SAMPLE QUESTION PAPER
CLASS XII
ARTIFICIAL INTELLIGENCE (CODE 843)

Time: 2 Hours **Maximum Marks: 50**

General Instructions:

1. Please read the instructions carefully.
2. This Question Paper consists of **21 questions** in two sections: **Section A** & **Section B**.
3. Section A has Objective type questions whereas Section B contains Subjective type questions.
4. **Out of the given (5 + 16 =) 21 questions, a candidate has to answer (5 + 10 =) 15 questions in the allotted (maximum) time of 2 hours.**
5. All questions of a particular section must be attempted in the correct order.
6. **SECTION A—OBJECTIVE TYPE QUESTIONS (24 MARKS):**
   (i) This section has 05 questions.
   (ii) There is no negative marking.
   (iii) Do as per the instructions given.
   (iv) Marks allotted are mentioned against each question/part.
7. **SECTION B—SUBJECTIVE TYPE QUESTIONS (26 MARKS):**
   (i) This section contains 16 questions.
   (ii) A candidate has to do 10 questions.
   (iii) Do as per the instructions given.
   (iv) Marks allotted are mentioned against each question/part.

SECTION A—OBJECTIVE TYPE QUESTIONS

1. Answer any 4 out of the given 6 questions on Employability Skills. **(4 × 1 = 4 marks)**

(i) During a group discussion, Priya is explaining her point of view on a project idea. Midway through her explanation, Arun interrupts and starts sharing his own thoughts without letting Priya complete her sentence. If you were in Arun's place and wanted to follow the T of RESPECT in active listening, what should you do?

(a) Interrupt politely if you feel your point is important.

(b) Start speaking as soon as you think you understand her point.

(c) Speak at the same time so both ideas are heard together.

(d) Wait until Priya finishes speaking, then respond to her points.

Ans. (d) Wait until Priya finishes speaking, then respond to her points.

(ii) _____ is a trait, wherein individuals show tendency towards anxiety, self-doubt, depression, shyness and other similar negative feelings. (Fill in the blank)

Ans. Neuroticism

(iii) Match the following skills with their correct descriptions:

Skill	Description
1. Positive thinking	(a) To be aware of your strengths and make the best out of them.
2. Result orientation	(b) To think that one can get things done and be happy.
3. Self-awareness	(c) To dream big and achieve the desired or set goals.

(a) 1 → b, 2 → c, 3 → a

(b) 1 → a, 2 → b, 3 → c

(c) 1 → b, 2 → a, 3 → c

(d) 1 → c, 2 → a, 3 → b

Ans. (a) 1 → b, 2 → c, 3 → a

(iv) What happens when you change the layout of a slide?

(a) The arrangement of content (text, images, shapes) changes.

(b) The format of the text changes.

(c) New slide is inserted.

(d) The title gets aligned to the center of the slide.

Ans. (a) The arrangement of content (text, images, shapes) changes.

(v) **Assertion (A):** Economists, psychologists, sociologists and management experts define entrepreneurs differently.

Reason (R): The definition of an entrepreneur varies depending on whether the focus is on resources, psychological drive, societal contribution or vision with action.

(a) Both A and R are correct and R is the correct explanation for A.

(b) Both A and R are correct but R is not the correct explanation for A.

(c) A is correct but R is not correct.

(d) A is not correct but R is correct.

Ans. (a) Both A and R are correct and R is the correct explanation for A.

(vi) Appropriate technology is small-scale, environment-friendly technology suited to local needs. It gets the job done using locally available resources in a sustainable manner. (State whether this is True/False)

Ans. True

2. Answer any 5 out of the given 6 questions. **(5 × 1 = 5 marks)**

(i) Match the correct question from Column A to the correct step of the Data Science Methodology in Column B.

