

DETAILED QUESTION BANK

Introduction to Artificial Intelligence (U.G. / 5th Semester — 3-Credit VAC)

Structure per Unit: 20 Short Questions (1 Mark) | 15 Questions (2 Marks) | 10 Questions (5 Marks) | 5 Questions (8 Marks)

UNIT 1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

1 Mark Questions (1 Mark Each)

- Q1. Define the term 'Artificial Intelligence'.
- Q2. What constitutes an 'Intelligent Machine'?
- Q3. Give one real-life example of a Smart System.
- Q4. Who is widely considered the father of Artificial Intelligence?
- Q5. Mention any one fundamental scope of AI in modern engineering.
- Q6. What is a rule-based system in Artificial Intelligence?
- Q7. State the primary objective of Natural Language Processing (NLP).
- Q8. Define 'Computer Vision' in a single sentence.
- Q9. What is the Turing Test designed to evaluate?
- Q10. Name one classical search technique used in AI problem solving.
- Q11. What is the core difference between data and intelligence?
- Q12. Give an example of an early landmark milestone in the history of AI.
- Q13. Define 'State Space Search' in the context of problem solving.
- Q14. What is the function of an inference engine in rule-based setups?
- Q15. Name one daily application that relies heavily on Computer Vision.
- Q16. What does 'Heuristic Search' mean briefly?
- Q17. State one major limitation of early rule-based expert systems.
- Q18. What is syntax parsing in the context of NLP?
- Q19. True or False: Smart systems must possess human physical characteristics.
- Q20. Define 'Rational Agent' in AI.

2 Marks Questions (2 Marks Each)

- Q1. Differentiate between Human Intelligence and Artificial Intelligence.
- Q2. Explain the operational scope of modern 'Smart Systems'.
- Q3. Briefly describe how a Rule-Based System processes conditional parameters.

- Q4.** Illustrate how Computer Vision mimics human visual processing patterns.
- Q5.** What are the main components of an AI problem-solving agent?
- Q6.** Contrast Uninformed (Blind) Search with Informed (Heuristic) Search.
- Q7.** Why is understanding natural language contextually difficult for computers? Explain with an example.
- Q8.** Elaborate on how the history and evolution of AI transitioned from symbolic rules to data-driven code.
- Q9.** Describe the role of a Knowledge Base within expert rule configurations.
- Q10.** Explain the concept of 'Bounded Rationality' in intelligent agents.
- Q11.** What is the difference between Weak AI (Narrow AI) and Strong AI (AGI)?
- Q12.** Explain how image segmentation serves as a fundamental building block in Computer Vision.
- Q13.** What are the key steps involved in Natural Language Processing pipeline execution?
- Q14.** Explain why search techniques are vital when direct algebraic solutions do not exist for complex problems.
- Q15.** Identify and explain two major factors that triggered the historical 'AI Winters'.

5 Marks Questions (5 Marks Each)

- Q1.** Discuss the detailed architectural setup, structural components, and processing flow of a standard Rule-Based System.
- Q2.** Analyze the historical evolution of Artificial Intelligence, marking key achievements from the Dartmouth workshop to modern deep models.
- Q3.** Compare and contrast the procedural execution, optimality, and time complexity of Breadth-First Search (BFS) and Depth-First Search (DFS).
- Q4.** Explain how Natural Language Processing handles structural challenges such as syntactic ambiguity and semantic parsing.
- Q5.** Elaborate on the definition, architecture, and functional boundaries of modern Smart Systems in urban infrastructure.
- Q6.** Detail the foundational steps involved in building a complete Computer Vision pipeline, from image acquisition to object categorization.
- Q7.** Explain the state-space formulation strategy used by intelligent machines to model complex multi-step problems systematically.
- Q8.** Examine how rule-based architectures deal with uncertainty, and explain why they struggle when handling unstructured real-world datasets.
- Q9.** Analyze how modern definitions of intelligence vary when evaluated across automation efficiency versus autonomous cognitive flexibility.
- Q10.** Describe the role of heuristic evaluation functions in minimizing search trees, referencing an illustrative graph example.

