21/05/2025 SE IT SEM-IV C-SCHEME   AT QP CODE: 10083247

Duration: 3 Hrs   **Max. Marks: 80**

NB:

1. Question No. 1 is compulsory and solve any THREE questions from remaining questions
2. Assume suitable data if necessary
3. Draw clean and neat diagrams

Q1.		Answer the following questions	Marks
	a.	Explain any 5 closure properties of Regular Languages	5
	b.	Convert the given grammar Right Linear Grammar to Left Linear Grammar $S{\to}bB$, $B{\to}bC$ | aB | b, $C{\to}a$	5
	c.	Construct Right linear grammar for RegEx- 00^* ($01+0)^*$	5
	d.	Write RegEx and draw FA for all strings over $\{0, 1\}$ containing the sequence 011	5

Q2.	a.	Construct NFA for accepting the input string that contains either the keyword 000 / 010 and convert this to equivalent DFA .	10
	b.	Design a Moore machine that will read the sequence made up of letters $\Sigma=\{a,e,i,o,u\}$ it will give same sequence except in those sequence where **'i'** is directly follow **'e'** , it will give output **'u'.** hint [a e i e $\to$ a e i u]	10

Q3.	a.	Construct NFA with ε moves for "zero or more number of 0's followed by zero or more number of 1's followed by zero or more number of 2's . Convert this DFA.	10
	b	Convert the following CFG to CNF	10

$$G: \quad S{\to}ABA, A{\to}aA \mid bA \mid \lambda, B{\to}bB \mid aA \mid \lambda$$

Q4	a.	What is Ambiguous Grammar, Explain with example .	10
	b.	Let G be the grammar. Find the leftmost derivation, rightmost derivation and parse tree for the string 001222. $S \to 0S \mid 1A \mid 2B \mid \varepsilon$ $A \to 1A \mid 2B \mid \varepsilon$ $B \to 2B \mid \varepsilon$	10

Q5	a.	Design PDA for odd length palindrome, **let $\sum$ ={ 0,1} ,L= { W X W^R }**	10
	b.	Design Turing Machine for **L={ 0^n 1^n where n>=1 }**	10

Q6	Write short notes on (any Four) a) Applications of Automata Theory b) Chomsky Hierarchy c) Power and limitations of PDA d) Halting Problem. e) Variations of Turing machine	20

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