Model Question Paper with effect from 2024-25 (CBCS Scheme)

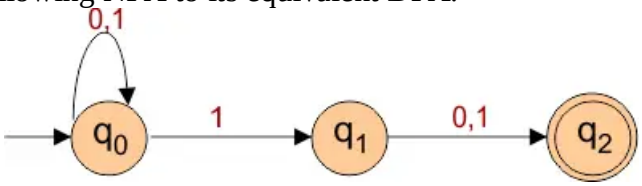
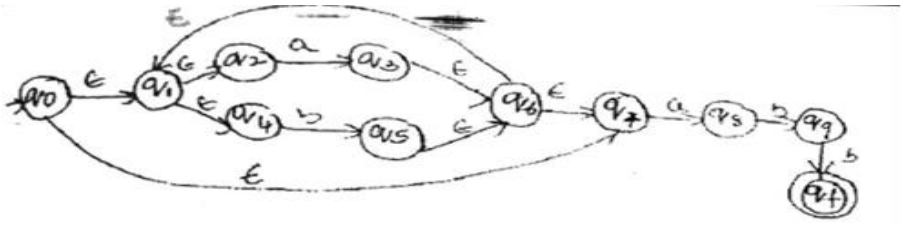
USN | | | | | | | | | | |

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**.

		Module 1	**BL**		**Marks**
Q.01	a	i. Design DFA to accept strings of a's and b's where language L={|W|mod5=|W|mod4} ii. Design DFA to Accept stings of 0's and 1's L={ starting with 01 or starting with 10}	L3		10
	b	Define NFA. Convert the following NFA to its equivalent DFA. 	L3		10
		OR			
Q.02	a	 Find E-Closure of all the states Convert following NFA to DFA	L3		10
	b	1. Define Alphabets Strings and Languages. ii. Construct a DFA to accept strings of 0's and 1's starting with at least two 0's and ending with at least two 1's.	L2		10
		Module-2			
Q. 03	a	i. Define Regular Expressions. ii. Obtain RE to accept strings of a's and b's whose second symbol from the right end is a iii. Obtain RE to accept words with two or more letters but beginning and ending with the same letter where {a, b} are inputs. iv. Obtain NFA which accepts strings of a's and b's starting with the string ab v. Obtain NFA for the Regular Expression (a+b)*aa(a+b)*	L3		10
	b	Minimize the following DFA using Table filling Algorithm.	L3		10

	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			
		OR			
Q.04	a	i. State and prove pumping lemma Theorem ii. Show that , L= {WW^R | W Є {a,b) *}} is not regular	L2		10
	b	Show that regular languages are closed under i. Union,concatenation and Kleens star ii. Intersection and Difference	L3		10
		Module-3			
Q. 05	a	**i. Obtain** the unambiguous grammar for the grammar shown and get the derivation for the expression **(a+b)*(a-b).** E→ E+E | E-E E→ E*E | E/E E→ (E) | I I→ a|b|c ii. Consider the following grammar **S→ AbB** **A →aA | Є** **B→ aB | bB | Є** Give LMD and RMD and Parse tree for the string **"aaabab "**	L3		10
	b	**a)** Design a PDA for accepting a palindrome **L(M) = {WCW^R |** Wϵ(a+b)*} where W^R is reverse of W and **show ID** for the string **"aab"**	L3		10
		OR			
Q. 06	a	Construct CFG for the following languages **i)** L={$0^{2n}1^m$ | n>=0,m>=0} ii) L= {WW^R | W Є {a,b) *}} iii) L= { w | w Є {0,1 }* with atleast one occurance of "101" } iv) L= { strings of a's and b's with equal number of a's and b's } V) Obtain a grammar to generate a language of strings 0's and 1's haing a substring **000**	L2		10
	b	Define with example i. Grammar ii. Derivation iii. Leftmost and Rightmost derivation iv. Ambiguous grammar v. Parse tree	L3		10
		Module-4			
Q. 07	a	S → a | aA | B A → aBB | ε B → Aa | b Convert the above grammar to CNF	L3		10
	b	S → Sa | Sb| aA| B A →Ab| aBB | a| b B → Ba|bb Eliminate left recursion.	L3		10

		OR			
Q. 08	a	$A \rightarrow BC$ $B \rightarrow CA \mid a$ $B \rightarrow AB \mid b$ Convert the above grammar to GNF	L3		10
	b	Show that CFL is not closed under union , Concatenation , star and complimentation	L3		10
		Module-5			
Q. 09	a	i. Explain The Church-Turing machine with neat a diagram ii. Explain Multiple TM with a neat diagram	L2		10
	b	Define Turing Machine (TM). Design a TM for language $L=\{0^n 1^n \mid n>=0\}$ Show that the string 0011 is accepted	L3		10
		OR			
Q. 10	a	Define Turing Machine (TM). Design a TM for language $L=\{1^n 2^n 3^n \mid n>=1\}$ Show that the string 111222333 is accepted	L4		12
	b	Demonstrate the model of Linear bound automata(LBA) with neat diagram	L3		08