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

Programme: B. Tech (Computer) Year: III Semester: V
Batch: 2014-2015

Academic Year: 2015-2016

Subject: Theoretical Computer Science

Date: 25/11/2015

Marks: 60
Time: 2.00 pm to 5.00 pm
Duration: 3 (hrs)

Re-Examination

Instruction: 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.

NB:
1) Question No. _1___ is compulsory.
2) Out of remaining questions, attempt any __4___ questions.
3) In all ___5_ 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.

1. a. Prove that L= $\{(ab)^n a^k : n>k, k>=0\}$ is not regular [3]
   b. Design DFA to accept set of strings that accept 00 as substring but not 000 as a substring. [3]
   c. Differentiate between a) NFA and DFA [6]
   b) Moore and Mealy

2. a. Convert the following grammar to CNF [6]
   A aBb | bBa
   B->aB | bB | $\in$
   b. Reduce the following grammar to GNF [6]
   i) S AB
   A BSB | BB | b
   ii) B aAb | a
   S AA | a
   A SS | b.

3. Write Short note on any four. [12]
   a) Halting Problem
   b) Types of Turing Machines
   c) Closure properties of regular languages
   d) Recursively enumerable languages
   e) Post Correspondence Problem

4. a. Design TM to accept the language consisting of equal number of 0's and 1's.Simulate the operation for 110100. [6]
   b. Design a TM to accept language $\{0^n1^n \mid n>0\}$ [6]

5. a. Design a PDA for accepting a language L = $\{ WcW^R \mid W \in \{a, b)^* \}$ [6]

b. Design a PDA to accept the language L= $\{0^n1^n \mid n <= m\}$ [6]

6. a. For the given grammar given below [6]

S A1B

A 0A| $\in$

B 0B |1B| $\in$

Give leftmost and rightmost derivation of the string 1001.Also draw parse tree.

b. Design a Mealy machine that accepts input from (0+1)*, if the input ends in 101, output A; if the input ends in 110, output Otherwise. [6]

7. a. In each case,show that the grammar is ambiguous and find the equivalent unambiguous grammar

S SS|a|b

S ABA, A aA| $\in$, B bB| $\in$ [6]

b. Construct NFA from the following RE and convert into minimized DFA.

i. (0+1)*(00+11) [6]
