Total No. of Questions : 5] [Total No. of Printed Pages : 3

Roll No. .....

MCA–402(N)

M. C. A. (Fourth Semester) EXAMINATION, June, 2008

(New Course)

MOBILE COMMUNICATION

[MCA – 402(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt all the *five* questions selecting *one* question from each Unit.

Unit – I

1. (a) Compare various multiple access techniques. 10

   (b) Explain the relationship between OSI model and wireless communications. 10

Or

   (a) Explain the difference between different modulation techniques. 10

   (b) Define the following : 10

   (i) Frequency modulation

   (ii) Frequency derivation

   (iii) Modulation index for frequency modulation

Unit – II

2. (a) What are different physical factors affecting small scale fading ? 10

   (b) Explain about slow and fast fading. 10

P. T. O.

Or

(a) How can you increase the capacity of cellular system with the help of frequency reuse concepts ? 10

(b) Given a cellular system in which there are a total of 1001 radio channels available for handling traffic. It is also given that the area of a cell is 6 km^2 and the area of the entire system is 2100 km^2 : 10

(i) Calculate the system capacity if the cluster size is 7.

(ii) How many times would the cluster of size 4 have to be replicated in order to approximately cover the entire cellular area ?

Unit – III

3. (a) Explain the architecture of GSM. 10

(b) Explain the GSM protocol architecture. 10

Or

(a) Explain about the protocol layers in GPRS. 10

(b) Explain short messaging services in GPRS. 10

Unit – IV

4. (a) Explain the protocol layers wireless application protocol (WAP). 10

(b) Expain the WAP programming architecture. 10

Or

(a) Describe reference architecture of IEEE 802·11. 10

(b) Explain the following : 10

(i) FHSS

(ii) DSSS

(iii) DFIR

(iv) MAC sublayer

Unit – V

5. What is bluetooth ? Why is the technology called bluetooth ? How is bluetooth used ? Will bluetooth and wireless LAN interface with each other ? What is the data throughput speed of a bluetooth connection ? What is the range of bluetooth transmitter/receivers ? Will other radio frequency devices interface with bluetooth devices ? What kind of encryption is used for bluetooth security ? 20

Or

What is VSAT system ? What are difference VSAT topologies and access schemes ? Explain. 20

Total No. of Questions : 8] [Total No. of Printed Pages : 3

Roll No. .....

MCA–402(O)

M. C. A. (Fourth Semester) EXAMINATION, June, 2008

(Old Course)

ARTIFICIAL INTELLIGENCE AND APPLICATIONS

[MCA–402(O)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) What do you mean by AI ? What are the important AI techniques ?

   (b) Find a good state space representation for the missionaries.

2. (a) Trace the constraint satistaction procedure solving the following cryptatithmetic problem :

$$\begin{array}{r} \text{S E N D} \\ +\ \text{M O R E} \\ \hline \text{M O N E Y} \end{array}$$

   (b) Differentiate between depth first and breadth first search.

3. (a) Write down the A* algorithm with its merits and demerits.

P. T. O.

(b) Describe how the branch and bound technique could be used to find the shortest solution to a water jug problem.

4. (a) Consider the following sentences :

(i) Annu likes all kinds of food

(ii) Bananas are food

(iii) Apples are food

(iv) Anything any one eats and isn't killed by food

(v) Bali eats peanuts and is still alive

(vi) Ram eats everything Bali eats

(a) Translate these sentences into predicate logic and clause form.

(b) Prove that Annu likes peanuts using resolution.

(b) State and prove unification algorithm. Why is unitication required ?

5. (a) Explain the semantic nets and make the partitioned semantic net for the following sentence :

"Every dog in town has bitten the constable."

(b) Show a conceptual dependency representation of the following sentence :

"John ate the egg"

6. (a) Consider the following blocks world problem :

Stars :	On (A, B) ∧	Goal :	On table (D) ∧
	On (B, C) ∧		On table (C) ∧
	On (C, D) ∧		On table (B) ∧
	On table D		On table (A)

Show that how STRIPS would solve the above problem.

(b) Write down the minimax algorithm and explain with the help of an example.

7. (a) What is NLP ? Differentiate between ATN and PTN.

(b) Explain explanation based learning and learning from analog with example.

8. Write short notes on any *four* of the following :

(i) MYCIN

(ii) Bayesian Networks

(iii) STRIPS

(iv) Frames

(v) Horn clause

(vi) Certainty factor

Total No. of Questions : 8] [Total No. of Printed Pages : 2

MCA–402(N)

M. C. A. (Fourth Semester)
EXAMINATION, June, 2007

(New Scheme)

MOBILE COMMUNICATION

[MCA – 402 (N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Explain the operation of basic cellular system.
   (b) Explain the concept of reuse channels schemes and distance.

