Code No. 6109

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, is 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 $\sum = \{0,1\},\ \Gamma = \{1,2,3\},\ h(0) = 3122,\ \ h(1) = 132$ 2
   What is (0+1)* (00)*?

4. Consider the following grammar 3
   S → aCa
   C → 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

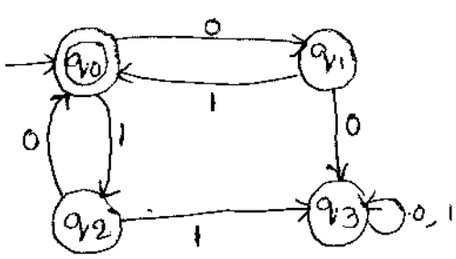
8. Define turning machine. How a TM accepts a language? 3

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

..2

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 → BC B → CA/b C → AB/a

b) Obtain a CFG for the following PDA. 5

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

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

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 $S \rightarrow A_1A_2|A_2A_3$, $A1 \rightarrow A_2A_1|0$ 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
→ A	B	A
B	A	C
C	D	B
* D	D	A
E	D	F
F	D	E
G	F	G
H	G	D

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FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I-Semester (Suppl.) Examination, July 2014

Subject : Automata Languages and Computation

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Define δ in a TM. (2)
2 State pumping lemma for CFL's. (2)
3 Define Church's hypothesis. (2)
4 Define the term LBA and explain. (2)
5 Prove that (O+1)* 100 regular or not. (3)
6 State the closure properties of Regular Languages. (2)
7 Define PCP and MPCP. (2)
8 Construct a right linear grammar for (0+1)*00(0+1)*. (3)
9 Convert to CNF. (3)
$S \rightarrow aB \mid bA$
$A \rightarrow a \mid aS \mid bAA$
$B \rightarrow b \mid bS \mid aBB$
10 What are intractable problem ? Explain. (3)

PART – B (50 Marks)

11 (a) Construct a DFA equivalent to the regular expression 10+(0+11)0*1. (6)
(b) Differentiate between NFA and DFA. (4)

12 (a) Given CFG G = ({S, A}, {a, b}, P, S) where
P consists of $S \rightarrow aAS \mid a$
$A \rightarrow SbA \mid SS \mid ba$
Give the LMD, RMD and parse tree for "aabbaa" (5)
(b) What are ambiguous grammars ? Give examples. Is the above grammar ambiguous. (5)

13 Design a PDA to accept equal no of a's and b's over the alphabet $(a+b)^+$. (10)

14 (a) Write short notes on Universal TM . (5)
(b) Design a TM for L $\{WW^R \mid W \in (0+1)^*$, R stands for Reverse$\}$. (5)

15 Reduce to GNF
$S \rightarrow AA \mid O$
$A \rightarrow SS \mid 1$ (10)

16 (a) Define Chomsky hierarchy. (3)
(b) What are recursively enumerable languages? Give example. (3)
(c) Explain undecidability. (4)

17 (a) Explain a restricted satisfiability problem. (5)
(b) Explain the classes of P, NP and explain the terms NP - complete and NP-nard. (5)

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