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Question Paper Code: U3C01

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2022

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)

- Which of the following is not a part of 5-tuple finite automata? CO1- U
(a) Input alphabet (b) Transition function (c) Initial State (d) Output Alphabet
- What kind of expressions do we use for pattern matching? CO2- U
(a) Regular Expression (b) Rational Expression
(c) Regular & Rational Expression (d) None of the above
- How many tuples are used in PDA CO3- U
(a) 5 (b) 4 (c) 7 (d) 6
- In which year Turing machine was invented? CO4- U
(a) 1956 (b) 1936 (c) 1917 (d) 1926
- A Turing Machine with a _____ has a left end but no right end. CO5- U
The left end is limited with an end marker.
(a) multi track tape (b) semi-infinite tape
(c) multi tape (d) infinite tape

PART – B (5 x 3= 15 Marks)

- Define Automation and draw the Chomsky Hierarchy. CO1- U
- Design a FA with $\Sigma = \{0, 1\}$ accepts the strings with an even number of 0's followed by single CO2- App
- Define the instantaneous description of PDA with example CO3- U
- Design a TM to recognize all strings consisting of an odd number of a 's. CO4- App

10. How to define Language Decidability with diagram

CO1- U

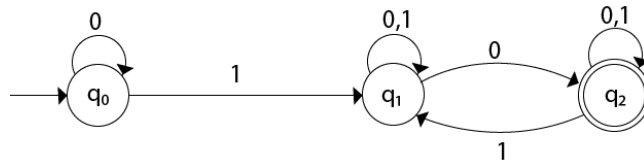
PART – C (5 x 16= 80 Marks)

11. (a) (i) State and Compare between Mealy Machine and Moore Machine

CO3- Ana (8)

(ii) How to Convert the given NFA to DFA.

CO3- Ana (8)



Or

(b) How to convert the NFA 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)

$S \rightarrow 0S1 \mid A$

$A \rightarrow 1A0 \mid S \mid \epsilon$

(ii) Construct PDA to accept the Language $L = \{a^n c a^n \mid n \geq 0\}$

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 $L = \{a^n b^n \mid n \geq 0\}$ accepting by Final State

CO3- Ana (8)

14. (a) How to design a TM for the language $L = \{0^n 1^n 2^n\}$ where $n \geq 1$ CO3- Ana (16)
Or
(b) Construct a TM machine for checking the palindrome of the string of even length. CO3- Ana (16)
15. (a) How to define empty and non empty languages and Find whether the lists $M = (ab, bab, bbaaa)$ and $N = (a, ba, bab)$ have a Post Correspondence Solution? CO3- Ana (16)
Or
(b) How to define Undecidability of Universal Languages and how to prove the theorem that L_u is RE but not recursive. CO3- Ana (16)