Column A	Column B
1. In what way can the data be visualized to get to the required answer?	(a) Data understanding
2. How can you use the data to answer the question?	(b) Business understanding
3. What is the problem that you are trying to solve?	(c) Analytic approach
4. Is the data collected representative of the problem to be solved?	(d) AI Modelling

(a) 1 → a, 2 → b, 3 → c, 4 → d

(b) 1 → d, 2 → c, 3 → b, 4 → a

(c) 1 → b, 2 → a, 3 → d, 4 → c

(d) 1 → c, 2 → b, 3 → a, 4 → d

Ans. (b) 1 → d, 2 → c, 3 → b, 4 → a

(ii) The given diagram shows the working of a vision-based system that identifies objects in an image. What is the other name for this technology?

Ans. Machine Vision

(iii) Which law suggests that increasing computing power over time makes it easier to handle large volumes of data?

(a) Boyle's Law

(b) Murphy's Law

(c) Newton's Law

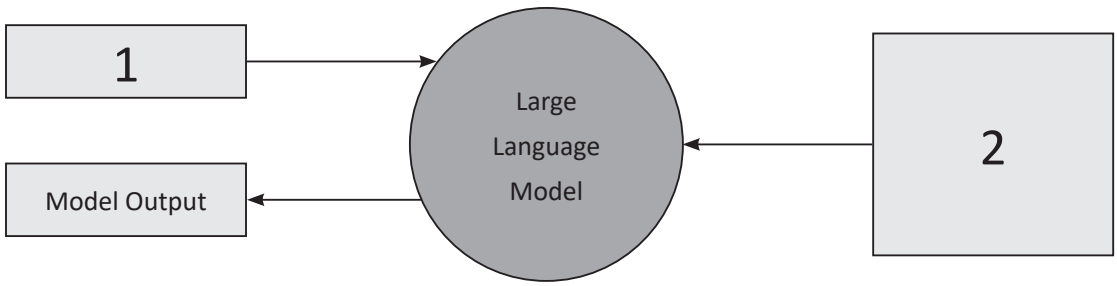
(d) Moore's Law

Ans. (d) Moore's Law

(iv) An Artificial Neural Network (ANN) with two or more hidden layers is known as a _____. (Fill in the blank)

Ans. Deep Neural Network

(v) What will come in place of '1' and '2'?



Ans. 1 → User Prompt; 2 → Training Data

(vi) In the context of data storytelling, a valuable and meaningful observation or understanding derived from analysing data is called:

(a) Prediction (b) Pattern

(c) Insight (d) Correlation

Ans. (c) Insight

3. Answer any 5 out of the given 6 questions. **(5 × 1 = 5 marks)**

(i) _____ is the process of selecting, modifying or creating new features from raw data to improve the performance of machine learning models. (Fill in the blank)

Ans. Feature Engineering

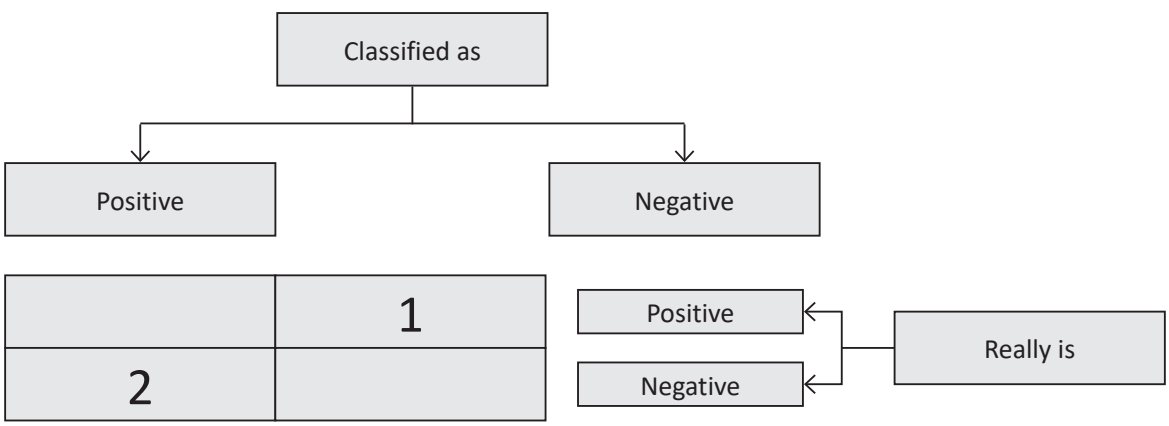
(ii) What will come in place of 1 and 2?

