CS & IT ENGINEERING

Theory of Computation

Turing Machine Recursively Enumerable

Turing Machine-1

DPP 01 Discussion Notes

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01 Question

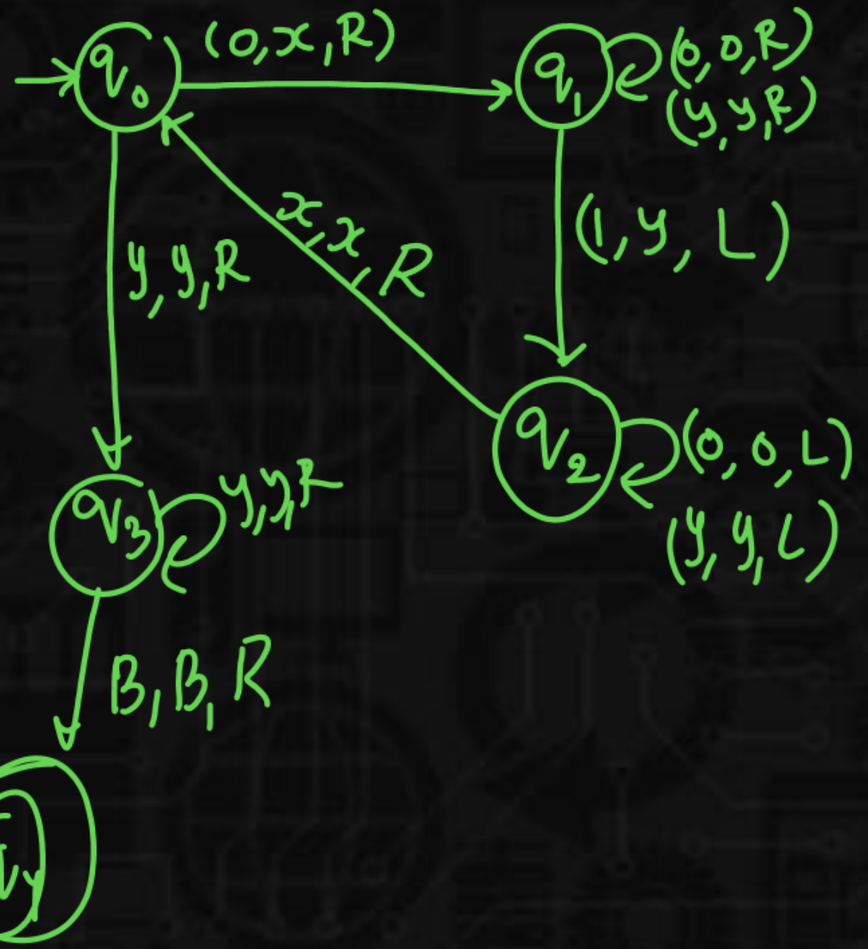
02 Discussion

Q.1

Let M be a turing machine having $Q = \{q_0, q_1, q_2, q_3, q_4\}$ a set of states, input alphabet $\{0, 1\}$. The tape alphabets $\{0, 1, B, x, y\}$. The symbol B is used to represent the end input string. The initial and final states are q_0 and q_4 respectively. The transitions are as follows:

[MCQ]

1. $(q_0, 0) = (q_1, x, R)$
2. $(q_0, y) = (q_3, y, R)$
3. $(q_1, 0) = (q_1, 0, R)$
4. $(q, 1) = (q_2, y, L)$
5. $(q_1, y) = (q_1, y, R)$
6. $(q_2, 0) = (q_2, 0, L)$
7. $(q_2, x) = (q_0, x, R)$
8. $(q_2, y) = (q_2, y, L)$
9. $(q_3, y) = (q_3, y, R)$
10. $(q_3, B) = (q_4, B, R)$



Which of the following statement is true about M?

A. M accepts on $L = \{0^n 1^m \mid n, m \geq 0\}$.

B. M accepts 010 as a substring.

C. M accepts on $L = \{0^n 1^n \mid n \geq 1\}$.

D. M accepts on 011 as a substring.

Q.2

[MCQ]

Consider the following turing machines:

(i) Single-tape TM

(ii) Multi-tape TM

(iii) Universal TM

Which of the above TM's are equivalent?

