs from group think in that the Abilene paradox is characterized by an inability to manage agreement.

The Abilene paradox is similar to group think; however, group think individuals are not acting contrary to their conscious wishes and generally feel good about the group decisions.

**Q.1.(f)** "For a surprisingly large number of clinical trials, scientists cannot reproduce the original result when a study is repeated. This suggests that something may be seriously wrong with the system of peer review and publication around clinical trials. Identify the conclusion in the above argument." (2.5)

**Ans.** Scientists aim for their studies to be replicable-meaning that another researcher could perform a similar investigation and obtain the same basic results. When a study cannot be replicated, it suggests that our current understanding of the study system or our methods of testing are insufficient. (2.5)

**Q.1. (g)** A \_\_\_\_\_ is a closed chain of causal connections from a stock, through a set of decisions or rules or physical laws or actions that are dependent on the level of stock, and back again through a flow to change the stock. Fill in the blank & explain your answer. (2.5)

- (i) Interconnections
- (ii) Flows

- (iii) Feedback Loop
- (iv) Mental Model

**Ans.** Feedback loop is the part of a system in which some portion (or all) of the system's output is used as input for future operations.

**Q.1. (h)** "If a child gets a new toy, he or she will want to play with it; So, if a nation gets new weapons, it will want to use them." The above is an example of which fallacy. (2.5)

- (i) Faulty analogy

- (ii) Slippery slope

- (iii) Hasty Generalization

- (iv) Straw man

**Ans.** Faulty analogy fallacy consists in assuming that because two things are alike in one or more respects, they are necessarily alike in some other respect.

## UNIT- I

**Q.2. (a)** Analyse critically the following passage and answer the following questions: (7)

There is a Thai saying, "False happiness makes people become haughty and arrogant. Real happiness makes people joyful and fills them with wisdom and compassion." Is one happy just because one is wealthy? All too many people have allowed money to ruin their lives. We have to understand the importance of absolute happiness over relative happiness. Absolute happiness is not how one stands compared with others, nor is it a transitory, illusory happiness (relative happiness) that fades with the passing of time. Infact it is a state where we strive to attain a state of life where, no matter what circumstances we may encounter, we can feel that life itself is a joy. When we attain that state of life, our lives overflow with unsurpassed joy, wisdom, and compassion-just as the Thai proverb says: "Real happiness makes people joyful and fills them with wisdom and compassion," All kinds of things happen in life. There is sadness, there is happiness. Every day, there are things we may find unpleasant or annoying. Good friends may sometimes quarrel. A family may have a sick child, or one of the family members may suffer unemployment. We face all kinds of sufferings and problems. How formidable are the challenges of living!

We have to bring out enough strength from within that enables us to persevere in life to the very end. The strength which we are able to manifest

through our own efforts serves as the propulsive force for us to pierce through the clouds of limit, to fly serenely through the skies of happiness. And we can develop the can transform all problems into happiness, sufferings into hoy, anxiety into hope, and worry into peace of mind. We will always be able to find a way foreword. It is our inherent immense power that gives vitality to and breathes fresh life into all things, including individuals, organizations, societies, and nations.

(i) What is the definition of human happiness?

(ii) Author differentiates between absolute happiness and relative happiness. Do you feel this is the key conclusion or there are other conclusions also?

(iii) What are the reasons provided by the writer to support the above conclusions?

(iv) Are there any biases in this passage? If yes, elaborate.

(v) We can transform all problems into happiness'. Do you agree with statement, if yes how can we do this?

(vi) Do you agree with the key conclusions of the writer? Give reasons.

(vii) Give some other suggestions how can one live mostly in a state of happiness.

**Ans.** (i) Real human happiness is a state of life where no matter what circumstances we may encounter, we can feel that life itself is a joy.

(ii) There are other conclusions: we have to bring out enough strength from within that enables us to persevere in life to the very end.

(iii) The writer feels that if we can bring out joy from within ourselves then we can transform all problems into happiness, sufferings into joy, anxiety into hope and worry into peace of mind.