(a) True Positive, False Positive

(b) False Positive, True Negative

(c) True Negative, False Negative

(d) False Negative, False Positive



Ans. (d) False Negative, False Positive

(iii) Match the image processing technique in Column A with its correct description in Column B.

Column A	Column B
1. Edge Detection	(a) Finds points where two or more edges meet
2. Corner Detection	(b) Identifies boundaries between regions with large intensity change
3. Texture Analysis	(c) Extracts features like smoothness or repetition
4. Color-based Feature Extraction	(d) Measures color distribution to distinguish objects

(a) 1 → a, 2 → b, 3 → c, 4 → d (b) 1 → a, 2 → c, 3 → b, 4 → d

(c) 1 → b, 2 → a, 3 → c, 4 → d (d) 1 → c, 2 → b, 3 → a, 4 → d

Ans. (c) 1 → b, 2 → a, 3 → c, 4 → d

(iv) Big Data refers to extremely large and complex datasets that regular computer programs and databases cannot handle. Which of the following is NOT one of its main sources?

(a) Printed Library catalogue data (b) Transactional data

(c) Machine data (d) Social data

Ans. (a) Printed Library catalogue data

(v) Identify the **odd one out** from the following activation functions:

(a) Sigmoid Function (b) Tanh Function

(c) ReLU (Rectified Linear Unit) (d) Linear Regression

Ans. (d) Linear Regression

(vi) Refer to the Venn diagram that illustrates the three key elements of Data Storytelling: Narrative, Visuals and Data. What term should replace the question mark (?) in the center where all the three elements intersect?

Ans. Change

4. Answer any 5 out of the 6 given questions. **(5 × 1 = 5 marks)**

(i) **Assertion (A):** The diagnostic measures phase is used to ensure that the model is working as intended and to refine it if necessary.

Reason (R): In this phase, predictive models can be evaluated using decision trees, while descriptive models can be tested with known outcomes to check alignment with the design.

(a) Both A and R are correct and R is the correct explanation for A.

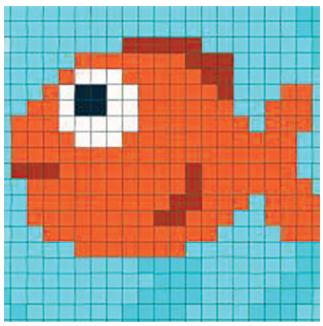
(b) Both A and R are correct but R is not the correct explanation for A.

(c) A is correct but R is not correct.

(d) A is not correct but R is correct.

Ans. (a) Both A and R are correct and R is the correct explanation of A.

(ii) When a computer processes an image, it perceives it as a collection of tiny squares known as _____.



Ans. Pixels

(iii) Which emerging technology in Big Data analytics promises unprecedented processing power and can solve complex problems much faster than classical computers?

(a) Cloud Computing (b) Quantum Computing

(c) Edge Computing (d) Parallel Processing

Ans. (b) Quantum Computing

(iv) In a neural network, which component defines how weights and biases are adjusted during training?

(a) Activation function (b) Learning rule

(c) Loss function (d) Hidden layer

Ans. (b) Learning rule

(v) Name the two neural networks used in a Generative Adversarial Network (GAN).

Ans. Generator, Discriminator

(½ mark for each correct answer)

(vi) Match the type of Generative AI application to the correct AI tool.

AI Tool	Application Type
1. Stable Diffusion	(a) Audio Generation
2. ChatGPT	(b) Text Generation
3. Google's Lumiere	(c) Video Generation
4. Meta's AI Voicebox	(d) Image Generation

(a) 1 → c, 2 → d, 3 → a, 4 → b (b) 1 → a, 2 → c, 3 → b, 4 → d

(c) 1 → d, 2 → b, 3 → c, 4 → a (d) 1 → c, 2 → b, 3 → d, 4 → a

Ans. (c) 1 → d, 2 → b, 3 → c, 4 → a

5. Answer any 5 out of the given 6 questions. **(5 × 1 = 5 marks)**

(i) Feedback is the last stage of data science methodology that helps to refine the model and assess it for performance and impact. (State whether this is True/False)

Ans. True

(ii) **Assertion (A):** Image normalization adjusts the pixel values of an image so they fall within a consistent range, such as 0–1 or -1 to 1.