8 Marks Questions (8 Marks Each)

- Q1.** Provide a comprehensive architectural blueprint of a classic Rule-Based Expert System. Detail how the working memory, knowledge base, and inference engine interact through forward versus backward chaining paradigms.
- Q2.** Evaluate the evolution of AI search methodologies. Explain how problem-solving agents navigate search spaces, contrast blind search strategies against informed heuristics, and prove how A* search secures path optimality.

Q3. Deconstruct the complete domain of Natural Language Processing and Computer Vision as introductory pillars of AI. Analyze their foundational workflows, core algorithmic demands, and highlight major industrial tasks they automate.

Q4. Examine the historical trajectory of Artificial Intelligence from its early academic origins, through structural algorithmic shifts, down to the design of contemporary intelligent machines. Detail the breakthroughs that broke through the 'AI Winters'.

Q5. Synthesize an evaluation framework detailing the exact boundaries of automated problem solving. Discuss how defining an AI problem requires explicit state spaces, initial/goal criteria, and operational rules, evaluating the trade-offs between algorithmic accuracy and computational complexity.

UNIT 2: MACHINE LEARNING FUNDAMENTALS

1 Mark Questions (1 Mark Each)

- Q1.** Define the foundational term 'Machine Learning'.
- Q2.** What represents 'Data-Driven Intelligence'?
- Q3.** Name the three primary paradigms of Machine Learning.
- Q4.** What is labeled data in the context of supervised frameworks?
- Q5.** Give an example of a typical continuous regression task.
- Q6.** What is the core target of a classification algorithm?
- Q7.** Define 'Clustering' in unsupervised environments.
- Q8.** What is the main goal of Dimensionality Reduction?
- Q9.** Name the basic biological inspiration behind artificial Neural Networks.
- Q10.** What structure does a Decision Tree mimic to perform splits?
- Q11.** What does 'k' represent in the k-NN algorithm?
- Q12.** Define Deep Learning in terms of structural layer hierarchy.
- Q13.** What metric calculates the overall ratio of correct predictions over total samples?
- Q14.** Write the mathematical formula or conceptual ratio for 'Precision'.
- Q15.** Define 'Recall' in binary classification metrics.
- Q16.** What type of learning relies on reward/punishment feedback signals?
- Q17.** What is an overfitted model in machine learning?
- Q18.** Name one standard real-life application of predictive regression.
- Q19.** What unsupervised method is commonly used to group customer profiles?
- Q20.** What does a high precision score signify about false positives?

2 Marks Questions (2 Marks Each)

- Q1.** Differentiate clearly between Supervised and Unsupervised Learning paradigms.
- Q2.** Explain the role of training data versus test verification data.
- Q3.** How does Regression differ fundamentally from a Classification task?

- Q4.** Elaborate on the mechanism of Reinforcement Learning through environmental interactions.
- Q5.** Explain why Dimensionality Reduction is necessary when dealing with high-dimensional datasets.
- Q6.** Describe the basic node-and-link processing layer architecture of a simple Neural Network.
- Q7.** How does a Decision Tree implement feature selection criteria at its root?
- Q8.** Explain the working mechanic of the k-Nearest Neighbors (k-NN) classification choice.
- Q9.** Why is accuracy sometimes a misleading performance metric in highly imbalanced datasets?
- Q10.** Contrast the core concept of Deep Learning with traditional shallow Machine Learning systems.
- Q11.** Explain the trade-off and mathematical relationship between Precision and Recall performance scores.
- Q12.** What is meant by Clustering, and how does it map data patterns without external output labels?
- Q13.** How do real-life recommendation engines exploit data-driven intelligence to suggest items?
- Q14.** Define the concept of an activation function within artificial neural network nodes.
- Q15.** Explain how a model uses a confusion matrix layout to extract evaluation parameters.

