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Reg. No.: | 1 | 1 | 7 | 2 | 0 | 2 | 1 | 0 | 0 | 0 |

END TERM EXAMINATION – MAY 2022

SEMESTER –IV

(Btech)

Subject Code: CS2004 **Duration: 3 hours**

Subject: TOC **Max. Marks: 100**

Instructions

- **All Questions are compulsory**
- **The Question paper consists of 2 sections - Part A contains 10 questions of 2 marks each. Part B consists of 5 questions of 16 marks each.**
- **There is no overall choice. Only Part B question include internal choice.**

PART – A

*(2 * 10 = 20 Marks)*

1. Write at least two difference between NPDA and DPDA
2. What do you mean by instantaneous description of a PDA?
3. Construct a DFA to accept strings of 0's, 1's & 2's beginning with 0 followed by odd number of 1's and ending with 2.
4. Write regular expression for the language having input alphabets a and b, in which two a's do not come together.
5. Which is the most restricted type of grammar? Give reason
6. Context-free language closed under union. Justify the statement.
7. State Pumping Lemma?
8. Write 5 tuple definition of NFA.
9. What is Left Recursion and how it is eliminated?
10. What are the applications of TM?

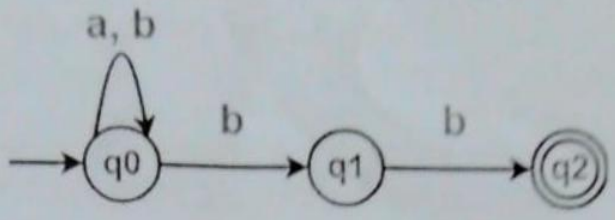
PART – B

*(16 * 5 = 80 Marks)*

11. a)

i. What are the differences between Moore machine and Mealy machine? (8 Marks)

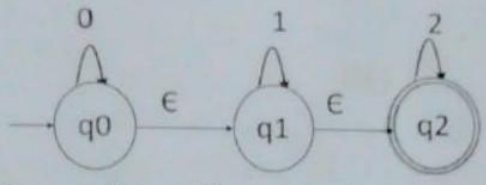
ii. Convert the following Non-Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA) (8 Marks)



OR

b)

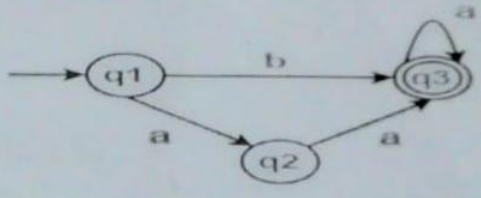
i. Convert the given NFA with epsilon to NFA without epsilon. (8 Marks)



ii. Discuss the differences between NFA and DFA. (8 Marks)

12.a)

i. Find regular expression for the following DFA using Arden's Theorem- (8 Marks)



ii. Design a FA from given regular expression

$10 + (0 + 11)0^*1$. (8 Marks)

OR

b)

i. Convert $(00 + 1)^* 1 (0 + 1)$ to a NFA. (8 Marks)

ii. Discuss closure properties of CFL. (8 Marks)

13.a)

i. Consider the grammar G whose productions are:

S -> 1A0S

S -> 1A0S1S

A -> 1

S -> 0

Prove that the above given grammar is ambiguous. (8 marks)

ii. Convert the following CFG into CNF

$S \rightarrow ASB$

$A \rightarrow aAS|a|\varepsilon$

$B \rightarrow SbS|A|bb$

(8 marks)

OR

b)

i. Simplify the following CFG by preserving the meaning of it.

$S \rightarrow XYX$

$X \rightarrow 0X \mid \varepsilon$

$Y \rightarrow 1Y \mid \varepsilon$

(8 marks)

ii. Convert this grammar to Greibach Normal Form.

$S \rightarrow XA|BB$

$B \rightarrow b|SB$

$X \rightarrow b$

$A \rightarrow a$

(8 marks)

14. a) Construct a PDA for language $L = \{0^n1^m \mid n >= 1, m >= 1, m > n+2\}$

OR

b)

i. Construct PDA for the following $L = \{w \in \{0, 1\}^* \mid w = w^R$ and the length of w is odd}

ii. Discuss different ways to define PDA acceptability.

(8 +8)

15.a) i. Construct a TM for the language $L = \{0^n1^n2^n\}$ where $n \geq 1$

ii. Discuss the comparison between RE and REC language.

(8+8)

OR

b) i. Analyze the languages proposed by Chomsky with the help of examples.

ii. Construct a TM machine for checking the palindrome of the string of even length

(8+8)