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Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U3C01

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

Third Semester

Computer Science and Business Systems

21UCB301 - FORMAL LANGUAGES AND AUTOMATA THEORY

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. DFS is a Special_____ CO1- U

(a) Data Flow System (b) Recursive Algorithm

(c) Depth First search (d) none of the above

2. What kind of expressions do we used for pattern matching? **CO2- U**

(a) Regular Expression (b) Rational Expression

(c) Regular & Rational Expression (d) None of the above

3. How many tuples are used in PDA CO3- U

(a) 5 (b) 4 (c) 7 (d) 6

4. How many tuples are used in non-deterministic Turing machine? CO4- U

(a) 5 (b) 4 (c) 7 (d) 6

5. A Turing Machine with a _____ has a left end but no right end. The left end is limited with an end marker. CO5- U

(a) multi track tape (b) semi-infinite tape

(c) multi tape (d) infinite tape

PART – B (5 x 3= 15 Marks)

6. Define Kleene Star. CO1- U

7. Design a FA with $\sum = \{0, 1\}$ accepts the strings with an even number of 0's followed by single CO2- App

8. Define the instantaneous description of PDA with example CO3- U

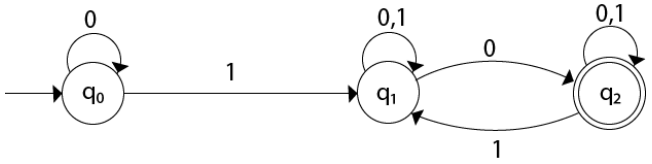
9. Design a TM to recognize all strings consisting of an odd number of α's. CO4- App

10. How to define Language Decidability with diagram CO1- U

PART – C (5 x 16= 80 Marks)

11. (a) (i) State and Compare between Mealy Machine and More Machine CO3- Ana (8)

(ii) How to Convert the given NFA to DFA. CO3- Ana (8)



Or

(b) How to convert the NDFA to DFA with detail explain it? CO3- Ana (16)

12. (a) Define grammar? Explain about the Chomsky Hierarchy? Give an examples. CO1- U (16)

Or

(b) (i) Check whether the grammar G with production rules CO2- App (8)

$X \rightarrow X+X \mid X*X \mid X \mid a$

is ambiguous or not using Right most derivation

(ii) Convert the following CFG into CNF CO2- App (8)

$S \rightarrow XY \mid Xn \mid p$

$X \rightarrow mX \mid m$

$Y \rightarrow Xn \mid o$

13. (a) (i) Construct PDA equivalent for the following grammar given below CO3- Ana (8)

$S \rightarrow 0S1 / A$

$A \rightarrow 1A0 / S / \varepsilon$

(ii) Construct PDA to accept the Language $L=\{a^nCa^n / n>=0\}$ CO3- Ana (8)

Or

(b) (i) How to construct PDA for the following CFG and test whether "abbabb" is N(P) CO3- Ana (8)

(ii) Construct PDA to accept the Language $L=\{a^n b^n / n>=0\}$ accepting by Final State CO3- Ana (8)

14.	(a)	How to design a TM for the language L = $\{0^n1^n2^n\}$ where n≥1	CO3- Ana	(16)
		Or		
	(b)	Construct a TM machine for checking the palindrome of the string of even length.	CO3- Ana	(16)
15.	(a)	Explain about the Rice Theorem with example	CO1- U	(16)
		Or		
	(b)	Explain about the Turing Machine Halting Problem with examples	CO1- U	(16)