5 Marks Questions (5 Marks Each)

- Q1.** Provide an analytical breakdown of Supervised, Unsupervised, and Reinforcement Learning, detailing their distinct data needs and feedback pathways.
- Q2.** Explain the mathematical goals and procedural steps of Regression models compared against multi-class Classification routines.
- Q3.** Detail the concepts of Clustering and Dimensionality Reduction, explaining how algorithms like K-Means and Principal Components manage unlabelled features.
- Q4.** Describe the inner architecture of a multi-layer Perceptron Neural Network, detailing the role of input, hidden, and output node operations.
- Q5.** Analyze the structural splitting logic of Decision Trees, discussing how entropy or index parameters govern tree construction.
- Q6.** Explain the k-NN classification algorithm step-by-step, evaluating the performance influence of 'k' parameter selection choices.
- Q7.** Deconstruct Deep Learning foundations by examining how hierarchical hidden architectures extract abstract representations from raw input strings.
- Q8.** Evaluate model performance parameters by detailing the definitions, expressions, and trade-offs between Accuracy, Precision, and Recall scores.
- Q9.** Discuss real-life machine learning applications across automated medical diagnosis and financial fraud risk mitigation patterns.
- Q10.** Examine the core challenges of model training, highlighting the indicators, consequences, and resolution paths for Underfitting and Overfitting.

8 Marks Questions (8 Marks Each)

- Q1.** Construct a comprehensive architectural review of modern machine learning paradigms. Systematically evaluate Supervised, Unsupervised, and Reinforcement frameworks, profiling their mathematical goals, input requirements, and performance boundaries.
- Q2.** Deconstruct the complete life cycle of training an analytical Machine Learning model. From data ingest optimization down to validation checking, detail how parameter variations alter structural boundaries, referencing

specific structural layers.

Q3. Formulate an evaluation framework for algorithm metrics. Detail the mathematical composition of Accuracy, Precision, and Recall, tracking their shifting values across severely skewed test datasets, and provide mitigation methods.

Q4. Analyze structural tree-based and proximity-based algorithms. Explain the complete operational mathematics behind Decision Tree branch evaluations and contrast it against the distance-based logic of k-Nearest Neighbors (k-NN) classifiers.

Q5. Develop an extensive technical comparison between shallow Machine Learning systems and Deep Learning deep architectures. Map how multi-layered neural systems extract high-level feature sets, and evaluate the trade-offs regarding compute demands.

UNIT 3: AI APPLICATIONS & TOOLS (STREAM SPECIFIC)

1 Mark Questions (1 Mark Each)

- Q1.** Name one prominent application of Artificial Intelligence in modern healthcare systems.
- Q2.** How can AI tools optimize yields in the agricultural sector?
- Q3.** Mention one application of machine intelligence in corporate governance.
- Q4.** What does Business Analytics use AI for primarily?
- Q5.** Name a dominant text-generation tool developed by OpenAI.
- Q6.** Which Google-engineered LLM tool serves as a primary competitor to ChatGPT?
- Q7.** What is Microsoft Copilot utilized for in coding and productivity environments?
- Q8.** Name the advanced LLM system designed by Anthropic.
- Q9.** What creative task does Canva AI streamline for graphic designers?
- Q10.** What digital media format does Runway ML specialize in generating and editing?
- Q11.** What interactive web tool allows beginners to train models using a simple webcam interface?
- Q12.** Name the pioneering AI model designed by OpenAI for generating high-fidelity images from text prompts.
- Q13.** What creative corporate suite includes the Firefly generative engine?
- Q14.** What automation task does Pictory specialize in doing for content creators?
- Q15.** What platform serves as Google's developer prototyping environment for accessing Gemini APIs?
- Q16.** Name one domain of the Arts Stream that leverages automated text generation.
- Q17.** How is AI utilized in climate modeling computations?
- Q18.** What branch of science uses machine tools to map genomic strings and protein folds?
- Q19.** Name one specific use case of AI in automated financial auditing.
- Q20.** How does e-commerce leverage AI algorithms to optimize revenue?

2 Marks Questions (2 Marks Each)

- Q1.** Explain how AI improves personalized learning pathways within modern educational platforms.
- Q2.** Describe how predictive analytics models can transform diagnostic medicine workflows.

