

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (Sem.-5)

**FORMAL LANGUAGE & AUTOMATA THEORY**

Subject Code : BTCS-502-18

M.Code : 78321

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

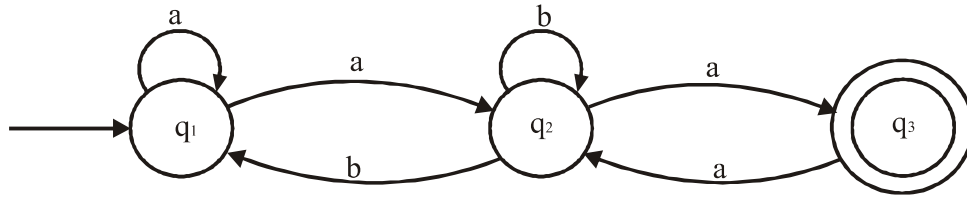
**SECTION-A**

**Answer briefly :**

- 1) If  $A = \{a, b\}$  and  $B = \{a, c\}$ , Find  $A^* \cup B^*$ .
- 2) State Kleene's Theorem.
- 3) Find Regular Expression over  $\{a, b\}$  having set of all string containing exactly two a's.
- 4) Differentiate between type1 and type2 grammar.
- 5) State Arden's Theorem.
- 6) Describe PDA.
- 7) Differentiate between Injective and Surjective functions in a set.
- 8) Write the steps needed for proving that a given set is not regular.
- 9) Define Derivation Tree.
- 10) State Ambiguous grammar with example.

### SECTION-B

- 11) Describe pumping lemma for regular set with the help of an example.
- 12) Prove that string represented by following transition system is  
 $(a + a(b + aa)^*b)^* a(b + aa)^*a$ .



- 13) Find a reduced grammar equivalent to the given grammar.  
 $S \rightarrow AB \quad A \rightarrow a \quad B \rightarrow b \quad B \rightarrow C \quad E \rightarrow c$
- 14) What are the different types of Grammars and Languages associated with it.
- 15) Discuss the Universality of Cellular Automata.

### SECTION-C

- 16) Find a grammar in GNF equivalent to the grammar.  
 $E \rightarrow E + T \mid T \quad T \rightarrow T * F \mid F \quad F \rightarrow (E) \mid a$
- 17) Discuss the various representations of Turing Machine.
- 18) Design PDA for  $\{wcw^T \mid w = \{a,b\}^*\}$ .

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**