Gautam Juneja
Mark: total score: 8/18

+2/1/56+

QUIZ 2 CS205 08 Feb, 2023

Duration: 30 Min **Max Marks:** 20

Name GAUTAM JUNEJA Roll 210101041

INSTRUCTIONS

- This question paper has **10** questions. All the answers are to be bubbled on the Answer Sheet.
- Each question could have multiple correct option.You need to mark all the correct options for getting credit. There is no partial marking. Each question carries 2 marks. You may use your own supplementary sheets for the rough work.

MULTIPLE CHOICE QUESTIONS

Question 1 Consider the DFA $A = (\{q_0, q_1, q_2\}, \{a, b\}, \delta, q_0, \{q_2\})$ with the following transitions: $\delta(q_0, a) = q_0$, $\delta(q_0, b) = q_1$, $\delta(q_1, a) = q_2$, $\delta(q_1, b) = q_1$, $\delta(q_2, a) = q_2$, $\delta(q_2, b) = q_0$. Number of strings of length 3 accepted by A is

[A] 4 [B] 2 [C] 3 [D] 8 [E] 6

Question 2 Which of the following statements is/are true?
S1: If $L_1 \cup L_2$ is regular and L_1 is finite, then L_2 must be regular.
S2: The language $\{a^{3+4k} | k \geq 0\}$ is regular.

[A] $S1$ only [B] $S2$ only [C] Neither $S1$ nor $S2$ [D] Both $S1$ and $S2$

Question 3 Let h be the homomorphism $h(a) = 01, h(b) = 0$ and let $L = 001(10 + 1)^*$. Then $h^{-1}(L)$ is

[A] $ba(a + b)^*$ [B] $\{ba\}$ [C] Φ [D] baa^*

0 01 (01)*

Question 4 Which of the following languages is/are regular?
$L_1 = \{a^n b^m | n \geq m\}$ ✗
$L_2 = \{a^n w b^n | w \in \{a, b\}^*\}$ ✓ $n \geq 1$

[A] L_1 only [B] L_2 only [C] Both L_1 and L_2 [D] Neither L_1 nor L_2

Question 5 Let A be a minimal DFA with k states which is equivalent to the NFA N having n states. Which of the following is/are certainly true?

[A] $n \leq k < 2^n$
[B] $k \leq 2^n$
[C] $n \leq k \leq 2n$
[D] $k = 2^n$
[E] $k \geq n$

Question 6 Which of the following statements is/are true?
S1: If $L_1 \cup L_2$ is regular, then both L_1 and L_2 must be regular.
S2: If $L_1 \cap L_2$ is regular, then either L_1 or L_2 must be regular.

[A] $S1$ only [B] $S2$ only [C] Both $S1$ and $S2$ [D] Neither $S1$ nor $S2$

Question 7 Consider the DFA $A = (\{q_0, q_1, q_2\}, \{a, b\}, \delta, q_0, \{q_2\})$ with the following transitions: $\delta(q_0, a) = q_0$, $\delta(q_0, b) = q_1$, $\delta(q_1, a) = q_2$, $\delta(q_1, b) = q_1$, $\delta(q_2, a) = q_2$, $\delta(q_2, b) = q_0$. Then $L(A)$ is the set of all strings

[A] represented by the regular expression $(a + b)^*$
[B] that end with a
[C] represented by the regular expression $a^*bb^*aa^*(ba^*bb^*a)^*$
[D] having at least one occurrence of ba

Question 8 Let $L_1 = \{a^n b^m | n \geq 1, m \geq 0\} \cup \{ba\}$ and $L_2 = \{b^i | i \geq 1\}$. Then L_1/L_2 is given by

[A] Φ
[B] $\{a^n | n \geq 1\}$
[C] $\{a^n b^m | n \geq 1, m \geq 0\}$
[D] a^*b^*
[E] $\{a^n | n \geq 1\} \cup \{ba\}$

Question 9 The number of states of a minimal DFA accepting the language of the regular expression $(a + b)(a + b^*)$ is

[A] 3 [B] 4 [C] 2 [D] 6 [E] 5

Question 10 Let A be a DFA with n states. Which of the following is/are true?

[A] If $L(A)$ is nonempty, then A accepts some string of length k, where $n \leq k < 2n$
[B] If A accepts a string of length $k < 2n$, then $L(A)$ is infinite.
[C] If $L(A)$ is infinite, then A accepts some string of length k, where $n \leq k < 2n$
[D] There is an algorithm to decide whether A is equivalent to another DFA M with k states.

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Answer Sheet

The last 3 digits of your Roll No. is your UID.
For dual degree students the UID is 2xx, where xx is the last two digits of your Roll No.

Student Information

Please bubble your UID.

Name GAUTAM JUNEJA

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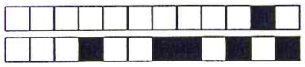
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

Responses

2/2	Q 1:	A	B	C	D	E
2/2	Q 2:	A	B	C	D
0/2	Q 3:	A	B	C	D
2/2	Q 4:	A	B	C	D
0/2	Q 5:	A	B	C	D	E

0/2	Q 6:	A	B	C	D
0/0	Q 7:	A	B	C	D
0/2	Q 8:	A	B	C	D	E
0/2	Q 9:	A	B	C	D
2/2	Q 10:	A	B	C	D

PLEASE DO NOT WRITE ANYTHING ON THE OTHER SIDE OF THE ANSWER SHEET.



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