2015

M.Sc.

3rd SEMESTER EXAMINATION

COMPUTER SCIENCE

PAPER—COS-302

Full Marks : 50

Time : 2 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Module–I

(*Artificial Intelligence*)

[Marks : 25]

Answer any *two* questions.

1. (a) Write down the A* algorithm. 3

(b) What is fitness number ? Explain. 2

(c) Show that :

$$\exists_y \forall_x P(x,u) \Rightarrow \forall_x \exists_y P(x,y)$$

but converse in not true. 3

(d) Write down the difference between monotonic reasoning and non-monotonic reasoning. 2

2. (a) Write down the basic principal of Alpha-Beta-cut off (Pruning). 2

(b) Explain the Alpha-Beta-Cut off (Pruning) in detail. 4

(c) Write down the limitation of Minimax algorithm. 4

(d) Prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ where A and B are two events. 3

3. Represent the following rules in first order logic : 5×2

(a) All dogs are mortal.

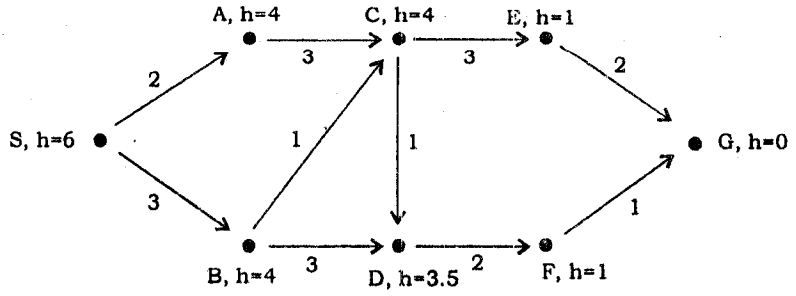
(b) No person buys an expensive policy.

(c) All horses, cows and pigs are mammals.

(d) Offspring and parent are inverse relations.

(e) Not all the basketball players are tall.

4. Consider the graph to find the shortest path from S to G using A* algorithm : 10



[Internal Assessment — 5 Marks]

Module-II

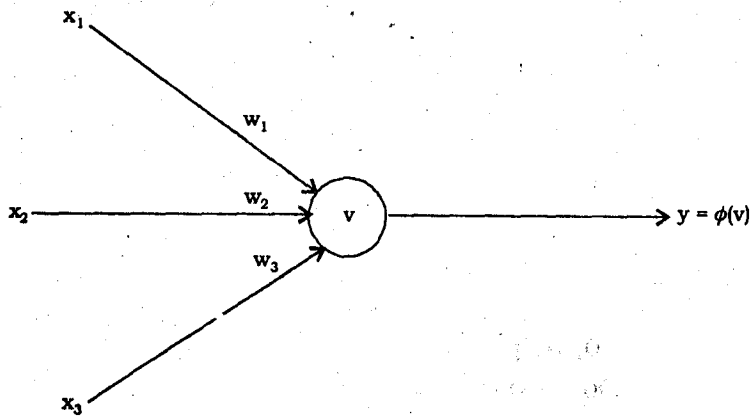
(*Soft. Computing*)

[Marks : 25]

Answer *all* questions.

1. (a) Compute the weight matrix for a Hopfield network with the two memory vectors [1, −1, 1, −1, 1, 1] and [1, 1, 1, −1, −1, −1] stored in it. 2

(b) Below the diagram of a single artificial neuron (unit) :



The node has three inputs $x = (x_1, x_2, x_3)$ that receive only binary signals (either 0 or 1). How many different input patterns this node can receive ? What if the node had four inputs ? Can you give a formula that computes the number of binary input patterns for a given number of inputs ? 1+2+1

(c) Implement a simple genetic algorithm (GA) that solves the problem of optimizing the function y = f(x) with f(x) = x*x . 4

2. (a) What is Delta learning rule ? How is this applied in ANN ? 3+2

(b) Design perceptron network that implements AND function. 5

3. (a) Two fuzzy sets A and B both defined on x as follows :

$\mu(x_i)$	x_1	x_2	x_3	x_4	x_5	x_6
A	0·1	0·6	0·8	0·9	0·7	0·1
B	0·9	0·7	0·5	0·2	0·1	0

Find (i) $A \cup B$; (ii) $A \cap B$; (iii) $A \times B$. 10

4. (a) Let X = {a, b, c, d, e, f}, Y = {10, 20, 40, 60, 80, 100}

$\tilde{A}$ = {(a, 0·2), (b, 0·5), (c, 0·8), (d, 1), (e, 0·6), (f, 0·1)}

$\tilde{B}$ = {(10, 0·3), (20, 0·6), (40, 0·9), (60, 1), (80, 0·6), (100, 0·3)}

$\tilde{C}$ = {(10, 0·3), (20, 0·6), (40, 0·7), (60, 0·9), (80, 1), (100, 0·5)}

Determine the implication relations :

(i) IF x is $\tilde{A}$ THEN y is $\tilde{B}$;

(ii) IF x is $\tilde{A}$ THEN y is $\tilde{B}$ ELSE y is $\tilde{C}$.

(b) Draw the flow chart of Genetic Algorithm. Illustrate where possible.

6+4

[Internal Assessment — 5 Marks]