

CEED 2018

Question Paper



Indian Institute of Technology Bombay

CEED 2018 Question Paper

Instructions

1. The total duration of the examination is 3 hours. The question paper contains two parts - Part A and Part B. The duration of Part A is one hour. The duration of Part B is two hours. Part B will start only after Part A ends. Part A cannot be attempted after Part B commences.
2. Questions of Part A and Part B will appear on the computer. Answers to **Part A** have to be entered in the **computer**. Answers to **Part B** have to be given in the **answer book** provided by the invigilator.
3. Part A carries a total of 100 marks. It contains 5 sections. The following table summarises the number of questions in each section, type of questions, marks for correct answers, marks for wrong answers, marks for questions not attempted and total marks for the section:

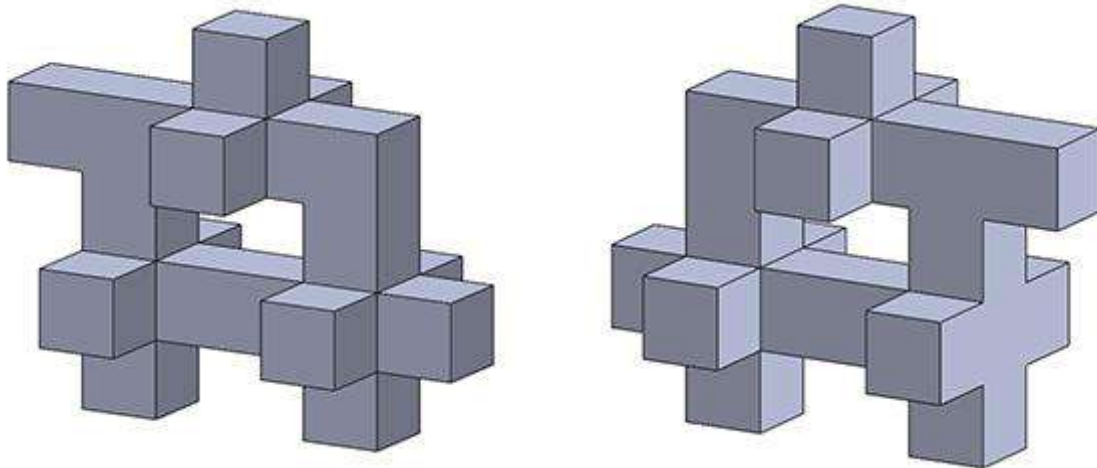
Part A Section	Number of questions	Type of questions	Marks for each correct answer	Marks for each wrong answer	Marks for each question not attempted	Total marks for the section
I	2	Numerical answer type (NAT)	6	0	0	12
II	6	Numerical answer type (NAT)	3	0	0	18
III	2	Multiple select questions (MSQs)	4	0	0	8
IV	6	Multiple select questions (MSQs)	2	0	0	12
V	25	Multiple choice questions (MCQs)	2	-0.6	0	50

4. For each NAT question, the answer is a **real number with decimal digits up to two decimal places**. The answer needs to be entered using the virtual keyboard on the monitor. No choices will be shown for these questions. There is no negative or partial marking for NATs.
5. Each MSQ has four choices of which **one or more** is/are the correct answer(s). The marks will be awarded only if **all the correct choices** are selected. There is no negative or partial marking for MSQs.
6. Each MCQ has four choices of which **only one** is the correct answer. In MCQs, the correct answer will be awarded **2 marks** and wrong answer will be awarded **-0.6 marks**. Questions not attempted will be awarded zero marks.

7. Scribble pads will be provided for rough work for Part A. These have to be returned to the invigilator at the **end of the Part A exam**.
8. Part B carries a total of 100 marks. It contains 8 questions. You may choose to answer any ONE of Questions 1, 2, 3, 4 and 5. Questions 6, 7 and 8 are mandatory. Each question must be answered on the page(s) designated for that question in the answer book. Additional instructions to Part B questions are provided in the answer book.
9. In Part B, colour pencils, crayons, sketch pens etc. may be used unless otherwise specified in the questions.
10. Charts, graph sheets, tables, calculators, cellular phones and other electronic gadgets are not allowed in the examination hall.

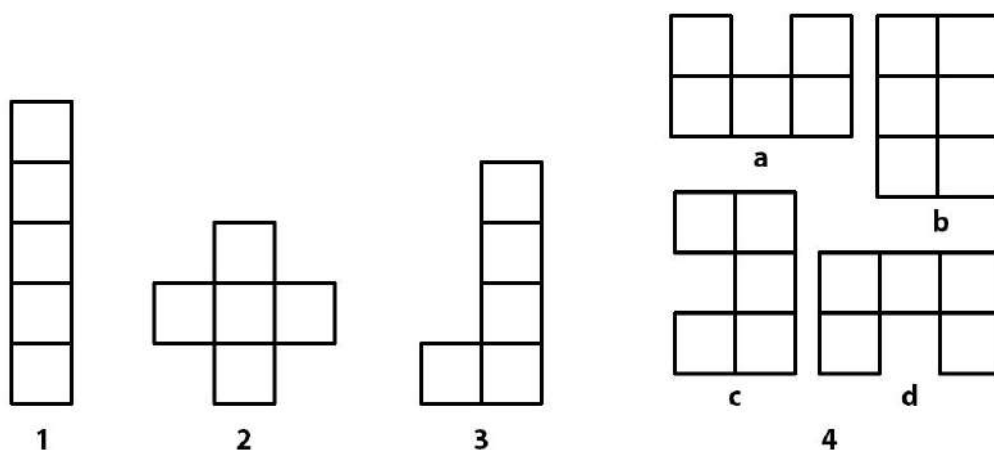
Part A – Section I: NAT1

Q.01 Shown below are two views of the same object. How many surfaces does the object contain?



