SVKM's NMIMS
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Programme: B. Tech (COMPUTER) Year: III Semester: V

Batch: 2014-15/ 2015-16

Academic Year: 2017-2018

Subject: Theoretical Computer Science

Date: 04 December 2017

Marks: 60
Time: 2.00 pm to 5.00 pm
Duration: 3 (hrs)
No. of Pages: 02

Re-Examination

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1) Question No. 01 is compulsory.
2) Out of remaining questions, attempt any 04 questions.
3) **In all 05 questions to be attempted.**
4) All questions carry equal marks.
5) **Answer to each new question to be started on a fresh page.**
6) **Figures in brackets on the right hand side indicate full marks.**
7) **Assume suitable data, if necessary.**

Q.1.		Solve any three.	
	a.	Design Mealy & Moore machine to calculate one's complement of the given binary number.	[04]
	b.	Design PDA for accepting language $L = \{a^n b^n \mid n > 0\}$.	[04]
	c.	Convert the Context Free Grammar(CFG) G = ({S,A,B}, {a,b},P,S) in to equivalent Chomsky Normal form (CNF), whose production rules are {S → AB , A →BSB |bB|b , B → aS|aB|b }.	[04]
	d.	Differentiate between i. Pushdown Automata and Turing Machine. ii. Finite Automata and Pushdown Automata	[04]
	e.	Explain Chomsky Hierarchy of Languages.	[04]
Q.2.	a.	Convert the following regular expression in to equivalent English Statements i. (10+111)0*1 . ii. (a+b)*baa(b+a)* . iii. 01(0+1)* . iv. a*(a*+b*)* .	[04]
	b.	Construct NFA with-∈ & DFA for the regular expression "ab(a+b)*+ aab".	[08]
Q.3.	a.	Show that $L = \{x^n y^n z^n \mid n>0\}$ is not a regular language.	[06]
	b.	Give Mealy Machine to convert every sequence of "1000" in to "1001" over an alphabet {0+1}*.	[06]

Q.4. a. Let G = ({S,A,B}, {a,b},P,S) be a context free grammar with production rules, [06]
$P = \{S \rightarrow AB \mid \in, A \rightarrow aB, B \rightarrow Sb\}$ Find
i. Leftmost derivation ii. Rightmost derivation & Derivation Tree for the string "aabbbb".

b. Give Push Down Automata for accepting the strings of the language [06]
$L = \{\#w\#w^R\# \mid w \in \{0+1\}^*$, w^R is the reverse of w and # is any terminal symbol}.

Q.5. a. Give Post machine for the Language $L = \{a^n b^n c^n d^n \mid n>0\}$. [06]

b. Give Turing machine for the language $L = \{wcw \mid w \in \{0+1\}^*$ and c is any input symbol}. [06]

Q.6. Give Turing machine for the following. (Any two)

a. To evaluate the function F(x,y) such that [06]
F(x,y) = x-y, if x > y
= 0 , otherwise
Where x, y are any two unary numbers.

b. To evaluate the multiplication of two unary numbers. [06]

c. To accept the language containing equal number of 0's and 1's over an alphabet [06]
{0+1}*. Also give proliferation for the input "0010011011".

Q.7. Explain (any four)

a. Halting problem of Turing Machine. [03]

b. Post Correspondence Problem. [03]

c. Difference between Mealy and Moore Machine. [03]

d. Application of Finite automata in compiler construction. [03]

e. Ambiguity in Grammar. [03]

f. Un-decidability problem. [03]

g. Closure properties of Context Free Languages. [03]