(iv) All too many people have allowed money to ruin their lives.

(v) We can transform all the problems into happiness by developing an inherent immense power that gives vitality to and breathes fresh life into all things.

(vi) Yes, we agree with the key conclusions of the writer because happiness depends more on our internal state of mind than our external circumstances.

(vii) One can live mostly in a state of happiness by focusing on the good and the positive things in his/her life and by bring grateful for them.

**Q.2. (b) Which of the following statement(s) are correct with respect to "Critical Thinking." Explain your answer.** (8)

(i) If you have never properly examined your beliefs, they are not truly yours.

(ii) It applies only to your individual beliefs.

(iii) It is not about what you think, but how you think.

(iv) It focuses not on what causes a belief, but on whether it is worth believing.

**Ans.** (i) Correct as your beliefs are yours only if you critically examine them for yourself to see if they are supported by good reasons. The empowerment obtained through critical thinking can take several forms: Skills for learning and exploring, defence against error, manipulation, and prejudice; and tools for self-discovery.

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**Q.3. (a)  
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- (ii) Incorrect as critical thinking is the act of deliberately analysing information so that you can make better judgements and decisions. It involves using things like logic, reasoning, and creativity, to draw conclusions and generally understand things better.
- (iii) Correct as critical thinking is the act of deliberately analysing information so that you can make better judgements and decisions. It involves using things like logic, reasoning, and creativity, to draw conclusions and generally understand things better.
- (iv) Correct as critical thinking focuses not on what causes a belief, but on whether it is worth believing. A belief is worth believing, or accepting, if we have good reasons to accept it.

OR

**Q.3. (a) What are biases? Classify which of the following sentences showcase Personal Bias, Confirmation Bias, Gender Bias, Anchoring bias, Survivor-ship Bias, Normalcy Bias, Unconscious Bias, Conscious Bias or none of the above.**

- (i) Sally is in support of gun control. She seeks out news stories and opinion pieces that reaffirm the need for limitations on gun ownership. When she hears stories about shootings in the media, she interprets them in a way that supports her existing beliefs. (7)
- (ii) I feel whatever are my circumstances, whatever is my past, the forces that determine my future are nowhere but within my own heart and mind. It is here that the star of my destiny shines.
- (iii) I tell Ram that the exclusive pursuit of one's own interests cannot bring true happiness. It is in striving for the sake of others that the great path to genuine happiness is opened.
- (iv) My mother told me that from a healed, peaceful heart, humility is born; from humility, a willingness to listen to others is born; from a willingness to listen to others, mutual understanding is born; and from mutual understanding, a peaceful society will be born.
- (v) Education is a process of stimulating and awakening people form the very core of their being, enabling them to unlock and develop the power within them to create happiness. My teacher's belief in this is very strong.
- (vi) Victory in any endeavor is decided by how effectively we use our time without wasting a moment, and how hard we work even when our efforts go unnoticed.
- (vii) While it is important to win, it's even more important to remain undefeated no matter what happens. This is particularly valid for boys.

**Ans.** Bias is an inclination, prejudice, preference or tendency towards or against a person, group, thing, idea or belief. Biases are usually unfair or prejudicial and are often based on stereotypes, rather than knowledge or experience. Bias is usually learned, although some biases may be innate. Bias can develop at any time in an individual's life.

Bias is a uniquely human attribute. In some cases, the bias may be subconscious, and the individual may not be aware that they are experiencing bias towards others. Although biases can sometimes be positive or helpful to the individual, in the majority of cases, biases will be negative or damaging.

