(6)

- **7.** The discretized membership functions for a transistor and a resistor are given below :
 - $T = \{0/0 + 0.2/1 + 0.7/2 + 0.8/3 + 0.9/4 + 1/5\}$ $R = \{0/0 + 0.1/1 + 0.3/2 + 0.2/3 + 0.4/4 + 0.5/5\}$
 - Find the following :
 - (a) Algebraic sum
 - (b) Algebraic product
 - (c) Bounded sum
 - (d) Bounded difference $2 \times 4 = 8$

[Internal Assessment—5+5]

 $\star\star\star$

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PG/2nd Sem/COS-203/24

2024

M.Sc. 2nd Semester Examination

Computer Science

PAPER : COS-203

(Artificial Intelligence & Soft Computing)

Full Marks: 40

Time: 2 hours

The figures in the right-hand margin indicate marks.

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

Illustrate the answers wherever necessary.

Answer from both the Sections

SECTION-A

(M1/Marks : 20)

(Artificial Intelligence)

GROUP-A

- **1.** Answer any **two** questions : $2 \times 2=4$
 - (a) What is the difference between strong AI and weak AI?
 - (b) Why is heuristic search better than blind search?

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BL24/5(121)-75

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(Turn Over)

- (c) Differentiate between DFS and BFS.
- (d) Show the truth table of implication connective.

GROUP-B

2. Answer any **two** questions : $4 \times 2 = 8$

- (a) Define heuristic function. Give one example of heuristic function for 8-puzzle problem. Is your heuristic admissible? How will you prove that is it admissible or not?
- (b) Translate the following English sentences into predicate logic : 4
 - *(i)* There is a girl who likes all dogs who are not black.
 - (ii) No person likes dull pets.
 - (iii) Not all students take both History and Biology.
 - (iv) Only one student failed in History.
- (c) Compare Greedy Best first search and A search algorithm based on the following performance measures with justification :

Complete, optimal, time and space complexity.

(d) Describe the crossover and mutation operators in Genetic Algorithm with suitable example. 2+2=4 (5)

we define two fuzzy sets A and B representing the conditions of "near" a mach number of 0.65 and "in the region" of a mach number of 0.65, respectively, as follows :

- A near mach 0.65
- $A \quad \{0/0.64 + 0.75/0.645 + 1/0.65 + 0.5/0.655 + 0/0.66\}$
- *B* in the region of mach 0.65
- $B \quad \{0/0.64 + 0.25/0.645 + 0.75/0.65 + 1/0.655 + 0.5/0.66\}$

For these two fuzzy sets create (i) A = B, (ii) A = B, (iii) $\overline{A} = \overline{B}$ and (iv) \overline{A} . $1 \times 4 = 4$

- **4.** How does genetic algorithm (GA) differ from traditional algorithm? What is Roulette wheel selection in GA? 2+2=4
- **5.** What is a Hopfield net? State the advantages of associative memory. 2+2=4

GROUP-C

Answer any **one** question :

8

6. Write the expression for binary and bipolar sigmoid activation function. Why is the McCulloch Pitts neuron widely used in logic functions? Distinguish between artificial neuron and biological neuron. 2+2+4=8

4

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(Turn Over)

(M2/Marks : 20)

(Soft Computing)

GROUP-A

- **1.** Answer any **two** questions : $2 \times 2 = 4$
 - (a) What is fuzzy inference system?
 - (b) What is fuzzification?
 - (c) Compare soft computing with hard computing.
 - (d) Define one-point crossover.

GROUP-B

Answer any **two** questions :

4×2=8

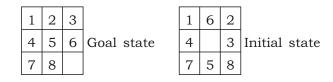
2. Compare the following two fuzzy relations *R*1 and *R*2, using max-min and max-product compositions : 2+2=4

[<i>R</i> 1	y1	y2	уЗ	<i>y</i> 4	[<i>R</i> 2	z1	z2	<i>z</i> 3	
<i>x</i> 1	0.3	0	0.7	0.3	y1	0.1	0.2	0.4	
<i>x</i> 2	0	1	0.2	0]	y2	0.8	0.3	1.0	
					уЗ	0.7	0.9	0.6	
					<i>y</i> 4	1	0.2	0.1]	

3. For aircraft simulator data the determination of certain changes in its operating conditions is made on the basis of hard break points in the mach region,

GROUP-C

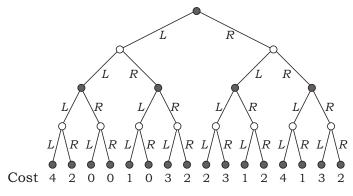
- **3.** Answer any **one** question :
 - (a) Consider the given instance of 8-puzzle :



- *(i)* Formulate the problem as state space search problem.
- (ii) Draw the implicit search graph.
- (iii) Apply IDS to the graph and show the resulting path. 2+3+3=8
- (b) Apply alpha-beta pruning on the following game tree considering first node as MAX and identify which are alpha cut offs and which are beta cut offs :

8

8



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(Turn Over)