Reason (R): It ensures that all images in a dataset have a similar scale, which helps the model learn better.

(a) Both A and R are correct and R is the correct explanation for A.

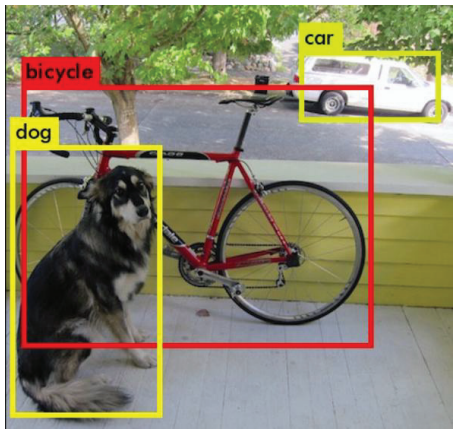
(b) Both A and R are correct but R is not the correct explanation for A.

(c) A is correct but R is not correct.

(d) A is not correct but R is correct.

Ans. (a) Both A and R are correct and R is the correct explanation for A.

(iii) The image shows bounding boxes and labels for multiple objects like a bicycle, dog, and car. Which computer vision task does this represent?



(a) Image Classification
(b) Object Detection
(c) Instance Segmentation
(d) Semantic Segmentation

Ans. (b) Object Detection

(iv) Match the type of neural network in Column A with its corresponding task in Column B.

Column A	Column B
1. Perceptron	(a) Classification
2. Convolutional Neural Network (CNN)	(b) Object detection
3. Recurrent Neural Network (RNN)	(c) Machine translation

(a) 1 → c, 2 → a, 3 → b
(b) 1 → a, 2 → c, 3 → b
(c) 1 → b, 2 → a, 3 → c
(d) 1 → c, 2 → b, 3 → a

Ans. (b) 1 → a, 2 → c, 3 → b

(v) _____ is the compressed representation of the actual data in Variational Autoencoders. (Fill in the blank)

Ans. Latent space

(vi) A chart used in stock, forex, commodity and option trading that shows price movements (open, high, low, close) is a _____.

(a) Line chart
(b) Bar chart
(c) Facet grid chart
(d) Candle stick chart

Ans. (d) Candle stick chart

SECTION B—SUBJECTIVE TYPE QUESTIONS

Answer any 3 out of the given 5 questions on Employability Skills in 20–30 words each. **(3 × 2 = 6 marks)**

6. "Wow!", "Oh no!", "Thanks!", "Help!"—What are these words known as? Explain.

Ans. The given words **"Wow!", "Oh no!", "Thanks!", "Help!"** are known as **interjections**.

They are words that express strong emotions, such as happiness, surprise, anger or pain.

(1 mark for identifying the word *interjection*; 1 mark for explanation)

7. Write any two steps a person can take to overcome personality disorders.

Ans.
- Talk to someone. Most often, it helps to share your feelings.
- Look after your physical health. A healthy body can help you maintain a healthy mind.
- Build confidence in your ability to handle difficult situations.
- Engage in hobbies, such as music, dance and painting. These have a therapeutic effect.
- Stay positive by choosing words like 'challenges' instead of 'problems'.

(any 2 points; 1 mark per point)

8. In a spreadsheet, you can position the text in a cell to the left, right or center.

(a) Name this feature of a spreadsheet.

(b) How are numbers and text positioned in a cell by default?

Ans. (a) Alignment feature

(b) Default Positioning:
- Text is left-aligned by default.
- Numbers are right-aligned by default.

(1 mark for identifying the term *alignment*; ½ mark each for correctly stating the default text alignment and number alignment.)

