Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA- IInd SEMESTER–EXAMINATION –JUNE - 2012

Subject code: 620007 Date: 14/06/2012

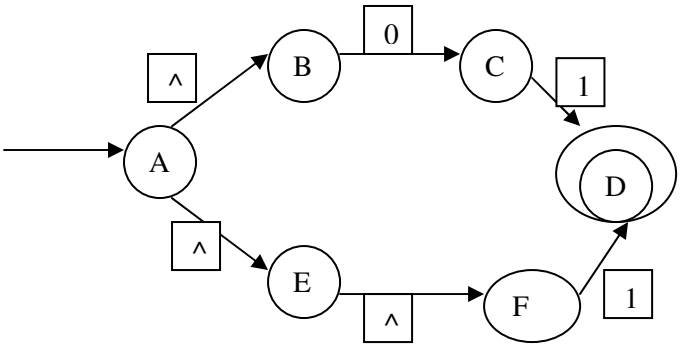
Subject Name: Theory of Computation

Time: 10:30 am – 01:00 pm Total Marks: 70

Instructions:

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

Q.1	(a)	Explain logical Quantifiers and Quantified statement.	04
	(b)	Define regular language, ∑*,L* and L+.	04
	(c)	Find regular expression for following languages over {0 ,1}. (i) String end with 01. (ii) String with only two 1 and single 0. (ii) String of size four.	06
Q.2	(a)	Explain principle of mathematical induction with example .	07
	(b)	Draw FA to recognize the following languages defined over {0,1}*. (i) (0+1)*(11) (ii) 11(0+1)*(10)	07
		OR	
	(b)	Draw and explain FA for even number of 0(zero) and even number of 1(one).	07
Q.3	(a)	Given that L1 = {x ϵ (0,1)* ׀ x ends with 00} L2 = {x ϵ (0,1)* ׀ x ends with 01} Give FA for L1 , L2 and L1 ∩ L2.	07
	(b)	Define FA and δ* for FA .	07
		OR	
Q.3	(a)	With example explain non-determinism in NFA.	07
	(b)	Find ^ closure for of A and F 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 – ^	input -0	input-1
a	{b}	{a}	Φ
b	{d}	{c}	Φ
c	Φ	Φ	{b}
d	Φ	{d}	Φ

Give transition diagram for above NFA-^.
& find equivalent NFA .

(b) Write a short note on Push Down Automata (PDA). 07

OR

Q.4 (a) Find language corresponding to following CFG production. 07
(i) S → aS | bS | a
(ii) S→ aS | bS | a | b
(iii) S → aSb | bSa | ^
(iv) S → SaS | b

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

Q.5 (a) Write a short note on Derivation tree and ambiguity with reference to CFG. 07

(b) Convert following grammar into Chomsky Normal Form. 07
S →AACD
A → aAb | ^
C → aC |a
D → aDa |bDb | ^

OR

Q.5 (a) Write a short note on recursive enumerable and recursive language. 07

(b) Draw NFA - ^ corresponding to following regular expression over ∑ = {0,1}. 07
(10+00)*(01)*

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