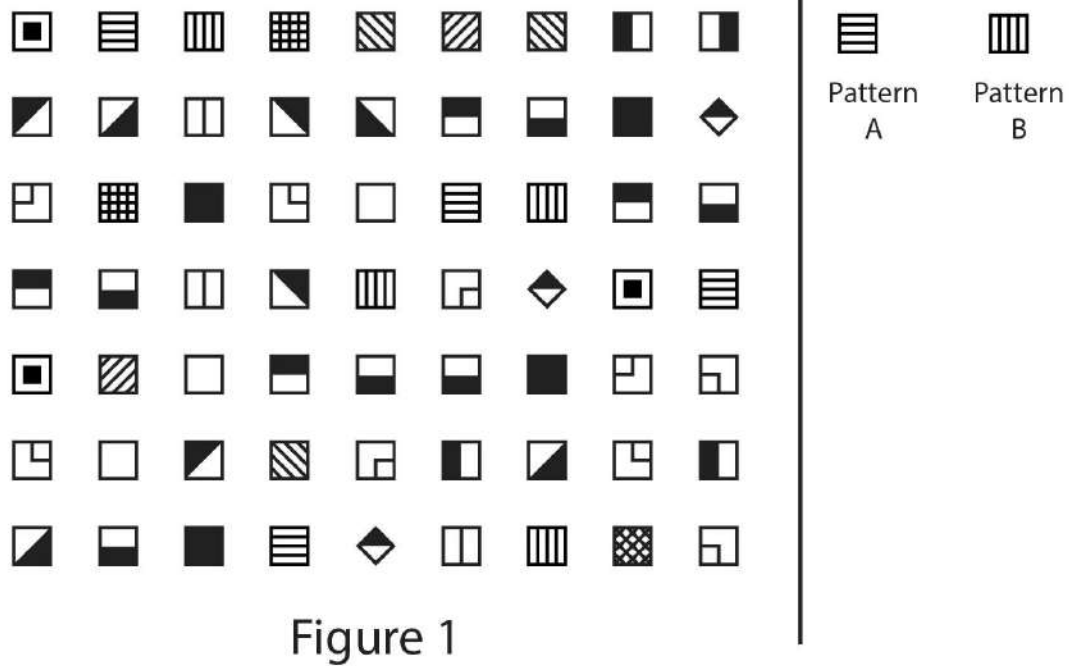
Q.02 Different shapes can be generated by sticking square tiles edge to edge. The figures below show examples of FOUR unique shapes generated by sticking FIVE square tiles in the given manner. Please note that shapes a, b, c and d of example 4 are NOT DIFFERENT from each other as any of them can be generated by simple operation(s) of rotation or flipping the others.

What is the total number of unique shapes (including the four shown) that can be generated by sticking FIVE square tiles along their edges?

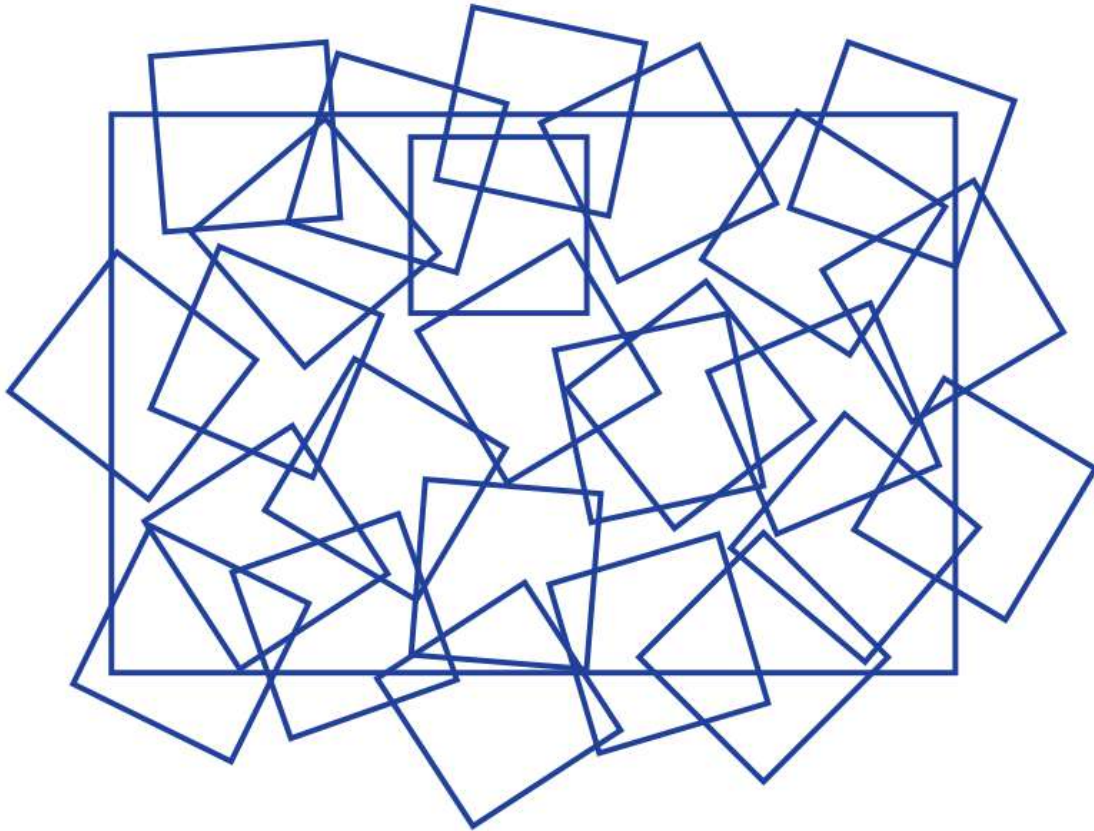


Part A – Section II: NAT2

Q.03 Assume that patterns such as Pattern A and Pattern B are distinct. How many patterns appear in the Figure 1?



Q.04 How many squares appear in the image given below?



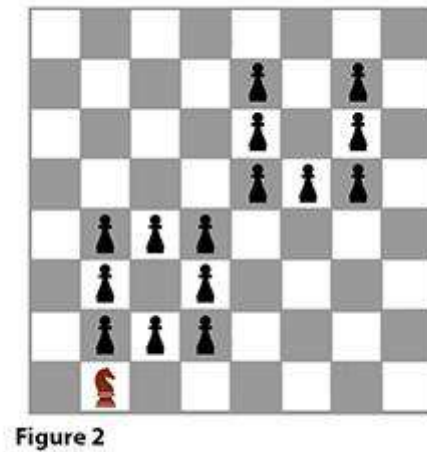
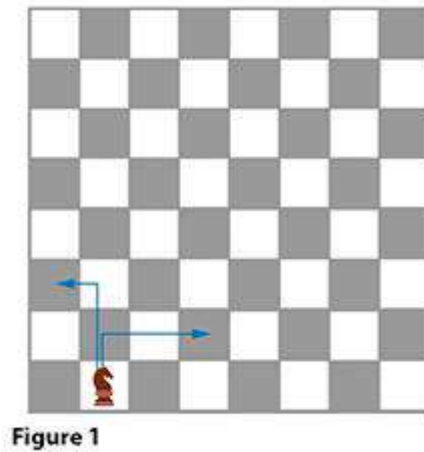
Q.05 Hue is the value of the equivalent pure (saturated) colour in any given colour. It is represented as a colour wheel going through the colour spectrum, from primary colours Red through Green, Blue and back to Red. If the hue values in degrees range from 0 to 360, what is the hue value of the colour Yellow?