- (i) Confirmation Bias  
 (ii) Personal Bias

- (iii) Confirmation Bias
- (iv) None
- (v) Personal Bias
- (vi) Survivorship Bias
- (vii) Gender Bias

**Q.3. (b) What is a deductive argument? What is an inductive argument?**  
**Give an example of each.**

**Ans.** A deductive argument is one in which true premises guarantee a true conclusion. In other words, it is impossible for the premises to be true but the conclusion false. Thus, the conclusion follows necessarily from the premises and inferences. In this way, a true premise is supposed to lead to a definitive proof truth for the claim (conclusion). Here is a classic example:

1. Socrates was a man (premise)
2. All men are mortal (premise)
3. Socrates was mortal (conclusion)

The essence of the argument, mathematically, is: If  $A = B$ , and  $B = C$ , then  $A = C$ .

As we can see, if the premises are true (and they are), then it simply isn't possible for the conclusion to be false. If you have a correctly formulated deductive argument and you accept the truth of the premises, then you must also accept the truth of the conclusion; if you reject it, then you are rejecting logic itself. There are those that argue, with some irony, that politicians are sometimes guilty of such fallacies—rejecting deductive conclusions against all logic.

An inductive argument, sometimes considered bottom-up logic, is one in which premises offer strong support for a conclusion, but one that is not a certainty. This is an argument in which the premises are supposed to support the conclusion in such a way that if the premises are true, it is improbable that the conclusion would be false. Thus, the conclusion follows probably from the premises and inferences. Here is an example:

1. Socrates was Greek (premise)
2. Most Greeks eat fish (premise)
3. Socrates ate fish (conclusion)

In this example, even if both premises are true, it is still possible for the conclusion to be false (maybe Socrates was allergic to fish, for example). Words which tend to mark an argument as inductive—and hence probabilistic rather than necessary—include words like probably, likely, possibly and reasonably.

## UNIT-II

**Q.4. (a) In the following argument, what is the implicit premise that will make the argument either valid or strong.**

"Sunita failed her driving test three times. She's probably not paying attention."

(i) Identify the conclusion in the argument given below:

"You should definitely let me look after your dog while you're on holiday. I love dogs. And dogs love me. I have many of dogs at home and know how to look after them. I have six dogs, and I talk to them all the time. I'm a real dog expert."

**Ans.** (i) She should focus on her driving skills and keep practicing.

(ii) Your pet will feel comfortable and safe around this pet sitter as he is experienced, professional, knowledgeable and able to handle emergencies. So, you will be feel relax on your holiday.

**Q.4. (b) Correct the following sentences using Inductive Reasoning, where words we use are important.**

(i) You never go to library and read. (8)

(ii) Men don't survive severe Heart Attack.

(iii) Ram always end up quarrelling.

(iv) Laptops will continue to enhance their features every year.

**Ans.** (i) You should go to library for reading.

(ii) Men are not able to survive major heart attacks.

(iii) Ram fights always in the end.

(iv) Every year, laptops will get better features.

**OR**

**Q.5. (a) Which of the following are valid arguments. Justify your answer.** (7)

(i) Because banning assault rifles violates a constitutional right, the U.S. government should not ban assault rifles.

(ii) The Wall Street Journal says that people should invest heavily in stocks. Therefore, investing in stocks is a smart move.

(iii) When Judy drives her car, she's always late. Since she's driving her car now, she will be late.

(iv) Any movie with clowns in it cannot be a good movie. Last night's movie had at least a dozen clowns in it. Consequently, it was awful.

(v) Without a military intervention in nation X, terrorists cannot be defeated. They will always be able to find safe haven and support in the X regime. [Premise] Even if terrorists are scattered around the world, support from nation X will increase their chances of surviving and launching new attacks. The war on terrorism must include a massive military strike on nation X.

(vi) No one should buy a beer brewed in Canada. Old Guzzler beer is brewed in Canada. So, no one should buy it.

(vii) I have been alive every day for the last 10,000 days; thus, I will always be alive.

**Ans.** (i) Valid argument according to constitutional right of U.S. government.

(ii) Invalid argument as stock market is not always profitable.

(iii) Valid argument as she always drives slowly according to first statement.

(iv) Valid argument as 'Joker' is a scary movie.

