

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

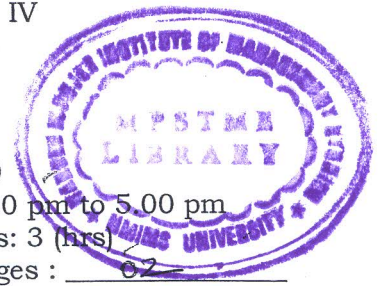
Date: 12 May 2018

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 ϵ -moves equivalent to the regular expression [08]
" $a.(a+b)^*.a+a.(b.b+a)$ "
- Q.3. a. Convert the following CFG in to equivalent Chomsky Normal Form [08]
 $\langle \{S, X, Y\}, \{a, b\}, \{S \rightarrow XYX, X \rightarrow aX \mid bX \mid \epsilon, Y \rightarrow bbb\}, S \rangle$
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 [02]
 $\{a, b\}$ such that it contains at most three a 's. Justify your answer.

- Q.4. a. Design a Mealy machine to convert every sequence of "1000" in to "1001" [05]
from the given input string over an alphabet $\{0, 1\}$.
- b. Design a Turing Machine for calculating multiplication of two unary numbers [09]
 n and m , also give proliferation for $n=2$ and $m=3$.
- Q.5. a. Design Turing Machine for accepting the strings from language $L(a^n b^n | n \geq 1)$. [05]
- b. Design Push Down Automata for accepting the strings from the language [09]
 $L(ab^n cd^n e | n > 0)$.
- 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]
-