A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 94C05

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Fourth Semester

Computer Science and Business Systems

19UCB405 - Formal Languages And Automata Theory

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. There are _____ tuples in finite state machine. CO1- U

   (a) 4 (b) 5 (c) 6 (d)unlimited

2. Which of the following does not represents the given language? CO2- App
   Language: {0,01}

   (a) 0+01 (b) {0} U {01} (c) {0} U {0}{1} (d) {0} ^ {01}

3. The Grammar can be defined as: G=(V, ∑, p, S) In the given definition, what does S represents? CO1- U

   (a) Accepting State (b) Starting Variable (c) Sensitive Grammar (d) None of these

4. Which among the following is not a part of the Context free grammar tuple? CO2- App

   (a) End symbol (b) Start symbol (c) Variable (d) Production

5. Which of the operations are eligible in PDA? CO2- App

   (a) Push (b) Delete (c) Insert (d) Add

6. which of the following correctly recognize the symbol '|-' in context to PDA? CO2- App

   (a) Moves (b) transition function (c) or/not symbol (d) none of the mentioned

7. The value of n if turing machine is defined using n-tuples CO1- U

   (a) 6 (b) 7 (c) 8 (d) 5

8. If T1 and T2 are two turing machines. The composite can be represented using the expression: CO1- U

(a) T1T2 (b) T1 U T2 (c) T1 X T2 (d) None of the mentioned

9. Which of the problems are unsolvable? CO1- U

(a) Halting problem

(b) Boolean Satisfiability problem

(c) Halting problem & Boolean Satisfiability problem

(d) None of the mentioned

10. If a problem has an algorithm to answer it, we call it _____ CO1- U

(a) decidable (b) solved (c) recognizable (d) none of the mentioned

PART – B (5 x 2= 10 Marks)

11. Define Finite Automata and Transition diagram. CO1- U

12. Define CNF with an example CO1- U

13. Define the instantaneous description of PDA CO1- U

14. Define Turing Machine CO1- U

15. Define Rice Theorem CO1- U

PART – C (5 x 16= 80 Marks)

16. (a) Construct the Epsilon NFA for the Regular Expression CO2- App (16)
(a+b)* abb and (0+1)* (00+11)(0+1)*

Or

(b) Construct DFA for NFA-Epsilon given below CO2- App (16)

	a	b	C	Epsilon
(Start) p	{p}	{q}	{r}	ϕ
q	{q}	{r}	ϕ	{p}
(Final)r	{r}	ϕ	{p}	{q}

17. (a) Construct the leftmost and Right most derivation and draw the parse tree for 00101 and 1001 CO2- App (16)
Given the productions are S →A1B , A →0A/ ε , B->0B / 1B / ε and Explain the Types of Grammar .

Or

	(b)	(i) Convert the following Grammar in to GNF S->AB A->BS / b B->SA / a	CO2- App	(12)
		(ii) Find CNF for the following Grammar S->aAbB A->aA /a B->bB / b	CO2- App	(4)
18.	(a)	(i) Construct PDA equivalent for the following grammar given below E -> E+E / E*E / a	CO2- App	(8)
		(ii) Show that the language $L=\{a^n b^n c^n d^n / n>=0\}$ is not a Context Free Language	CO2- App	(8)
		Or		
	(b)	(i) Construct PDA equivalent for the following grammar given below S-> aAA A->aS / bS /a	CO2- App	(8)
		(ii) Construct PDA to accept the Language $L=\{WCW^R / W=\{0,1\}^*\}$	CO2- App	(8)
19.	(a)	Explain Programming Techniques for Turing Machine Construction in Detail.	CO1- U	(16)
		Or		
	(b)	Explain Multi head and Multi tape Turing machine in detail.	CO1- U	(16)
20.	(a)	Explain Universal Turing Machine in detail.	CO1- U	(16)
		Or		
	(b)	Explain applications of Finite Automata in detail.	CO1- U	(16)