2. (a) Discuss the handoff phenomenon in detail.
   (b) What is fading ? Explain small scale fading and multipath fading.

3. (a) During a busy hour the number of calls per hour Q_i, for each of 10 calls is 2000, 1500, 3000, 500, 1000, 1200, 1800, 2500, 2800, 900. Assume that 60% of the car phones will be used during this period and that call is made per car phone. Evaluate the number of customers in the system.

P. T. O.

(b) Discuss the designing of an omnidirectional antenna system in the worst case.

4. (a) Give detailed comparison between TDMA, FDMA and CDMA.

   (b) Explain GSM architecture. What is layer modeling ?

5. (a) What are mobility and security management in GSM ?

   (b) Discuss transmission media for wireless LAN.

6. (a) What are various digital cellular systems ? Explain each in brief.

   (b) Give various applications of wireless LAN.

7. (a) Discuss IEEE 802·11 standards.

   (b) How do inclination and elevation determine the use of a satellite ?

8. Write short notes on any *two* of the following :

   (i) FHSS and DSSS

   (ii) Error coding and correction

   (iii) GRPS architecture

   (iv) Components of VSAT system

   (v) Blue tooth technology

Total No. of Questions : 8] [Total No. of Printed Pages : 3

MCA–402(O)

M. C. A. (Fourth Semester)
EXAMINATION, Nov.-Dec., 2007

(Old Course)

ARTIFICIAL INTELLIGENCE AND APPLICATIONS

[MCA – 402(O)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Explain about AI technique. What are the characteristics of an AI program ? 10

   (b) Explain state space representation. Give a state space representation of 15-puzzle problem. 10

2. (a) Explain about production systems. What are its characteristics ? 10

   (b) Explain breadth first search technique along with its algorithm. What are the advantages and drawbacks of depth-first search ? 10

3. (a) Explain the problems in hill climbing techniques along with way to solve this problem. 10

P. T. O.

(b) Trace the constraints satisfaction procedure solving the following crypt arithmetic problem : 10

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

4. (a) Assume the following facts : 10

(i) Steve only like easy courses.

(ii) Science courses are hard.

(iii) All the courses in the basket weaving department are easy.

(iv) BK 301 is basket weaving course.

Use resolution to answer the question, "What course would Steve like" ?

(b) Using facts answer the "Did Marcus hate Caesar" ?

Facts : 10

(i) Marcus was a man.

(ii) Marcus was a Pompeian.

(iii) All Pompeians were Romans.

(iv) Caesar was a ruler.

(v) All Romans were either loyal to Caesar or hated him.

(vi) Everyone is loyal to someone.

(vii) People only try to assassinate rulers they are not loyal to.

(viii) Marcus tried to assassinate Caesar.

5. (a) Explain alpha-beta cut-offs in game playing with example. 10

(b) Construct a SCRIPT for the sentence, "John went to the restaurant last night. He had his dinner, paid the bill and returned back home." 10

6. (a) Explain monotonic and non-monotonic with examples. Compare them giving advantages and drawbacks of each. 10

(b) Explain backward reasoning with examples. 10

7. (a) Explain probabilistic reasoning and Baye's theorem with examples. 10

(b) What are the advantages of natural language processing ? Also give the major problem in NLP. 10

8. Write short notes on any *three* of the following : 20

(i) Mycin

(ii) Hill Climbing

(iii) Expert System

(iv) Neural Network

Total No. of Questions : 8] [Total No. of Printed Pages : 4

MCA–402

M. C. A. (Fourth Semester) EXAMINATION, Dec., 2006

ARTIFICIAL INTELLIGENCE AND APPLICATIONS

(MCA – 402)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Define AI. What are essential abilities for Intelligence ? Define and describe the difference between knowledge, hypothesis, belief and data. Distinguish between knowledge acquisition and knowledge representation. 10

   (b) What is cognitive science ? Differentiate between computer and human brain. How does human brain process information ? What is computational intelligence ? 10

2. (a) Compare and contrast AI programming paradigm and object oriented programming paradigm. Represent the 8 puzzle problem using AI production system.

