



PAPER: Theory of Automata (IT)
Course Code: IT-301 Part-I (Compulsory)

MAX. TIME: 15 Min.
MAX. MARKS: 10

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the right answer, cutting and overwriting is not allowed. (1x10=10)

1) Which one is not true?

- a. $\Lambda a = \Lambda a \Lambda$
- b. $\{\} = \{\Lambda\}$
- c. $\Lambda = \Lambda \Lambda \Lambda$
- d. None of above

2) Minimum number of states in a FA are:

- a. 0
- b. 1
- c. 2
- d. 3

3) There is one and only one FA for a language:

- a. True
- b. False
- c. May and may no
- d. None of these

4) Which one is true?

- a. $\{\Lambda\}^* = \{\}^*$
- b. $\{\Lambda\}^* = \{\Lambda\}^*$
- c. Both a & b
- d. None of the above

5) Regular expression for all strings starting with "ab" and ending with "bba" is:

- a. aba^*b^*bba
- b. $ab(ab)^*bba$
- c. $ab(a+b)^*bba$
- d. All of the above

6) For $\Sigma = \{a, b\}$ and L: all strings containing "aba" as Substring. Difference of transactions made in constructing DFA & an equivalent NFA?

- a. 2
- b. 3
- c. 4
- d. Can't be determined

P.T.O.

- 7) Valid strings for a language are:
- Which are over given Σ
 - Follow the rules of that specific language.
 - Both a & b
 - None of above.
- 8) For a string "aaaaaa" What is the smallest valid length? If $\Sigma = \{a, aa, aaa\}$
- 6
 - 2
 - 3
 - 0
- 9) If $S = \{ab, bb\}$ then S^* will not contain
- abbbab
 - bbba
 - bbbbab
 - ababbb
- 10) Which one is true?
- All FA's are also NFA
 - All NFA's are also FA
 - Both are true
 - None of them



UNIVERSITY OF THE PUNJAB

Fifth Semester – 2019

Examination: B.S. 4 Years Program

Roll No.

PAPER: Theory of Automata (IT)

Course Code: IT-301 Part – II

MAX. TIME: 2 Hrs. 45 Min.

MAX. MARKS: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Questions with short answers.

(5 x 4 = 20)

- Give Recursive definition of Regular Expressions.
- Give the definition of CNF and also describe its advantages.
- Define ambiguity, give an ambiguous grammar and also prove it.
- Give comparison among the power of FA, NFA, PDA, NPDA, and Turing Machine.
- Discuss the difference between the input tapes of Turing Machine and Post Machine.

Q.3. Questions with long answers.

(6 x 5 = 30)

- Construct a Turing Machine which will double every 'b' in all inputted string over $\Sigma = \{a, b\}$
- Construct PDA for the language PALINDROME over $\{c, d\}$.
- Construct MOORE machine (an FA with output) which can subtract any two inputted binary strings.
- Give the Regular Expression and FA for the language ODD-EVEN.
- Write the CFG for the Language $a^n b^m d^m c^n$; $m, n \geq 0$
- Write the Context Sensitive Grammar for language $c^n a^n b^n$; $n \geq 0$