Reg. No.										

Manipal University, Manipal

III SEMESTER M.Sc. (APPLIED MATHEMATICS AND COMPUTING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: FORMAL LANGUAGE AND THEORY OF COMPUTATION [MAT 709.10]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.

1A. Sketch the block diagram of a finite automaton and explain it's parts. **4 Marks**

1B. Define ambiguous grammar.
Show that the grammar S→a | abSb | aAb,A→bS | aAAb is ambiguous. **3 Marks**

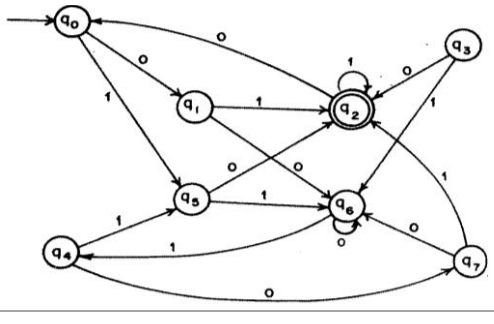
1C. Show that {abc,bca,cab} can be generated by a regular grammar whose terminal set is {a,b,c}. **3 Marks**

2A. Define Mealy Machine.
Convert the given machine in to an equivalent Moore machine from the given table: **4 Marks**

	Next State			
	i.p a=0		i.p a=1	
State	State	O.P	State	O.P
→ q_1	q_3	0	q_2	0
q_2	q_1	1	q_4	0
q_3	q_2	1	q_1	1
q_4	q_4	1	q_3	0

2B. Find all strings of length 5 and write the regular set from the regular expression $a^*+ (ab + a)^*$. **3 Marks**

2C. Construct a minimum state automaton equivalent to the finite automaton given in figure **3 Marks**



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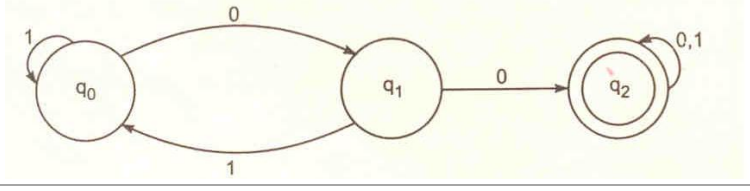
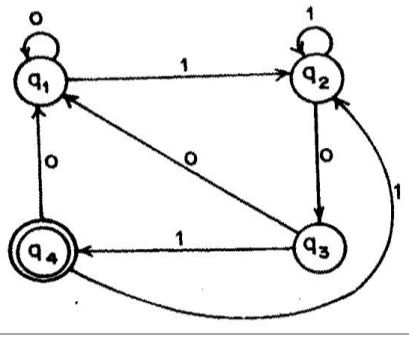
3A.	Prove that there exists a recursive set which is not a context sensitive language over {0,1}.	**4 Marks**
3B.	Define push down automata. Represent this transition diagram in terms of PDA 	**3 Marks**
3C.	Show that L={a^p/p is a prime} is not regular.	**3 Marks**
4A.	Find the regular expression corresponding to the figure using Arden's theorem. 	**4 Marks**
4B.	State and prove pumping lemma for regular sets.	**3 Marks**
4C.	Find regular expressions representing the following sets: i)the set of all strings over {0,1} having atmost one pair of 0's or atmost one pair of 1's. ii)the set of all strings over {0,1} ending with 11 and beginning with 00.	**3 Marks**
5A.	Define a Greibach normal form. Convert the grammar S →AB,A →BS/b,B →SA/a, into GNF.	**4 Marks**
5B.	State and prove Kleen's theorem.	**3 Marks**
5C.	Show that there exists no finite automaton accepting all palindromes over {a,b}	**3 Marks**
6A.	Define a Greibach normal form. Convert the grammar S →AB,A →BS/b,B →S A/a, into GNF.	**4 Marks**
6B.	Show that {a^n $b^n c^n$|n≥1} is not context free but context sensitive.	**3 Marks**
6C.	If L is regular then prove that L^T is also regular.	**3 Marks**