

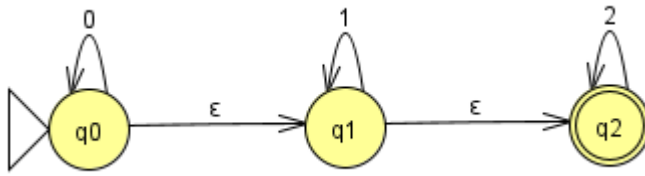
Duration: 3hrs

Marks:80

- N.B. :** (1) Question No 1 is Compulsory.  
 (2) Attempt any three questions out of the remaining five.  
 (3) All questions carry equal marks.  
 (4) Assume suitable data, if required and state it clearly.

- 1 Attempt any FOUR [20]
- a Prove by Mathematical Induction that  $3^n - 2n - 1$  is divisible by 4 [05]
- b Explain Reflexive and Transitive Relation with Suitable Example. [05]
- c Explain Mealy and Moore Machine with Example. [05]
- d Define regular expression and Describe it's any two properties [05]
- e Define Pushdown Automata. What are the different types of PDA? What are the application of PDA? [05]
- 2 a Give an Example of Graph which is [10]
- 1) Eulerian and Hamiltonian,  
 2) Eulerian but Not Hamiltonian,  
 3) Hamiltonian but not Eulerian,  
 4) Neither Hamiltonian not Eulerian
- b Construct the digraph and the Hasse diagram for the poset  $(A, |)$  where [10]
- $A = \{1, 2, 3, 4, 6, 8\}$  and  $|$  denote the divisibility Relation.
- 3 a Define and give Example of Injective, Surjective & Bijective function. [10]
- b Transform the following formula into Conjunctive Normal Form [05]
- $\sim(p \rightarrow q) \vee (r \rightarrow p)$ .
- c Construct truth table to determine whether the given statement is tautology, contradiction or neither. [05]
- $(q \wedge p) \vee (q \wedge \sim p)$

- 4 a Convert the given  $\epsilon$  NFA to NFA. [10]



- b Write a short notes on Types of Grammar. [10]
- 5 a Construct a DFA that accept the Language represented by  $0^*1^*2^*$ . [10]
- b Write a short note on Myhill- Nerode theorem. [10]
- 6 a Design a FA from given regular expression  $10 + (0 + 11)0^*1$ , with proper explanation of all steps. [10]
- b State the condition of Graph Isomorphism. Determine whether the following Graphs are Isomorphic or not with all Suitable condition. [10]

