

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3605

L

Unique Paper Code : 6202454801

Name of the Paper : Advanced AI Systems Design

Name of the Course : B.Voc. Software Development

Semester : VIII

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. The paper has **two** sections.
3. **Section A** is compulsory. Each question is of **5** marks.
4. Attempt any **four** questions from **Section B**. Each question is of **15** marks.

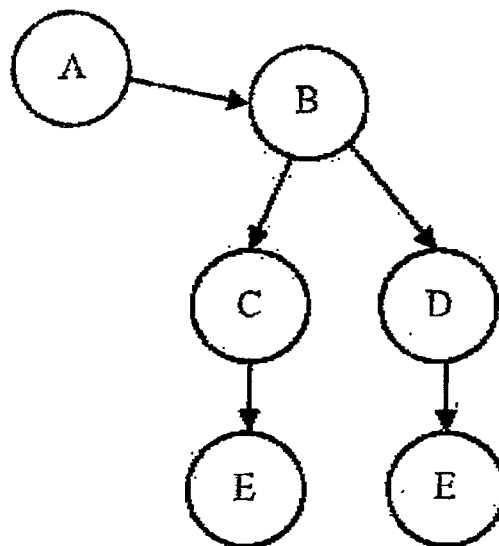
Section A

- 1 a) What is symbolic AI? Explain its advantages and limitations. 5
- b) Compare uninformed search and informed search strategies in Artificial Intelligence. 5
- c) What is a rational agent? List the factors that determine its rationality. 5
- d) What is multimodal AI? Explain it with a suitable example. 5
- e) What are the major privacy concerns in AI applications? 5
- f) What is the future scope of AI in real-world applications? 5

P.T.O.

Section B

- 2 a) Explain the Breadth-First Search (BFS) algorithm with the help of a suitable example. Compare its performance with Depth-First Search (DFS). 7
- b) Given the graph below with edges $A \rightarrow B$, $B \rightarrow C$, $B \rightarrow D$, $C \rightarrow E$, and $D \rightarrow E$, apply the Depth-First Search (DFS) algorithm starting from node A to find the goal E. At each step, 8
- Show the frontier
 - Show the explored set after each expansion
 - Write the order of node expansion
 - Find the final path from A to E



- 3 a) Describe the working of A* Search Algorithms with an example. How does it combine the features of Breadth-First Search (BFS) and heuristic search? 7
- b) i. What is local connectivity in Convolutional Neural Networks (CNN)? Why is it preferred over full connectivity in image processing? 8

- ii. An input volume of size $[32 \times 32 \times 3]$ is passed through a convolutional layer with filter size = 5, stride = 1, padding = 0, and 10 filters. Calculate:
 - a. Output volume size
 - b. Total number of parameters (with parameter sharing)

- 4 a) Describe the advantages and limitations of using LLM APIs such as OpenAI GPT, Claude, and Gemini. 7
- b) Write a Python program using the OpenAI Responses API to generate text with a reusable prompt. 8
 - i. Import the required library and initialise the client
 - ii. Create a response using the "gpt-5" model
 - iii. Create a request that reuses an existing prompt using its prompt ID and version
 - iv. Pass variable values and print the generated output

- 5 a) Explain the concept of prompt engineering. Also, explain different prompt engineering techniques with suitable examples. 7
- b) Write a Python program using LangChain to create an AI agent with a custom `get_weather` tool to answer a weather query. 8
 - i. Import the required function to create an agent
 - ii. Define `get_weather (city: str) -> str`
 - iii. Create the agent using the model "OpenAI: gpt-5.2" with a suitable system prompt and tool.
 - iv. Invoke the agent and print the response

- 6 a) Explain the concept of Explainable AI (XAI). Why is model interpretability important in real-world applications? 7
- b) Explain the concept of Responsible AI. Discuss its key principles that guide the ethical and trustworthy development and deployment of AI systems. 8

- 7 a) Explain generative AI applications such as GPT, DALL·E, and Stable Diffusion with suitable examples. 7
- b) Describe reinforcement learning and explain its applications in gaming and robotics. 8