9. Identify the type of attitude the following entrepreneur is showing:

(a) Ganesh was always interested in hairstyling. He knew the latest international styles and would keep trying them on his friends. But his family wanted him to work in a software company. Encouraged by friends, he spoke to his family and convinced them of his talent and business skills. With their support, he set up his own salon.

(b) Malvika has a book selling business. One day, a shipment of her books gets lost. This creates a lot of problems for her customers. She apologises to them and works hard for two days to get a new shipment by the next day.

Ans. (a) Taking initiative

(b) Perseverance (1 mark each)

10. What is meant by waste exchange? How does waste exchange help in reducing waste disposal?

Ans. Waste exchange is when the waste product of one process becomes the raw material for another. It helps in reducing waste disposal by reusing waste, thereby minimizing the amount sent to landfills.

(1 mark for explaining the meaning of waste exchange.

1 mark for explaining how it helps in reducing waste disposal.)

Answer any 4 out of the given 6 questions in 20 – 30 words each. **(4 × 2 = 8 marks)**

11. Define Data Science Methodology. How many steps are there in it?

Ans. Data Science Methodology is a process with a prescribed sequence of iterative steps that data scientists follow to approach a problem and find a solution.

It consists of ten steps.

(prescribed sequence of iterative steps – ½ mark
data scientists follow – ½ mark
approach a problem and find a solution – ½ mark 10 steps – ½ mark)

12. Computer vision, a vital part of artificial intelligence, faces several hurdles as it strives to make sense of the visual world around us. Explain any two challenges related to computer vision.

Ans. (a) **Reasoning and Analytical Issues:** Computer vision relies on more than just image identification; it requires accurate interpretation. Robust reasoning and analytical skills are essential for defining attributes within visual content. Without such capabilities, extracting meaningful insights from images becomes challenging, limiting the effectiveness of computer vision systems.

(b) **Difficulty in Image Acquisition:** Image acquisition in computer vision is hindered by various factors like lighting variations, perspectives and scales. Understanding complex scenes with multiple objects and handling occlusions adds to the complexity. Obtaining high-quality image data amidst these challenges is crucial for accurate analysis and interpretation.

(c) **Privacy and Security Concerns:** Vision-powered surveillance systems raise serious privacy concerns, potentially infringing upon individuals' privacy rights. Technologies like facial recognition and detection prompt ethical dilemmas regarding privacy and security. Regulatory scrutiny and public debate surround the use of such technologies, necessitating careful consideration of privacy implications.

(d) **Duplicate and False Content:** Computer vision introduces challenges related to the proliferation of duplicate and false content. Malicious actors can exploit vulnerabilities in image and video processing algorithms to create misleading or fraudulent content. Data breaches pose a significant threat, leading to the dissemination of duplicate images and videos, fostering misinformation and reputational damage. (any 2 points; ½ mark for each challenge; ½ mark for its relevant explanation)

13. Differentiate between Batch Processing and Stream Processing.

Ans.

Batch Processing	Stream Processing
Processes large volumes of data all at once within a specific time span.	Processes continuous streams of data immediately as it is produced.
Takes more time to process data.	Takes less time (seconds or milliseconds) to process data.

(½ mark for each point)

14. Consider the following perceptron that predicts the academic performance of a student with inputs, weights and a bias of **–2**. Calculate Output/Predicted outcome **($\hat{y}$)** for the given scenario.

Factor	Input	Weight
Study Hours	1	6
Distractions (TV/Games)	0	3
Sleep Quality	1	2

Ans. $\hat{y} = \Sigma w_i x_i + \text{bias}$

$= w_1x_1 + w_2x_2 + w_3x_3 + \text{bias}$

Substituting values of w_1, x_1 , w_2, x_2 ,w_3 , x_3, bias, we get

$\hat{y} = (6 \times 1) + (3 \times 0) + (2 \times 1) - 2$

$= 6 + 0 + 2 - 2$

= 6 (1 mark for formula; 1 mark for calculations)

15. What distinguishes generative models from discriminative models?

Ans. Generative models aim to understand and replicate the underlying data distribution to generate new samples, while discriminative models focus on distinguishing between different data classes.

