Model Question Paper-1 with effect from 2022-23 (CBCS Scheme)

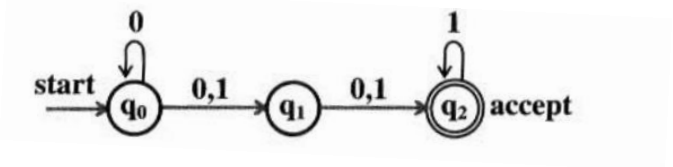
USN | | | | | | | | | | |

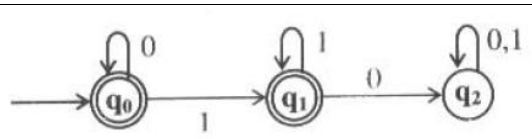
Fifth Semester B.E. Degree Examination

THEORY OF COMPUTATION

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02. Draw transition diagrams wherever necessary.

		Module -1	*Bloom's Taxonomy Level	COs	Marks
Q.01	a	Obtain a DFA to accept strings of a's and b's having odd number of a's and even number of b's.	L3	CO1	5
	b	Draw a DFA to accept decimal strings divisible by 3.	L3	CO1	6
	c	Define the following terms with example: i) Alphabet ii) Power of Alphabet iii) Languages	L2	CO1	9
		OR			
Q.02	a	Obtain an ϵ- NFA which accepts strings consisting of zero or more a's followed by zero or more b's followed by zero or more c's.	L3	CO1	5
	b	Define Deterministic Finite Automata. Explain the two preferred notations for describing the Transition Function with an example.	L2	CO1	6
	c	Obtain a DFA for the following NFA using lazy evaluation method. 	L3	CO1	9
		Module-2			
Q. 03	a	List applications of RE. What are the notations used in UNIX Operation system? List few Regular expressions with its UNIX notations.	L2	CO2	5
	b	Obtain an ∈-NFA for the Regular Expression (a+b)* bb (a+b)*	L3	CO2	6
	c	Find the minimized DFA of the following. δ | 0 | 1 →A | B | A B | A | C C | D | B *D | D | A E | D | F F | G | E G | F | G H | G | D	L3	CO2	9
		OR			
Q.04	a	Define Pumping Lemma. Prove that below language is not a regular Language. **L ={ $a^i b^j$ | i > j }**	L2	CO2	5
	b	Develop Regular expressions for the following Languages on Σ = { a, b} i) Accept strings of a's and b's whose fifth symbol from the right end is a. ii) Accept strings of a's and b's containing not more than 3 a's.	L3	CO2	6
	c	Find Regular language accepted by the following FA by eliminating states?	L3	CO2	9

					
		Module-3			
Q. 05	a	What is ambiguous grammar? Explain the Techniques for reducing ambiguity in the grammar with suitable examples.	L3	CO3	5
	b	Show that the following grammar is ambiguous by taking the string aab. S → aS | aSbS | ϵ	L3	CO3	6
	c	Design the Context Free Grammar for the following Languages. i) To accept the set of all strings with no more than three a's when Σ = {a, b}. ii) To accept the set of strings with any number of a's and b's with at least one a.	L3	CO3	9
		OR			
Q. 06	a	For the below Grammar obtain the corresponding PDA S → aABC, A → aB | a, B → bA | b, C → a	L3	CO3	5
	b	Let G be the Grammar S → aB | bA A → a | aS | bAA B → b | bS | aBB For the string aabbabab, find i) Derivation Tree ii) Leftmost Derivation iii) Rightmost Derivation	L3	CO3	6
	c	Define CFG. Design CFG for the following Languages: i) Consisting of set of all non-palindromes over **Σ ={a,b}** ii) **L = { 0^n1^{n+1} | n ≥ 0 }** iii) **L = { wcw^R : w ϵ {a,b}*, w^R is the reverse of w}**	L3	CO3	9
		Module-4			
Q. 07	a	Define the following with suitable examples: **(i)** Inherently ambiguous Language **(ii)** Chomsky Normal Forms **(iii)** Greibach Normal Form	L2	CO4	6
	b	Remove all the **ϵ-productions** and **Unit productions** from the grammar: S → aA | aBB A → aAA | ϵ B→ bB | bbC C →B	L3	CO4	6
	c	Define GNF. Convert the following grammar into GNF. S→ AB1 | 0 A→ 00A | B B→ 1A1	L3	CO4	8
		OR			
Q. 08	a	Write the LMD, RMD and Parse tree for the string: **+*-xyxy** using the grammar E → +EE | *EE | -EE | x | y	L3	CO4	6
	b	Obtain the following grammar in CNF: S → ASB | ϵ A → aAS | a B → SbS | A | bb	L3	CO4	6
	c	Define CNF. Convert the following grammar into CNF. S→ 0A | 1B A→ 0AA | 1S | 1 B→ 1BB | 0S | 0	L3	CO4	8
		Module-5			
Q. 09	a	Define Turing Machine. With a neat Block diagram, explain the the working of basic Turing Machine.	L2	CO5	6
	b	Design a Turing Machine to accept all set of palindrome over {a,b}*. Draw the transition table and also transition diagram. Show the sequence of IDs for the string: "ababa"	L3	CO5	6
	c	Write a short note on: a) Multitape Turing Machine b) Nondeterministic Turing Machine	L2	CO5	8
		OR			
Q. 10	a	Briefly explain The Techniques for Turing Machine construction. Also write applications of Turing Machine.	L2	CO5	6
	b	Design a Turing Machine to accept the Language:	L3	CO5	6

		$L=\{a^n b^n \mid n \geq 1\}$. Draw the transition diagram and show the moves made by TM for the string: "aaaabbbb".			
	c	Design a Turing Machine to accept strings formed on {0,1}* and ending with 000. Write transition diagram and sequence of IDs for w = 101000	L3	CO5	8

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.