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P1395

[2963] - 450

T.E. (IT) (2003 Course)

THEORY OF COMPUTATION

Time : 3 Hours]

[Max. Marks : 100

Instructions:

- 1) Attempt 3 questions from section I and 3 questions from section II.
- 2) Answers to the two sections must be in different answer books.
- 3) Figures to the right indicate full marks.

SECTION - I

Q1) A) Consider the following Σ -NFA

	a	b	c	Σ
p	{p}	{q}	{r}	ϕ
q	{q}	{r}	ϕ	{p}
r	{r}	ϕ	{p}	{q}

- i) Compute Σ -closure of each state
- ii) Give all strings of length 3 or less accepted by the automation.
- iii) Convert the automation to DFA [12]

B) Define:

- i) Alphabet
- ii) Language [4]

OR

Q2) A) Give Mealy and Moore machine for the following:

From input Σ^* , where $\Sigma \{0,1,2\}$ print the residue modulo 5 of the input treated as ternary (base 3). [12]

B) Define:

NFA, DFA in the Tuple Format [4]

Q3) A) State and prove Pumping Lemma for regular sets [8]

B) Which of the following are true? Explain.

1) $baa \Sigma a^* b^* a^* b^*$

2) $b^* a^* \cap a^* b^* = a^* \cup b^*$

3) $a^* b^* \cap b^* c^* = \phi$

4) $abcd \Sigma (a (cd)^* b)^*$ [8]

C) What language is represented by Regular Expression:
(((a*a)b) U b) [2]

OR

Q4) A) Convert following RE to DFA
(RE to NFA with Σ moves to DFA)
 $(ab + ba)^* aa (ab + ba)^*$ [12]

B) Write a note on Kleen's Theorem [6]

Q5) A) Write an algorithm in C to convert Regular Grammar to DFA.
Simulate it with an example. [14]

B) Define Phase Structure Grammar [2]

OR

Q6) A) Write CFG for the following languages
i) $L = \{O^i P^j O^k / j > i + K\}$
ii) Matching Parenthesis
iii) All strings with atleast 2 a's alphabet = {a, b} [10]

B) Write a note on [6]
'Simplification of Grammar'

SECTION - II

Q7) A) With the help of PDA show that CFL are closed under union, concatenation and Kleen's closure. [12]

B) Compare the power of Post machine and Push Down Automata. [4]

OR

Q8) A) Construct PDA for
 $S \rightarrow OBB$
 $B \rightarrow OS/IS/O$ [8]

B) Draw a Post Machine that accepts even and odd palindrome [8]

Q9) A) Write a TM for making copy of a string that consists of {a, b} [10]

B) Write short note on:
Halting Problem [8]

OR

Q10) A) Write a T.M. to replace string 110 by 101 in a binary input string. [8]

B) Write Notes on:
i) Church's Turing Hypothesis
ii) Unsolvable Problems [10]

Q11) Write short notes on:
a) Applications of FA
b) Chomsky Heirarchy
c) Limitations of TM [16]

OR

Q12) A) Compare DPDA, NPDA, DFA and NFA in terms of their powers. [8]

B) Write a short note on 'Applications of TM' [8]