

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I – Semester (Main) Examination, November 2013

Subject : Automata Languages and Computation

Time : 3 hours

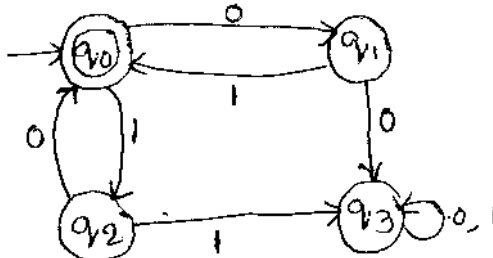
Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.**PART – A (25 Marks)**

1. Obtain a DFA to accept strings of 0's, 1's and 2's beginning with a '0' followed by odd no. of 1's and ending with a '2'. 3
2. Obtain a regular expression to accept strings of a's and b's whose length is either even or multiples of 3 or both. 2
3. If $\Sigma = \{0,1\}$, $\Gamma = \{1,2,3\}$, $h(0) = 3122$, $h(1) = 132$
What is $(0+1)^* (00)^*$? 2
4. Consider the following grammar 3
 $S \rightarrow aCa$
 $C \rightarrow aCa|b$
 What is the language generated by this grammar?
5. Define Chomsky Normal Form (CNF). 2
6. Prove that reversal of a CFL is also an CFL. 3
7. What do you understand by the term LBA? 3
8. Define Turing machine. How a TM accepts a language? 3
9. Define MPCP. 2
10. What is universal language? 2

PART – B (50 Marks)

- 11.a) Construct a DFA to accept decimal strings divisible by 3. 5
 b) Convert the FA to regular expression. 5



- 12.a) Prove that $(00^*1)^*1 = 1+0(0+10)^*11$. 5
 b) State and prove pumping lemma for CFL. 5

13. Obtain a TM to accept a palindrome consisting of a's and b's of any length. 10

14.a) Convert the following grammar into GNF. 5

$$A \rightarrow BC \quad B \rightarrow CA/b \quad C \rightarrow AB/a$$

b) Obtain a CFG for the following PDA. 5

$$\delta(q_0, a, z) = (q_0, AZ), \quad \delta(q_0, a, A) = (q_0, A)$$

$$\delta(q_0, b, A) = (q_1, \epsilon), \quad \delta(q_1, \epsilon, z) = (q_2, \epsilon)$$

15.a) Prove that PCP is undecidable. 5

b) State PCP and find whether given instances of PCP has solution or not. 5

	List A	List B
1	10	101
2	011	11
3	101	011

16.a) Obtain a TM to multiply two unary no's separated by the delimiter '1'. 6

b) Consider the CFG $S \rightarrow A_1A_2|A_2A_3, A_1 \rightarrow A_2A_1|0$ 4

$$A_2 \rightarrow A_3A_3|1, A_3 \rightarrow A_1A_2|0$$

Test 10010 is a member or not using CYK algorithm

17. Minimize the following DFA : 10

	0	1
\rightarrow A	B	A
B	A	C
C	D	B
* D	D	A
E	D	F
F	D	E
G	F	G
H	G	D
