

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
V SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: IT303

Course Name: THEORY OF COMPUTATION

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Define E-NFA with an example. How does the E-Closure of a function is computed. (7)
- b) Define the following terms (4)
1. Alphabet
 2. String
 3. Power of an alphabet
 4. Language
- c) Define closure of an alphabet. Give variants (4)
- 2 a) Define Mealy and Moore machine with example (5)
- b) Design a FA for the language $L = \{w/w \text{ which contains } 1101 \text{ as substring}\}$ (5)
- c) Write applications of Finite state machine (5)
- 3 a) Minimize the following automata (8)

	a	b
q0	q1	q4
q1	q2	q3
q2	q7	q8
q3	q8	q7
q4	q5	q6
q5	q7	q8
q6	q7	q8
q7	q7	q7
*q8	q8	q8

- b) State and prove the equivalence of NFA and DFA (7)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) State and prove pumping Lemma theorem for regular languages (5)
- b) Show that $a^n b^n$ is not regular (5)

- c) Define ambiguity. Eliminate useless productions for the following (5)
 $S \rightarrow A/a, B \rightarrow CA$
 $A \rightarrow b$
- 5 a) Convert the following DFA to regular expression where q_1 is the initial and (5)
 final state
- | | 0 | 1 |
|-------|-------------------------------|---|
| q_1 | <u>q_1</u> q_2 | |
| q_2 | q_3 q_2 | |
| q_3 | q_1 q_2 | |
- b) Write regular Expression for the strings $=\{0,1\}$ (6)
 1)ends in 00
 2)whose tenth symbol from the right end is 1
 3)contains even no of zeros followed by odd no of ones
- c) Explain Arden's theorem. (4)
- 6 a) Convert GNF (5)
 $S \rightarrow AA/a$
 $A \rightarrow SS/b$
- b) Eliminate Epsilon productions (5)
 $S \rightarrow ABAC$
 $A \rightarrow aA/\epsilon$
 $B \rightarrow bB/\epsilon$
 $C \rightarrow c$
- c) Construct an NFA from the R.E $01^*(1+0)^*00$ (5)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Define the following Turing machine (10)
 a) Non-Deterministic TM
 b) Universal TM
 c) Offline TM
 d) Multi-tape TM
- b) Explain decidable and undecidable problems (5)
 c) Define Church Turing thesis (5)
- 8 a) Design a Turing machine to add two unary numbers represented as (15)
 consecutive zeros
- b) Write a note on Linear bounded automata. (5)
- 9 a) Discuss the properties of recursive and recursive enumerable language (5)
 b) Write a note on halting problem with an example (5)
 c) State and prove the equivalence of single tape and multi-tape Turing (10)
 machine