Q.06 In the image below, three-letter words appear horizontally in a line, together, and in the normal reading order. The word SET has been highlighted for you in the first line. Including SET, how many 3-letter English words are there?

TZLSETIIZIHUBHRVNWSBSBANSVHUZDGXB
BPTKHPJLMHSQHIDGXFAKLZNJMEMVVCOE
NNFOXPOCUCOMNUHTMWPPDDNHPNZM
LAZRVZCUNUDQABVBABMRWCWBXXONN
DIPTRFOQWXOECIPPVZESYKSHBGGHRTYG

Q.07 In a secret code, if 3 becomes 1312, 4 becomes 1716, 5 becomes 2120, 6 becomes 2524, 7 becomes 2928 and 8 becomes 3332 then what would 9 become?

Q.08 As shown in Figure 1, in chess, a knight moves 2 squares in one direction and one square at right angle to that direction. Figure 2 shows 15 pawns on the chess board. What is the minimum number of moves that the knight needs to capture all the pawns?



Part A – Section III: MSQ1

Q09 Consider the following text by Jonardon Ganeri:

“The right way to formulate epistemic pluralism has actually already been provided for us from within the pluralist cosmopolis of Sanskrit. The remarkable Jaina philosophers make a distinction of fundamental epistemological significance when they say that as well as and in addition to epistemic principles (pramana), there are also nayas, epistemic standpoints or stances, and that both are essential constituents in an epistemic culture. A naya is not a proposition but a practical attitude, a strategy or policy that guides enquiry: it is an approach to the problem of producing knowledge, not a proposition about the sources of justification. One such policy might be to attend only to what is immediately present in experience, another might be to enumerate everything one encounters without making any categorical distinctions, another to attend to stasis rather than flux, or to causal interconnections rather than to essential attributes. The philosopher Anjan Chakravartty at the University of Notre Dame in Indiana stresses that *‘One does not believe a stance in the way that one believes a fact. Rather, one commits to a stance, or adopts it.’*”

Based on the above text, which of the following statements is/are TRUE?

- A. Statement 1: The author recommends that a rigorous validation process should be followed in order to establish our practical strategy or policy about certain matters of knowledge.
- B. Statement 2: In a long complicated manner, the author conflates epistemic principles with positions and argues that they are essentially the same.
- C. Statement 3: The passage basically asserts that knowledge can consist of multiple perspectives and does not entail a single dogmatic view.
- D. Statement 4: The author suggests that knowledge consists of certain fundamental tenets along with some functional approaches.

Q.10 Consider the following text by Katherine Hayles :

“Nicolas S. Tzannes pointed out that whereas Shannon and Wiener define information in terms of what it is, MacKay defines it in terms of what it does. The formulation emphasizes the reification that information undergoes in the Shannon-Wiener theory. Stripped of context, it becomes a mathematical quantity weightless as sunshine, moving in a rarefied realm of pure probability, not tied down to bodies or material instantiations. When information is made representational, as in MacKay’s model, it is conceptualized as an action rather than a thing. Verb-like, it becomes a process that someone enacts, and thus it necessarily implied context and embodiment. The price it pays for embodiment is difficulty of quantification and loss of universality.”

Based on the above text, which of the following statements is/are TRUE?

- A. Statement 1: According to Shannon-Wiener theory, information is embodied.
- B. Statement 2: When information is representational, it is about what it ‘does’.
- C. Statement 3: When information is defined in terms of what it ‘is’, it becomes mathematical.
- D. Statement 4: According to Nicolas S. Tzannes, Mackay models information as verb-like.

Part A – Section IV: MSQ2

Q.11 Goethe said, “Doubt grows with knowledge”. From this perspective which of the following statements is/are TRUE?

- A. The less one knows, the more sure one is.
- B. Knowing is the cause of doubtfulness.
- C. The more one knows, the more sure one is.
- D. Knowing means having more doubts.

Q.12 Frequent use of the mouse and the keyboard can lead to physiological problems. Shaktimaan has been working on his college project report for several hours a day for many days using poorly designed furniture. Which of the following problems could he face?

- A. Osteoporosis
- B. Carpel tunnel syndrome
- C. Repetitive stress injury
- D. Athlete’s foot

Q.13 Which concept(s) does this image by Escher illustrate?



- A. Tessellation
- B. Figure and Ground
- C. Mise en Scene
- D. Collage

Q.14 Given below are three statements, based on which some conclusions have been drawn. If the statements are TRUE, which of the conclusions can be said to be TRUE?

Statement 1: Visuals can either be abstract or non-abstract.

Statement 2: All logos are abstract visuals.

Statement 3: All photographs are non-abstract visuals.

- A. A logo cannot be a photograph.
- B. A photograph cannot be a logo.
- C. An abstract photograph can be a logo.
- D. A non-abstract logo can be a photograph.

Q.15 It is recommended to keep an automobile's petrol tank full or nearly full at all times. Which of the options could be the reason(s) for this recommendation?

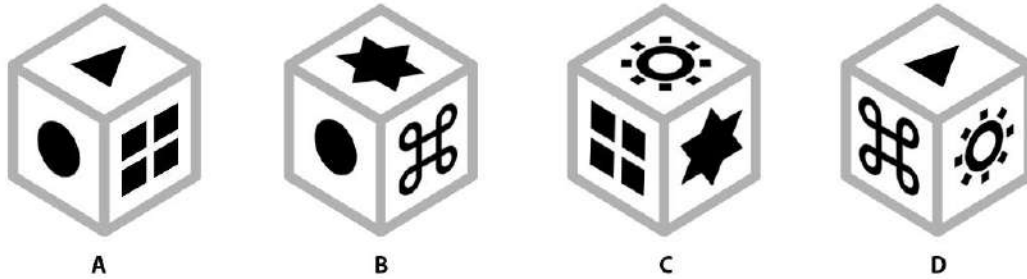
- A. A full tank prevents moisture from condensing in the petrol tank.
- B. In an empty petrol tank, dirt or rust may get trapped easily, which can block the fuel filter.
- C. Keeping the tank full would leave less air in the tank, thus reducing the evaporation rate of the petrol.
- D. The weight of a full petrol tank is less than 3% of the weight of the automobile, and hence the loss of fuel efficiency due to this extra weight is negligible.

