Day : Monday   Time : 10:00 AM-TO 1:00 P.M.
Date : 26-12-2022   Max. Marks : 100

W-11843-2022

N.B.:

1) Attempt **ANY FOUR** questions from Section – I and attempt **ANY TWO** questions from Section – II.
2) Answers to both the sections should be written in **SEPARATE** answer books.
3) Figures to the right indicate **FULL** marks.

SECTION – I

Q.1 **a)** Prove that the following language is Not Regular. **[07]**
$L = \{a^n b^{n-1} \mid n > 0\}$

b) Construct FA for following Regular expressions **[08]**
$ab(a + b) + ba (a + b)$

Q.2 **a)** Construct DFA for accepting strings starting with 0 and not having "012" as a substring over $\{0, 1, 2\}$. **[07]**

b) Construct equivalent DFA for the NFA where **[08]**
$M = (\{q_0, q_1, q_2, q_3, q_4\}, \{a, b\}, \delta, q_0, \{q_1\})$.

δ	a	b
q_0	$\{q_1, q_2, q_3\}$	$\{q_2, q_3\}$
q_1^*	$\{q_1, q_2\}$	$\{q_2, q_3\}$
q_2	--	$\{q_2, q_3, q_4\}$
q_3	$\{q_4\}$	$\{q_2, q_3, q_4\}$
q_4	--	--

Q.3 **a)** Convert the following Chomsky Normal Form (CNF) to Greibach Normal Form (GNF). **[07]**
$S \rightarrow AB$
$A \rightarrow BS \mid 0$
$B \rightarrow SA \mid 1$

b) Find the CFL generated by the following grammar **[08]**
$S \rightarrow AB$
$A \rightarrow aA \mid bB \mid a$
$B \rightarrow Ba \mid Bb \mid a$

Q.4 **a)** Consider Grammar $G = (\{S, A\}, \{a, b\}, P, S)$ where P is **[07]**
$S \rightarrow aAS \mid a$
$A \rightarrow SbA \mid SS \mid ba$
Draw left most derivation and right most derivation for the string.
i) "aabbaa"   **ii)** "aabaabaa"

b) Construct the Mealy and Moore Machine, which prints 'even' or 'odd' **[08]** according to number of occurrences of 1's in the string over $\{0, 1\}$.

P.T.O.

Q.5 a) Construct FA for following Regular Grammar: **[07]**

S → 0A | 1B
A → 0C | 1A | 0
B → 1B |1A | 1
C → 0 | 0 A

b) Simplify the following grammar: **[08]**

S → ABA
A → aA | ∈
B → bB | ∈

SECTION – II

Q.6 Construct the minimize DFA for the following DFA where **[20]**
M = ({A, B, C, D, E, F, G, H}, {0, 1}, δ, A, {C})

δ	0	1
A	B	F
B	G	C
C*	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

Q.7 Define Turing Machine with its type. Construct a Turing Machine, which **[20]** recognize well formedness of parenthesis over { [, (, {, },),] }

Q.8 Define PDA state differences between PDA and FA. Construct the PDA that **[20]** accepts languages as:

S → aS | aSbS | a.

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