P. T. O.

Illustrate this representation by solving the following instance of the problem : 10

	1	2
3	4	5
6	7	8

Goal State

7	2	4
5		6
8	3	1

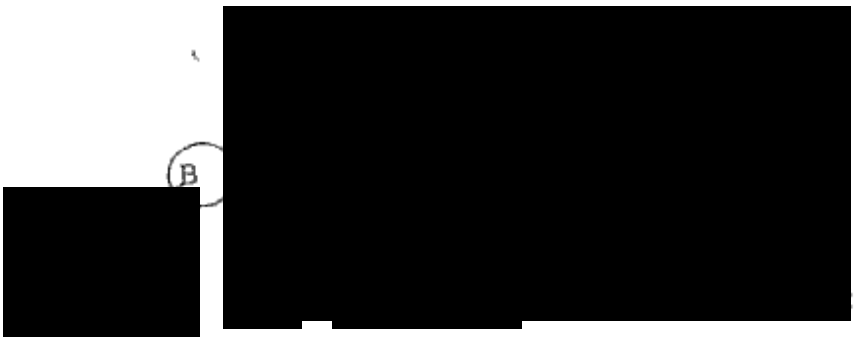
Initial State

(b) Compare and contrast expert systems and decision support system. Describe the architecture of an Expert System. 10

3. (a) Prove that A* Search is both complete and optimal. 10

(b) Differentiate between simple hill climbing and steepest Ascent hill climbing. What major problem occurs due to hill climbing ? How can these problems be solved ? 10

4. (a) Write down the Algorithm for Alpha Beta pruning ? Prune this tree. 10



(b) What is FOPL ? Differentiate between propositional logic and predicate logic ? Describe Ontological and Epistemological commitment for logical languages. 10

5. (a) Define Resolution. Solve the following using resolution :

Premises : 10

(i) Every one loves all animals is loved by someone

(ii) Any one who kills an animal is loved by no one

(iii) Jack loves all animals

(iv) Either Jack or Kitty killed her cat, which is named Tuna.

Conclusion

Did Kitty kill the cat ?

(b) State and prove unification algorithm. Why is unification required ? 10

6. (a) What are semantic nets and partitioned semantic nets ? Draw semantic nets for the following : 10

(i) John gave the book to Mary.

(ii) Every dog has bitten a mail carrier.

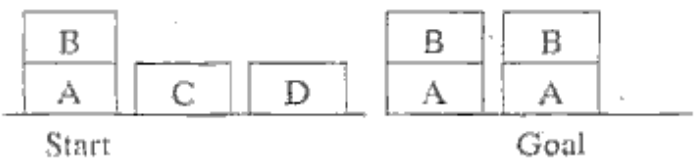
(b) Define CD. Describe different primitive for CD. Write down CD for the following : 10

(i) John prevented Marry from giving a book to Bill.

(ii) John fertilized the field.

7. (a) What is NLP ? Differentiate between ATN and RTN. Define various arcs and labels for RTN. 10

(b) Using Goal Stack Planning, solve the block word problem : 10



P. T. O.

8. Write short notes on the following : 5 each

(i) Bayesian Networks

(ii) Horn Clause

(iii) Computational Learning

(iv) Fuzzy Reasoning

Total No. of Questions : 8] [Total No. of Printed Pages : 3

MCA–402

M. C. A. (Fourth Semester) EXAMINATION, Dec., 2005

ARTIFICIAL INTELLIGENCE AND APPLICATIONS

(MCA—402)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks. Make suitable assumptions, if required.

1. What do you understand by Artificial Intelligence ? What are the different Task domains of A. I. ? Explain each of them. 10

   (b) Prove that the following equality holds in the propositional calculus : 5

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

   (c) Give an example of a problem for which breadth-first search would work better than depth-first search and vice-versa. 5

2. (a) Differentiate between Simple Hill Climbing, Steepest-Ascent Hill Climbing and Simulated Annealing Algorithms. 12

P. T. O.

(b) Trace the constraint satisfaction procedure solving the following crypta arithmetic problem : 8

$$\begin{array}{r} a\,a\,a \\ +\,a\,a\,a \\ \hline a\,a\,a \end{array}$$

3. (a) Consider the following sentences : 10

(i) Maria is Bill's mother.

(ii) Amanda is one of Bill's ancestors.

(iii) Every one of Bill's ancestors is either his mother, father or one of their ancestors.

Translate these sentences into predicate logic and convert it into clause form.