Q.16 The rear view mirror in an automobile often has a warning that reads, "OBJECTS IN THE MIRROR ARE CLOSER THAN THEY APPEAR". Which of the options is/are the correct implication(s) of this warning?

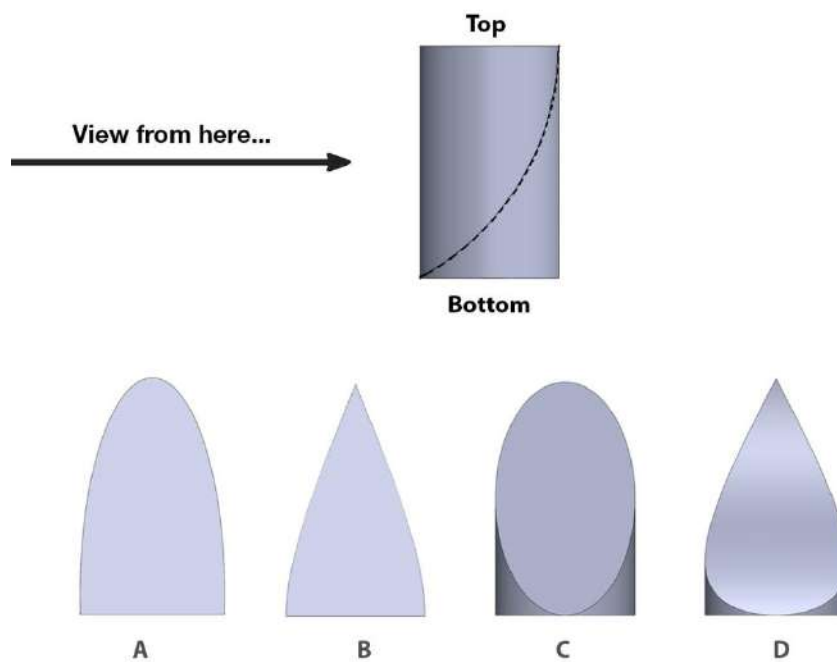
- A. The mirror is magnifying objects to make them appear larger.
- B. The mirror is showing objects smaller than their actual size.
- C. The mirror is showing objects in the same size as they appear.
- D. The mirror is showing a wider view of the area.

Part A – Section V: MCQ

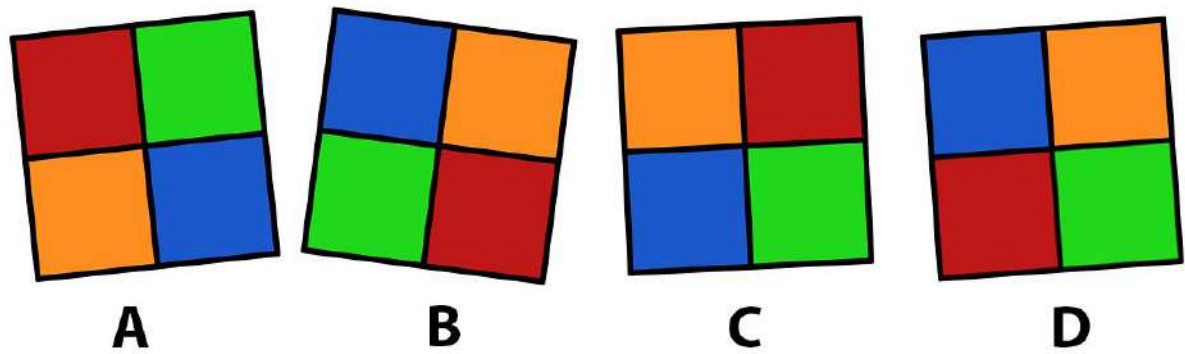
Q.17 Which option is not a view of the same box?



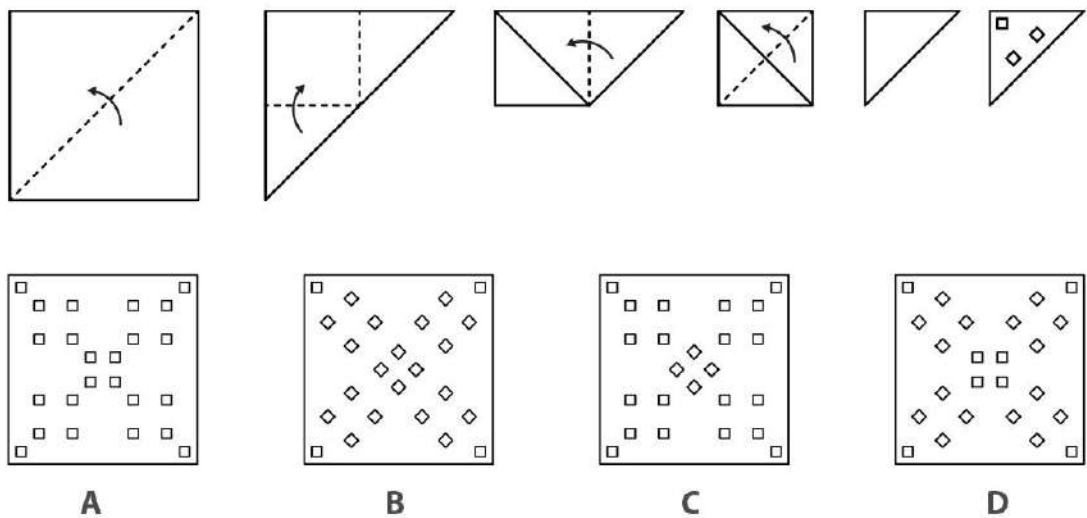
Q.18 A cylinder is cut by a curved surface as indicated by the dotted line in the figure. The top portion of the cylinder is removed. Which option shows the resultant view when seen from the direction indicated by the arrow?



Q.19 Which option is not a rotated view of the same tile?



Q.20 A piece of paper is folded according to the sequence of steps given below. After folding, square cuts are made as shown in the last step. Which of the options will result when the paper is unfolded?



Q.21 Four pairs of cities are listed below. Which option arranges the pairs in an ascending order of the aerial distances between them?

- K. Ahmedabad – Guwahati
- L. Kolkata – Bengaluru
- M. Lucknow – Bhopal
- N. Delhi – Thiruvananthapuram

- A. M-L-K-N
- B. K-L-M-N
- C. L-M-N-K
- D. M-L-N-K

Q.22 Who is the woman depicted in this painting by Raja Ravi Varma?