- Q3.** How do smart automation systems enhance financial service delivery and fraud management?
- Q4.** Contrast the functional outputs of text-to-image engines like DALL-E with video editing tools like Runway ML.
- Q5.** What makes Google Teachable Machine an ideal platform for introducing foundational ML logic to non-technical users?
- Q6.** Explain how AI tools like Claude and ChatGPT assist professionals in complex technical research workflows.
- Q7.** How do AI applications optimize inventory control pipelines in modern global e-commerce setups?
- Q8.** Detail how climate modeling frameworks benefit from the integration of deep machine learning algorithms.
- Q9.** Explain the role of automated algorithmic systems in executing real-time stock price predictions.
- Q10.** How do digital humanities researchers exploit machine learning tools to evaluate historical manuscripts?
- Q11.** Describe how Google AI Studio assists developers in configuring and testing custom model parameters.
- Q12.** How does the integration of Adobe Firefly assist marketing teams while preserving intellectual property alignment?
- Q13.** Detail how automated accounting scripts minimize transaction filing errors in large corporate structures.
- Q14.** Explain how robotic automation systems utilize real-time sensor processing to navigate warehouse floors.
- Q15.** What are the direct advantages of utilizing platform tools like Pictory for automated video content marketing?

5 Marks Questions (5 Marks Each)

- Q1.** Analyze the cross-disciplinary impact of Generic AI Applications across Education, Healthcare, and Agriculture, highlighting specific efficiency upgrades.
- Q2.** Compare the operational capabilities, architectural backends, and targeted workflows of conversational models ChatGPT, Gemini, and Claude.
- Q3.** Evaluate the productivity and design impacts of Adobe Firefly, Canva AI, and Runway ML in transforming commercial multimedia content pipelines.
- Q4.** Explain the technical onboarding role of Google Teachable Machine and Google AI Studio in bridging consumer ideas with developer environments.
- Q5.** Detail the specific implementations of AI in the Arts Stream, highlighting its influence on music composition, journalism, and creative text writing.
- Q6.** Examine how the Science Stream applies machine intelligence within healthcare diagnostics, bioinformatics, and environmental monitoring grids.
- Q7.** Analyze the deployment of AI in the Commerce Stream, detailing its operations in marketing automation, customer tracking, and stock predictions.
- Q8.** Explain how robotic systems utilize deep reinforcement loops and machine vision setups to execute precision assembly configurations.
- Q9.** Discuss the role of AI in predictive data analytics for public governance, tracking optimization paths for resource distribution models.
- Q10.** Evaluate the structural shifts in business analytics triggered by automated pipeline tools, highlighting changes in consumer risk indexing.

8 Marks Questions (8 Marks Each)

- Q1.** Formulate an exhaustive technical map matching advanced AI Tools to their specific commercial target spaces. Evaluate the core processing differences across text engines, graphic tools, and developer studios.

Q2. Deconstruct the specialized application of Artificial Intelligence within the Science and Healthcare streams. Detail how deep networks accelerate bioinformatics protein folding and map complex multi-variant climate models.

Q3. Produce a comprehensive comparative analysis of AI integration within the Commerce and Financial sectors. Focus heavily on automated stock prediction algorithms, fraud detection pipelines, and predictive consumer analytics engines.

Q4. Critique the role of generative AI systems within the Arts and Creative Writing streams. Analyze how deep language transforms text creation, journalism workflows, and visual arts, evaluating issues of genuine creative ownership.

Q5. Synthesize a broad industry case study evaluating the operational efficiency returns of integrating robotic automation, business analytics, and generic AI systems into a global enterprise framework. Detail the exact tooling layers required.

UNIT 4: ETHICAL, SOCIAL, ECONOMIC AND LEGAL IMPLICATIONS OF AI

1 Mark Questions (1 Mark Each)

Q1. Define the concept of 'Ethical AI'.

Q2. What constitutes an 'Algorithmic Bias'?

Q3. State one fundamental pillar of Responsible AI Practices.

Q4. How does algorithmic automation threaten individual consumer privacy?

Q5. What term describes AI-generated video or audio that realistically alters real occurrences?

Q6. Define the 'Digital Divide' in terms of technology access equity.

Q7. What is a primary security concern linked to autonomous AI model deployments?

Q8. Name one threat AI-generated content poses to traditional Intellectual Property laws.

Q9. What economic shift describes job tracking displacements caused by intelligent scripts?

Q10. What is the core focus of AI Governance frameworks?

Q11. Mention one major source of misinformation spreading via modern AI generators.

Q12. What does 'Fairness' imply when training predictive assessment algorithms?

Q13. Give one real-world example of surveillance risk driven by facial recognition setups.

Q14. What does 'Sustainable AI Development' prioritize regarding global infrastructure?

Q15. True or False: Current intellectual property laws universally grant copyrights to AI entities.