(1 mark each for a correct difference)

16. List the steps involved in creating a compelling story through data.

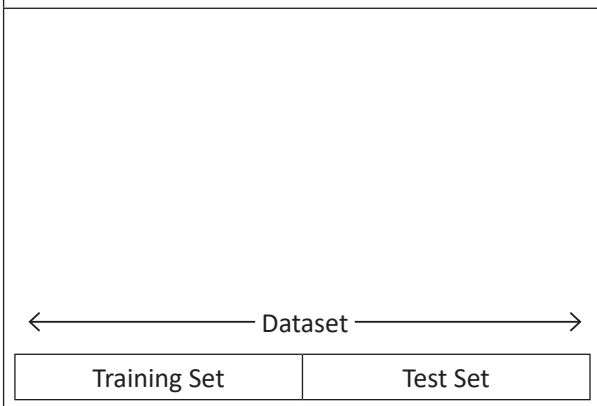
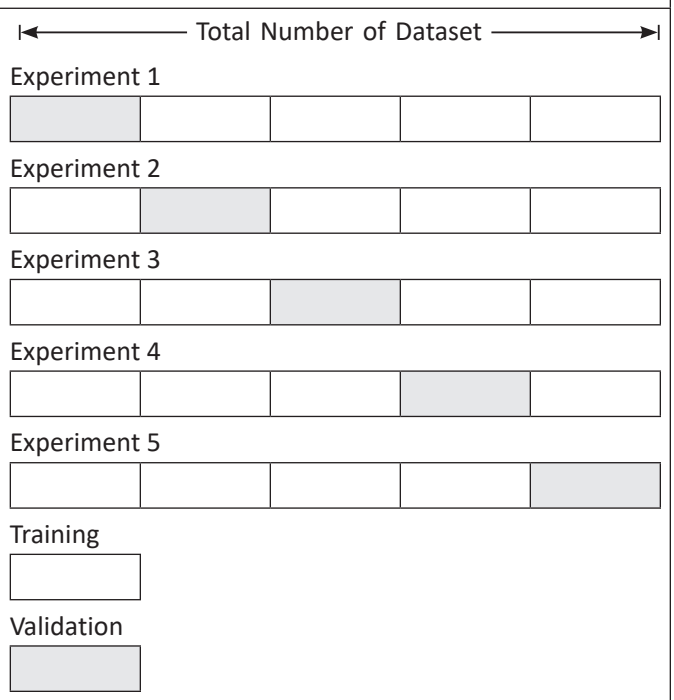
Ans.

- Collect and organize the data.
- Use proper visualization tools to present the data.
- Observe relationships between data.
- Create a simple narrative hidden in the data for the audience.
  (½ mark for each point)

Answer any 3 out of the given 5 questions in 50–80 words each **(3 × 4 = 12 marks)**

17. Validating the machine learning model during the training and development stages is crucial for ensuring accurate predictions. Differentiate between the Train-Test Split and Cross-Validation methods and support your answer with a neat, labelled diagram.

Ans.

Train-Test Split	**Cross Validation**
	
Normally applied on large datasets	Normally applied on small datasets
Divides the data into training dataset and testing dataset.	Divides a dataset into subsets (folds), trains the model on some folds, and evaluates its performance on the remaining data.
Clear demarcation on training data and testing data.	Every data point at some stage could be in either testing or training dataset.

18. A global e-commerce company handles millions of transactions every day. Identify the **characteristics of Big Data** you can relate to in the following scenarios and explain them in detail:

(a) Customers place orders online, and the website records thousands of clicks, searches and transactions every second.

(b) The company's servers store petabytes of customer orders, payment details and product listings collected over years.

(c) The stored data comes in different formats — structured (databases of products), semi-structured (XML, JSON order files) and unstructured (customer reviews, product photos, videos).

(d) Sometimes, the system collects incomplete or duplicate records, and before analysis, the team removes errors to ensure the information is accurate and trustworthy.

