KATHMANDU UNIVERSITY
End Semester Examination
March, 2025

Marks Scored:

Level : B.Tech.
Year : I

Course : AICC 101
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 20.March-025

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate answer.

1. Who is considered the father of Artificial Intelligence?
   a. Alan Turing b. Marvin Minsky c. John McCarthy d. Arthur Samuel

2. Who were awarded the 2024 Nobel Prize in Physics for their foundational work in artificial intelligence?
   a. Yoshua Bengio and Yann LeCun *b. Geoffrey Hinton and John Hopfield*
   c. Andrew Ng and Demis Hassabis *d. Fei-Fei Li and Sebastian Thrun*

3. In which year was the term "Artificial Intelligence" first coined?
   a. 1943 b. 1950 c. 1965 d. 1956

4. Which of the following companies developed the AI language model ChatGPT?
   a. Google DeepMind b. OpenAI
   c. IBM d. Microsoft

5. In Propositional Logic, which of the following is NOT a logical connective?
   a. AND ($\wedge$) b. OR ($\vee$) c. FORALL ($\forall$) d. NOT ($\neg$)

6. Which of the following correctly represents De Morgan's Law in Propositional Logic?
   a. $\neg(P \wedge Q) \equiv \neg P \vee \neg Q$ b. $\neg(P \vee Q) \equiv P \wedge Q$
   c. $(P \rightarrow Q) \equiv (\neg Q \rightarrow \neg P)$ d. $\neg(P \wedge Q) \equiv P \vee Q$

7. In Predicate Logic, which of the following statements correctly represents "All humans are mortal"?
   a. $\forall x\ (Human(x) \wedge Mortal(x))$ b. $\exists x\ (Human(x) \rightarrow Mortal(x))$
   c. $\forall x\ (Human(x) \rightarrow Mortal(x))$ d. $\exists x\ (Mortal(x) \rightarrow Human(x))$

8. What is the perceptron model primarily used for?
   a. Linear classification tasks b. Regression problems
   c. Clustering problems d. Feature extraction

9. What is the purpose of backpropagation in a neural network?
   a. To update the output layer values
   b. To calculate and minimize errors by adjusting weights
   c. To increase the number of hidden layers
   d. To prevent overfitting

10. Which of the following architectures is an example of a feedforward neural network?
    a. Convolutional Neural Network (CNN)
    b. Recurrent Neural Network (RNN)
    c. Hopfield Network
    d. Multilayer Perceptron (MLP)

11. Which of the following tasks is NOT a part of NLP?
    a. Sentiment analysis
    b. Named Entity Recognition (NER)
    c. Image recognition
    d. Machine Translation

12. What does TF-IDF stand for in NLP?
    a. Term Frequency-Inverse Document Frequency
    b. Text Feature-Indexed Data Filtering
    c. Token Frequency-Individual Data Factor
    d. Time Frequency-Information Density Function

13. What is a state space in AI?
    a. A collection of all possible actions an agent can take
    b. A graphical representation of all possible states and actions
    c. A set of only the initial and goal states
    d. A technique used for compressing search problems

14. Which of the following is an example of an uninformed search algorithm?
    a. A* Search
    b. Best-First Search
    c. Depth-First Search (DFS)
    d. Hill Climbing

15. If a goal node is at depth d and there are b branches per node, what is the worst-case space complexity of BFS?
    a. O(d) b. O(b^d) c. O(b+d) d. O(V+E)

16. What is Word Embedding in NLP?
    a. A technique to compress text files
    b. A form of encryption for text
    c. A technique for speech recognition
    d. A method to convert words into numerical vectors

17. What is the primary function of an expert system?
    a. To replace human experts entirely
    b. To mimic human expertise in a specific domain
    c. To perform general-purpose computing
    d. To execute only predefined tasks

18. In a decision tree, what is the term used for the final classification outcome?
    a. Root Node b. Internal Node c. Leaf Node d. Branch Node

19. The splitting criterion in decision trees for classification problems is often based on:
    a. Entropy and Information Gain
    b. Gradient Descent
    c. Backpropagation
    d. Convolution Filters

20. What type of activation function does a simple perceptron use?
    a. Sigmoid b. Tanh c. Step Function d. ReLU

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SECTION "B"
[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. What is AI? Discuss brief history of AI with chronological development. 1.3

2. What is an intelligent agent? Explain different types of AI agents

3. List the different types of problems and explain any two of them in detail.

4. **Explain with the truth table: Tautology and Contradiction. And Show that $(\neg(p \vee q)) \leftrightarrow(\neg p \wedge \neg q)$ is a tautology**

5. What do you understand by predicates and quantifiers? Explain different types of quantifiers.

6. What do you understand about the Decision tree? Explain with an example of your own.

7. What do you understand about the Expert system? Explain its characteristics.

SECTION "C"
[2Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

8. What do you understand about propositional logic and predicate logic? List the different types of logical operators used for propositional logic.

9. Show that De Morgan's laws hold under the principle of logical equivalence.

10. Write short note on: [4Q × 2=8]
    a. Depth First Search
    b. Breadth-First Search
    c. Neural Network
    d. Natural Language Processing