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Subject Code: ACSBS306

Roll No: | 2 | 0 | 0 | 1 | 3 | 3 | 1 | 5 | 6 | 0 | 0 | 2 | 3 |

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY ,GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech (CSBS)

(SEM: III SESSIONAL EXAMINATION –I) Session -2021-2022

Subject Name: Formal Languages and Automata Theory

Time: 1.15Hours **Max. Marks:30**

[SET-A]

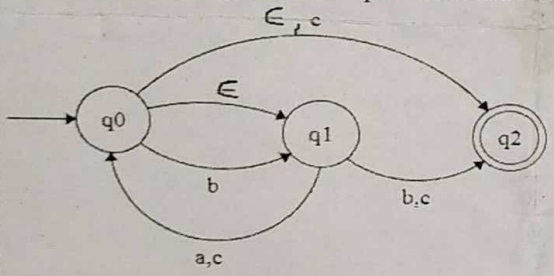
General Instructions:

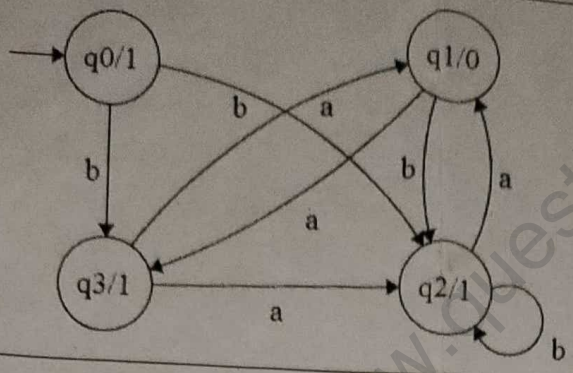
- All questions are compulsory. Answers should be brief and to the point.
- This Question paper consists of 04 pages & …5……questions.
- It comprises of three Sections, A, B, and C. You are to attempt all the sections.
- **Section A** -Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- **Section B** - Question No-3 is Short answer type questions carrying 5 marks each. You need to attempt any two out of three questions given.
- **Section C** -Question No. 4 &5are Long answer type (within unit choice) questions carrying 6marks each. You need to attempt any one part *a* or *b*.
- Students are instructed to cross the blank sheets before handing over the answer sheet to the invigiiator.
- No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

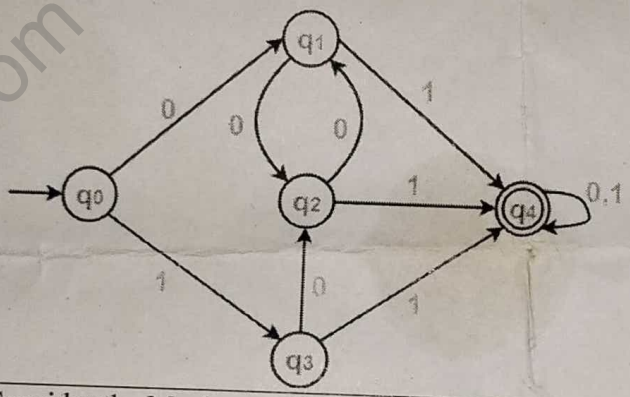
		SECTION – A	**[8]**	
1.	**Attempt all parts**		**(4×1=4)**	**CO**
	a.	In NDFA the transition function δ is given by: a) $\delta: Q \times \Sigma \rightarrow Q$ b) $\delta: Q \times \Sigma \rightarrow 2^Q$ c) $\delta: Q \times q0 \rightarrow Q$ d) $\delta: Q \times q0 \rightarrow F$	**(1)**	**1**
	b.	Finite Automata has A. Unlimited memory B. No memory at all C. Limited Memory D. None of these	**(1)**	**1**
	c.	Choose the incorrect statement A. Moore and Mealy Machines are FSM with output capability B. Any given Moore machine has an equivalent Mealy Machine C. Any given Mealy machine has an equivalent Moore Machine D. Moore machine is not an FSM.	**(1)**	**1**

	d.	Let $\Sigma = \{a, b\}$. How many strings are there in Σ^3 a) 256 b) 8 c) 4 d) 64	(1)	1
2.	**Attempt all parts**		**(2×2=4)**	**CO**
	a.	Design a DFA in which abb is a substring over $\Sigma=\{a,b\}$.	(2)	1
	b.	Draw a DFA for the language accepting strings starting with 'ab' over input alphabets $\Sigma = \{a, b\}$	(2)	1
		SECTION – B		
3.	**Answer any twoof the following-**		**[2×5=10]**	**CO**
	a.	Convert the following NFA to equivalent DFA. p is the initial state and s is the final state.	(5)	1

State/∑	0	1
p	{p,q}	{p}
q	{r}	{r}
r	{s}	
s	{s}	{s}

	b.	Design a DFA which accepts all binary strings whose decimal representation is divisible by 6.	(5)	1
	c.	Convert following NFA to equivalent DFA: ---  	(5)	1
		SECTION – C		
4	**Answer any one of the following-(Any one can be applicative if applicable)**		**[2×6=12]**	**CO**
	a.	**Question-** Change the Moore machine intoMealy machine	(6)	1



	b.	**Question-**Give the DFA accepting the following languages over the alphabet {0, 1}: (i) The set of all strings ending in 00 (ii) The set of all strings such that every block of five. Consecutive symbols contain at least two 0's	**(6)**	**1**
5.	**Answer any one of the following-**			
	a.	Minimize the automata given below:  	**(6)**	**1**
	b.	Consider the Mealy machine described by the transition table. Construct a Moore machine which is equivalent to the Mealy machine. q1 is initial state. Present State / Next State Input a=0: state, output Input a=1: state, output q1: q3, 0 / q2, 0 q2: q1, 1 / q4, 0 q3: q2, 1 / q1, 1 q4: q4, 1 / q3, 0	**(6)**	**1**