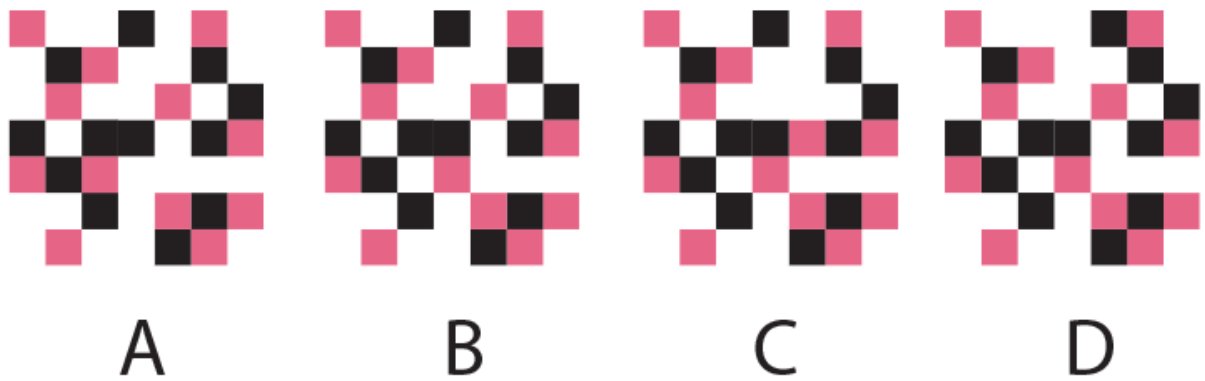


- A. Shakuntala
- B. Lakshmi
- C. Saraswati
- D. Damayanti

Q.23 Which option organises the art movements in the correct chronological order (oldest to newest)?

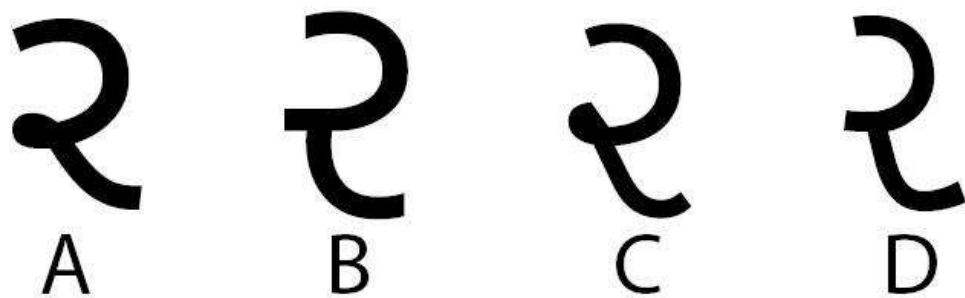
- A. Art Deco, Arts and Crafts, Renaissance, Baroque
- B. Renaissance, Art Deco, Arts and Crafts, Baroque
- C. Renaissance, Baroque, Arts and Crafts, Art Deco
- D. Baroque, Renaissance, Art Deco, Arts and Crafts

Q.24



Q.25 The word shown below uses a specific font. From the options, choose the letter that belongs to the same font.

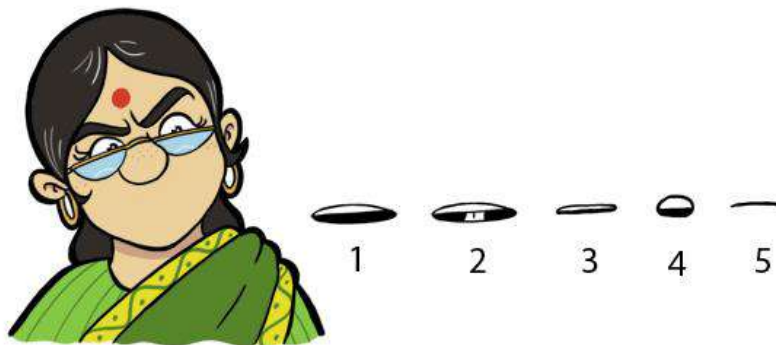
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Q.26 Which phenomenon listed in the options below is responsible for the twinkling of stars?

- A. Atmospheric reflection
- B. Atmospheric refraction
- C. Dispersion
- D. Total internal reflection

Q. 27 Here is a sketch of Mrs. Banerjee with her mouth missing. Choose the correct sequence of mouth shapes that represents her saying "STAND UP!".

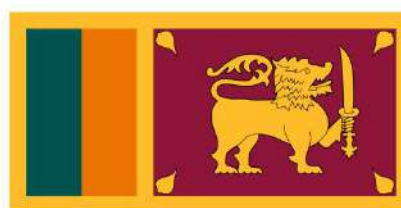


- A. 3, 2, 1, 2, 4, 5
- B. 4, 5, 2, 1, 3, 5
- C. 3, 2, 1, 2, 5, 4
- D. 3, 2, 5, 4, 1, 3

Q.28 Which of the options is the flag of Sri Lanka?



A



B

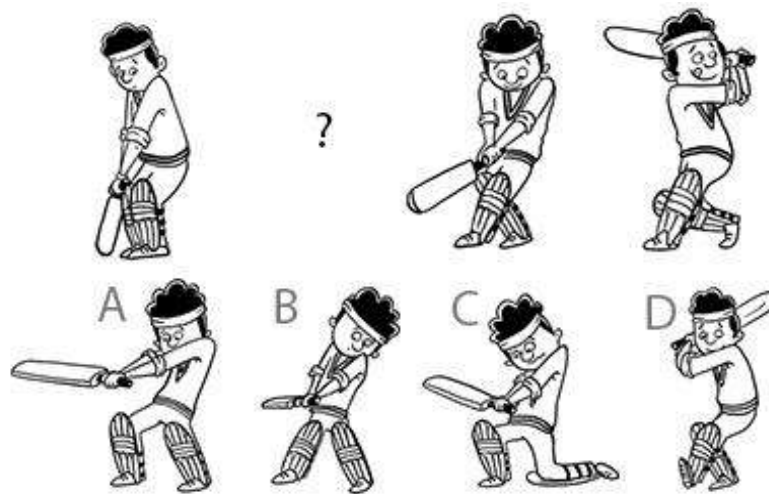


C



D

Q.29 Given below is a sequence of drawings from the animation of a cricket batsman performing a pull shot, with the missing drawing represented by a question mark. Which of the options below would best replace the question mark?

