*Total No. of Printed Pages : 5* **SEM 6 BCA CC 24**

**2024**

(May)

**COMPUTER APPLICATION**

**Core Course**

(*Artificial Intelligence*)

Course Code : **BCA-CC-T4-601**

Credit : **4**

Total Marks : 56 Time : $2^1/_2$ Hours

***The figures in the margin indicate full marks for the questions***

1. Choose the correct option : 1×6=6

(*a*) What is the primary goal of Artificial Intelligence (AI)?

(*i*) Enhancing computer hardware

(*ii*) Emulating human intelligence

(*iii*) Developing software applications

(*iv*) Optimizing algorithms

(*b*) Which search algorithm explores neighbour nodes before moving to the next level?

(*i*) Breadth First Search (*ii*) Depth First Search

(*iii*) A* algorithm (*iv*) Hill climbing

***Contd .....2***

(c) What is the foundation of knowledge representation in AI?

(i) Frames

(ii) First Order Predicate Logic

(iii) Semantic Nets

(iv) Conceptual Graphs

(d) Which logic programming language is commonly used for knowledge representation?

(i) Java (ii) C++

(iii) Python (iv) PROLOG

(e) What does a Truth Maintenance System primarily focus on?

(i) Maintaining consistent knowledge

(ii) Handling probabilistic reasoning

(iii) Dealing with inconsistencies

(iv) All of the above

(f) Which grammar type is commonly used to model the syntax of natural languages?

(i) Context-Free Grammars

(ii) Transformational Grammars

(iii) Regular Grammars

(iv) Stochastic Grammars

*Contd .....3*

2. Answer Briefly : $2 \times 6 = 12$

(*a*) What are the fundamental components of an intelligent agent, and how do they contribute to its functionality?

(*b*) Describe the role of First Order Predicate Logic in knowledge representation and reasoning.

(*c*) Discuss the advantages and disadvantages of using Frames as a knowledge representation technique.

(*d*) Define the Hill climbing Algorithm.

(*e*) Discuss the concept of Default Reasoning in dealing with uncertainties and its applications in AI systems.

(*f*) Explain the role of Parsing Techniques in natural language processing and understanding.

3. Compare and contrast the Turing Test and Rational Agent approaches to AI, highlighting their respective strengths and limitations. Additionally, explain the structure and behaviour of intelligent agents, emphasizing their role in problem-solving and decision-making processes. $3 + 3 = 6$

4. Answer ***any one*** :

(*a*) Write the A* search algorithm. Explain how A* utilizes heuristic functions to guide the search process and estimate the cost of reaching the goal state. Analyse the time and space complexity of the A* algorithm and propose strategies for optimizing its performance in large-scale search spaces.. $5 + 2 + 3 = 10$

***Contd .....4***

(*b*) Compare and contrast the Breadth First Search (BFS) and Depth First Search (DFS) algorithms. Provide detailed explanations of how these algorithms traverse search spaces and explore solution paths. Illustrate with examples how BFS and DFS can be applied to solve different types of problems, highlighting scenarios where one algorithm may be more suitable than the other. 4+3+3=10

5. Answer ***any one*** :

(*a*) Examine the role of Production Rules in expert systems and AI applications. Describe how Production Rules encode knowledge in the form of condition-action pairs and facilitate reasoning and problem-solving tasks. Discuss the advantages and limitations of using Production Rules for knowledge representation and inference. 3 + 2 + 5 = 10

(*b*) Explore the fundamentals of Programming in Logic (PROLOG) and its role in AI programming. Discuss the syntax and semantics of PROLOG. Analyse the strengths and weaknesses of PROLOG as a programming language for AI applications. 3 + 3 + 4 = 10

6. Answer ***any one*** :

(*a*) Investigate the role of AI in decision-making processes under uncertainty, exploring the use of Bayesian Probabilistic Inference and Probabilistic Reasoning. Discuss real-world applications in domains such as finance, healthcare, and autonomous vehicles. 3 +3 = 6

*Contd .....5*

(*b*) Explore the concept of Probabilistic Reasoning in AI systems, analysing how it enables machines to make decisions in uncertain environments. Discuss the advantages and limitations of Probabilistic Reasoning techniques. 3 + 3 = 6

7. Answer ***any one*** :

(*a*) Discuss the role of semantic representation and knowledge graphs in enhancing language understanding capabilities. 6

(*b*) Explain the role of Parsing Techniques in natural language processing. Compare and contrast Context-Free and Transformational Grammars. Additionally, examine the significance of Augmented Transition Nets in resolving ambiguities and understanding complex linguistic phenomena. 2 + 2 + 2 = 6

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