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B.E / B.Tech ( Full Time ) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013 INFORMATION TECHNOLOGY Fourth Semester
IT 9251 Formal Languages and Automata
(Regulations 2008)
Time: 3 Hours
Answer ALL Questions
Max. Marks 100
PART- A (10 $\times 2=\mathbf{2 0}$ Marks)

1. Prove that $\sqrt{2}$ is not rational
2. Design the DFA accepting the fanguage over the alphabet 0,1 that has the set of all strings that begin with 0 and end with 1.
3. Design NFA for the regular expression 01*.
4. Suppose $H$ is the homomorphism from the alphabets $\{0,1,2\}$ to the alphabets $\{a, b\}$ defined by $h(0)=a h(1)=a b h(2)=b a$. What is $h(0120)$ and $h(21120)$ ?
5. Consider $G$ whose productions are $S \rightarrow a A S|a, A \rightarrow S b A| S S \mid$ ba. For the string $w=$ aabbaa, find the leftmost and rightmost derivation.
6. Define the languages generated by a PDA using final state of the PDA and empty stack of that PDA.
7. State Griebach Normal form.
8. Define Turing Machine and state the formal definition of it.
9. What is Recursive descent parsing? What are the drawbacks of it?
10. Define $\operatorname{LL}(1)$ grammar. Check the following grammar is $\operatorname{LL}(1)$.
$S \rightarrow A B, A \rightarrow a b \mid \varepsilon, B \rightarrow a$.

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\text { Part - B ( } 5 \times 16=80 \text { marks) }
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11 a) i) Consider the following $\varepsilon$-NFA. Compute the $\varepsilon$-closure of each state and find it's equivalent DFA.

| $q$ | $\delta(q, \varepsilon)$ | $\bar{\delta}(q, 0)$ | $\delta(q, 1)$ |
| :--- | :--- | :--- | :--- |
| $A$ | $\{B\}$ | $\{A\}$ | $\varnothing$ |
| $B$ | $\{D\}$ | $\{C\}$ | $\varnothing$ |
| $C$ | $\varnothing$ | $\varnothing$ |  |
| $D$ | $\varnothing$ | $\{D$ | $\{D\}$ |

11 a) ii) Prove that "A language $L$ is accepted by some DFA if and only if $L$ is accepted by some NFA".

12 a) i) Find the equivalent DFA that has the minimum number of states.


12 a) ii) Convert the DFA to Regular Expression by eliminating states.


