

**B.Tech. – VIEP – COMPUTER SCIENCE AND
ENGINEERING (BTCSVI)**

Term-End Examination

June, 2016

00330

BICS-018 : THEORY OF COMPUTATION

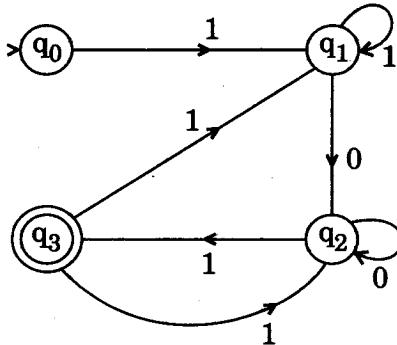
Time : 3 hours

Maximum Marks : 70

Note : Attempt any seven questions. All questions carry equal marks.

1. (a) Enumerate the difference between DFA and NFA with the help of an example. 5
- (b) Construct a Mealy machine which can output EVEN, ODD according to the total number of even and odd 1's encountered. The input symbols are 0 and 1. 5
2. (a) Design a DFA for all the strings over {a, b}, where number of b's are $3k + 1$ and $k = 0, 1, 2, \dots$ 5
- (b) Discuss the closure properties of regular languages. 5

3. (a) Construct a finite automaton equivalent to the regular expression $(10 + (0 + 11) 1^* 0)$. 5
- (b) Find the regular expression corresponding to the automaton given below : 5



4. Define Deterministic Push Down Automata (DPDA). Design a DPDA for the language $\{a^n b^n \mid n \geq 1\}$. 10
5. Define Turing Machine. Design a Turing Machine that concatenates two strings of 0's separated by a blank. 10
6. Explain the following : 5+5=10
- (a) Two-way Infinite Tape Turing Machine
- (b) Multiple Tracks Turing Machine
7. Prove that the universal language is recursively enumerable. 10
8. Prove that the halting problem is undecidable. 10

9. How is a Turing Machine different from RAM ?
Explain and discuss NP-complete and NP-hard
problems. 10

10. Write short notes on any *two* of the
following : 2×5=10

- (a) Myhill-Nerode Theorem
 - (b) Church's Hypothesis
 - (c) Travelling Salesman Problem
-