Final Assessment Test – November 2019

VIT
Vellore Institute of Technology

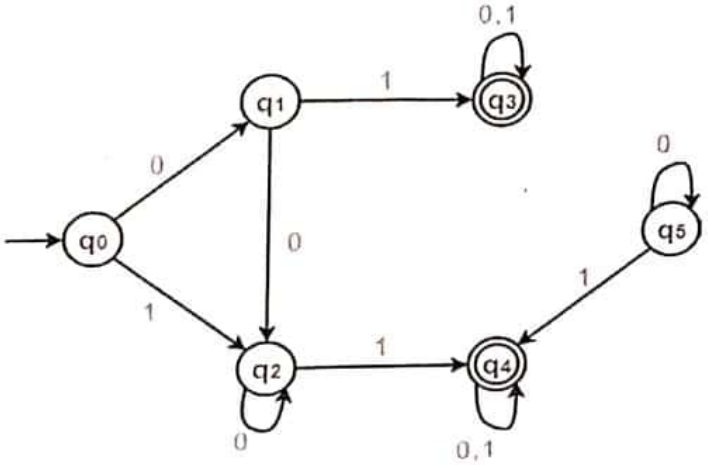
Course: ITE1006 - Theory of Computation
Class NBR(s): 2629 Slot: B1+TB1
Time: Three Hours Max. Marks: 100

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS EXAM MALPRACTICE

Answer ALL Questions
(10 X 10 = 100 Marks)

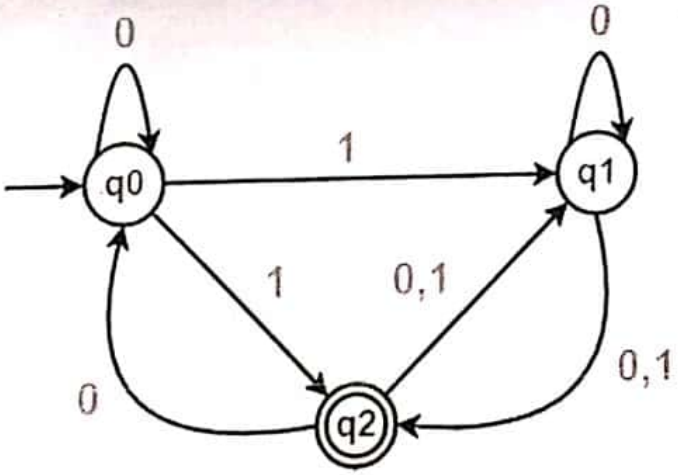
1. a) Define proof by contra positive and induction principle. [2]

   b) Minimize the following DFA. [8]



2. a) Design a Deterministic Finite Automaton for the language accepting strings ending with 'abba' over input alphabets ∑ = {a, b} [5]

   b) Convert the following Non-Deterministic Finite Automaton (NFA) to Deterministic Finite Automaton (DFA)- [5]



3. a) Consider the following productions of context free grammar 1 [5]

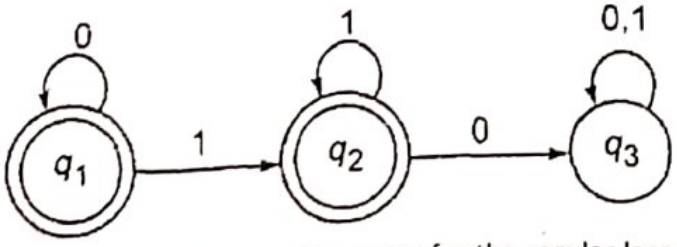
$$E \rightarrow E + T / T$$
$$T \rightarrow T \times F / F$$
$$F \rightarrow id$$

Consider the following productions of context free grammar 2

$$E \rightarrow E + E / E \times E / id$$

Identify which of the above grammar is ambiguous.

b) Find the regular expression for the following transition system



4. a) Construct a Context Free Grammar for the regular language consisting of all strings over {a,b} which contain a different number of a's than b's. [6]

   b) Define Moore machine with its tuple definition. Is it possible to convert the given automaton into a Moore machine? Justify your answer. If yes specify the rules and example, otherwise specify the rules with example for other suitable form of conversion. [4]

5. Convert the given context free grammar to Chomsky Normal Form

   $S \rightarrow 1A / 0B$

   $A \rightarrow 1AA / 0S / 0$

   $B \rightarrow 0BB / 1S / 1$

6. Convert the following to Greibach normal form

   $S \rightarrow XA \mid BB$

   $B \rightarrow b \mid SB$

   $X \rightarrow b$

   $A \rightarrow a$

7. Design a Push Down Automaton which accepts the set of balanced parenthesis ({ { ( ) } })

8. Construct Pushdown automata for

   $L = \{0^m 1^{(n+m)} 2^n \mid m,n \geq 0\}$

   Example:

   Input: 011122

   Output: Accepted

   Input: 00000112222

   Output: Not Accepted

9. Design a Turing Machine to accept strings formed on {0, 1} and ending with 000. [5]

10. a) Write short notes on Chomsky hierarchy of classification. [5]

    b) Explain the practical importance of certain automata model with some example from the view point of industry.

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