Artificial Intellegence

PAPER ID-311642

Printed Page: 1 of 1
Subject Code: KCA301

Roll No:

MCA
(SEM III) THEORY EXAMINATION 2023-24
ARTIFICIAL INTELLIGENCE

TIME: 3HRS **M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

Q no.	Question
a.	What do you mean by AI?
b.	What are the different branches of artificial intelligence?
c.	Discuss searching process.
d.	Define conceptual dependency.
e.	Explain Bayesian networks.
f.	Describe forward chaining.
g.	What is Statistical learning method?
h.	Describe decision tree with diagram?
i.	What is Statistical PR?
j.	Explain K-means clustering.

SECTION B

2. Attempt any *three* of the following: 10x3=30

a.	Describe the applications of artificial intelligence.
b.	Explain Searching techniques used in games.
c.	Describe the use of Hidden Markov models in speech recognition.
d.	Explain learning with hidden data – EM algorithm.
e.	Define pattern recognition. What are the components of pattern recognition?

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a.	Explain various approaches in NLP?
b.	Differentiate between human intelligence and machine intelligence.

4. Attempt any *one* part of the following: 10x1=10

a.	Discuss the problem of water jug with heuristic search techniques.
b.	Explain Alpha-Beta pruning with example.

5. Attempt any *one* part of the following: 10x1=10

a.	What do you mean by knowledge representation? Describe the techniques of knowledge representation.
b.	Explain the methods of planning & acting in the real world.

6. Attempt any *one* part of the following: 10x1=10

a.	Write short note on the following: i) Reinforcement learning ii) Machine learning.
b.	Explain discrete model, Naive Bayes Model & Continuous Model.

7. Attempt any *one* part of the following: 10x1=10

a.	Define Principle Component Analysis (PCA). Write steps involved in making principle components to do a classification of given data.
b.	Explain Nearest Neighbor (NN) rule in detail.

Printed Pages: 2 **Sub Code:KCA301**

Paper Id: 232332 **Roll No.**

MCA
(SEM III) THEORY EXAMINATION 2022-23
ARTIFICIAL INTELLIGENCE

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a) What is an intelligent agent?
b) State any two foundation areas of artificial intelligence.
c) Compare uninformed and informed search methods.
d) Briefly explain the concept of adversarial search.
e) Differentiate between procedural and declarative knowledge.
f) What do you mean by the knowledge representation?
g) Define the term machine learning.
h) Write a short note on reinforcement learning.
i) Define the term pattern with example.
j) State nearest neighbor rule.

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a) Discuss various categories of artificial intelligence tasks.
b) Explain Best-first search algorithm with the help of a diagram.
c) Discuss and compare forward and backward chaining methods with example.
d) What do you mean by statistical learning? Explain Naïve Bayes model.
e) Define the term clustering. Discuss k-means clustering algorithm.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

a) Discuss functioning of model based intelligent agent with the help of a diagram.
b) Explain various steps involved in natural language processing.

4. Attempt any *one* part of the following: 10 x 1 = 10

a) Explain AND-OR graph searching algorithm.
b) Discuss the concept of MIN MAX search algorithm with diagram.

5. Attempt any *one* part of the following: 10 x 1 = 10

a) Explain concept and use of clause form conversion algorithm.
b) What is Bayesian network? Explain steps to create a Bayesian network.

6. Attempt any *one* part of the following: 10 x 1 = 10

a) What do you mean by Maximum Likelihood estimation? Also explain Expectation Maximization algorithm.
b) Discuss steps and algorithm to construct a decision tree.

7. Attempt any *one* part of the following: 10 x 1 = 10

a) Explain design cycle of a pattern recognition system with diagram.
b) Explain need and concept of principle component analysis in pattern recognition process.

MCA
(SEM III) THEORY EXAMINATION 2021-22
ARTIFICIAL INTELLIGENCE

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Define the terms – weak artificial intelligence and strong artificial intelligence.
b. What is natural language processing?
c. Explain AND-OR graph.
d. Differentiate between simple hill climbing and steepest ascent hill climbing algorithms.
e. Justify the usage of universal and existential quantifier with an example.
f. Compare propositional logic and predicate logic
g. Explain naïve bayes classifier.
h. What are statistical learning models.
i. Write short note on Support Vector Machine (SVM)
j. What does a Bayesian network represent?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. What is PEAS description of the task environment for "Internet shopping agent".
b. Describe alpha-beta pruning and give the other modifications to Min-Max procedure to improve its performance?
c. Write the steps for converting FOPL into CNF.
d. What is machine learning? Differentiate between supervised, unsupervised and reinforcement learning.
e. Design principles of pattern recognition system. Explain Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA).

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

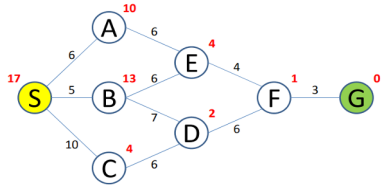
(a) Describe intelligent agents in terms of Precepts, Actions, Goals and Environment with suitable block diagram and example.