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iii)

D. (i), (ii), and (iii) ✓

Q.3 If the following turing machine accepts L = {(0 + 1)*}, then what will the value of x and y?

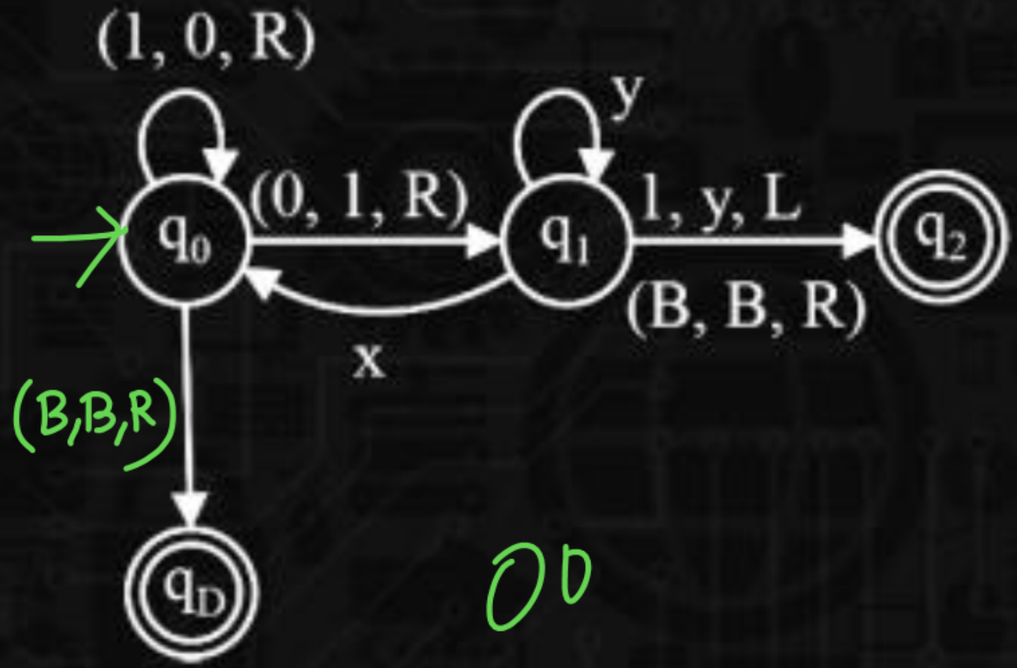
[MSQ]

A. x = (1, 1, R); y = (0, 0, R)

B. x = (1, 0, R); y = (0, 1, R)

C. x = (1, 1, R); y = (1, 1, R)

D. x = (0, 1, R); y = (1, 0, R)



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Q.4

Which of the following statement is/are correct regarding tuples of turing machine

[MCQ]

A. TM has six tuples which are $\{Q, T, \Sigma, \delta, q_0, F\}$.

B. Σ is the input alphabet.

C. T is the tape alphabet.

D. Q is finite set of states.

Q.5

Consider a Turing machine with following restrictions [MCQ]

(i) Head can only read and cannot write.

(ii) Head can move only in one direction.

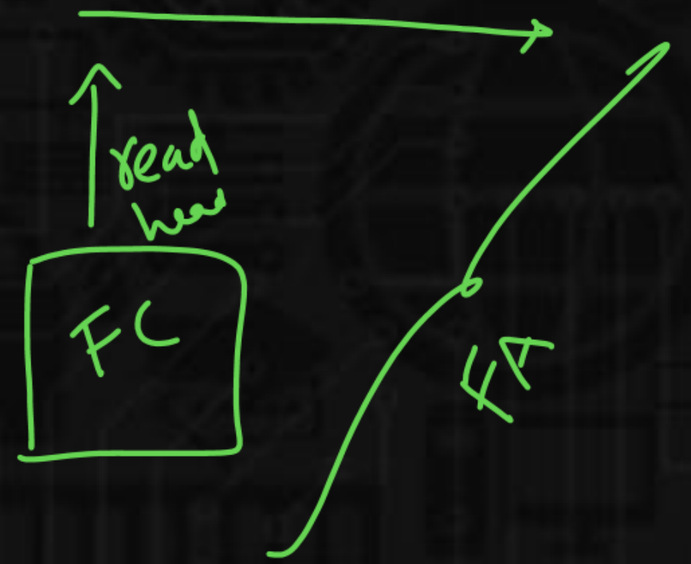
The Turing machine with above restrictions is known as _____.

