Port City International University

Mid-Term Examination, Spring-2025 (Trimester)

Course Code: CSE 317 **Course Title:** Theory Of Computing
Department: CSE **Batch**: CSE-28-D-(A+B)
Time: 2.00 hours **Full Marks**: 30

[N.B.: Answer any **five** (5) questions. Figures in the right margin indicate full marks.]

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1. In theoretical computer science and mathematics, the theory of computation is the branch that deals with what problems can be solved on a model of computation, using an algorithm, how efficiently they can be solved or to what degree. The field is divided into three major branches: automata theory and formal languages, computability theory, and computational complexity theory

   a) Define Automata. 2
   b) Discuss the tuples of the Finite state machine. 4

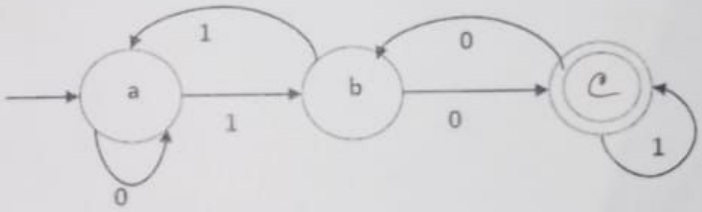
2. 

Figure: 1

   a) Describe the basic concept about DFA. 2
   b) Find out whether the given graph in Figure: 1 is a DFA or NFA. 4

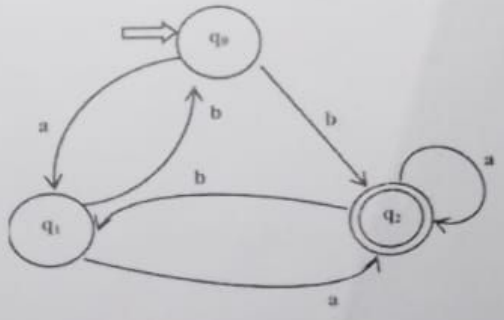
3. 

Figure:2

   a) Present the logical and symbolic relationship between Kleene star and Kleene plus. 2
   b) Find out if the string **"ababbaba"** is accepted for the graph in Figure: 2. 4

4. Finite automata may have outputs corresponding to each transition. There are two types of finite state machines that generate output: (i)Mealy Machine, (ii)Moore machine 2

   a) Define Transducer. 4
   b) Differentiate between Mealy machine and Moore machine.

5.

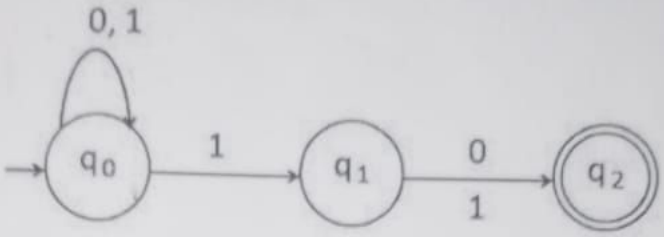


Figure: 3

If the given graph in Figure: 3 is a NFA then convert it to DFA. 6

6.

Present state	Next state			
	Input = 0		Input = 1	
	State	Output	State	Output
→a	b	x_1	c	x_1
b	b	x_2	d	x_1
c	d	x_3	c	x_1
d	d	x_3	d	x_2

Table: 1

a) Define acceptor. 2

b) Construct the state diagram from the Table: 1. 4

7.

Present State	Next State		Output
	a = 0	a = 1	
→a	d	b	1
b	a	d	0
c	c	c	0
d	b	a	1

Table: 2

a) Describe how many tuples are there in a Moore machine. What are they? 3

b) Using transition table, convert it into Mealy machine 3