(b) Differentiate between goal-based agent and utility-based intelligent agents with the help of block diagram?

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Identify the difference between forward and backward chaining? Given the knowledge base as: P, P→Q, Q→R. Infer R by using forward and backward chaining?

(b) Explain the A* Algorithm on the following figure. Explicitly write down the queue at each step and find the path till goal state.



5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Convert the following sentence into predicate logic and then prove "Was Marcus loyal to Caesar? using resolution:
1. Marcus was a man.
2. Marcus was a Pompeian.
3. All Pompeian's were Romans.
4. Caesar was a ruler.
5. All Romans were either loyal to Caesar or hated him.
6. Everyone is loyal to someone.
7. People only try to assassinate rulers they are not loyal to.
8. Marcus tried to assassinate Caesar.

(b) Distinguish between Markov model and Hidden Markov Model (HMM) in probabilistic reasoning?

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Describe the decision tree-learning model by choosing a suitable example? Discuss the issues related to the applications of decision tree
(b) Explain the expectation and maximization (EM) algorithm for finding the maximum likelihood with hidden variables

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) To which category of clustering schemes does the k-means algorithm belong? What is its major advantage? Which are the factors that influence the computation duration of this algorithm
(b) Show, how classification is done by k-nearest neighbors. Construct KNN classification algorithms on the following dataset and predict the class for X (p1=4, p2=6). Given k=3.

P1	P2	Class
6	5	False
7	7	False
3	5	True
2	4	True

Printed Pages: 02 **Sub Code: RCA403**
Paper Id: 214239 **Roll No.**

MCA
(SEM IV) THEORY EXAMINATION 2018-19
ARTIFICIAL INTELLIGENCE

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

(a)Name the elements of an agent.
(b) Summarize the factors that make up rationality.
(c) What do you infer from hill-climbing search algorithm?
(d) Compare propositional logic and predicate logic
(e) Justify the usage of universal and existential quantifier with an example.
(f) Give the heuristic function for shortest path problem.
(g) Which algorithm is more similar to backward chaining algorithm? Write its algorithm

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

(a) You have three jugs measuring 12 gallons, 8 gallons, and 3 gallons, and a water faucet. You need to measure out exactly one gallon.
(b) Describe the planning method based on hierarchical task networks with an example.
(c) Discuss the different design issues to be solved to use hidden markov model for real world application.
(d) Assume two players, min and max, play nim (as described above). Min plays first' If a terminal state in the search tree developed above is a win for min, a utility function of zero is assigned to that state. A utility function of I is assigned to a state if max wins the game. Apply the minimax algorithm to the search tree to assign utility functions to all states in the search tree.
(e) Give the completeness proof of resolution.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

a. Implement the Search Algorithms described in this lecture in LISP and/or C. Comment on how suited each language would be for each type of search?
b. How suited would PROLOG be in implementing the search algorithms? Comment on how this might be done and what difficulties might exist.

4. Attempt any *one* part of the following: 7 x 1 = 7

a. Trace the constraint satisfaction procedure to solve the following cryptarithmetic problem:

```
  CROSS
 +ROADS
 -------
DANGER
```

b. Discuss how constraint satisfaction might work it implemented its search strategy via:
i. depth first search
ii. breadth first search
iii. best first search

5. Attempt any *one* part of the following: 7 x 1 = 7

a. Represent the following in partitioned semantic networks:
i. Every player kicked a ball.
ii. All players like the referee.
iii. Andrew believes that there is a fish with lungs.
b. Pick a problem area and represent the knowledge in frame based system.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Describe a rational agent function for the modified performance measure that deducts one point for each movement. Does the corresponding agent program require internal state?
(b) Discuss possible agent designs for the cases in which clean squares can become dirty and the geography of the environment is unknown. Does it make sense for the agent to learn from its experience in these cases? If so, what should it learn?

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss back propagation algorithm for learning in multilayer neural network.
(b) Explain the concept of forward and backward state space search in detail.

Printed Pages: 2 | Sub Code:RCA403
Paper Id: 214423 | Roll No.

MCA
(SEM IV) THEORY EXAMINATION 2017-18
ARTIFICIAL INTELLIGENCE

Time: 3 Hours *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. What is meant by the term Artificial Intelligence? How it is different from natural intelligence?
b. Discuss Branch-and-bound search algorithm.
c. Differentiate between local search and global search.
d. Transform the following formula to Prenex Normal form—
$$\forall x: \forall y: (\exists z: P(x,z) \cap P(y,z)) \rightarrow \exists u: Q(x,y,u)$$
e. Define forward chaining and backward chaining with example.
f. Explain in brief the concept of reinforcement learning.
g. Write a short note on Support Vector Machine.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. What is an intelligent agent? Discuss any two types of intelligent agents.
b. Explain Steepest-ascent hill climbing algorithm. What are the problems with hill climbing algorithm?
c. Describe Hidden Markov model with suitable example. Also discuss its role in probabilistic reasoning.
d. Discuss Maximum-likelihood parameter learning for complete data with discrete models.
e. What do you mean by classification? Discuss the process of classification with the help of a diagram.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss the historical development of artificial intelligence.
(b) For each of the following agents, develop a PEAS description of the task environment-
(i) Mathematician's theorem proving assistant
(ii) Satellite image analysis system
(iii) Internet book shopping agent
(iv) Medical diagnosis system

