## M.Sc. 3rd Semester Examination, 2013

### COMPUTER SCIENCE

*( Artificial Intelligence/Neural Network)*

PAPER — COS/MSc-303(Gr. A + B)

*Full Marks* : 50

*Time* : 2 hours

*The figures in the right hand margin indicate marks*

### GROUP – A

*[Marks* : 20]

Answer any *two* questions

1.  (*a*) Convert the following sentences into corresponding predicate logic.        1 x 5

    (*i*)   All the existing kinds of birds can fly.

    (*ii*)  Some existing kinds of birds can fly.

    (*iii*) At least two existing kinds of birds can fly.

(iv) For every one there in someone to love.

(v) All existing kinds of birds can fly, except two.

(b) Define with example :                    1 × 5

Tautology, Contradiction, Contingency, Existential Quantifier, Universal Quantifier.

2. Suppose we want to use the $A^*$ algorithm on the graph below to find the shortest path from node $S$ to node $G$. Each node is labelled by a capital letter and the value of a heuristic function. Each edge is labelled by the cost to traverse that edge.
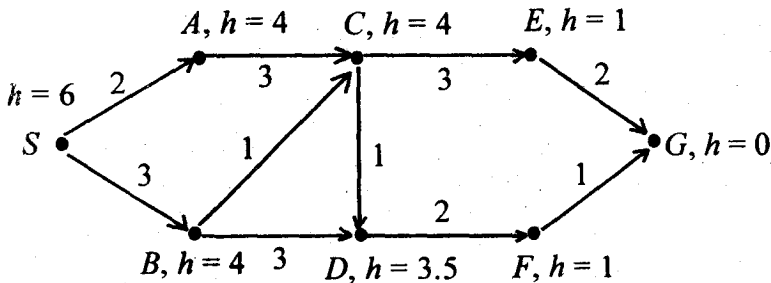
(*i*) Perform $A^*$ algorithm on this graph and show the resultant path.

(*ii*) Make this example inadmissible by changing the heuristic value at one of the nodes. What node do you choose and what heuristic value do you assign ?                          $5 + 5$

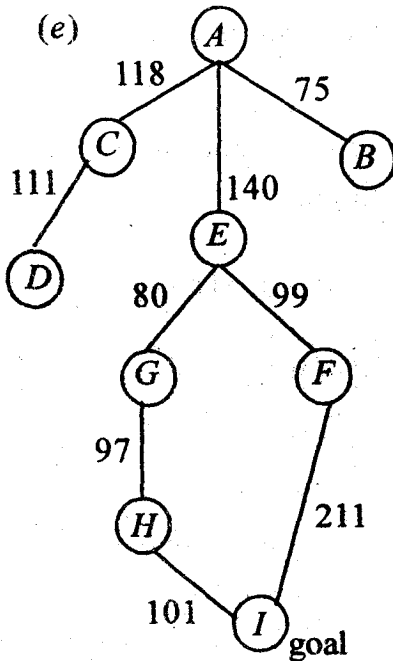3.  (*a*) What are the meaning of $P_{n-\Gamma}$ and $g*(n)$. With respect to properties of Heuristic Function.                          2

   (*b*) When we said a heuristic $fu^n$ is admissible.                          1

   (*c*) Prove that "Any node $n^*$ " on an optimal path $P^*_{\gamma-\Gamma}$ always satisfies

   $$f^*(n^*) = C^*$$

   where $C^*$ is the cheapest cost from $S$ to $\Gamma$.                          3

   (*d*) Write down the algorithm for representing a sentence into clauses.                          2

(e)



| State | Heuristic |
|-------|-----------|
| A | 366 |
| B | 374 |
| C | 329 |
| D | 244 |
| E | 253 |
| F | 178 |
| G | 193 |
| H | 98 |
| I | 0 |

From the above tree and table find the path cost and distance of the goal node in greedy search technique. 2

4. (a) Write down the procedure of "Depth First Search" algorithm. 3

(b) What is the space complexity and time complexity of Depth First Search. 1

(c) What is heuristic function ? Explain.  2

(d) Show the computation for the first 3 play moves in tac-tac-toe game using the $\alpha$-$\beta$-cut-off algorithm.  4
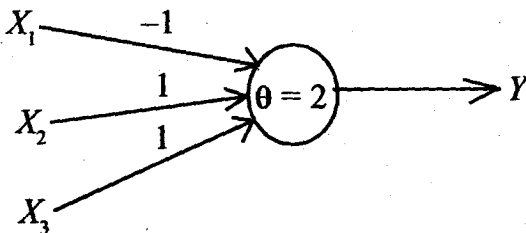
[ *Internal Assessment* — 5 Marks ]

## GROUP — B

## [*Marks* : 20]

## Answer any *two* questions

1. (a) With the help of suitable diagram discuss the functioning of 'Widrow's Adaline Model'. Explain how it differs from MP-models.  4 + 1

   (b) Write short notes on :  $2\frac{1}{2} \times 2$

   (i) Hebbian Learning and

   (ii) Reinforced learning.

2. (a) What is Excitatory and Inhebitory input ?  1

   (b) Explain about memory cell.  2

( *Turn Over* )

(c) Describe about multilayer network. 4

(d) What is the difference between supervised learning over unsupervised learning ? 2

(e) What is fixed Network ? 1

3. (a) Mention the different architecture of Neural network. Describe any of them. 1 + (3 + 3)

(b) What is activation function ? Mention any two activation functions. 1 + 2

4. (a) Consider the network shown 3 + 2



Find the truth table of the logic functions implemented in network. What is the significance of bias in neural network.

(*b*) Show how one can realize the logic circuit of NAND and NOR gates using Mc Culloch Pitts Model. $2\frac{1}{2} \times 2$

[ *Internal Assessment* — 5 Marks ]

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