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Roll No.

322554(22)

B. E. (Fifth Semester) Examination,

Nov.-Dec. 2021

(New Scheme)

(CSE Engg. Branch)

THEORY OF COMPUTATION

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : All questions are compulsory. Part (a) is compulsory, answer any two parts from (b), (c) & (d) of each question. Part (a) carries 2 marks and part (b), (c) & (d) carries 7 marks.

Unit-I

1. (a) Differentiate between NFA and DFA. 2
- (b) Construct a Moore machine equivalent to the Mealy machine M defined by the table : 7

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PTO

[2]

P. S.	a = 0		a = 1	
	State	Output	State	Output
→ q ₁	q ₁	1	q ₂	0
q ₂	q ₄	1	q ₄	1
q ₃	q ₂	1	q ₃	1
q ₄	q ₃	0	q ₁	1

(c) Define Myhill-nerode theorem. Explain properties of FSM. 7

(d) Write short notes on : 2×3½=7

- (i) Two way finite Automata
- (ii) Mealy machines

Unit-II

2. (a) Define pumping Lemma for regular sets. 2

(b) Construct Transition diagram for following regular grammar 7

(i) $A_0 \rightarrow aA_1, A_1 \rightarrow bA_1, A_1 \rightarrow a, A_1 \rightarrow bA_0$

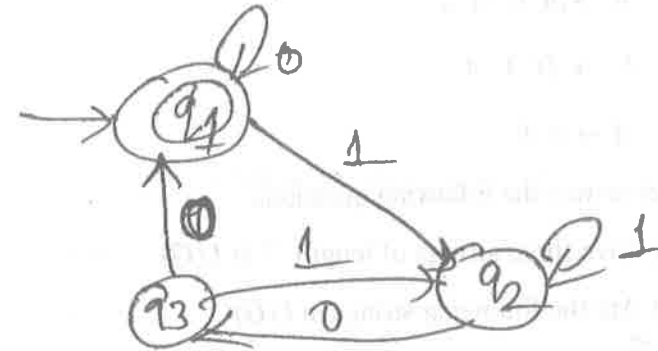
(ii) $S \rightarrow aS/a$

(c) Construct finite Automata equivalent to the regular expression

$(0+1)^*(00+11)(0+1)^*$ 7

[3]

(d) Calculate regular expression from the transition system. 7



Unit-III

3. (a) Write the types of grammar with their accepting machine. 2

(b) What do you mean by ambiguity in context free grammar. If G is grammar $S \rightarrow SbS/a$ then show that G is ambiguous. 7

(c) Convert the following productions into GNF. 7

$S \rightarrow AA/a$

$A \rightarrow SS/b$

(d) Consider a CFG, G with the following productions : 7

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$S \rightarrow ASA / B$

$B \rightarrow aCb / bCa$

$C \rightarrow ACA / A$

$A \rightarrow a / b$

and answer the following questions :

(a) Give three strings of length 7 in $L(G)$

(b) Are the following strings in $L(G)$

(i) aaa

(ii) bbb

(iii) aba

(iv) abb

(c) True or false : $c \Rightarrow bab$

(d) True or false : $c \Rightarrow^* bab$

(e) True or false : $c \Rightarrow^* abab$

(f) True or false : $c \Rightarrow^* AAA$

(g) Is \wedge in $L(G)$

Unit-IV

4. (a) Define non deterministic *pda*.

2

[5]

(b) Design a TM, M which accepts language

$$L = \{1^n 2^n 3^n / n \geq 1\}$$

7

(c) Explain the acceptance by *pda*.

7

(d) Construct a *pda* accepting $\{a^n b^m c^n / m, n \geq 1\}$ by null store.

7

Unit-V

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

2

(b) What is computation? Explain Turing model of computation.

7

(c) What is turing computation function construct turing machine for zero function?

7

(d) Show that $f(x, y) = x * y$ and $f(x, y) = x^y$ is primitive recursive function.

7