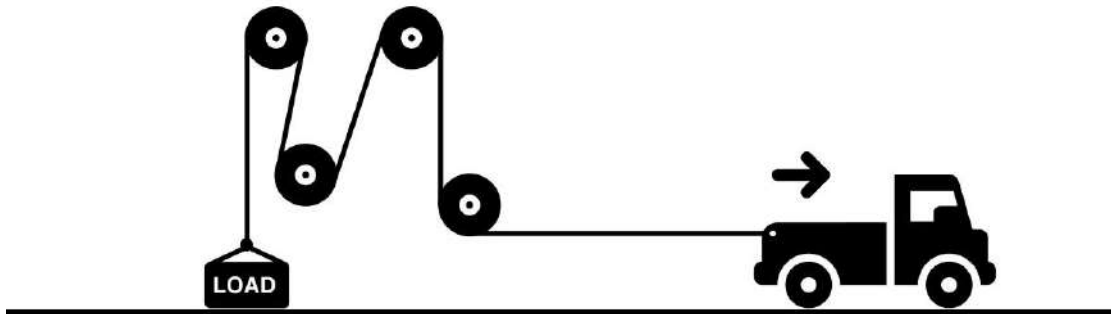


Q.30 Given below are two lists. One has names of personalities and the other has their well-known creations. Which of the options matches the personalities and their creations correctly?

PERSONALITIES	CREATIONS
P. Elon Musk	1. Cyclone Vacuum Cleaner
Q. Alexander Dumas	2. Tesla Technologies
R. Dean Kamen	3. The Three Musketeers
S. James Dyson	4. Segway

- A. P3, Q2, R4, S1
- B. P2, Q3, R4, S1
- C. P2, Q3, R1, S4
- D. P4, Q3, R1, S2

Q.31 In the image shown below, all pulleys are fixed. If the load needs to be lifted by a height of 8 m, by how much distance will the truck have to move?



- A. 8 m
- B. 6 m
- C. 4 m
- D. 2 m

Q.32 A kitchen platform is to be constructed in an Indian home. Which of the options should be used to determine the height of the platform?

- A. The height of tallest 5% adult Indian male population
- B. The height of tallest 5% adult Indian female population
- C. The height of tallest 50% adult Indian female population
- D. The average height of adult Indian male and female population

Q.33 Government of India has mandated a safety feature called “Automotive Headlights On” (AHO) in 2-wheelers. According to this, the vehicle headlight needs to remain perpetually in the ON mode when the vehicle is running and cannot be turned off even during the day. Which option best explains the reason for this mandate?

- A. People do not turn their headlights ON while driving at night.
- B. With the headlights ON, the pedestrians and oncoming vehicle drivers can notice the vehicle more easily.
- C. With the headlights ON, the vehicle rider can see the pedestrians much more clearly.
- D. It is a fancy feature that will enhance the aesthetics of the vehicle.

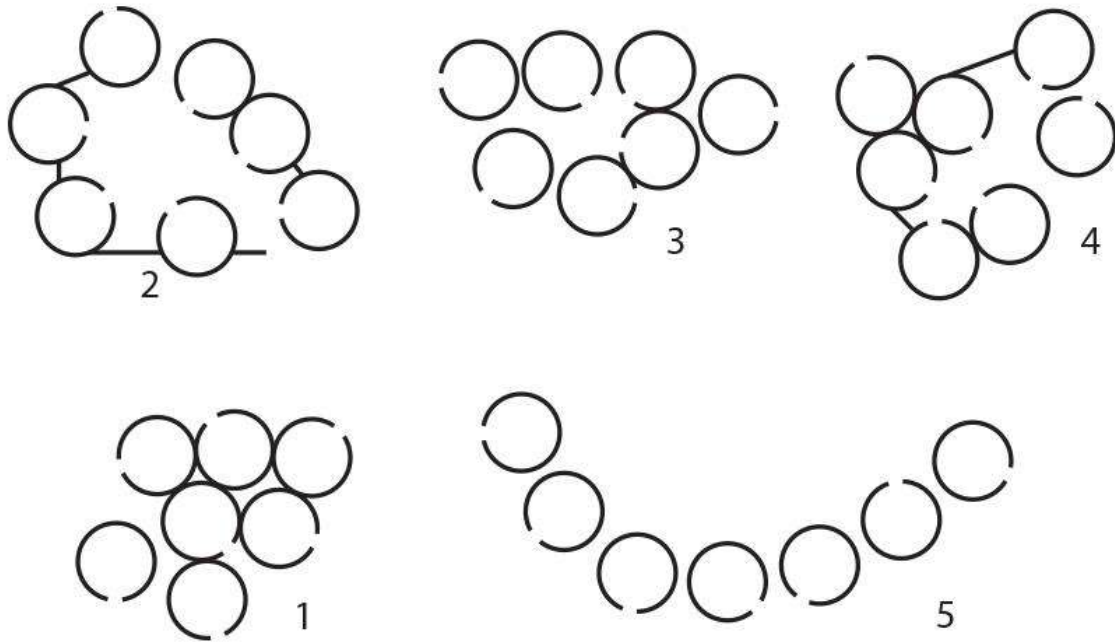
Q.34 Who is the designer of the chair shown below?



- A. Charles and Ray Eames
- B. Harry Bertoia
- C. Philippe Starck
- D. Ludwig Mies van der Rohe

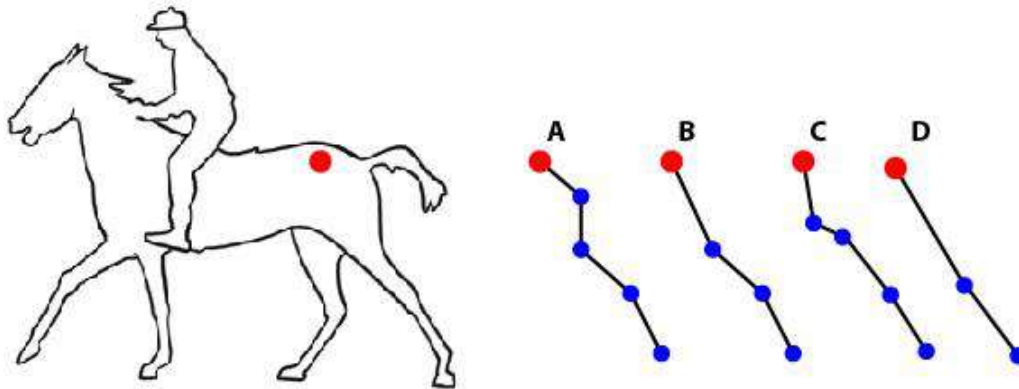
Q.35 An interactive space is a common space between entities. It offers scope for communication between those entities. In the figure below, each circular figure represents the plan of a house with a door opening. There are additional walls in some clusters. The house does not have windows. Five clusters (1, 2, 3, 4 and 5) of such houses are shown below.

