USN											**21CST501**

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

AUTOMATA THEORY AND INTRODUCTION TO COMPLIERS

(Model Question Paper - I)

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

Instructions to students: Answer 5 full questions.

			Marks	Course Outcomes	BTL* Cognitive Level
1	**a)**	What is an automaton? Discuss why study automaton?	**[06 M]**	**CO1**	**L2**
	b)	Design DFA for the following languages over $\sum = \{ a, b\}$ • Set of all string that either begins or ends or both with substring ab. • Set of all strings that end with substring abb. • L= {w: |w| mod 5 ≠ 0}	**[09 M]**	**CO1**	**L5**
	c)	Explain the applications of Finite Automata?	**[05 M]**	**CO1**	**L3**
		OR			
2	**a)**	Convert to a DFA, the following NFA δ_{NFA} | 0 | 1 →P | {P,Q} | {P} Q | {R} | {R} R | {S} | ϕ *S | {S} | {S}	**[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)**	State and prove pumping lemma for Regular Languages	**[08 M]**	**CO2**	**L3**
	b)	Minimize the following DFA, given A = Start state. States C, F and I are final states. δ | 0 | 1 →A | B | E B | C | F * C | D | H D | E | H E | F | I *F | G | B G | H | B H | I | C *I | A | E	**[12 M]**	**CO2**	**L4**
		OR			
4	**a)**	Write the Table filling algorithm to find the distinguishable pairs in a DFA 'M'.	**[08 M]**	**CO2**	**L2**
	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 3.Rightmost derivation	**[08 M]**	**CO3**	**L1**
	b)	Show that following grammar is ambiguous. Obtain unambiguous grammar for this: E→E+E/E*E/E/E-E/(E)/a/b.	**[06 M]**	**CO3**	**L3**
	c)	Write CFG for the language 1.L = { $0^n 1^n$ | n>=1} 2. L = {w w^R | w ε{a,b}*, w^R is the reversal of w}	**[06 M]**	**CO3**	**L2**
		OR			
6	**a)**	Write context free grammars for the following i) L(G) = {$a^n b^m c^m d^n$: m, n ≥ 1} ii) L(G) = { $a^n b^{n+1}$: n ≥ 0 } iii) L(G) = {w: $n_a(w) = n_b(w)$} iv) L(G) = {w: $n_a(w) > n_b(w)$}	**[12 M]**	**CO3**	**L2**
	b)	Write a note on chomsky hierarchy.	**[08 M]**	**CO3**	**L2**
7	**a)**	With neat diagram explain the working of PDA and define the language accepted by PDA by both methods.	**[12 M]**	**CO4**	**L2**
	b)	Design a PDA to accept the language L = {w w^R : w ε {0,1}*} by empty stack method.	**[08 M]**	**CO4**	**L5**
		OR			
8	**a)**	Give the formal definition of a PDA.	**[06 M]**	**CO4**	**L2**
	b)	Obtain a PDA to accept the language L = { $a^n b^n$ | n≥0} by a final state. Give the graphical representation for PDA obtained. Show the moves made by the PDA for the string aaabbb.	**[14 M]**	**CO4**	**L3**
9	**a)**	Eliminate λ, unit & useless productions. S → a|aA|B|C A → aB | λ B → Aa C → cCD D → add.	**[12 M]**	**CO5**	**L4**
	b)	State and prove Pumping Lemma for CFLs.	**[08 M]**	**CO5**	**L3**
		OR			
10	**a)**	Design a TM to accept languages L = {$0^n 1^n$ | n≥1} & give transition diagram for same.	**[12 M]**	**CO5**	**L5**
	b)	Write a short note on multidimensional Turing Machines.	**[08 M]**	**CO5**	**L1**

9	**a)**	Explain various phases of compiler. Show the translation for an Assignment statement. Position= Initial + rate * 60. Clearly indicate the output of each phase.	**[12 M]**	**CO5**	**L5**
	b)	What are the applications of compiler? Explain.	**[08 M]**	**CO5**	**L1**
		OR			
10	**a)**	Write a brief note on language processing system	**[06 M]**	**CO5**	**L1**
	b)	Explain the concept of input buffering in the lexical analysis with its implementation.	**[10 M]**	**CO5**	**L1**
	c)	Define Token, pattern and lexeme with example.	**[04 M]**	**CO5**	**L1**