VIT UNIVERSITY
(Estd. u/s 3 of UGC Act 1956)

Regular Arrear Examination - December 2013

Course : ITE203 - Theory of Computation

Time : Three Hours **Max.Marks:100**

PART – A (8 X 5 = 40 Marks)
Answer ALL Questions

1. Where is the difference in the tuple definition between NFA and DFA? Explain it with an example.
2. What do you mean by zero length sequence? While comparing moore and melay machine which machine accepts zero length sequence? Explain.
3. What is the correlation between the arden's theorem and kleenes theorem? Explain.
4. Explain the steps involved in the constructing regular grammar for the given deterministic finite automaton.
5. Is Programming languages are context free language? Justify your answer with suitable tuple definition and examples.
6. Consider the context free grammar having following productions

   S → A1B

   A → 0A | ^

   B → 0B | 1B | ^

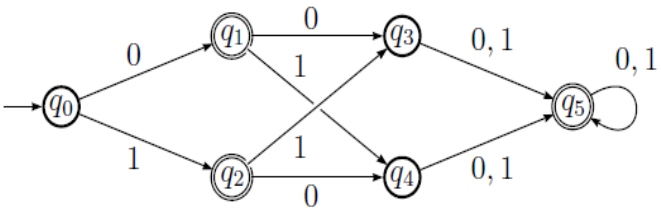
   Give parse tree for the string

   a) 00101
   b) 1001
7. What are the working components of Push down automata? Explain with a block diagram.
8. List the different variations of the Turing machine and explain about deterministic and non-deterministic Turing machine.

PART – B (6 X 10 = 60 Marks)

Answer any SIX Questions

9. Minimize the following automata



10. In Greibach Normal Form, consider the following production

$Q_3 \rightarrow Q_3Q_3Q_1$

Here how you avoid the left recursion in the above obtained intermediate form of production? If required make use the following productions

$Q_2 \rightarrow Q_3Q_3 \mid a$ and $Q_3 \rightarrow Q_2Q_1$

Also quote format with some valid examples.

11. Find productions of context free grammar for the following languages

a) $L = \{0^n 1^{2n} \mid n \geq 0\}$ **[5]**

b) $L = \{w \mid w \in \{0,1\}^* \text{ and of even length } \}$ **[5]**

12. Explain the steps involved in removing null and unit productions with suitable example.

13. a) Define nullable variable? Give one example. **[3]**

b) Assume w is a nullable variable with value w = {B,C}. For the following production during the process of elimination of null production is it possible to obtain new set of productions. Also quote the appropriate rules. **[7]**

$Q_0 \rightarrow ABD \mid BC \mid AE$

14. Construct a Push Down Automaton that accepts the language $L = \{a^n b^n \mid n \geq 3\}$. Check the acceptability by final state.

15. a) Design a Turing machine that accepts even number of 0's. **[5]**

b) Write short notes on the following **[5]**

i) Turing Machine

ii) NP Complete and NP Hard

16. a) Check whether the following instances X and Y has a post correspondence solution **[5]**

X = (ab, bba, b,baa)

Y = (abb, ba, aab,b)

b) Write short notes on **[5]**

i) Zero function

ii) Projector function

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