If the clusters are arranged in an ascending order (lowest to highest) based on their potential for interactivity and communication within the cluster, which option is correct?



- A. 5-4-3- 2-1
- B. 3-1-4-5-2
- C. 1-3-4-2-5
- D. 1-5-3-4-2

Q.36 The drawing shows the figure of a horse with the point (marked with a red dot) where the pelvic girdle meets the vertebral column. Which of the options shows simplified bone linkages for the hind leg of the horse beginning with the red dot?

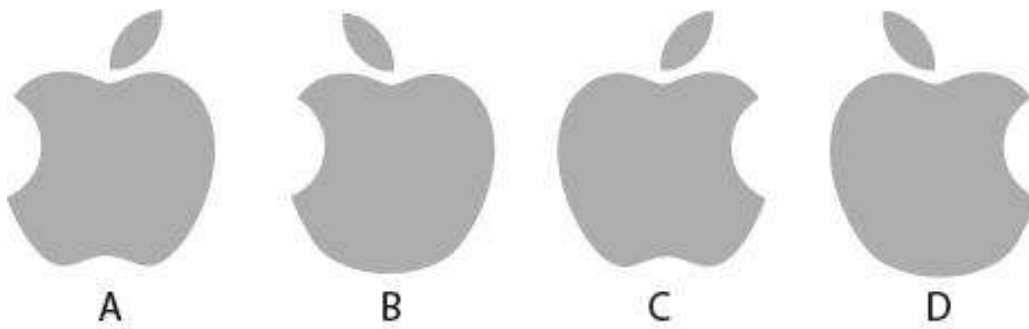


Q.37 How many differences are there between the two images shown below?



- A. 4
- B. 6
- C. 8
- D. 10

Q.38 Which of the following is the correct logo of Apple Computers?



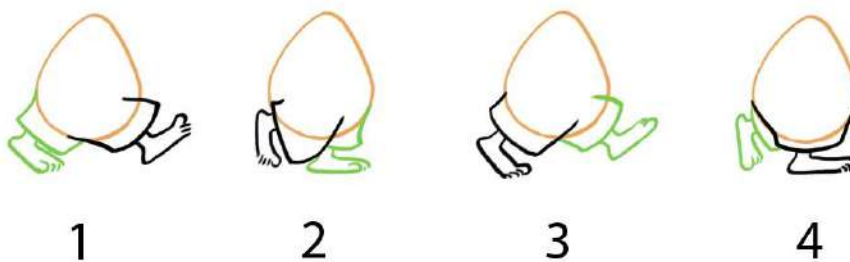
Q.39 What do the terms Kanji, Hiragana, Katakana and Jiaguwen refer to?

- A. Theatre forms
- B. Painting styles
- C. Writing systems
- D. Weapons and martial arts

Q.40 If you were to shoot for slow motion, at what frame rate would you shoot?

- A. 8 frames per second
- B. 16 frames per second
- C. 24 frames per second
- D. 64 frames per second

Q.41 Which option is the correct sequence representing a human walk?



- A. 2, 4, 3, 1
- B. 4, 3, 2, 1
- C. 3, 1, 2, 4
- D. 4, 1, 2, 3

Part B

Answer ANY ONE question out of 1, 2, 3, 4, and 5. (50 marks)

Q.1 Industrial Design

Mr. Chatterjee a right-handed person, recently met with an accident and had to get his right hand amputated. He lives alone and therefore finds it difficult to perform everyday activities. Every morning a standard 500 ml milk pouch is delivered to his residence. One of the challenges he faces is to cut open the pouch and pour the milk into a utensil to heat the milk.

Design a product that can aid him to perform the following operations with ease:

- Lifting and supporting the pouch
- Cutting the pouch
- Pouring the milk without spilling
- Discarding the empty pouch

Present your design proposal with:

- A. Neat free hand sketches showing the overall form and its features
- B. Sketches illustrating the usage scenario
- C. Indicators of materials and processes used in manufacturing
- D. A brief note articulating your design decisions (max 100 words)

Evaluation criteria: User centric design considerations, feasibility and overall effectiveness of your design solution, appropriateness of materials to be used in the manufacturing, originality of concepts, attention to details, design sensitivity and aesthetics, quality of presentation.

Answer ANY ONE question out of 1, 2, 3, 4, and 5. (50 marks)

Q.2 Communication Design

An optical illusion (also called visual illusion) can use colour, light and patterns to create images that can deceive our brains. Information gathered by the eye is processed by the brain, creating a perception that does not match the actual image.

Akihito Yujumari is an established artist and author and is releasing his 25th book which documents the greatest optical illusions of the world. He has commissioned you to design the cover for his book. Following are the details of the book:

- Title of the book: The Art of Optical Illusion
- Author: Akihito Yujumari
- Paperback: 312 pages
- Publisher: Square Book Publishers
- Language: English
- ISBN-13: 93-34567898765 (with barcode)
- Book dimensions: 22.9 x 2.2 x 25.4 cm

You are required to do the following:

- A. Design the front cover for the book that includes the author name and the title of the book.
- B. Design a spine for the book that includes the title of the book, the name of the author and the publisher's logo and name.
- C. Design a back cover for the book that includes the ISBN number with the barcode and the following paragraph about book:

"This intriguing collection contains more than 275 optical illusions that appear to change before your eyes. Akihito Yujumari has carefully selected every type of optical illusion, which intrigues the mind and delights the eye, along with notes about the science behind each illusion."

Evaluation criteria: Ability to understand the design brief, originality and creativity of ideas, clarity of thought, neatness and effectiveness of presentation, design sensitivity and attention to details.

