USN											21CST501

B. E. Degree (Autonomous) Fourth Semester End Examination (SEE)

AUTOMATA THEORY AND COMPILER DESIGN

(Model Question Paper - III)

Time: 3 Hours] **[Maximum Marks: 100**

Instructions to students: Answer 5 full questions.

			Marks	Course Outcomes	BTL* Cognitive Level
1	A)	Define the following terms with examples of each i) Alphabet ii) String iii) Language iv) Reverse of a string v) Length of a string	[10 M]	CO1	L1
	B)	Design DFA for the following languages over ∑ = { 0,1} ● Set of all strings not containing 110 ● Set of all strings with exactly 3 consecutive 0's ● Set of all strings containing at least two 1's ● Set of all strings containing not more than 3 0's	[10 M]	CO1	L5
		OR			
2	A)	Convert the following NFA to a DFA δ NFA | a | b □p | q | φ q | q | q, r *r | q | q, r s | φ | φ	[10 M]	CO1	L2
	B)	Prove that a language is Regular if and only if it is accepted by a Finite Automata.	[10 M]	CO1	L3
3	A)	Minimize the following DFA using table filling algorithm where A = Start state. State C is a final state. 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	[12 M]	CO2	L4
	B)	State and prove pumping lemma for Regular Languages	[08 M]	CO2	L3
		OR			
4	A)	Write the Table filling algorithm to find the distinguishable pairs in a DFA 'M'.	[08 M]	CO2	L1

	B)	Show that the language L = { 0^n / n is prime } is not regular.	**[06 M]**	**CO2**	**L3**
	C)	Using identities prove that the regular languages are closed under intersection.	**[06 M]**	**CO2**	**L3**
5	**A)**	Define the following terms with examples 1.Parse tree 2.Ambiguity	**[05 M]**	**CO3**	**L1**
	B)	Consider the CFG with productions: E→E+T/T T□F-T/F F□ (E)/0/1 With an example explain leftmost derivation, rightmost derivation & parse tree for the same string generated by the above grammar.	**[09 M]**	**CO3**	**L2**
	C)	Generate CFG for the language 1.L = { $a^n b^n$ | n>=1} 2. L = {wCw^R | w ε{a,b}*, w^R is the reversal of w}	**[06 M]**	**CO3**	**L1**
		OR			
6	**A)**	Formally define the language accepted by empty stack and final state method.	**[08 M]**	**CO3**	**L1**
	B)	Generate context free grammars for the following i) L(G) = {$a^n b^n c^m$: m, n ≥ 1} ii) L(G) = {w: $n_a(w) = n_b(w)$} iii) L(G) = { $a^i b^j$: i ≠ j and i, j ≥ 0} iv) L(G) = { $a^{n+2} b^n$: n ≥ 1}	**[12 M]**	**CO3**	**L5**
7	**A)**	Give the formal definition of a PDA.	**[08 M]**	**CO4**	**L2**
	B)	Design a PDA to accept the language L = { ww^R} by a final state. Give the graphical representation for PDA obtained. Show the moves made by the PDA for the string aabbaa.	**[12 M]**	**CO4**	**L5**
		OR			
8	**a)**	Explain the algorithm to convert a CFG to PDA with the help of an example.	**[08 M]**	**CO4**	**L2**
	b)	Obtain a PDA to accept the language L = { $a^n b^n$ | n≥0} by empty stack. Give the graphical representation for PDA obtained. Show the moves made by the PDA for the string aabb.	**[12 M]**	**CO4**	**L3**
9	**a)**	What is a compiler? Explain the various phases of compiler with a neat diagram and show the output of each phase for the expression a = b + c * 25. Assume all variable are a type float.	**[12 M]**	**CO5**	**L4**
	b)	What are the applications of compiler? Explain	**[08 M]**	**CO5**	**L3**
		OR			
10	**a)**	Explain with a neat diagram the components of a typical language processing system.	**[07M]**	**CO5**	**L1,L2**

	b)	Explain the interaction between the lexical analyzer and parser with a neat diagram.	**[07 M]**	**CO5**	**L1**
	c)	Differentiate between call by-value and call by-refernce of parameter passing techniques.	**[06M]**	**CO5**	**L2, L3**