A. Turing machine

B. Linear bounded automata

C. Push down automata

D. Finite Automata



Q.6

[MCQ]

Consider the given grammar:

$S \rightarrow aASccc \mid \in$

$Aa \rightarrow aA$

$Ac \rightarrow bbc$

$Ab \rightarrow bbb$

$S \rightarrow aASccc$
$\Rightarrow aAccc$
$\Rightarrow abbccc$
$a^1 b^2 c^3$

Which of the following language is derived by the above grammar?

A. $L = \{a^n b^n c^n \mid n \geq 0\}$

B. $L = \{a^n b^{2n} c^n \mid n \geq 0\}$

C. $L = \{a^n b^{2n} c^{3n} \mid n \geq 0\}$

D. $L = \{a^{4n} b^{3n} c^{2n} \mid n \geq 0\}$

Q.7

[MCQ]

Consider the following transitions of a turing machine M:

$\delta(q_0, a) = (q_1, B, R)$

$\delta(q_0, b) = (q_1, B, R)$

$\delta(q_0, B) = (q_3, B, R)$

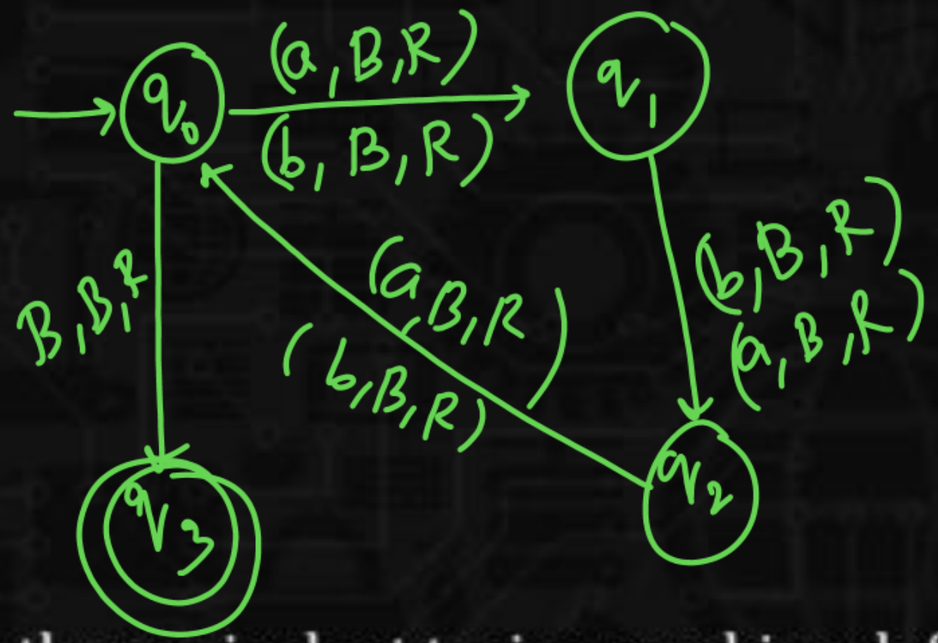
$\delta(q_1, b) = (q_2, B, R)$

$\delta(q_1, a) = (q_2, B, R)$

$\delta(q_2, a) = (q_0, B, R)$

$\delta(q_2, b) = (q_0, B, R)$

q_3 is final



The language derived by the equivalent turing machine defined as?

A. $L = \{w: |w| \text{ is even}\}$

B. $L = \{w: |w| \text{ is odd}\}$

C. $L = \{w: |w| \text{ is multiple of 3}\}$

D. None of these

Q.8

Minimum number of stacks required by push down automata to behave like a turing machine. [MCQ]

A. 1

B. 2

C. 3

D. None of these

2 Stack PDA
≅
TM


THANK YOU GW
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