# 38 Lecture - CS402

## **Important Subjective**

## 1. What is a nondeterministic pushdown automaton (NPDA)?

Answer: A theoretical model of computation that extends the capabilities of a deterministic pushdown automaton (DPDA) by allowing multiple possible transitions from a given state on the same input symbol.

## What is the primary difference between a DPDA and an NPDA?

Answer: The primary difference is that an NPDA can have multiple possible transitions from a given state on the same input symbol, while a DPDA can only have one.

## What is a valid component of an NPDA?

Answer: A 5-tuple consisting of a set of states, an input alphabet, a stack alphabet, a transition function, and a set of accepting states.

#### Can an NPDA have multiple start states?

Answer: No, an NPDA can only have one start state.

## What does it mean for an NPDA to accept an input string?

Answer: It means that there exists at least one valid path through the machine's states and stack that leads to an empty stack at the end of the input.

#### Can an NPDA accept an input string with an invalid path?

Answer: No, an NPDA can only accept an input string if there exists at least one valid path through the machine's states and stack.

#### What is a nondeterministic choice in an NPDA?

Answer: A nondeterministic choice is when the machine has multiple possible transitions from a given state on the same input symbol, and it chooses one of them nondeterministically.

#### What is a computation tree in an NPDA?

Answer: A tree-like representation of the possible paths the machine can take through its states and stack on a given input string.

#### What is the time complexity of an NPDA?

Answer: It can be either exponential or polynomial, depending on the specific machine and input.

### Can an NPDA recognize a language that is not context-free?

Answer: No, an NPDA can only recognize context-free languages.