Ans. (a) Velocity

- Velocity refers to the speed at which data is generated, delivered and analyzed.
- In the present digital world, millions of people are accessing and storing information online, leading to high-speed data flow, *e.g.*, the website recording thousands of clicks, searches and transactions every second reflects high data generation speed.

(b) Volume

- Volume refers to the massive quantity of data generated daily, which may range from terabytes to exabytes.

- As online platform usage grows, the quantity of data stored increases exponentially, *e.g.*, petabytes of orders, payment details and product listings stored over years represent the large volume characteristic.

(c) Variety

- Variety refers to the different types and formats of data in Big Data — structured, semi-structured and unstructured.
- These diverse formats provide richer information but require different processing techniques, *e.g.*, structured product databases, semi-structured XML/JSON order files, and unstructured reviews, images and videos.

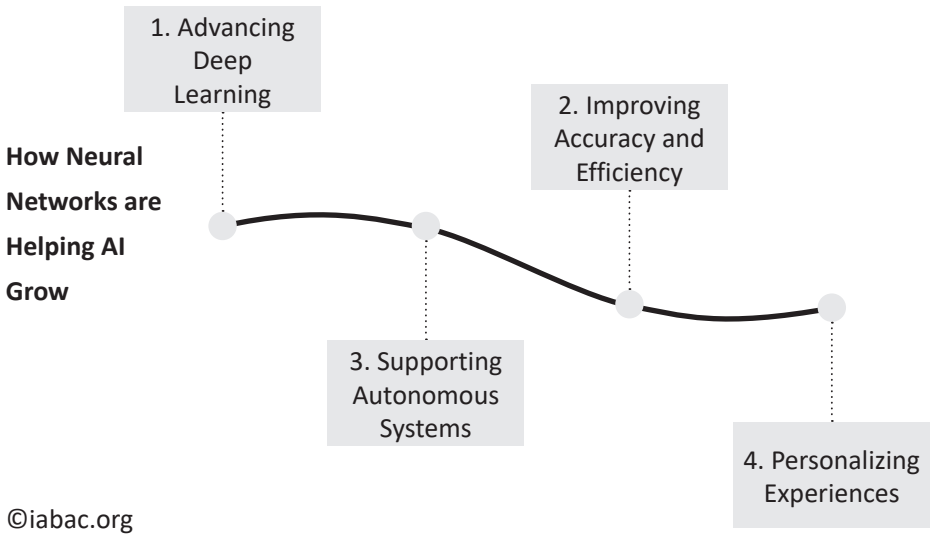
(d) Veracity

- Veracity deals with the accuracy, quality and trustworthiness of data.
- Not all collected data is useful; data cleaning is essential to remove errors and inconsistencies before analysis, *e.g.*, removing incomplete or duplicate records to ensure the dataset is reliable.

(½ mark for identifying each correct term ; ½ mark for each relevant explanation)

19. Explain the role of neural networks in the future of AI.

Ans.



- **Advancing Deep Learning** → Neural Networks with multiple layers power Deep Learning, helping machines understand complex patterns in large datasets.
- **Improving Accuracy and Efficiency** → They analyze vast data and make highly accurate predictions (*e.g.*, detecting diseases from medical images), boosting efficiency in real-world tasks.
- **Supporting Autonomous Systems** → Neural networks provide the perception and decision-making capabilities needed for autonomous systems (*e.g.*, self-driving cars, robots, drones), enabling real-time sensing, control and safe automation.
- **Personalizing Experiences** → By analyzing user preferences, Neural Networks power recommendation systems (shopping, music, movies), creating tailored experiences.