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss Simulated Annealing search algorithm with its advantages and disadvantages.
(b) What are the steps to define a problem? Explain. Also discuss various components of a problem.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss algorithm of conversion to clause form. Convert the following to clause form using algorithm-
$$\forall x[Brick(x) \rightarrow (\exists y\{On(x,y) \cap \neg Pyramid(y)\} \cap \neg\exists y\{On(x,y) \cap On(y,x)\} \cap \forall y\{\neg Brick(y) \rightarrow \neg Equal(x,y)\})]$$
(b) Explain the concept of Alpha-beta pruning. Write Alpha-beta search algorithm.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Discuss various application domains of machine learning.
(b) Describe major steps involved in a learning process. Also discuss how learning systems are classified.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) What is pattern recognition? Explain various steps involved in the designing of a pattern recognition system with the help of a diagram.
(b) Explain Nearest Neighbor rule used for classification.

Printed Pages : 2 | Roll No. | NMCA413

M.C.A.
THEORY EXAMINATION (SEM–IV) 2016-17
ARTIFICIAL INTELLIGENCE

Time : 3 Hours *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION – A

1. Explain the following: 10 x 2 = 20

(a) Name the elements of an agent.
(b) Summarize the factors that make up rationality.
(c) What do you infer from hill-climbing search algorithm?
(d) Compare propositional logic and predicate logic
(e) Justify the usage of universal and existential quantifier with an example.
(f) Give the heuristic function for shortest path problem.
(g) Which algorithm is more similar to backward chaining algorithm? Write its algorithm.
(h) What do you mean by hybrid Bayesian network?
(i) Which value is assigned to alpha and beta in the alpha-beta pruning?
(j) List few decision tree algorithms.

SECTION – B

2. Attempt any five of the following questions: 5 x 10 = 50

(a) Discuss the structure of an intelligent agent. Give an example.
(b) Compare the uninformed and informed search strategies with respect to all factors.
(c) Solve the 8- puzzle problem using Hill climbing. Write down the heuristic function.

Initial state

1	2	3
8	6	5
7	4	

Goal state

1	2	3
4	5	6
7	8	

(d) The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American. Prove that Col. West is criminal by forward and backward chaining.
(e) Assume two players, min and max, play nim (as described above). Min plays first. If a terminal state in the search tree developed above is a win for min, a utility function of zero is assigned to that state. A utility function of 1 is assigned to a state if max wins the game. Apply the minimax algorithm to the search tree to assign utility functions to all states in the search tree.
(f) Consider the following data set

Feature 1	Feature 2	Feature 3	Class
0	0	0	0
1	0	1	1
1	0	0	0
1	1	1	1
0	1	1	1
0	1	1	0

Assume the test pattern as feature 1 as 0 , feature 2 as 0 and feature 3 as 1 , classify the pattern using NNC and Bayes classifier.
(g) Write down the evaluation procedure of HMM.
(h) How a k-means Clustering algorithm works? Give an example.

SECTION – C

Attempt any two of the following questions: 2 x 15 = 30

3. (a) Represent the following sentences in first-order logic, using a consistent vocabulary (which you must define):
(i) Not all students take both History and Biology.
(ii) Only one student failed History.
(iii) Only one student failed both History and Biology.
(iv) The best score in History was better than the best score in Biology.
(v) Every person who dislikes all vegetarians is smart.
(vi) No person likes a smart vegetarian.
(vii) There is a woman who likes all men who are not vegetarians.
(viii) There is a barber who shaves all men in town who do not shave themselves.
(ix) No person likes a professor unless the professor is smart.
(x) Politicians can fool some of the people all of the time, and they can fool all of the people some of the time, but they can't fool all of the people all of the time.
(b) (i) Give a predicate calculus sentence such that every world in which it is true contains exactly one object.
(ii) Represent the sentence "All Germans speak the same languages" in predicate calculus. Use *Speaks(x, l)*, meaning that person *x* speaks language *l*.

4. Write in detail about the decision trees and decision lists with an example.

5. How parameter estimation is done? Explain with an example.

Printed Pages: 4 NMCA-413

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 214427 Roll No.

M.C.A.

Theory Examination (Semester-IV) 2015-16

ARTIFICIAL INTELLIGENCE

Time : 3 Hours *Max. Marks : 100*

Section-A

Q1. Attempt all the parts. All parts carry equal marks. Write answer of each part in short. (10×2=20))

(a) What is machine learning? How many types of learning are there?

(b) List the characteristics of intelligence.

(c) What is "overfitting"? How do we overcome overfitting?

(d) Explain the statistical nature of the learning process.