(v) Invalid argument as terrorism can never be defeated by military means - by killing guilty and innocent alike. Ultimate victory over terrorism can only be ideological; a recognition that whatever our differences - ethnic, religious, national or political - they are insignificant compared with our common humanity.

(vi) Invalid argument as there is not valid reason.

(vii) Invalid argument as none of human will always be alive.

**Q.5. (b) Give an example of each. Use one sentence for each of the following**

- (i) Description
- (ii) Clarification
- (iii) Summary
- (iv) Opinion

**Ans. (i) Description:** Description is the pattern of narrative development that aims to make vivid a place, object, character, or group. For example, she has given the police a very detailed/full description of the robber.

**(ii) Clarification:** Clarification is what you hope to achieve when you make an idea or concept less confusing and easier to understand. This often happens after a detailed or very clear explanation. In other words we can say clarification is an interpretation that removes obstacles to understanding. For example, the professor's clarification helped her to understand the textbook.

**(iii) Summary:** A brief statement or account covering the substance or main points is known as summary. For example, the brilliant summary of the historian Thucydides in the famous Funeral Speech of Pericles (delivered in 430), in which the social life, the institutions and the culture of his country are set forth as a model, gives a substantially true picture of Athens in its greatest days.

**(iv) Opinion:** An opinion is a belief or judgment about something that isn't necessarily based on fact. People have lots of different opinions and in many cases, people can have differing opinions on the same issue. For example, some people have the opinion that low taxes are best for job growth and that people should be able to keep more of their own money. Others have the opinion that higher taxes are better in order to fund more government services.

### UNIT-III

**Q.6. (a) Which of the following statement(s) are true in respect of the way the mind works.**

(i) The mind is a pattern-making system.

(5)

(ii) The arrangement of information is always less than the best possible arrangement.

(iii) The patterns tend to become established ever more rigidly since they control attention.

(iv) Information that is arranged as part of one pattern can easily be used as part of a completely different pattern.

(v) Left and right part of the brain function differently.

**Ans. (i) True**

(ii) False

(iii) True

(iv) True

(v) True

**Q. 6. (b) List five important areas on which an effective problem solver focusses on.**

**Ans. Problem solving** is the act of defining a problem; determining the cause of the problem; identifying, prioritizing, and selecting alternatives for a solution; and implementing a solution.

5 Effective  
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## 5 Effective Problem-Solving Strategies

### 1. Trial and error

One of the most common problem-solving strategies is trial and error. In other words, you try different solutions until you find one that works. For example, say the problem is that your Wi-Fi isn't working. You might try different things until it starts working again, like restarting your modem or your devices until you find or resolve the problem. When one solution isn't successful, you try another until you find what works.

### 2. Heuristics

Sometimes, it's more effective to solve a problem based on a formula than to try different solutions blindly.

Heuristics are problem-solving strategies or frameworks people use to quickly find an approximate solution. It may not be the optimal solution, but it's faster than finding the perfect resolution, and it's "good enough."

Algorithms or equations are examples of heuristics.

### 3. Gut instincts (insight problem-solving)

While algorithm-based problem-solving is formulaic, insight problem-solving is the opposite. When we use insight as a problem-solving strategy we depend on our "gut instincts" or what we know and feel about a situation to come up with a solution.

For example, you might face the problem of whether or not to stay in a relationship. The solution to this problem may come as a sudden insight that you need to leave. In insight problem-solving, the cognitive processes that help you solve a problem happen outside your conscious awareness.

### 4. Working backward

Working backward is a problem-solving approach often taught to help students solve problems in mathematics. However, it's useful for real-world problems as well.

Working backward is when you start with the solution and "work backward" to figure out how you got to the solution. For example, if you know you need to be at a party by 8 p.m., you might work backward to problem-solve when you must leave the house, when you need to start getting ready, and so on.

### 5. Means-end analysis

Means-end analysis is a problem-solving strategy that, to put it simply, helps you get from "point A" to "point B" by examining and coming up with solutions to obstacles.

