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Roll No.300211722011

C109513(022)

**B. Tech. (Fifth Semester) Examination,
Nov.-Dec. 2024**

[CS & Engg. (AI & ML) Engg. Branch]

THEORY of COMPUTATION

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : First part of each unit is compulsory containing 4 marks. Attempt any two from (b), (c) and (d) carries 8 marks each. Schematic diagrams and steps must be shown whenever necessary.

Unit-I

1. (a) Define and explain the term two way finite automata. 4
- (b) Minimize the following DFA by using my hill Nerode theorem. 8

| 2 |

State/ Σ	a	b
$\rightarrow q_0$	q_1	q_4
q_1	q_2	q_3
q_2	q_7	q_8
q_3	q_8	q_7
q_4	q_5	q_6
q_5	q_7	q_8
q_6	q_7	q_8
q_7	q_7	q_7
q_8	q_8	q_8

2. (a) Define
property
(b) Const
the re
(c) Usin
langa

(c) Compare NFA and DFA with suitable example. 8

(d) Consider the Mealy machine describe by the
following transition table, construct the equivalent
Moore machine. 8

(d) Exp
(i)
(ii)

P/S	Next State			
	$q = 0$		$q = 1$	
	State	Output	State	Output
q_1	q_3	0	q_2	0
q_2	q_1	1	q_4	0
q_3	q_2	1	q_1	1
q_4	q_4	1	q_3	0

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3. (a) D
p

(b)

[3]

Unit-II

2. (a) Define Regular Expression and write their different properties. 4

- (b) Construct a DFA with reduced state equivalent to the regular expression i.e. $10 + (0 + 11)0^*1$. 8

- (c) Using pumping lemma to prove that the following language is not regular.

$$L = \{a^n b^{n+1} / n \geq 0\} \quad 8$$

- (d) Explain the following : 8

- (i) Regular sets and Regular grammar

- (ii) Decision algorithm for regular set for and grammar

Unit-III

3. (a) Define context free grammar and write different properties of context free language. 4

- (b) Consider the context free grammar G where

$$S \rightarrow AB, A \rightarrow a, B \rightarrow C/b, C \rightarrow D, D \rightarrow E,$$

$E \rightarrow a$. Eliminate all unit production. 8

[4]

(c) Convert CGF to CNF from which is given below

$$S \rightarrow bAc \mid aB, A \rightarrow bAA \mid aS \mid a, B \rightarrow aBB \mid bS \mid b \quad 8$$

5.

(d) Write notes on : 8

(i) Ambiguity in grammar

(ii) Role and application areas of grammars

Unit-IV

4. (a) Define Push down Automata and NPDA with example. 4

(b) Design a PDA which accepts a language. 8

$$L = \{a^n b^n / n \geq 1\}$$

(c) Design Turing Machine M that recognizes that recognize the language. 8

$$L = \{a^n b^n c^n / n \geq 1\}$$

(d) Write short notes on : 8

(i) Church's Hypothesis

(ii) Halting problem of Turing Machine

[5]

Unit-V

5. (a) What do you mean by Space and time complexity?

4

Explain.

(b) Explain recursive and recursive enumerable language with example.

8

(c) What is Computation? Explain Turing model for computation.

8

(d) Write notes on :

8

(i) Turing computable functions

(ii) Partial recursive function

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