(e) Represent the following sentence in the Predicate form"AII the children like sweets".

(g) What do you understand by Natural Language Processing?

(g) What is artificial intelligence? How it is different than general intelligence?

(h) Describe the role of computer vision in artificialintelligence.

(i) Write four properties a good system should possess forthe knowledge representation in a particular domain.

(j) Explain Maximum likelihood hypothesis and Maximum a posteriori.

Section-B

Q2. Attempt any 5 questions from this section. (5×10=50)

(a) Explain how' Bayesian statistics provide reasoning under various kinds of uncertainty.

(b) Describe A* search technique. Prove that A* is complete and optimal.

(c) Give an example of a problem for which breath first search would work better than depth first search. Write the difference between these two approaches.

(d) What is Bayesian reasoning? What does a Bayesian network represent? Explain.

(e) Describe alpha-beta pruning and give the other modifications to the min-max procedure to improve its performance.

(f) Explain the expectation and maximization (EM) algorithm for finding the maximum likelihood with hidden variables.

(g) Design principles of pattern recognition system. Explain Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA).

(h) What do you understand by pattern recognition? Differentiate between structured description and symbolic description.

Section-C

Note: Attempt any 2 questions from this seetion. (2×15=30)

Q3. To which category of clustering schemes does the k-means algorithm belong? What is its major advantage? Which are the factors that influence the computation duration of this algorithm?

Q4. Convert the following sentence into predicate logic and then prove "Marcus is Dead" using resolution:

- Marcus was a man.
- Marcus was a Pompeian.
- Marcus was born in 40 AD.
- All men are mortal.
- All Pompeian's dead when the volcano erupted in 1979.
- No mortal lives more than 150 years.
- It is now 1991.
- Alive means not dead.

Q5. Write whort note on the following :

i. Support vector machine (SVM)

ii. Linear Discriminant Analysis

iii. Bayesian classifier

b) Explain how classification is done by using Bayes classifier.

c) Explain the expectation and maximization (EM) algorithm for finding the maximum likelihood with hidden variables.

Q5. Attempt any ***two*** questions from the following : 10x2=20

a) With the help of a suitable diagram, explain the classification process in a pattern recognition system.

b) To which category of clustering schemes does the k-means algorithm belong? What is its major advantage? Which are the factors that influence the computation duration of this algorithm?

c) Write short notes on the following :

i) Computer vision

ii) Control strategy

iii) Alpha-beta pruning

Printed Pages : 4

NMCA413

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 214427

Roll No.

MCA
(SEM. IV) THEORY EXAM. 2014-15
ARTIFICIAL INTELLIGENCE

Time : 3 Hours] [Total Marks : 100

Note : Attempt the questions as indicated.

Q1. Attempt any ***four*** questions from the following : 5x4=20

a) Define the terms - natural intelligence and artificial intelligence. How do you differentiate between the two?

b) Write four properties a good system should possess for the knowledge representation in a particular domain.

c) What is natural language processing?

d) State and explain the Branch-and-bound searching technique.

e) Define and differentiate between weak and strong AI.

f) Write down the foundation of AI.

Q2. Attempt any ***four*** questions from the following : 5x4=20

a) What is the difference between knowledge representation and knowledge acquisition?

b) What do you mean by constraint satisfaction problem? Explain constraint satisfaction algorithm.

c) Explain the effect of over-estimation and under - estimation on A* algorithm.

d) Explain AND-OR graph.

e) Differentiate between simple hill climbing and steepest-ascent hill climbing algorithms.

f) Discuss MIN-MAX algorithm for game playing.

Q3. Attempt any ***two*** questions from the following : 10x2=20

a) Convert the following sentences to FOPL-

- Jack owns a dog
- Every dog owner is an animal lover.
- No animal lover kills an animal.
- Either Jack or Curiosity killed the cat, who is named Tuna.

Also prove by resolution – **Did curiosity kill the cat**

b) Using propositional linear resolution, show the following propositional sentence is unsatisfiable. Convert this sentence to clause form and derive the empty clause using resolution –

$$(P \vee Q \vee \neg R) \vee ((\neg R \vee Q \vee P) \Rightarrow (R \vee Q) \wedge \neg Q \wedge \neg P)$$

c) What is Bayesian reasoning? What does a Bayesian network represent? Explain.

Q4. Attempt any ***two*** questions from the following : 10x2=20

a) What is machine learning? Differentiate between supervised, unsupervised and reinforcement learning.

(d) Image Analysis

(e) Support Vector Maching (SVM)

(f) Probabilistic reasoning.

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Printed Pages : 4

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NMCA-413

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 214427

Roll No.

MCA
(Sem.-IV) Even Semester
EXAMINATION, 2014-15
ARTIFICIAL INTELLIGENCE

Time : 3 Hours] *[Total Marks : 100*

Note: Attempt all questions. All question carry equal marks.

1. Attempt any four parts of the following: 5×4=20

(a) What is artificial intelligence? Does artificial intelligence is same as computational intelligence?

