

2021
B.A./B.Sc.
Fifth Semester
CORE – 12
COMPUTER SCIENCE
Course Code: CSC 5.21
 (Theory of Computation)

Total Mark: 70

Pass Mark: 28

Time: 3 hours

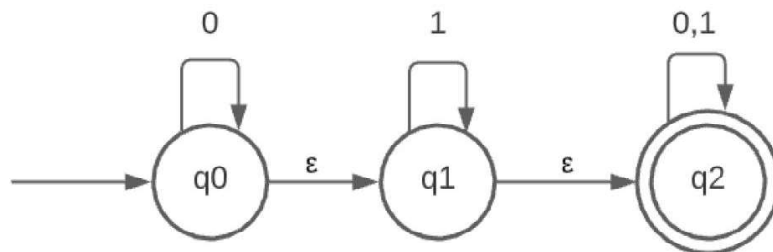
Answer five questions, taking one from each unit.

UNIT-I

1. (a) What is computation? Write a note on automated theory and language. 2+6=8
- (b) Explain symbols, alphabets, power of an alphabet and length of string with examples each. 6
2. (a) Explain complexity theory and computability theory. 6
- (b) What is a language? Write a note on set operations on a language. 2+6=8

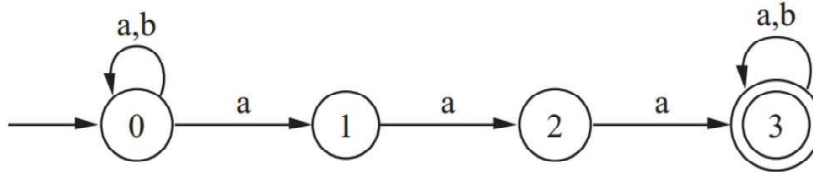
UNIT-II

3. (a) Define automata. Differentiate between DFA and NFA. 3+5=8
- (b) Convert the following ϵ -NFA to NFA. 6



4. (a) What is a transition state and transition table? 4

(b) Define DFA and NFA. Convert the NFA to DFA. 5+5=10



UNIT-III

5. (a) Define a grammar. Suppose $L(G) = \{a^m b^n \mid m \geq 0 \text{ and } n > 0\}$. Find out the grammar G which produces $L(G)$ 3+5=8
 (b) Explain rightmost and leftmost derivation tree with an example. 6
6. (a) List and explain the Chomsky classification of grammar. 6
 (b) Define a CFG. Write a note on parse tree. 3+5=8

UNIT-IV

7. Define a Turing Machine. Construct a TM for the language $L = \{0^n 1^n 2^n\}$, where $n \geq 1$ and draw its transition diagram. 4+10=14
8. Write a note on Halting problem. Construct a TM for addition and subtraction of a unary number. 2+6+6=14

UNIT-V

9. Explain decidable, undecidable and semi decidable language with example each. 14
10. Write a note on recursive enumerable and recursive language with example. 14