

Class – M.Sc (C.Sc) Sem II

Subject – Theory of Computation

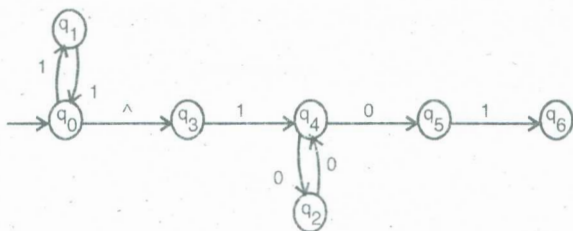
Paper – MCS-201

Time Allowed : 3 Hours

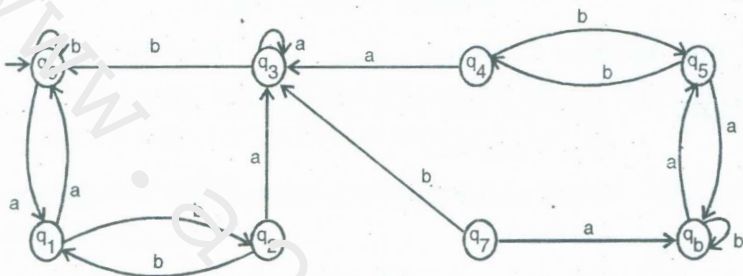
Maximum Marks : 100

Note :- Attempt any five questions. All questions carry equal marks.

1. (a) State and Prove Arden's theorem with its algebraic method. 10
- (b) Construct a DFA with reduced states equivalent to the regular expression  $10 + (0 + 11)0^*1$  10
2. (a) Write the steps to convert a CFG to CNF. 10
- (b) Is the grammar  $S \rightarrow ABb/a, A \rightarrow aaA, B \rightarrow bAb$  convertible to GNF? Justify your answer. 10
3. (a) Design a DFA that does not contain 3 consecutive 1's over  $\{0,1\}$ . 10
- (b) Is Union of two languages closed? If yes, justify your answer. 10
4. (a) How does a rewriting system work? Explain it by example. 10
- (b) What do you mean by cellular Automata? 10
5. Is the order of removal of  $\wedge$  transitions significant? Justify. Construct an equivalent graph without  $\wedge$  moves. 20



6. Explain minimization algorithm with example. Also construct a minimum state automata equivalent to the transition system given : 20



7. What does the figure depict? Elaborate your answer with appropriate theorems with examples. 20



8. (a) Write notes on –  
 (i) Mealy and Moore Machine  
 (ii) DFA and NDFAs
- (b) Let  $G = (\{S, C\}, \{a, b\}, P, S)$ , where  $P$  consists of  $S \rightarrow aCa, C \rightarrow aCa/b$ . Find  $L(G)$ . 10

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