When using means-end analysis you define the current state or situation (where you are now) and the intended goal. Then, you come up with solutions to get from where you are now to where you need to be.

For example, a student might be faced with the problem of how to successfully get through finals season. They haven't started studying, but their end goal is to pass all of their finals. Using means-end analysis, the student can examine the obstacles that stand between their current state and their end goal (passing their finals).

They could see, for example, that one obstacle is that they get distracted from studying by their friends. They could devise a solution to this obstacle by putting their phone on "do not disturb" mode while studying.

**Q. 6. (c) How does lateral thinking techniques facilitate the generation of ideas? How do they overcome / by-pass the existing mind-patterns? Explain using an example.** (5)

**Ans.** Lateral thinking is defined as solving problems with "an indirect and creative approach, typically through viewing the problem in a new and unusual light." But it's not just another buzzword. The concept of lateral thinking has been around for decades and it has a very specific methodology.

Usually, logical thinking is used to solve problems in a direct, straightforward way (also known as vertical thinking). Lateral thinking however, looks at things from a sideways perspective (also known as horizontal thinking), in order to find answers that aren't immediately apparent. The term was first coined by psychologist Edward de Bono. These skills are often required in creative careers like marketing or advertising.

Improving these skills can be challenging as lateral thinking comes more naturally to some people than others. However, like everything else, practice makes perfect, and setting yourself lateral thinking examples can help.

#### Mind mapping

Mind maps can be a great way of solving a problem when logical thinking just doesn't help. Because mind maps are visual aids, they require your brain to adjust its thought processes, which can often help you find answers unexpectedly. Mind maps give you the opportunity to put all your ideas down on paper and then take a step back to gather your thoughts.

#### Using your senses

We all have five senses – sight, touch, hearing, smell and taste – yet we very rarely use all of them to solve problems. Typically, you use our visual senses to work things out but making use of our other senses can sometimes have useful results. For example, when faced with a problem, why not speak your thoughts aloud and record them on your mobile phone? When you listen back, you may find something that you would have missed otherwise.

#### Reverse thinking

Reverse thinking involves analysing what people normally do in a situation and then doing the opposite. If you find yourself only getting so far into a problem and then becoming stuck, you might want to start at the end and work backwards. For example, look at the problem and then describe what you'd ideally like the solution to be. From there, you can begin working backwards to find the starting point to your solution.

OR

**Q.7. (a) Write at least four essential rules to be followed during a "brainstorming session" for generation of ideas.** (5)

**Ans.** The four rules to be followed during a "brainstorming session" for generation of ideas:

**1. Go for quantity:** This rule is a way of enhancing divergent production, aiming at facilitation of problem solution through the maximum quantity breeds quality. The assumption is that the greater the number of ideas generated the bigger the chance of producing a radical and effective solution.

**2. Withhold criticism:** In brainstorming, criticism of ideas generated should be put 'on hold'. Instead, participants should focus on extending or adding to ideas, reserving criticism for a later 'critical stage' of the process. By suspending judgment, participants will feel free to generate unusual ideas.

**3. Welcome wild ideas:** To get a good long list of suggestions, wild ideas are encouraged. They can be generated by looking from new perspectives and suspending assumptions. These new ways of thinking might give better solutions.

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4. **Combine and improve ideas:** As suggested by the slogan "1+1=3". It is believed to stimulate the building of ideas by a process of association.

Q.7. (b) Which one of the following can be used as "Sources of Data" during problem-solving process? Select the option(s) which are correct. There can be multiple correct options. (5)

- (i) Observations
- (ii) Fish-bone analysis
- (iii) Interviews
- (iv) Published Materials

**Ans.** (i), (iii) and (iv)

Q.7. (c) Apply 5 Why technique to find out the root cause of why you ate popcorns while watching a movie last night. (5)

**Ans.** 5 why techniques are as follows:

(i) Popcorn is a quiet, lightweight and easy to eat snack that could be enjoyed without distracting the audience or interfering with the movie experience.