(b) Describe the role of McCarthy in establishing artificial intelligence as a new discipline of computer science.

(c) What is an intelligent agent? Describe basic kinds of agents program.

(d) Define Turing test. Does Turing test is sufficient to define the operational definition of artificial intelligence.

(e) Describe the role of artificial intelligence in game playing.

(f) What is natural language processing? Explain your answer with examples.

2. Attempt any two parts of the following : 10×2=20

(a) Compare and contrast between informed and uninformed search.

(b) Describe A * search technique and prove that it is complete and optimal.

(c) Explain a local search algorithm by considering a suitable example.

3. Attempt any two parts of the following : 10×2=20

(a) i) Determine whether the following argument is valid:

"All dogs bark. Some animals are dogs. Therefore, some animals bark."

ii) State contrapositive theories with example.

(b) Explain the following rules in detail in the context of logic theory :

i) Rules of inference

ii) Rules of indirect proof

(c) What is a Bayesian network? How does the Bayesian network is used in representing the uncertainty about knowledge?

4. Attempt any two parts of the following : 10×2=20

(a) What is unsupervised learning? Describe any two unsupervised learning techniques in detail.

(b) Define the term clustering. Describe the K-mean clustering in detail.

(c) Write short notes on the following data representation techniques :

i) Principal component analysis (PCA)

ii) Linear discriminant analysis (LDA)

5. Write short notes on any four of the following : 5×4=20

(a) Pattern recognition system

(b) Hidden Markov Models

(c) Knowledge in learning

MCA (DUAL DEGREE)
(SEM-V) THEORY EXAMINATION 2020-21
ARTIFICIAL INTELLIGENCE

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a.	Give any two differences between human intelligence and artificial intelligence.
b.	What are the different levels of knowledge?
c.	Write Heuristic function for travelling salesman problem and Water jug problem.
d.	What do you mean by reinforcement learning?
e.	Write a short note on Adversarial search.
f.	What do you understand by state space representation of a problem?
g.	Briefly explain the concept of Hidden Markov model.
h.	Write Generate and Test search algorithm.
i.	With the help of example, briefly explain the concept of backward chaining.
j.	What is support vector machine? What are its types?

SECTION B

2. Attempt any *three* of the following: 10x3=30

a.	What are the various foundation areas of artificial Intelligence? Discuss.
b.	Explain the concept of Best-first search algorithm with the help of a diagram.
c.	Discuss unification and resolution algorithm for predicate logic.
d.	What do you mean by the term clustering? Explain k-means clustering.
e.	Discuss Linear discriminant analysis for two category case with example.

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a.	Explain structure and types of intelligent agents.
b.	What do you mean by natural language processing? Discuss steps in natural language processing?

4. Attempt any *one* part of the following: 10x1=10

a.	Discuss and compare uninformed and informed searching techniques with their advantages and limitations.
b.	Explain Minimax search strategy with alpha-beta cutoff using suitable diagram.

5. Attempt any *one* part of the following: 10x1=10

a.	Discuss algorithm for conversion to clause form. Also convert the following to clause form- (i) Sohan is a student. (ii) Shyam is elder brother of sohan. (iii) Shyam is married to Geeta. (iv) Shyam speaks Hindi language. (v) All Indians speak Hindi language.
b.	Discuss Bayes rule and Bayesian reasoning. What does a Bayesian network represents?

6. Attempt any *one* part of the following: 10x1=10

a.	Define the term machine learning. Discuss any four application areas of machine learning.
b.	Explain the concept of Expectation Maximization algorithm for learning with hidden data.

7. Attempt any *one* part of the following: 10x1=10

a.	What do you mean by classification? Explain. State nearest Neighbor rule of classification with example.
b.	Describe various stages of pattern recognition system design cycle with the help of diagram.

MCA (DUAL DEGREE)
(SEM-V) THEORY EXAMINATION 2019-20
ARTIFICIAL INTELLIGENCE

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a.	How goal-based agent works?
b.	Define the Heuristic function with example.
c.	What do you mean by alpha-beta pruning? Explain in brief.
d.	Differentiate between human vision and computer vision.
e.	Define the term production system.
f.	Briefly explain forward chaining with example.
g.	What do you mean by state space representation of a problem?
h.	With the help of a diagram, explain the functioning of a classifier.
i.	What do you understand by the term probabilistic reasoning?
j.	Write a short note on nearest neighbor rule.

SECTION B

2. Attempt any *three* of the following: 10x3=30

a.	What are the different categories of AI tasks? Explain.
b.	Explain the concept of Simulated Annealing. Also write its algorithm.
c.	Discuss algorithm to convert predicate formula to clause form with proper example.
d.	Describe Expectation Maximization algorithm for learning with hidden data.
e.	Explain the concept of Principle Component Analysis with the help of suitable diagram.

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a.	What is an intelligent agent? Discuss the structure of an intelligent agent with the help of a diagram. Also explain the functioning of utility-based intelligent agent.
b.	Describe various foundation areas of Artificial Intelligence.

