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

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

Academic Year: 2015-16

Batch: 2014-15 / 2015-16   Marks:60
Subject: Theoretical Computer Science   Time: 2.00 pm – 5.00 pm
Date: 08 June 2016   Durations: 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. **ONE** is compulsory.
2) Out of remaining questions, attempt any **FOUR** questions.
3) In all **FIVE** 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   Answer the following and justify in short.   12

a   Construct the grammar for the language

        $a^n c^i b^n$, where $n > 0$ and $i \geq 0$.

b   Find the highest type of the following grammar

        $S \rightarrow a/aAS$, $A \rightarrow SS/SbA/ba$.

c   Find the languages generated by the following grammar.

        $S \rightarrow aSa$, $S \rightarrow bSb$, $S \rightarrow c$.

d   Describe the following REs in English language.

        $(00)^* (11)^* 1$.

e   Find the RE for the following

        {w| w contains an even number of 0s, or contains exactly two 1s}

f   Which one of the following regular expressions is not equivalent to the regular expression $(a + b + c)^*$?

        i) $(a^*+b^*+c^*)^*$ ii) $(a^*b^*c^*)^*$ iii) $((ab)^*+c^*)^*$ iv) $(a^*b^* + c^*)$

Q.2 a Construct a DFA from the given NFA.   06

Present State	Next State	
	a=0	a=1
->p	p, q	r
q	r	r
r	s	q
*s	s	s

b Construct a minimum state automaton equivalent to an automaton whose transition 06
table is defined by Table

State	a	b
→q_0	q_1	q_2
q_1	q_4	q_3
q_2	q_4	q_3
q_3	q_5	q_6
q_4	q_7	q_6
q_5	q_3	q_6
q_6	q_6	q_6
q_7	q_4	q_6

Q.3 a Convert the given right linear grammar to equivalent left linear grammar form.   06

S→ aA | bB

A→ bC

B→ aC

C→ aC | bC | a | b

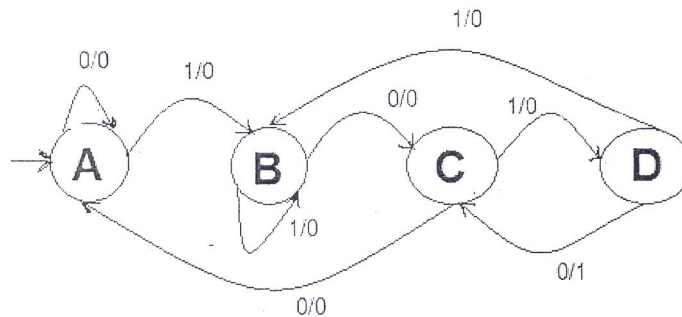b   Convert following grammer into GNF   06

$S \rightarrow AA/ a$

$A \rightarrow SS/b$

Q.4 a. Convert the following Mealy machine into an equivalent Moore machine by the 06
transitional format.

b   Check whether the following grammar is ambiguous or not Justify.   06

$S \rightarrow SS/a/b$

Q.5 a Design a non-deterministic PDA accepting string { WW^R where $W \in (a,b)+$ and W^R is 06
the reverse of W} by the empty stack and by the final state.

b   Design a PDA for the language $L=\{ a^n b^m c^m d^n$, where m, n≥1 } by empty stack and by 06
final stack.

Q.6 a Design the TM to accept the language $L=a^n b^n c^n$, where n>=1.   06

b   Construct a TM for the regular Expression $(a+b)^* (aa+bb) (a+b)^*$ 06

Q.7 a Explain Post Correspondence Problem (PCP) problem.   04

b   Convert the following NFA with €- moves to equivalent DFA.   08