(ii) To watching movies has traditionally been a social activity, and popcorn became a shared snack among friends, couples, and families. The act of sharing a large tub of popcorn enhances the communal aspect of the movie watching experience, making it more enjoyable and memorable.

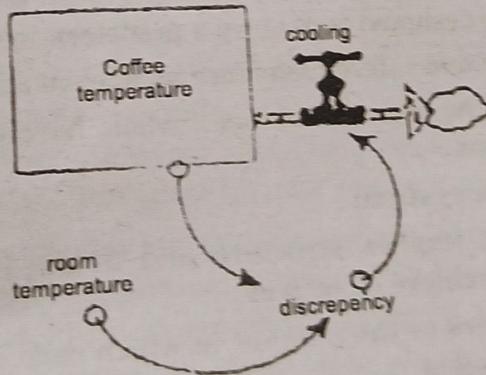
(iii) The popcorn is also inexpensive snack food.

(iv) The smell of popcorn can evoke feelings of nostalgia and excitement, which can enhance the movie watching experience.

(v) Popcorn is also less messy snack as popcorn can be easily cleaned if it falls.

#### UNIT-IV

Q.8. (a) (i) Explain the working of a feedback loop in a system. Draw the appropriate diagram(s). Explain the nature of the following feedback loop. (7)



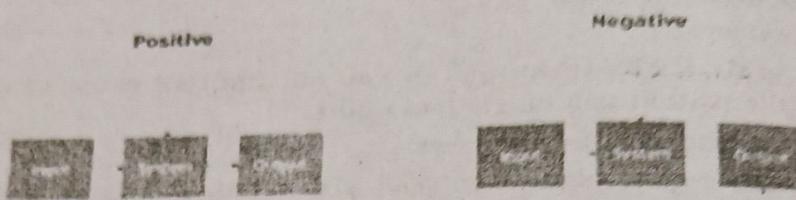
(ii) What kind of loop the following system demonstrates

When we were kids, the more my brother pushed me, the more I pushed him back, so the more he pushed me back, so the more I pushed him back.

**Ans.** A feedback loop is the part of a system in which some portion (or all) of the system's output is used as input for future operations. Each feedback loop has a minimum of four stages. During the first stage, input is created. During the second stage, input is captured and stored. During the third stage, input is created. During the fourth stage, the insight gained from analysis is used to make decisions.

Feedback loops can be either negative or positive. Negative feedback loops are self-regulating and useful for and maintaining an optimal state within specific boundaries. Negative feedback loops are known for being stable, but not especially accurate. In contrast, positive feedback loops simply repeat actions that have been effective in the past. The intention of a positive feedback loop is to amplify a desired variable and naturally move the system away from its starting state to a desired state.

## Types of feedback loops



- (i) Negative Feedback Loop
- (ii) Positive Feedback Loop

**Q.8. (b) What are systems? What are the characteristics of the systems? Explain briefly the following systems.**

(7)

(i) Solar Systems

(ii) Transport systems

(iii) Social Systems

**Ans.** A **system** is an orderly grouping of interdependent components linked together according to a plan to achieve a specific objective.

The study of system concepts has three basic implications:

1. A system must be designed to achieve a predetermined objective.
2. Interrelationships and interdependence must exist among the components.
3. The objectives of the organization as a whole have a higher priority than the objectives of its subsystems.

### Characteristics of a system:

1. **Organization:** It implies structure and order. It is the arrangement of components that helps to achieve objectives.
2. **Interaction:** It refers to the manner in which each component functions with other components of the system.
3. **Interdependence:** It means that parts of the organization or computer system depend on one another. They are coordinated and linked together according to a plan. One subsystem depends on the output of another subsystem for proper functioning.
4. **Integration:** It refers to the holism of systems. It is concerned with how a system is tied together.
5. **Central Objective:** A system should have a central objective. Objectives may be real or started. Although a started a started objective may be the real objective, it is not uncommon for an organization to state one objective and operate to achieve another.

