



Department of Computer Science and Engineering
Premier University

CSE 309: Theory of Computation

Title: CT 01

Submitted by:

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Remarks

Q: Mention the tuples of PDA. write down the differences between PDA and Turing Machine.

\Rightarrow PDA means A Pushdown Automata. It's formally represented by a 7-tuple:-

$$M = (Q, \Sigma, \Gamma, \delta, q_0, z_0, F)$$

where,

(i) $Q \rightarrow$ finite set of states

(ii) $\Sigma \rightarrow$ Input alphabet

(iii) $\Gamma \rightarrow$ Stack alphabet

(iv) $\delta \rightarrow$ Transition function.

$$Q \times (\Sigma \cup \epsilon) \times \Gamma \rightarrow P(Q \times \Gamma^*)$$

(v) $q_0 \rightarrow$ Initial state.

(vi) $z_0 \rightarrow$ Initial stack symbol

(vii) $F \rightarrow$ Set of final states.

(2)

Difference between PDA and Turing Machine:-

| Feature | Pushdown Automata (PDA) | Turing Machine (TM) |
|---------------------|---|---|
| Memory | Uses a Single stack as memory | Uses an infinite tape as memory. |
| Input head movement | Reads input only in one direction (left to right) | Can move both left and right on the tape. |
| Computational Power | Accepts Context free Languages (CFLs) | Accepts Recursively Enumerable language |
| Memory access | Can access only the top of the stack | Can access any tape cell directly |
| Capability | Less Powerful than TM. | More Powerful (Can simulate PDA) |