**Assignment(1)**

**Class:MCA-II(Sem-III)**

**Subject: Theory of Computation**

**Topics:**Difference between DFA and NFA and Difference between Moore and Mealy Machine

**Submitted To:**

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**Ques1:Differenec Between DFA and NFA?**

**Ans.**

| **DFA** | **NFA** |
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| DFA stands for Deterministic Finite Automata. | NFA stands for Nondeterministic Finite Automata. |
| For each symbolic representation of the alphabet, there is only one state transition in DFA. | No need to specify how does the NFA react according to some symbol. |
| DFA cannot use Empty String transition. | NFA can use Empty String transition. |
| DFA can be understood as one machine. | NFA can be understood as multiple little machines computing at the same time. |
| In DFA, the next possible state is distinctly set. | In NFA, each pair of state and input symbol can have many possible next states. |
| DFA is more difficult to construct. | NFA is easier to construct. |
| DFA rejects the string in case it terminates in a state that is different from the accepting state. | NFA rejects the string in the event of all branches dying or refusing the string. |
| Time needed for executing an input string is less. | Time needed for executing an input string is more. |
| All DFA are NFA. | Not all NFA are DFA. |
| DFA requires more space. | NFA requires less space then DFA. |
| Dead configuration is not allowed.  eg: if we give input as 0 on q0 state so we must give 1 as input to q0 as self loop. | Dead configuration is allowed.  eg: if we give input as 0 on q0 state so we can give next input 1 on q1 which will go to next state. |
| δ: QxΣ -> Q i.e. next possible state belongs to Q. | δ: QxΣ -> 2^Q i.e. next possible state belongs to power set of Q. |
| Backtracking is allowed in DFA. | Backtracking is not always possible in NFA. |
| Conversion of Regular expression to DFA is difficult. | Conversion of Regular expression to NFA is simpler compared to DFA. |
| Epsilon move is not allowed in DFA | Epsilon move is allowed in NFA |
| DFA allows only one move for single input alphabet. | There can be choice (more than one move)  for single input alphabet. |

**Ques2:Difference Between Moore and Mealy Machine?**

**Ans.**

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| **Moore Machine** | **Mealy Machine** |
| Output depends only upon the present state. | Output depends on the present state as well as present input. |
| Moore machine also places its output on the transition. | Mealy Machine places its output on the transition. |
| More states are required. | Less number of states are required. |
| There is less hardware requirement for circuit implementation. | There is more hardware requirement for circuit implementation. |
| They react slower to inputs(One clock cycle later). | They react faster to inputs. |
| Synchronous output and state generation. | Asynchronous output generation. |
| Output is placed on states. | Output is placed on transitions. |
| Easy to design. | It is difficult to design. |