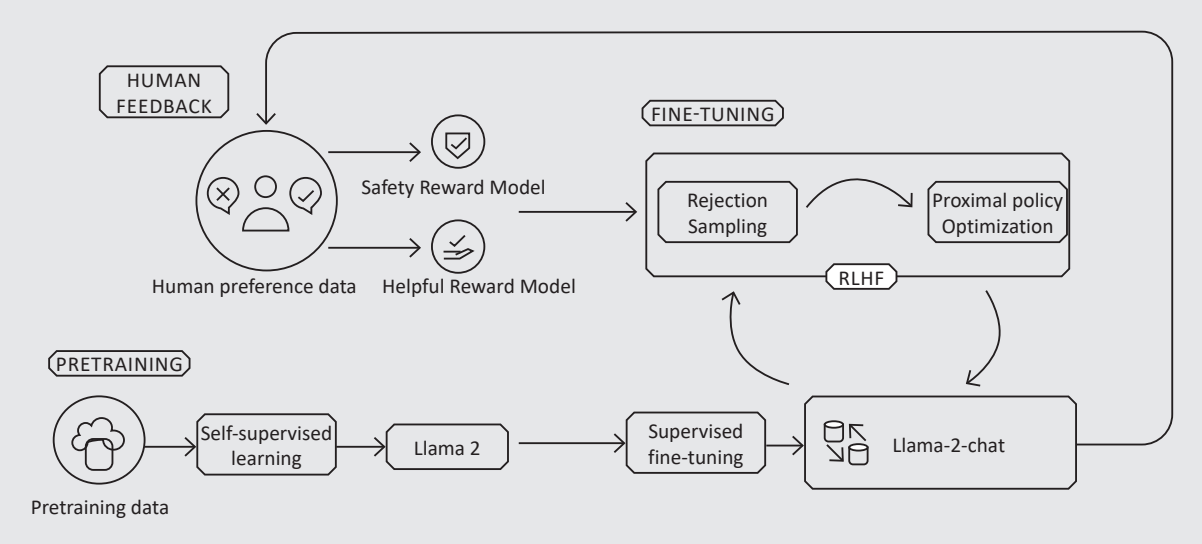
(1 mark for each point)

20. Explain how Meta's LLaMA is unique compared to traditional LLMs with a neat diagram.

Ans.

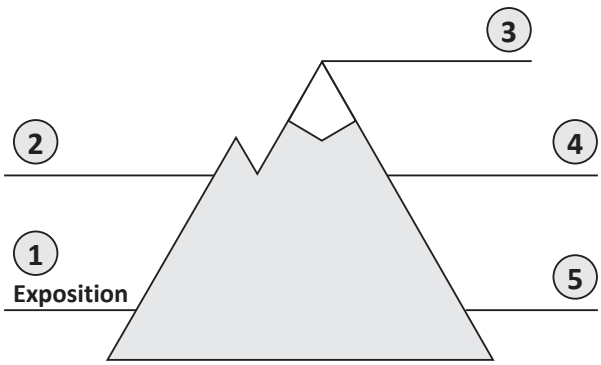
- **Disruptive Training Approach:** LLaMA is trained on publicly available text and code, unlike traditional LLMs that rely on proprietary datasets. This promotes transparency in AI research and makes the model more accessible. Additionally, it uses efficient training techniques, requiring less computational power, which improves scalability across devices.
- **Flexibility through Multi-Model Design:** Meta released LLaMA in multiple versions, ranging from 7 billion to 65 billion parameters. This provides flexibility — smaller models can run on devices with limited resources for everyday tasks, while larger models handle complex NLP applications with higher performance.

- **Impressive Results Despite Public Data:** Even though it uses open-source data, LLaMA delivers results that are competitive with or better than larger proprietary LLMs. It performs strongly in tasks like text summarization and answering questions, proving the effectiveness of its training approach.



(1 mark for diagram; 1 mark for each point)

21. The image illustrates Freytag's Pyramid, a classic narrative structure. While **(1) Exposition** introduces the story and characters, identify and briefly explain the stages labelled as **2, 3, 4** and **5** in the diagram.



Ans.

2. **Rising action:** The series of events that build up to the climax of the story.
3. **Climax:** The most intense or important point within the story. It is often an event in which the fortune of the protagonist turns for the better or worse in the story.
4. **Falling action:** The rest of the events that unravel after the main conflict has occurred, but before the final outcome is decided.
5. **Conclusion:** The conclusion of the story where all of the conflicts are resolved and outstanding details are explained.

(½ mark for identifying the term; ½ mark for brief explanation)