(i) **Solar System:** According to the definition of a system is that it is "A group of interacting, interrelated, or interdependent elements forming a complex whole". The concept of a system is also a group of objects occurring naturally like the planets in our Solar System. All of the planets are dependent on each other and our sun to stay in place. If it were not for the pull of gravity and the interaction between all the planets in our system there could be no seasons, tides, day and night etc. Because all of these objects are directly influencing each other we call it a system. The Sun is the center of our system and Solar is a term used in conjunction with sun.

(ii) **Transport System:** A transport system is a realization of spatial network, a structure of connected infrastructures that permits the flow of people and/or commodities.

(iii) **Social System:** A social system is a relational bond of personal or environmental roles that are a part of a whole, larger community. This social system also includes a larger society that works together and functions as a connection between community organizations and larger institutions. The main premise of a social system is to fulfill the needs of the larger unit of society. Communities, schools, religious buildings, and businesses are all examples of the units of society. Families, a local chamber of commerce, a preschool, or a specific religious group is the social system. The main characteristics of social systems are:

- Social systems are visible and have a specific goal
- The system has to have strong communal interaction to be effective
- Everyone in the system is dependent on each other
- Shared approach of communication with a vocabulary specific to their system.

## OR

**Q.9. (a) Write a short note on cognition and perception in Indian knowledge systems.** (7)

**Ans.** The main difference between cognition and perception is that cognition is the mental process of acquiring knowledge and understanding through thought, experience, and the senses, but perception is the ability to see, hear or become aware of something through the senses. Cognition and perception are two inherently tied concepts. In fact, one can say that perception is a part of cognition. However, cognition and perception are not the same. Cognition is a much broader concept than perception.

**Cognition** refers to the mental process of knowing, learning, and understanding things. In other words, it involves gaining knowledge and comprehension. It includes many aspects of higher brain functions and processes such as memory, attention, the formation of knowledge, judgment and evaluation, reasoning, problem-solving and decision making, comprehension, and production of language. Furthermore, cognitive processes use existing knowledge and generate new knowledge. Cognition also involves forming beliefs, making decisions, and solving problems, based on already existing information.

**Perception** is basically the ability to capture, process, and make sense of the information that our senses receive. In this process, our brain identifies and organizes the information it obtains from the neural impulses and then begins to interpret them. In other words, after our five senses receive several stimuli that are sent to our brain as nerve impulses, our brain interprets those impulses as a visual image, a sound, taste,

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odour, touch, or pain. Since the interpretation of this sense happens as a result of one's experiences, the result of perception differs according to each individual. Recipient's experiences, learning, memory, expectation, and attention can also shape perception. Moreover, perception is not just a single process that happens spontaneously, but it is a series of processes.

**Q. 9. (b) Is systems thinking different from design thinking. Explain with the help of an example.**

**Ans.** System thinking is different from Design thinking.

Difference between systems thinking and design thinking

(8)

<b>Systems Thinking</b>	<b>Design Thinking</b>
1. Driven by a motivation to understand the big systemic picture.	1. Driven by a motivation to address parts of an identified system to arrive at a product/solution.
2. Adopts a stakeholder-led approach.	2. Adopts a customer/user-led approach.
3. Focuses on satisfying and empowerment.	3. Focuses on optimization and solution delivery.
4. Focuses on problem structuring.	4. Focuses on problem solving.
5. Considers every situation critically embracing the issues of values and power dynamics.	5. Considers an objective as given and has a tendency to bypass issues of values and power dynamics.
6. Offers a range of methodologies for different kinds of problem situations.	6. Offers a set of indicative stages that can be used iteratively to arrive at customer/user solutions.
7. Participation in a systems thinking intervention process is considered from a critical angle.	7. Participation in a design thinking intervention process is considered to be problem-free.

As an example, systems thinking might look at a new product for its impact on the competition, your brand, customers, financial performance and operations considering opportunity costs in each area. Design thinking might be focused on creating a product that customers will like without much thought for secondary impacts.