4. Attempt any *one* part of the following: 10x1=10

a.	What do you mean by hill climbing? Explain different types of hill-climbing searching methods.
b.	Discuss and compare Depth-first search and Breadth-search methods with proper diagram.

5. Attempt any *one* part of the following: 10x1=10

a.	What do you mean by Bayesian network? Discuss steps to construct a Bayesian network.
b.	Convert the following into clause form- **(i) black →~white** **(ii) white → ~black ∧ ~yellow ∧ ~red** **(iii) snow → white** **(iv) black → coal ∨ dark** (v) **white → bright**

6. Attempt any *one* part of the following: 10x1=10

a.	What is the difference between human learning and machine learning process? Discuss. Also differentiate between supervised and unsupervised learning.
b.	Explain the functioning of decision tree for classification using a suitable diagram. Also state limitations of decision tree.

7. Attempt any *one* part of the following: 10x1=10

a.	What do you mean by statistical pattern recognition? Explain any one statistical pattern recognition model with proper diagram.
b.	Discuss and compare different types of support vector machine.

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(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 214584 Roll No. | | | | | | | | | | |

MCA

(SEM. V) THEORY EXAMINATION, 2015-16

ARTIFICIAL INTELLINGENCE

[Time:3 hours] [Total Marks:100]

Section-A

1. Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

   (a) Differentiate supervised and unsupervised learning

   (b) How machine translation systems are implemented?

   (c) What are the basic components of propositional logic?

   (d) State the reason why first order, logic fails to cope with that the mind like medical diagnosis.

   (e) State the reasons why the inductive logic programming is popular.

   (f) What is active and passive reinforcement learning?

   (g) How does one characterize the quality of heuristic?

   (h) Name three UnInformed search strategies.

   (i) How TELL and ASK are used in first-order-logic.

   (j) Construct CD representation of the following:

   John took the book from Mary.

Section-B

Atempt **any five** questions from this section. (10x5=50)

2. Describe about Learning based agent. Differentiate between Simple reflex based and Model based agents.

3. Solve the Crypt arithmetic problem :

   CROSS

   +ROADS

   DANGER

   ----

4. Briefly describe the meaning of Knowledge representation and knowledge acquistion. What procedure is followed for knowledge aquisition?

5. Describe the decision tree learning model by choosing "suitable example".

6. Describe A* search technique and prove that, it is opimal and complete.

7. Explain the concept of conceptual dependency? Give the conceptual dependency graph for the sentence: "Mary drove her car to office".

8. Explain Bayesian network by taking an example. How is the Bayesian network powerful representation for uncertainty knowledge?

9. Prove that the following sentence is valid: "If pries fall the rate increases. If rate increases then Johny makes a lot of money. But Johny does't make a lot of money. Prove by resolution that prices do not fall".

Section-C

Attempt **any two** question from this section. (15x2=30)

10. Explain learning with complete data-Naive Bayc's model and learnig with hidden data-EM algorithm.

11. Explain the design pattern of pattern recognition system.

12. Write short notes on the following:

   (a) Depth first searching

   (b) Bayesian network

   (c) Reinforcement learning.

—x—

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MCAE-24/MCA-511(A)

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 214563 Roll No. | | | | | | | | | | |

M. C. A.

(SEM. V) (ODD SEM.) THEORY EXAMINATION, 2014-15

ARTIFICIAL INTELLIGENCE

Time : 3 Hours] [Total Marks : 100

Note : Attempt **all** questions.

1 Attempt any **four** of the following : 5×4=20

   a) Define the terms: Knowledge, Intelligence and Artificial Intelligence. Write the various applications of Artificial Intelligence.

   b) What is Turing test? Suppose you design a machine to pass the Turing test then what are the capabilities such a machine must have?

   c) Differentiate between simple-reflex agent and utility agent.

   d) Discuss the basic element of natural language processing.

   e) State and explain the Min-Max algorithm of game playing.

   f) Prove that A* algorithm is optimal and complete.

2 Attempt any **four** of the following : **5×4=20**

a) Difference between declarative and procedural knowledge representations.

b) Describe, briefly the "Heuristic search strategy" by applying on Traveling Salesman Problem also write the heuristic function for TSP.

c) What is Production System? What are the main components of a Production System, Explain each with example?

d) Describe, briefly the "Hill Climbing" search strategy, problems and solutions. Which heuristic function is used?

e) Show the state space representation for the solution of water jug problem with the capacity of two jugs as 3 and 4 and fill 2 liter water in 4 liter jug. Devise all the production rules.

f) Give an example of a problem for which breath first search would work better than depth first search. Write the differences between these two approaches.

3 Attempt any **two** of the following : **10×2=20**

a) Convert following sentence into predicate logic and then prove "Marcus is dead" using resolution :

- Marcus was a man.
- Marcus was a Pompeian.
- Marcus was born in 40 AD
- All men are mortal
- All Pompeian's died when the volcano erupted in 1979
- No mortal lives longer than 150 years
- It is now 1991
- Alive means not dead.

b) Consider the following sentences :

- John likes all kinds of food.
- Apples are food.
- Chicken is food
- Anything anyone eats and isn't killed alive.
- Sue eats everything bill eats.

