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Question Paper Code: 94C05

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

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) $\{0\} \cup \{01\}$ (c) $\{0\} \cup \{0\}\{1\}$ (d) $\{0\}^{\wedge} \{01\}$
3. The Grammar can be defined as: $G=(V, \Sigma, p, S)$ In the given CO1- U
definition, what does S represents?
(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 CO2- App
tuple?
(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 CO2- App
context to PDA?
(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 $S \rightarrow A1B$, $A \rightarrow 0A / \epsilon$, $B \rightarrow 0B / 1B / \epsilon$ and Explain the Types of Grammar .

Or

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

