SVKM's NMIMS
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Programme:B. Tech (COMPUTER) Year: II Semester: IV

Academic Year: 2017-2018

Subject:Theoretical Computer Science

Date:12 May 2018

Marks:70
Time: 2.00 pm to 5.00 pm
Durations: 3 (hrs)
No. of Pages : 02

Final Examination

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1) Question No. 1 is compulsory.
2) Out of remaining questions, attempt any 4 questions.
3) In all 5 questions to be attempted.
4) All questions carry equal marks.
5) Answer to each new question to be started on a fresh page.
6) Figures in brackets on the right hand side indicate full marks.
7) Assume suitable data if necessary.

Q.1.	a.		Differentiate between Push Down Automata and Post Machine.	[05]
	b.		Application of Automata in Compiler Construction.	[04]
	c.		Explain the Halting Problem of Turing Machine.	[05]
Q.2.	a.		Give Context Free grammar for the following Languages	
		i.	L(**(baa+abb)***)	[02]
		ii.	L(**a*baab***)	[02]
		iii.	L(**b*ab*ab***)	[02]
	b.		Construct NFA with ∈-moves equivalent to the regular expression "*a.(a + b)*.a + a. (b.b + a)*"	[08]
Q.3.	a.		Convert the following CFG in to equivalent Chomsky Normal Form **< {S, X, Y}, { a, b}, { S→XYX, X→ aX | bX |∈, Y → bbb }, S >**	[08]
	b.		Describe the following regular expressions in English.	
		i.	**(a+b)*a(a+b)*b(a+b)*.**	[02]
		ii.	**(00)*(11)*1.**	[02]
	c.		Give Regular Expression for representing the set of strings over an alphabet *{a, b}* such that it contains at most three *a*'s. Justify your answer.	[02]

Q.4. a. Design a Mealy machine to convert every sequence of "*1000*" in to "*1001*" from the given input string over an alphabet *{0, 1}*. [05]

b. Design a Turing Machine for calculating multiplication of two unary numbers *n* and *m*, also give proliferation for *n=2* and *m = 3*. [09]

Q.5. a. Design Turing Machine for accepting the strings from language $L(a^n b^n | n>=1)$. [05]

b. Design Push Down Automata for accepting the strings from the language $L(ab^n cd^n e | n>0)$. [09]

Q.6. a. State and explain Pumping lemma for CFL. [05]

b. Design Post Machine to accept string for the language $L(0^n b^m 1^n d^m | m,n>0)$. [09]

Q.7. Explain the following.

a. Explain Turing Machine Codes with the help of suitable example. [05]

b. Mealy and Moore Machine. [05]

c. Explain Post Correspondence Problem with the help of suitable example. [04]
