

# NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Computer Science and Engineering - NOC:Theory of Computation (2023)

Subject Co-ordinator - Prof. Subrahmanyam Kalyanasundaram

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

- Lecture 1 - An Introduction to The Theory of Computation
- Lecture 2 - Notations and Terminology in Theory of Computation
- Lecture 3 - An Introduction to Finite Automata and Regular Languages - Part 1
- Lecture 4 - An Introduction to Finite Automata and Regular Languages - Part 2
- Lecture 5 - Significance of Regular Languages and Regular Operations
- Lecture 6 - Closure Properties of Regular Languages Under Union, Concatenation and Kleene Star Operation - Part 1
- Lecture 7 - Closure Properties of Regular Languages Under Union, Concatenation and Kleene Star Operation - Part 2
- Lecture 8 - An Introduction to Non-Deterministic Finite Automata (NFA)
- Lecture 9 - Formal Definitions and Examples of Non-Deterministic Finite Automata (NFA)
- Lecture 10 - Equivalence of NFA and DFA
- Lecture 11 - Closure of Regular Languages Under Regular Operations (Using NFA)
- Lecture 12 - Regular Expressions - Part 1
- Lecture 13 - Regular Expressions - Part 2
- Lecture 14 - Proving Equivalence of Regular Expression and DFA Through a GNFA
- Lecture 15 - Pumping Lemma for Regular Languages - Part 1
- Lecture 16 - Pumping Lemma for Regular Languages - Part 2
- Lecture 17 - Distinguishability of Strings and Myhill-Nerode Theorem
- Lecture 18 - Proving the Myhill-Nerode Theorem
- Lecture 19 - An Introduction to Context-Free Languages - Part 1
- Lecture 20 - An Introduction to Context-Free Languages - Part 2
- Lecture 21 - Chomsky Normal Form
- Lecture 22 - CYK Algorithm - Part 1
- Lecture 23 - CYK Algorithm - Part 2 (Example)
- Lecture 24 - Closure Properties of Context Free Languages
- Lecture 25 - An Introduction to Push Down Automata
- Lecture 26 - Normalizations in PDA and Intersection of Regular Language and CFL
- Lecture 27 - Equivalence of Context Free Grammars and Push Down Automata - Part 1
- Lecture 28 - Equivalence of Context Free Grammars and Push Down Automata - Part 2
- Lecture 29 - Equivalence of Context Free Grammars and Push Down Automata - Part 3

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- Lecture 30 - Pumping Lemma for Context Free Languages
- Lecture 31 - Examples of Pumping Lemma Usage for Context Free Languages
- Lecture 32 - Formal Definition of a Turing Machine
- Lecture 33 - Turing Recognizable and Decidable Languages and TM Examples
- Lecture 34 - Multitape Turing Machine
- Lecture 35 - Non-Deterministic Turing Machines
- Lecture 36 - Equivalence of Deterministic and Nondeterministic TM
- Lecture 37 - Church-Turing Thesis
- Lecture 38 - Decidable Problems Concerning Regular Languages
- Lecture 39 - Decidable Problems Concerning Context Free Languages
- Lecture 40 - Countability of Sets
- Lecture 41 - Proof of Existence of Undecidable Languages
- Lecture 42 - Halting Problem
- Lecture 43 - Co-Turing Recognizability
- Lecture 44 - An Introduction to Mapping Reducibility
- Lecture 45 - Examples of Proving Undecidability Using Reductions
- Lecture 46 - Rice Theorem
- Lecture 47 - Computation Histories
- Lecture 48 - The Post Correspondence Problem
- Lecture 49 - Checking Ambiguity in CFG is Undecidable
- Lecture 50 - Time Complexity - Part 1
- Lecture 51 - Time Complexity - Part 2
- Lecture 52 - Non-Deterministic Polynomial Time - Part 1
- Lecture 53 - Non-Deterministic Polynomial Time - Part 2
- Lecture 54 - Verifiability and NP
- Lecture 55 - Polynomial Time Reductions - Part 1
- Lecture 56 - Polynomial Time Reductions - Part 2
- Lecture 57 - NP-Completeness
- Lecture 58 - Cook-Levin Theorem
- Lecture 59 - Cook-Levin Theorem - Proof and Implications
- Lecture 60 - CLIQUE and VERTEX-COVER is NP-Complete
- Lecture 61 - HAM-PATH is NP-Complete
- Lecture 62 - SUBSET-SUM is NP-Complete
- Lecture 63 - Knapsack Problem
- Lecture 64 - Integer Linear Program is NP-Complete
- Lecture 65 - Space Complexity and its Complexity Classes
- Lecture 66 - Logspace Reductions and NL-Completeness
- Lecture 67 - Savitch's theorem
- Lecture 68 - Results in Space Complexity

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Lecture 69 - Summary and Concluding Remarks