(b) Write down the advantages of production systems for A. I. 10

4. (a) What do you understand by an Expert System ? Explain the various components of an Expert System. 10

(b) Show a conceptual dependency representation of the following sentences : 10

(i) Paul cut down the tree with a axe

(ii) Tom gave John an ice cream cone

5. (a) Using conceptual dependencies, define a script for going to the cinema. 10

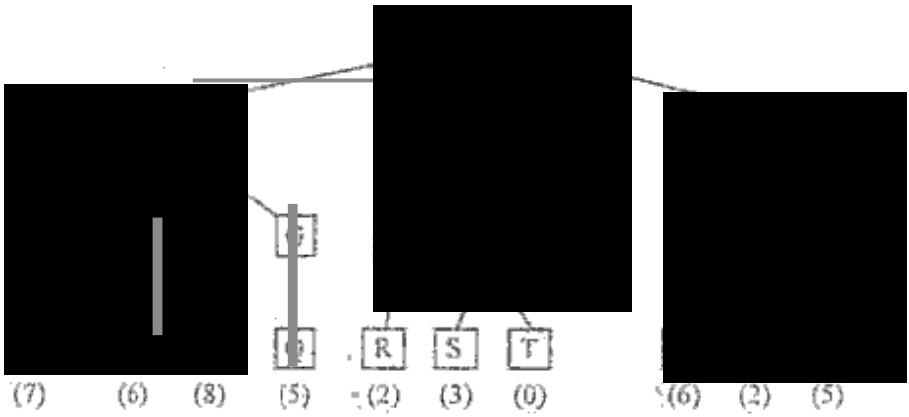
(b) Derive a Parse tree for the sentence "The big dog bites the man" using natural language grammar. 5

(c) Write down the brief note on Skolem functions. 5

6. (a) Explain Explanation based learning and learning from analogy with example. 10

(b) Write down the brief note on Symbolic Reasoning under uncertainty. 10

7. (a) Consider the following game tree. What nodes would not need to be examined using the alpha-beta pruning procedure ? 8



(b) Differentiate between the following : 12

(i) RNT and ATN

(ii) Context-free and Context-sensitive Grammars

(iii) Propositional and Predicate calculus

8. Write short notes on any *four* of the following : 20

(a) Frames

(b) Bayesian Networks

(c) Case grammars

(d) Unification Algorithm

(e) Non-linear planning

(f) MYCIN

Total No. of Questions : 8] [Total No. of Printed Pages : 3

MCA–402

M. C. A. (Fourth Semester) EXAMINATION, Dec., 2004

ARTIFICIAL INTELLIGENCE AND APPLICATIONS

(MCA – 402)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Define A. I. in terms of Intelligence and Computer Science. Also enumerate major component areas of study in A. I.

   (b) Construct Truth Table for the following logical expression :

   $$(P \leftrightarrow Q) \vee (\sim (P \wedge \sim Q))$$

   where P and Q are propositional symbols and '$\leftrightarrow$', '$\vee$' '$\sim$' are standard logical operators.

   (c) Give a conceptual graph representation of the following sentence : Student watched the planets with a telescope.

2. (a) Write down all the *four* production system characteristics with example.

   (b) What is the difference between generate and test *h* hill climbing ? Explain hill climbing method of searching.

P. T. O.

What are the ways of dealing with local maxima, plateau and ridge problems which arise in hill climbing ?

3. (a) Perform minimax and alpha-beta pruning on the tree (below) :

(b) Write a recursive algorithm (using open and closed lists) to implement breadth-first search. Does recursion allow the omission of the open list when implementing breadth-first search ? Explain.

4. (a) Sketch the architecture of an expert system, showing the major components and interrelationships between these components. Briefly describe the role of each component.

(b) Transform the following sentence into clause form :

$$\forall x \exists y (\forall z p (f(x), y, z) \rightarrow (\forall u Q(x, u) \rightarrow \exists v (R(y, v))$$

(c) Derive a parse tree for the sentence :
Mohan slept on the bench using the natural language grammar.

5. (a) Consider the following blocks world problem :

Start : On table (A) $\wedge$ On table (B) $\wedge$ Goal : on table (A) $\wedge$ on (B, A)

on table (C) ∧ on (C, B)
on table (D) ∧ on (D, C)
Arm Empty

Show how STRIPS would solve this problem ?

(b) Make the augmented transition network for the following sentence. :
"Every cloud has a silver lining". Explain it step by step.

6. (a) Using conceptual dependencies, define a script for interacting with a used-car salesman.

(b) What are different ways of training data and learning tasks ? Explain with the help of examples.

7. (a) Translate the following sentences into predicate calculus :
   (i) Basketball players are tall.
   (ii) Place all the ingredients in a bowl and mix thoroughly.

(b) Write down the brief note on the theory of certainty.

(c) Write down the brief note on logics for non-monotonic reasoning.

8. Write short notes on any *four* of the following :
   (a) MYCIN
   (b) Case Grammar
   (c) Unification Algorithm
   (d) Frames
   (e) AO* algorithm
   (f) Skolemization