18252

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – MCA-2025
Course Name – AI and its Applications
Course Code - MCA17405 (T)
(Semester I)

Full Marks : 40 **Time : 2:0 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 10=10

1. *Choose the correct alternative from the following :*

(i) Identify the main purpose of an agent's "actuators" in AI.
a) To receive input from the environment
b) To process percepts and make decisions
c) To perform actions in the environment
d) To update the agent's internal model

(ii) Select the true statement about a fully observable environment.
a) An agent cannot perceive every relevant aspect
b) The agent sensors provide access to the complete state of the environment
c) The environment is necessarily deterministic
d) It simplifies the learning process for an agent

(iii) Select the feature that allows AI to handle changing environments better than traditional programming.
a) Static syntax
b) Predefined outcomes
c) Experience-based adaptation
d) Fixed variable set

(iv) Identify the importance of goal formulation in intelligent agent design.
a) Sensing module design
b) Defining desired outcomes
c) Avoiding hardware failures
d) Matching sensor types

(v) Estimate how A* evaluates nodes using f(n).
a) $f(n) = g(n) \times h(n)$
b) $f(n) = g(n) - h(n)$
c) $f(n) = g(n) + h(n)$
d) $f(n) = h(n)$ only

(vi) Identify the importance of membership functions in fuzzy logic.
a) Store sensor values
b) Define system inputs
c) Represent degree of truth
d) Assign weights to classes

(vii) Estimate the union of two fuzzy sets A = {(X1, 0.2), (X2, 0.6), (X3, 0.9)} and B = {(X1, 0.5), (X2, 0.4), (X3, 0.8)}.
a) {(X1, 0.2), (X2, 0.4), (X3, 0.8)}
b) {(X1, 0.5), (X2, 0.6), (X3, 0.9)}
c) {(X1, 0.7), (X2, 0.6), (X3, 0.9)}
d) {(X1, 0.5), (X2, 0.4), (X3, 0.8)}

(viii) Compare fuzzy membership functions with crisp set membership in terms of output range.

a) Fuzzy: 0 or 1; Crisp: 0 to 1
b) Fuzzy: gradual from 0 to 1; Crisp: only 0 or 1
c) Both provide multi-valued logic
d) Crisp: includes weights; fuzzy: only binary

(ix) Select the correct fuzzy set union result if μA(x) = 0.6 and μB(x) = 0.8.

a) 0.6
b) 0.7
c) 0.8
d) 1

(x) Compare Information Gain and Gini Index as splitting criteria in decision trees.

a) Gini handles categorical data; Info Gain only numeric
b) Info Gain measures entropy reduction; Gini measures impurity
c) Gini is always slower
d) Both are used in unsupervised learning

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Name any two characteristics of an intelligent environment and explain their influence on agent performance. (3)
3. Associate the structure of an agent with its environment. (3)
4. Explain the concept of a state space in AI problem solving. (3)
5. Justify the use of explanation-based learning in domains like logistics or transportation. (3)
6. Evaluate the fuzzy Cartesian product A × B, given the fuzzy sets: A = {(x1, 0.4), (x2, 0.7), (x3, 0.2), (x4, 0.9)} B = {(y1, 0.5), (y2, 0.9), (y3, 0.1), (y4, 0.6)} (3)

OR

Convert the following two English sentences into First-Order Logic. 1) All professors who teach AI are intelligent. 2) Dr. Meera teaches AI. (3)

Group-C

(Long Answer Type Questions) 5 x 3=15

7. Illustrate the different types of environments AI agents can operate in. Explain how these affect agent design. (5)
8. Evaluate the trade-offs between Bayesian networks and Dempster-Shafer theory in representing uncertainty. (5)
9. Evaluate the use of AI in dynamic pricing models in transportation platforms like ride-hailing services. Propose improvements. (5)

OR

Analyze the trade-offs between accuracy and interpretability in neural network-based healthcare applications. (5)

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