

**B.Tech. – VIEP – COMPUTER SCIENCE AND
ENGINEERING (BTCSEVI)****Term-End Examination****December, 2015****BICS-018 : THEORY OF COMPUTATION***Time : 3 hours**Maximum Marks : 70*

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

1. (a) Define NDFSA and DFA with examples. 5
- (b) Write the statements of Myhill-Nerode theorem. 5
2. (a) Give a regular expression in which 3 consecutive zeros appear in a substring over input = {0, 1}. 5
- (b) Design a Moore and Mealy machine for Binary input sequence. If it ends in '101', output is 'A', If it ends in '110', output is 'B', otherwise 'C'. 5

3. (a) Write down the procedure for converting an NFA into equivalent DFA. 5
- (b) Prove that $(r + s)^*$ is not equal to $r^* + s^*$ and $r(s + t)$ is equal to $(rs + rt)$. 5
4. Write down the statements of Kleene's theorem and also prove it. 10
5. (a) Design a DFA for the regular expression $10 + (0 + 11)0^*1$. 5
- (b) Show that $\{a^n b^n \mid n \geq 1\} \cup \{a^m b^{2m} \mid m \geq 1\}$ cannot be accepted by deterministic PDA. 5
6. Design a Turing Machine (TM) that accepts $\{0^N 1^N \mid N \geq 1\}$. 10
7. Design a Moore and Mealy machine which prints the one's complement of the binary number = 0011. 10
8. Explain recursive and recursively enumerable language with its application and also compare and contrast decidability and undecidability. 10

9. What do you mean by an unsolvable problem ?
Explain.

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10. Write short notes on any *two* of the
following :

2×5=10

- (a) GNF
 - (b) Pumping Lemma for Regular Sets
 - (c) Travelling Salesman Problem
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