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BICS-010

**B.Tech. - VI EP - COMPUTER SCIENCE
AND ENGINEERING (BTCSVI)**

Term-End Examination, 2019

BICS-010 : FORMAL LANGUAGES AND AUTOMATA

Time : 3 Hours]

[Maximum Marks : 70

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

1. (a) What are the concepts of Automata Theory ?
Explain with the help of some examples. [5]
- (b) Define formal definition of finite automata. State the diagrams of the two-state finite automaton and five-state finite automaton. [5]
2. (a) Construct a DFA accepting all strings over {a,b} where number of a's is divisible by 3 and b's is divisible by 2. [5]
- (b) Construct a Mealy Machine which can output even, odd according to the total number of even or odd 1's encountered. The input symbol are 0 and 1. [5]

3. (a) Differentiate between a recursive and recursively enumerable language and also give the example of a language that is neither recursive nor recursively enumerable. [5]
- (b) What is CYK algorithm ? Explain it with suitable application. [5]
4. What is Turing Machine ? Design a Turing Machine (TM) which will compute 2's complement of a binary number. [10]
5. (a) Enumerate the difference between DFA and NFA with the help of example. [5]
- (b) Design a DFA for all strings over {a,b}, where number of b's are $3K+1$ where $K= 0, 1, 2, 3 \dots$. [5]
6. Implement 3-bit odd parity generator using JK flip-flop, with the help of state diagram, state table, transition table and excitation table. [10]
7. (a) Explain 4-bit parallel in serial out shift register with the help of a suitable diagram. [5]

- (b) Define modules of a counter. How can you change modules of counter ? [5]
8. (a) Which TTL series is most suitable at high frequencies and which gates are suitable for the wired AND operation ? Justify your answer. [7]
- (b) Explain Moore Machine. [3]
9. (a) What is halting problem ? Explain. [5]
- (b) Explain Turing reducibility Machine. [5]
10. Write short notes on any two of the following : [2×5=10]
- (a) Decade Counter
- (b) Church-Thesis
- (c) Undecidable languages

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