(i) Translate these sentences into formulas in predicate logic.

(ii) Prove that John likes peanuts using backward chaining.

c) Describe Bayesian networks. How is the Bayesian networks powerful representation for representing knowledge ?

4 Attempt any **two** of the following : **10×2=20**

a) What do you understand by pattern recognition? Differentiate between structured description and symbolic description.

b) Describe the role of Hidden Markov Model (HMM) in probabilistic reasoning.

c) Write short notes on any **two** of the following :

i. Supervised and Unsupervised Learning

ii. Reinforcement learning

iii. Principle Component Analysis (PLA).

5 Attempt any **two** of the following : **10×2=20**

a) Define the concept of Expectation Maximization Algorithm. Explain the role of E-step and M-step in EM algorithm.

b) What is clustering ? Describe k-means clustering technique with example.

c) Write short notes on any **two** of the following :

i. Support Vector Machine (SVM)

ii. Linear Discriminant Analysis

iii. Bayesian Classifier.

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M.C.A.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2013-14

ARTIFICIAL INTELLIGENCE

Time : 3 Hours Total Marks : 100

Note :-(I) Attempt all questions. (2) Be precise in your answer.

1. Attempt any four parts of the following: (5x4=20)

(a) Define Artificial Intelligence formulated by Haugeland. Also define Artificial Intelligence in terms of human performance.

(b) Elaborate the approaches for AI with example. Also give any two applications of AI in detail.

(c) What do you mean by Intelligent Agent ? What are the various types of Intelligent Agent ?

(d) Represent the following sentence in the Predicate form "All the children like sweets".

(e) Elaborate on the agent communication method by action.

(f) What do you understand by Natural Language Processing ?

2. Attempt any four parts of the following: (5x4=20)

(a) Define in your own words the "State Space Search". When would Best First Search be worse than simple Breadth First Search ?

(b) Discuss how a heuristic function helps in the search technique. Explain with a suitable heuristics function for TIC TAC TOE problems.

(c) What is A* algorithm ? Under what conditions A* algorithm produces optimal solution or always guarantees a solution.

(d) Explain Predicate Logic with the help of suitable examples.

(e) Explain genetic algorithm as a local search. Write in detail the online search agent working using depth first exploration.

(f) Describe alpha-beta pruning and give the other modifications to the minmax procedure to improve its performance.

Attempt any two parts of the following: (10x2=20)

3 .(a) How can resolution be used to show that a sentence is valid ? Draw the Conceptual Dependency (CD) representation for the sentence : John Punched Bill.

(b) Consider the following sentences:

- John likes all kinds of food
- Apples are food
- Chicken is food

Anything anyone eats and isn't killed by is food

- Bill eats peanuts and is still alive
- Sue eats everything bill eats

(i) Translate these sentences into formulas in predicate logic

(ii) Prove that John likes peanuts using backward chaining

(iii) Convert the formulas of a part into clause form

(iv) Prove that John likes peanuts using resolution.

(c) Explain how Bayesian statistics provide reasoning under various kinds of uncertainty.

Attempt any two parts of the following: (10x2=20)

(a) Discuss the concept of Supervised Learning and describe an algorithm for the same.

(b) Describe Naive Baye's Model for learning.

(c) Write note on Reinforcement Learning.

Describe any two parts of the following: (10x2=20)

(a) Design principles of pattern recognition system.

(b) Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA).

(c) Support Vector Machine (SVM).

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PAPER ID : 2149 **Roll No.** | | | | | | | | | | |

MCA

(SEMESTER-V) THEORY EXAMINATION, 2012-13

ARTIFICIAL INTELLIGENCE

Time : 3 Hours] ***[Total Marks : 100***

Section – A

1. Attempt **all** parts. **10 × 2 = 20**

(a) What are the task domains of artificial intelligence ?

(b) What are the factors that a rational agent should depend on at any given time ?

(c) Differentiate blind search and heuristic search.

(d) Give the PEAS description of an "Interactive English Tutor" system.

(e) List the various informed search strategy.

(f) Define Skolear constant.

(g) When learning problem is said to be realizable or unrealizable ?

(h) List the advantages of Decision Trees.

(i) What are the components of pattern recognition system ?

(j) What are the various approaches for pattern recognition ?

Section – B

2. Attempt any **three** parts. **10 × 3 = 30**

(a) (i) For each of the following agent, develop a PEAS description of the task environment.

(a) Robot Soccer Player

(b) Internet book-shopping agent

(ii) Both the performance measure and the utility function measure how well an agent is doing ? Explain the difference between two.

(b) Explain the following uninformed search strategies with examples :

(i) Breadth First Search

(ii) Uniform Cost Search

(c) What do you mean by supervised and unsupervised learning ? Explain.

(d) (i) Describe how Branch and Bound Technique could be used to find the shortest solution to a traveling salesman.

