Final Assessment Test – November 2019

VIT
Vellore Institute of Technology

Course: ITE1006 - **Theory of Computation**

Class NBR(s): **2629**

Time: **Three Hours**

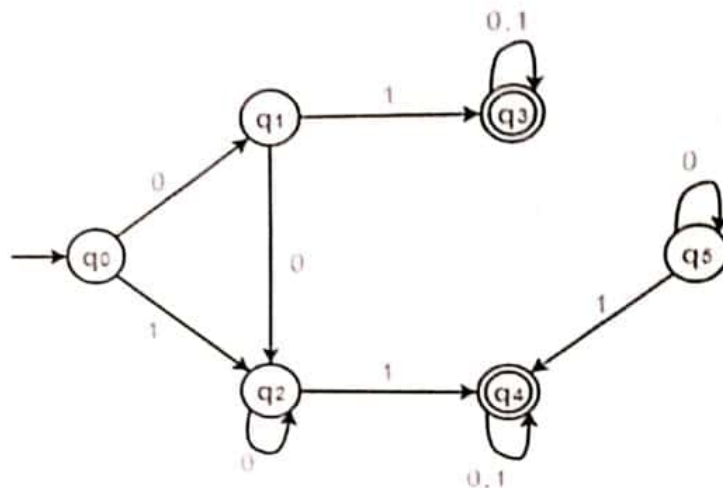Slot: **B1+TB1**

Max. Marks: **100**

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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 Σ = {a, b}   [5]

    b) Convert the following Non-Deterministic Finite Automaton (NFA) to Deterministic Finite Automaton (DFA)-   [5]
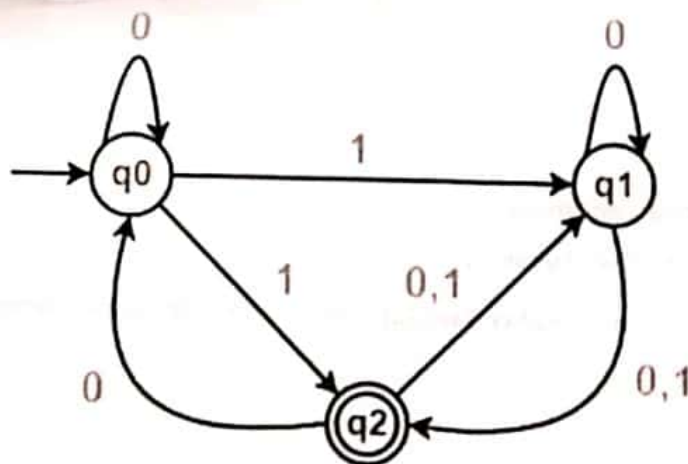
3. a) Consider the following productions of context free grammar 1   [5]

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

Consider the following productions of context free grammar 2

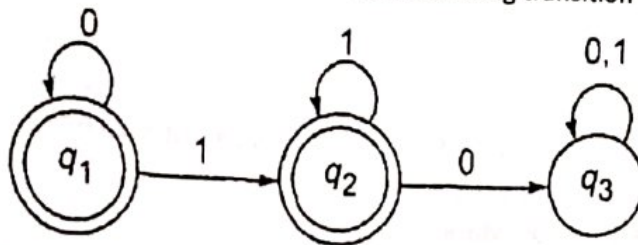$$E \rightarrow E + E / E \times E / id$$

Identify which of the above grammar is ambiguous.

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b) Find the regular expression for the following transition system [5]

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.

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. [5]

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