Q16. What is human-AI collaboration called in terms of dual workflow systems?

Q17. Name one major threat deepfakes present to modern democratic processes.

Q18. What is a black-box model in the context of ethical explainability?

Q19. Why does training large LLMs raise severe ecological and energy concerns?

Q20. State the primary reason existing legal frameworks struggle to govern global AI cross-border software.

2 Marks Questions (2 Marks Each)

Q1. Explain how biased training datasets lead directly to unfair discriminatory outcomes in automated scoring tools.

- Q2.** Define the core goals of Responsible AI Practices in modern software deployment structures.
- Q3.** How does the proliferation of deepfakes erode public trust in journalism and communication channels?
- Q4.** Describe the economic consequences of AI automation on lower-to-middle tier workforce employment structures.
- Q5.** What is the 'Digital Divide', and how does advanced AI access expand this socioeconomic disparity?
- Q6.** Explain the legal complexities surrounding ownership rights of artwork created by text-to-image generators.
- Q7.** How do predictive surveillance algorithms conflict with fundamental constitutional privacy protections?
- Q8.** What is the objective of AI Governance, and why is global collaboration required to implement its frameworks?
- Q9.** Explain the ecological and environmental impacts associated with processing massive data parameters for deep models.
- Q10.** How does Human-AI Collaboration mitigate the limitations of pure automated decision-making scripts?
- Q11.** Detail why data scraping practices for training large language models trigger copyright infringement claims.
- Q12.** What specific security vulnerabilities can malicious actors exploit in open-access machine intelligence APIs?
- Q13.** How do transparency and explainability frameworks help eliminate the issues of black-box model operations?
- Q14.** Describe how misinformation trends scale exponentially when driven by autonomous multi-agent generation networks.
- Q15.** What are the main goals behind developing green sustainable computing standards for global AI research centers?

5 Marks Questions (5 Marks Each)

- Q1.** Analyze the root causes and mitigation strategies for Algorithmic Bias, explaining how to secure systemic fairness across predictive datasets.
- Q2.** Examine individual privacy constraints within pervasive AI surveillance states, highlighting risks from predictive policing models.
- Q3.** Evaluate the sociopolitical threats of deepfakes and automated misinformation networks in destabilizing media reliability.
- Q4.** Discuss the legal battleground over Intellectual Property laws when managing model training scraping actions and synthetic outputs.
- Q5.** Analyze the shifting landscape of workforce structures, tracking job displacement profiles and the rise of Human-AI collaboration models.
- Q6.** Deconstruct the socioeconomic impacts of the Digital Divide, assessing how uneven access to elite AI systems skews global wealth.
- Q7.** Detail the primary security flaws of autonomous machine learning clusters, targeting data poisoning actions and model inversion tricks.
- Q8.** Evaluate the current global landscapes of AI Governance, highlighting the gaps between existing legal rules and rapid software shifts.
- Q9.** Explain the technical design requirements for establishing Green, Sustainable AI Systems that minimize massive carbon output metrics.
- Q10.** Discuss how the pillars of Explainable AI (XAI) work to convert uninterpretable black-box models into auditable configurations.

8 Marks Questions (8 Marks Each)

- Q1.** Construct an extensive, multi-dimensional ethical manifesto for global AI development. Systematically analyze how Algorithmic Bias, surveillance overreach, and data privacy leaks threaten individual liberties, proposing exact engineering and policy guardrails.
- Q2.** Deconstruct the macroeconomic and social disruptions caused by rapid AI market penetration. Critically analyze the evolution of labor displacement, identify vulnerable industrial sectors, and map how the Digital Divide creates severe global stratifications.
- Q3.** Evaluate the legal and regulatory framework governing synthetic media and automated content generators. Assess how deepfakes challenge traditional evidence validation, and critique the vulnerabilities of copyright systems confronting AI-generated works.
- Q4.** Formulate a complete blueprint for comprehensive AI Governance and Sustainable Model Development. Outline how international bodies must structure compliance regimes to manage existential risks while enforcing environmental restrictions on server centers.
- Q5.** Critique the operational model of Human-AI Collaboration under the lens of modern safety engineering. Analyze the psychological, economic, and technical dependencies that emerge when balancing machine predictive speed against human ethical oversight.