Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: BCA, 5th Semester
Name of the Paper: Introduction to Artificial Intelligent
Paper Code: TBC502
Time: 3 hour Maximum Marks: 100

Note:
(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks)

a. Differentiate between supervised and unsupervised learning with suitable example. CO1

b. Why AI is important in modern era? Give some important application areas where AI has significant importance. CO1

c. Describe the following

i. Deep learning
ii. Computer vision
iii. Natural language processing CO1

Q2. (2X10=20 Marks)

a. Discuss and draw the architecture of intelligent agent. Explain goal based and learning agent with real life examples. CO2

b. Consider following statements:

1. Ravi likes all kind of food.
2. Apples and chicken are food
3. Anything anyone eats and is not killed is food
4. Ajay eats peanuts and is still alive
5. Rita eats everything that Ajay eats.

Prove by resolution that Ravi likes peanuts using resolution. CO5

c. Perform k-means clustering on the following 2-D dataset with k = 2. Use initial centroids = first two points (i.e. $centroid_1$ = (1,1), $centroid_2$ = (1.5,2)). Run k-means until convergence. Show all distance calculations, assignments, centroid re-computations, and compute the final SSE.
Points: P1 = (1, 1), P2 = (1.5, 2), P3 = (3, 4), P4 = (5, 7), P5 = (3.5, 5), P6 = (4.5, 5) CO4

Q3. (2X10=20 Marks)

a. Draw and explain the architecture of pattern recognition. Explain the various concepts for pattern recognition system with suitable examples. Discuss the various applications for pattern recognition. CO3

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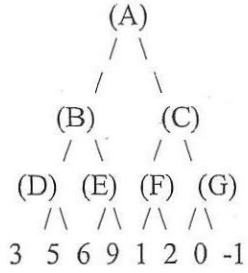
b. Consider following dataset:

Name	Age	Gender	Sport
Ajay	32	M	Football
Mark	40	M	Neither
Sara	16	F	Cricket
Zara	34	F	Cricket
Sachin	55	M	Neither
Rahul	40	M	Cricket
Pooja	20	F	Neither
Smith	15	M	Cricket
Laxmi	55	F	Football
Michael	15	M	Football

Using K-Nearest Neighbor algorithm, Classify sample {Name = Angelina, Age=5, Gender = F} CO6

c. The following is a game tree showing the possible moves for a two-player minimax game (MAX and MIN). The terminal (leaf) nodes represent the utility values for the MAX player. CO6

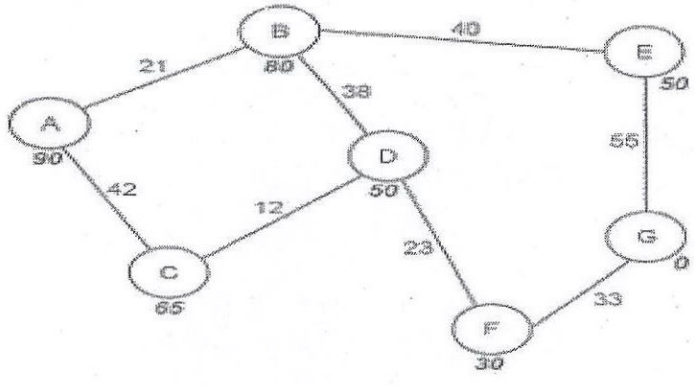


i. Using the Minimax algorithm, determine the value of the root node (A).
ii. Redraw the same tree and apply Alpha–Beta pruning to show which branches are not evaluated.

Q4. (2X10=20 Marks)

a. What are the different types of knowledge? Explain various Knowledge Representation issues in detail by using associated example. CO4

b. State and explain A* algorithm. Consider the following graph:



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Find the most cost-effective path from start state A to final state using A* algorithm. CO5

c. Discuss the support vector machine (SVM) in detail. What are support vectors. Differentiate between hard and soft margin in SVM. CO3

Q5. (2X10=20 Marks)

a. Consider the following dataset: CO5

S. No.	Color	Legs	Height	Smelly	Species
1	White	3	Short	Yes	M
2	Green	2	Tall	No	M
3	Green	3	Short	Yes	M
4	White	3	Short	Yes	M
5	Green	2	Short	No	H
6	White	2	Tall	No	H
7	White	2	Tall	No	H
8	White	2	Short	Yes	H

Classify the sample: X={Color=Green, Legs=2, Height=Tall, Smelly=No} using Naïve Bayes Classifier.

b. Differentiate between uninformed and informed search strategy algorithms. Give suitable example for each category. CO3

c. Describe the following using suitable example:

1. Principle component analysis (PCA)
2. Linear Decrementing Analysis (LDA) CO4

Note For the question paper setters:

- Question paper should cover all the COs of the course.
- Please specify COs against each question.