Question Paper

Exam Date & Time: 23-Nov-2022 (09:00 AM - 12:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV 2022

Natural Computing [ICT 4051]

Marks: 50 Α Answer all the questions. Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed Design a DFA to accept the language $L = \{\alpha \in \{a,b,c\}^* \mid \alpha \text{ starts and ends with same symbol}\}.$ A) B) Compare and contrast Evolutionary strategies and Evolutionary programming. C) Justify with an example whether memory is an advantage or a disadvantage of finite automata. Suppose you're running a travel agency, and you need to move three people namely Vash, Rohan and Ishaan from Patna to Jabalpur. And suppose that you have booked 2 jets for this purpose, and you want to figure out who gets into which jet ,given the following information: A) • Vash and Rohan are friends

- Vash and Ishaan are enemies
- Ishaan and Rohan are enemies

Show how Quantum Computing increases the efficiency when compared to regular non-quantum computing if you want to achieve the following goals:

- · Maximize the number of friend pairs that share the same jet
- Minimize the number of enemy pairs that share the same jet
- B) Considering the table Q.2B, which two selection techniques do you recommend? Justify. Also (3)explain their working.

Table Q.2B

Chromosome	Fitness
A	8.00
В	7.60
С	-2.20
D	5.23
E	3.20
F	9.33

C)

1)

2)

Summarize the sequence of four operations that are performed on a test tube in DNA sticker model (2)

Obtain a PDA to accept the language $L(M) = \{wCw^R \mid w \in (a+b)^*\}$ where w^R is reverse of w. by an

Duration: 180 mins.

(5)

(3)

(2)

(5)

Section Duration: 180 mins

3)	empty state.	(5)
A)		
B)	Compare and contrast Genetic algorithm and Particle Swarm Optimization.	(3)
C)	Illustrate with an example the GA encoding techniques that could be used in Knapsack and travelling salesman problems .	(2)
4)	Illustrate the working of Ant Colony Optimization algorithm by taking travelling salesman problem (TSP) as an example.	(5)
A)		
B)	Obtain the DFA for the language a +aa*b.	(3)
C)	Assume there is an automata which is non- deterministic and it recognizes strings generated by language L. In a FA, there will be accept and non-accept states. Prove that swapping of these 2 states might not result in a new NFA which accepts compliment of L.	(2)
5)	Construct a DFA which accepts binary strings of zeros and ones and represents 0 mod 5.	(5)
A)		
B)	Illustrate and summarize any 6 operations on DNA.	(3)
C)	Summarize the four ways in which quantum computers could change the future of AI.	(2)

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