Answer ANY ONE question out of 1, 2, 3, 4, and 5. (50 marks)

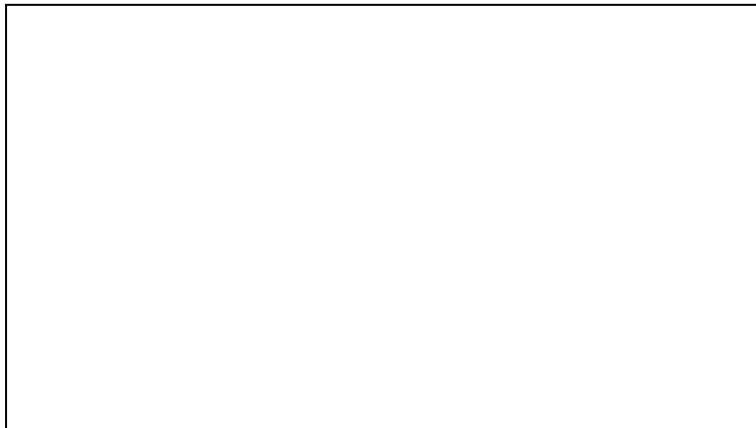
Q.3 Animation Design

An animation film for children is in the pre-production stage. The film is based on the relationship between a crow and a man. Given below is one scene from the film:

The man is about to have breakfast in the garden. On the table are a cup of tea and a plate of biscuits. There is a crow on a tree nearby eyeing the biscuits. Meanwhile, the man gets a phone call. He gets up and starts walking back and forth while talking on the phone. Seeing his chance, the crow swoops down and lands on the table. The man notices the crow about to go for the biscuits and shoos him away. He finishes his call and sits down for breakfast. The man looks up at the crow cawing insistently and feels sorry for the crow. He throws a biscuit in the air. The crow flies and catches the biscuit midair. The crow and the man are happy!

Part 1

Illustrate (create a storyboard of) the above shots as a series of picture frames (at least 10 frames). You may use more than one frame per shot if you want to. Approximate shape of the frame is shown below.



Evaluation criteria: Communication of the narrative through sequential pictures, shot composition (long shot, close up, top angle, low angle etc) and perspective.

Part 2

Design an image for the poster of the film showing the two characters - the man and the crow. Your drawings should depict the character so that it is a good reference for animation.

Evaluation criteria: Illustration skills, the attitude and the expressions and design of details in the characters (keeping in mind that this will be used for animation). Your style can be realistic or stylised.

Answer ANY ONE question out of 1, 2, 3, 4, and 5. (50 marks)

Q.4 Interaction Design

ASHA workers are local women in the villages who are trained as health educators and monitors. One key function that they do is monitor and maintain the health record of pregnant women in the village. Currently they maintain records using booklets. Now that every ASHA worker has a smart phone of her own and most villages have mobile networks, the ministry of health has decided to create a smart phone application to maintain the records. This is expected to reduce the errors in digitising data, improve the speed with which the data reaches the government, and enable better monitoring of health outcomes.

Consider the following scenario:

1. Amruta is an ASHA worker. She knows that Parvati has been pregnant since 6 months. She visits Parvati's home and opens the smartphone application. Parvati has already been registered in the database on Amruta's phone. Amruta retrieves Parvati's records.
2. The records include demographic information about Parvati such as name, age, existing children etc. as well as the earlier recorded pregnancy information such as the date of last menstrual period (LMP), the age of the foetus, the expected date of delivery, and data over the last six months for weight, blood sugar and blood pressure.
3. The ASHA worker then measures Parvati's current weight, blood sugar and blood pressure and enters this data in the application.
4. The application informs Amruta that Parvati's weight gain is not enough and her blood pressure is high. The ASHA worker then advises Parvati to visit the nearest Public Health Office at the earliest for consultation.

Do the following:

- A. Add a step of your choice to the above scenario.
- B. Draw the information architecture of an application that will support the scenario. (Information architecture shows how the information is structured and how the screens are interconnected in the application). Indicate where each of the above steps (1, 2, 3 and 4) happen in your information architecture.
- C. Design FOUR screens of the application in detail. Show the layout of the screens and detail out design elements such as the widgets and the information graphics used.
- D. Design icons for the application itself, and for depicting age of foetus, weight, blood sugar and blood pressure in the application. Draw each icon in size 5 cm by 5 cm.

Evaluation criteria: Originality, usability and appropriateness of the solution, the logic and flow in the architecture, ability to understand the needs and constraints of the users, quality of the presentation.

Answer ANY ONE question out of 1, 2, 3, 4, and 5. (50 marks)

Q.5 Mobility and Vehicle Design

A roadside bookseller wants to buy a new 2-wheeler that can also serve as a book display kiosk. He wants to use it as a kiosk during the day, but in the evenings or on the weekends, he wants to take his family members out for trips.

Design a new 2-wheeler solution that can enable him to perform the following functions:

- Travel from home to his workplace or crowded market
- Set up the kiosk for selling 100 books
- Store the books back and fold the kiosk back safely and securely
- Go out with family on the weekend

You are expected to think about the context, the target user (his needs and expectations) and the purpose of the vehicle. Your observations and insights should lead to development of unique concepts. You may choose one concept over others, develop the final rendering and detail the key features of the final concept.

Present your design proposal as follows:

- A. Identify with sketches at least five distinct factors essential in designing such a solution.
- B. Draw a neat side elevation sketch of the proposed vehicle.
- C. Draw a neat freehand perspective sketch showing the overall form and its features.
- D. Highlight the design detailing and indicate suitable materials wherever necessary.

Evaluation criteria: Design insights leading to novel ideas, concept exploration through good quality design sketches, presentation of the final concept through rendering, detailing and indication of appropriate materials used.

Mandatory question (20 marks)

Q.6 Sketching

A room of 10 ft × 10 ft dimensions has a table of 5 ft × 4 ft kept in the centre. On the table there is a match box, a watermelon cut into 2 halves and a glass of water. A person with an axe enters the room and switches on the light. With a harsh blow of the axe he breaks the table into two and leaves the room with his axe, leaving the light on.

Choose a point of view and draw a freehand perspective drawing of this scene after the person has left. You may use any medium of your choice.

Evaluation criteria: Perspective, light, shade and shadow, textures, quality of lines, scale and proportion in the composition.

Mandatory question (20 marks)

Q.7 Creativity

Imagine you are provided with a tyre, a plastic bottle, a cricket bat and a bucket. Illustrate five DIFFERENT creative ideas to use these objects in a combination at your home or a public place. You are required to use all the objects in each idea. You may use the objects more than once, change their scales, and proportions.

Evaluation criteria: Originality and diversity of your ideas and clarity of your sketches.

Mandatory question (10 marks)

Q.8 Visualization

The image given below shows a word written in a particular font. Visualize and draw the letter “d” (lower-case letter d) from the same font. The height of the letter should be 15 cm.

The image displays the word "Flows" in a large, bold, black serif font. The letters are thick and have a classic, slightly ornate appearance with distinct serifs. The 'F' and 'S' have prominent horizontal and curved strokes, while the 'l' is a simple vertical line. The 'o' and 'w' are rounded and connected, with the 'w' having a deep, narrow valley between its two peaks. The overall style is formal and elegant.

Evaluation criteria: Consistency with the existing letters and quality of rendering.