Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA Sem – II Examination June 2011

Subject code: 620007 **Subject Name : Theory of Computation**
Date: 29/06/11 **Total Marks: 70** **Time: 2:30pm to 5:00pm**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 (a) What is Proposition? Which are logical connectives. 05

(b) What is set ,Universal set and Complement set? List various set operators. 05

(c) Find regular expression for following languages over {0 ,1}. 04
(i) String end with 1.
(ii) String of even length.
(iii) String of size three or less than three.
(iv) String containing substring 00.

Q.2 (a) Give recursive definition for 04
Set of all strings in {0,1}* containing substring 00 .

(b) Prove that if either of a and b is even number the a*b is even number. 03

(c) Draw FA to recognize the following languages defined over {0,1}*. 07
(i) (0+1)*(110)
(ii) Language containing string of exactly two zeros.

OR

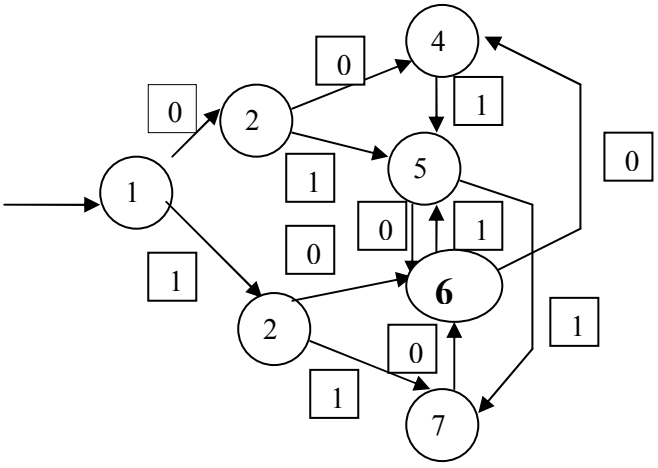
(c) Define FA and б* for FA . 07

Q.3 (a) Given that L1 = {x ϵ (0,1)* | x ends with 00} 07
L2 = {x ϵ (0,1)* | x ends with 10}
Give FA for L1 , L2 and L1 U L2.

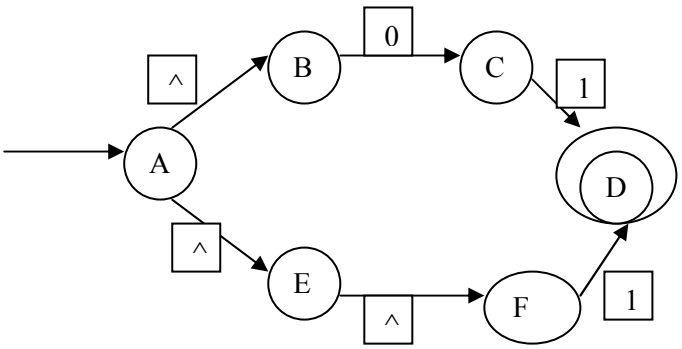
(b) Define NFA and б* for NFA . 07

OR

Q.3 (a) Find minimal FA for following FA**. Note that state-6 is accepting state.** 07



(b) Find ^ closure for of A and E for following NFA-^. 07



Q.4 (a) Let M = (Q, ∑, q0 , б, A) where Q= {a,b,c,d}, q0 = a and A={d} and б is given as follows. 07

State	input – 0	input -1
a	{b,d}	{c,d}
b	{b}	{d}
c	{d}	{c}
d	Φ	Φ

Give transition diagram for above NFA & find whether string 100101 will be accepted by it or not.

(b) Explain and define Push Down Automata (PDA). 07

OR

Q.4 (a) Find language corresponding to following CFG production. 07

(i) S → aSa | bSb | ^

(ii) S→ aS | bS | a

(iii) S → aSb | bSa | ^

(iv) S → aSa | bSb | a | b

(b) Draw Turing machine to accept (a+b)* aba (a+b)*. 07

Q.5 (a) Write a short note on Derivation tree and ambiguity with reference to CFG. 05

(b) Write a short note on recursive enumerable and recursive language. 05

(c) Construct Turing machine to accept palindrome. 04

OR

Q.5 (a) Explain Chomsky normal form with example. 05

(b) Write short note on pumping lemma for CFL. 05

(c) Draw NFA - ^ corresponding to following regular expression over ∑ = {0,1}. 04

(00+1)*(10)*

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