2054

B.E. (Information Technology)

Sixth Semester

PC-IT-601: Theory of Computation

Time allowed: 3 Hours

Max. Marks: 50

NOTE: *Attempt* _five_ *questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

x-x-x

I.   Answer the following:-

   a) What is the transition function of DFA? Explain with example.

   b) Is there any advantage of using NFA's over DFA's?

   c) Write regular expressions to represent identifiers of 'C' language.

   d) What are recursive languages?

   e) Does a pushdown automata has memory? Justify?   (5x2)

UNIT - I

II.   Explain Chomsky hierarchy for formal languages and analyze the languages proposed with the help of examples.   (10)

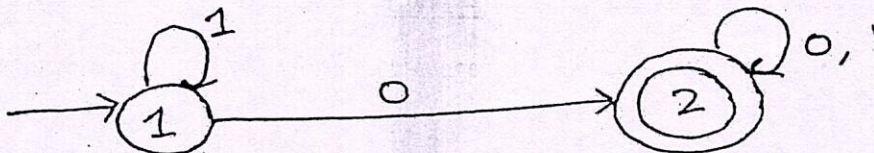III.   a) Design a DFA that recognizes string over {a,b} where every a's immediately followed by b's.

   b) Consider the following ε-NFA. Compute the ε-closure of each state and find its equivalent DFA.

δ/Σ	ε	a	b	c
→p	Ø	{p}	{q}	{r}
q	{p}	{q}	{r}	Ø
*r	{q}	{r}	Ø	{p}

Here *r denotes the final state.   (2x5)

IV.   a) Find the regular expression that denotes the language accepted by the following DFA using ARDEN'S Theorem.

   b) Examine whether the language L= ($0^n 1^n$| n>=1) is regular or not. Justify your answer. (2x5)

P.T.O.

UNIT - II

V.   a) Convert the following CFG into Chomsky Normal Form

S->bA|aB

A->bAA|aS|a

B->aBB|bS|b

b) Design a PDA accepting the following language by empty stack.   (2x5)

$L= \{a^n b^m a^n \mid m, n >= 1\}$

VI.   Design a Turing machine which computes the following function $f(w) = ww^R$, where R is the reverse of the string and $(w \in (a,b)^*)$.   (10)

VII.   Write notes on the following:

a)   Multi-tape Turing Machine

b)   Undecidability   (2x5)

x-x-x