(ii) Explain the effect of overestimation and underestimation of it on A* algorithm.

(e) Convert the following English sentences into predicate logic :

(i) Every fisherman likes the river.

(ii) No red flower is poisonous.

(iii) You can fool some of the people all of the time.

(iv) There are exactly two purple mushrooms.

(v) X is above Y if X is on directly on top of Y or else there is a pile of one or more other objects directly on top of one another starting with X and ending with Y.

Section – C

Attempt any **five** questions : **10 × 5 = 50**

3. Consider the following sentences :

(a) John like all kinds of food.

(b) Apples are food.

(c) Chicken is food.

(d) Anything anyone eats, and is not killed by is food.

(e) Jack eats peanut and is still alive.

(f) Jill eats everything Jack eats.

Represent these sentences into predicate logic and prove that "John likes peanuts" through resolution.

4. What is reinforcement learning ? Explain

(a) Passive reinforcement learning

(b) Active reinforcement learning.

5. Consider a statespace where the start state is number 1 and the successor function for state n return two states, numbers 2n and 2n + 1

(a) Draw the portion of the state space for states 1 to 15.

(b) Suppose the goal state is 11. List the order in which nodes will be visited for breadth first search, depth-limited search with limit 3, and iterative deeping search.

(c) What is the branching factor in each direction of the bidirectional search ?

6. Consider the basic concepts of game playing, using tic-tac-toe as an example. We define X_n as the number of rows, columns, or diagonals with exactly n X's and no O's. Similarly, O_n is the number of rows, columns, or diagonals with just n O's. The utility function assigns + 1 to any position with $X_3 = 1$ and – 1 to any position with $O_3 = 1$. All other terminal positions have utility O. For non-terminal positions, use a linear function defined as $Eval(s) = 3X_2(s) + X_1(s) - (3O_2(s) + O_1(s))$.

(a) Approximately how many possible games of tic-tac-toe are there ?

(b) Show the whole game tree starting from an empty board down to depth 2, taking symmetry into account.

(c) Mark on your tree the evaluations of all the positions at depth 2.

(d) Circle the nodes at depth 2 that would not be evaluated if alpha-beta pruning were applied, assuming the nodes are generated in the optimal order for alpha-beta pruning.

7. What are different types of Neural Networks ? Explain.

8. What are Intelligent Agents ? Explain different types of Intelligent Agents.

9. Given the full joint distribution below in Fig. (a), calculate the following :

(a) P (toothache)

(b) P (cavity)

(c) P (toothache / cavity)

(d) P(cavity / toothache V catch)

	Toothache		¬ Toothache	
	Catch	¬ Catch	Catch	¬ Catch
Cavity	0.108	0.012	0.072	0.008
¬ Cavity	0.016	0.064	0.144	0.576

Fig. (a)

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PAPER ID : 2149 Roll No.

M.C.A.

(SEM. V) THEORY EXAMINATION 2011-12

ARTIFICIAL INTELLIGENCE

Time : 3 Hours *Total Marks : 100*

Note :– Attempt **all** questions.

1. Attempt any **four** parts of the following : (5×4=20)
   (a) Define the term artificial intelligence.
   (b) How the artificial intelligence is different than general intelligence ?
   (c) Define Turing test. Is Turing test sufficient to define the operational definition of artificial intelligence ?
   (d) Define the role of intelligent agents in the problem solving.
   (e) Write a short note highlighting the landmark incidences that was responsible for the emergence of artificial intelligence as a new discipline.
   (f) Describe the role of artificial intelligence in natural language processing.

2. Attempt any **two** parts of the following : (10×2=20)
   (a) What do you mean by blind search ? List any four blind search techniques. Explain any one.

   (b) Describe bidirectional search technique. Prove that bidirectional search technique is complete and optimal.
   (c) Show that A* search technique is optimally efficient for any given heuristic function.

3. Attempt any **two** parts of the following : (10×2=20)
   (a) (i) Prove that the following sentence is valid :

   "If prices fall then sell increases. If sell increases, then John makes the whole money. But John doesn't make the whole money. Therefore, prices do not fall."

   (ii) Consider the argument :

   "All dogs bark. Some animals are dogs. Therefore, some animals bark".

   Determine whether the conclusion is a valid consequence of the premises.
   (b) Define Hidden Markov Model (HMM). Illustrate why HMM is a potential technique used for probabilistic reasoning.
   (c) Explain Bayesian Networks.

4. Attempt any **two** parts of the following : (10×2=20)
   (a) Illustrate decision trees learning technique using a suitable example.
   (b) What is clustering ? Describe k-mean clustering technique.
   (c) Describe a learning technique that is used to handle the problems of hidden variables.

5. Write short notes on any **four** of the following : (5×4=20)
   (a) Pattern Classification
   (b) Principle Component Analysis (PCA)
   (c) Linear Discriminant Analysis (LDA)
   (d) Nearest Neighbour Rule
   (e) Support Vector Machine (SVM)
   (f) Reinforcement learning.