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Roll No. .....

C109513(022)

B. Tech. (Fifth Semester) Examination,
Nov.-Dec. 2023

(Computer Science Engg. Branch) (AIML)

THEORY of COMPUTATION

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

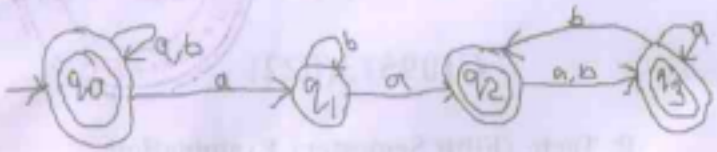
Note : *Attempt all questions. Part (a) of each question is compulsory and carries 4 marks. Solve any two parts from part (b), (c) & (d) and carries 8 marks each.*

Unit-I

1. (a) Define Mealy and Moor Machine. 4

   (b) Write the difference between DFA and NDFA. 8

(c) Convert the following NFA into DFA 8



(d) Minimize the following DFA by using My Hill Nerode Theorem : 8

State / Σ	a	b
→ 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

Unit-II

2. (a) Define Grammar and write a set of string which

consist of any number of a (including null) followed by any number of b (including null) followed by c (including null). 4

(b) Convert the given regular expression to quivalent DFA $(a+b)^* abb$ 8

(c) Explain Decision algorithm for regular expression. 8

(d) Construct a DFA with reduced state equivalent to the regular expression 10 + (0 + 11) 0*1 8

Unit-III

3. (a) Write the definition of context free Grammar. Write condition for CFG to be in CNF. 4

(b) Explain Chomskey Normal form for CFG. 8

(c) (i) Define ambiguous grammar. Show that following grammar is ambiguous. 4

E → E + E

E → E * E

E → (E)

E → a

(ii) Remove Unit production from given grammar .

S → AB

A → a

B → C/b

C → D

C → E/bC

E → d/Ab 4

(d) Convert the following CFG into CNF :

S → ASB/aB

A → B/S

B → b/ε 8

Unit-IV

4. (a) What is Deterministic and non-deterministic PDA? 4

(b) Explain Church's Hypothesis and post correspondence problem. 8

(c) Design PDA for language 8

$$L=\left\{WCW^R \mid W \in (a,b)^*\right\}.$$

(d) Design a Turing machine for language

$$L=\left\{a^n b^n c^n \mid n \geq 1\right\}. \quad 8$$

Unit-V

5. (a) Define partial and initial function. 4

(b) Explain recursive and recursive enumserable language with example. 8

(c) What is computation? Explain Turing Model for computation. 8

(d) Explain Space and time complexity. 8