LECTURE PLAN

Institute/Department	UNIVERSITY INSTITUTE OF ENGINEERING (UIE)	**Program**	**Bachelor of Engineering - Computer Science & Engineering (CS201)**
Master Subject Coordinator Name:	Priyanka Sharma	**Master Subject Coordinator E-Code**:	**E6197**
Course Name	Theory of Computation	**Course Code**	**20CST-353**

Lecture	Tutorial	Practical	Self Study	Credit	Subject Type
3	0	0	0	3.0	T

Course Type	Course Category	Mode of Assessment	Mode of Delivery
Program Core	Graded (GR)	Theory Examination (ET)	Theory (TH)

Mission of the Department	MD1: To provide practical knowledge using state-of-the-art technological support for the experiential learning of our students. MD2: To provide an industry-recommended curriculum and transparent assessment for quality learning experiences. MD3: To create global linkages for interdisciplinary collaborative learning and research. MD4: To nurture an advanced learning platform for research and innovation for students' profound future growth. MD5: To inculcate leadership qualities and strong ethical values through value-based education.
Vision of the Department	"To be recognized as a leading Computer Science and Engineering department through effective teaching practices and excellence in research and innovation for creating competent professionals with ethics, values, and entrepreneurial attitude to deliver service to society and to meet the current industry standards at the global level."

Program Educational Objectives(PEOs)	
PEO1	PEO1 Graduates of the Computer Science and Engineering will contribute to the Nation's growth through their ability to solve diverse and complex computer science and engineering problems across a broad range of application areas. (PEO1 is focused on Problem Solving)
PEO2	PEO2 Graduates of the Computer Science and Engineering will be successful professionals, designing and implementing Products & Services of global standards in the field of Computer Science & Engineering, becoming entrepreneurs, Pursuing higher studies & research. (PEO 2 is focused on Professional Success)
PEO3	PEO3 Graduates of the Computer Science and Engineering Program will be able to adapt to changing scenario of dynamic technology with an ability to solve larger societal problems using logical and flexible approach in decision making. (PEO 3 is focused on Attaining Flexibility and Adaptability)

Program Specific OutComes(PSOs)	
PSO1	PSO1 Exhibit attitude for continuous learning and deliver efficient solutions for emerging challenges in the computation domain.
PSO2	PSO2 Apply standard software engineering principles to develop viable solutions for Information Technology Enabled Services (ITES).

Program OutComes(POs)	
PO1	PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	PO2 Problem analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal, and environmental considerations.
PO4	PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
PO5	PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7	PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	PO9 Individual or teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO11	PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context to technological change.

Text Books

Sr No	Title of the Book	Author Name	Volume/Edition	Publish Hours	Years
1	Introduction to Languages and Theory of Computation	Martin J.C	3rd Edition	Tata McGraw-Hill Publishing Company Limited	-
2	Introduction to Automata Theory Languages and Computation	Hopcroft J.E. and Ullman J.D	-	Narosa Publications	-

Reference Books

Sr No	Title of the Book	Author Name	Volume/Edition	Publish Hours	Years
1	Theory of Computation	Sipser	-	-	-
2	Introduction to computer Theory	Daniel I.A. Cohen	2nd Edition	-	-

Course OutCome

SrNo	OutCome
CO1	Gain knowledge of formal languages and classify basic operations on them.
CO2	Illustrate Finite Automata and differentiate DFA and NFA with the help of examples
CO3	Explain and support the properties of Regular sets using pumping lemma and theorems.
CO4	Apply the knowledge of Context Free Grammar to estimate all possible patterns of strings in a given formal language.
CO5	Implementation of Chomsky hierarchy using the concept of Turing Machine, Pushdown Automata.

Lecture Plan Preview-Theory

Unit No	LectureNo	ChapterName	Topic	Text/ Reference Books	Pedagogical Tool**	Mapped with CO Numer (s)
1	1	Introduction	Basic introduction about subject	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
1	2	Introduction	Basic Terminology: Alphabet, Formal Language	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
1	3	Introduction	operations on formal languages, Examples of formal languages.	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1

1	4	Finite Automata	Concept of Basic Machines	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Introduction to computer Theor,R-Theory of Computation	PPT,Video Lecture	CO2
1	5	Finite Automata	Properties and Limitations of Finite State Machines	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO2
1	6	Finite Automata	Deterministic Finite Automata (DFA)	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO2
1	7	Finite Automata	Non-Deterministic Finite Automata (NFA)	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO2
1	8	Finite Automata	Practice questions on NFA and DFA	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO2
1	9	Finite Automata	Equivalence of DFA and NDFA	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO2
1	10	Finite Automata	Non-Deterministic Finite automata with ^-Transitions.	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO2
1	11	Regular expression	Introduction to Regular Languages	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO3
1	12	Regular expression	Introduction to Regular Expressions	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO3
1	13	Regular expression	Kleen’s Theorem	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO3
1	14	Regular expression	Arden’s Method	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO3
1	15	Revision	Unit 1	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
2	16	Properties of Regular sets	The Pumping Lemma for Regular sets	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO3
2	17	Properties of Regular sets	Application of the Pumping Lemma	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO3
2	18	Properties of Regular sets	Closure Properties of Regular Sets	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO3
2	19	Properties of Regular sets	Myhill- Nerode Theorem and Minimization of Finite Automata	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
2	20	Properties of Regular sets	Minimization Algorithm	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
2	21	Finite Automata with output	Moore and Mealy Machines	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO2
2	22	Finite Automata with output	Equivalence of Moore and Mealy Machines.	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO2
2	23	Context Free Grammars	Examples and Definitions, Derivation trees and ambiguity	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO4

2	24	Context Free Grammars	An Unambiguous CFG for Algebraic Expressions	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO4
2	25	Context Free Grammars	Regular Grammar	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO4
2	26	Context Free Grammars	Simplified forms and Normal forms: Removal of useless symbols and unit production	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO4
2	27	Context Free Grammars	Removal of ^-moves	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO4
2	28	Context Free Grammars	Chomsky Normal Form (CNF)	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO4
2	29	Context Free Grammars	Griebach Normal Form (GNF)	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO4
2	30	Revision	Unit 2	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO4
3	31	Context sensitive Language	Context sensitive Language and grammar	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
3	32	Context sensitive Language	Relation between languages of classes	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
3	33	Pushdown Automata	Introduction and Definition of Push-Down Automaton	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO5
3	34	Pushdown Automata	Applications of Push Down Automata	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO5
3	35	Turing Machines	Definitions and Examples	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO5
3	36	Turing Machines	Deterministic and Non- Deterministic Turing Machines	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Introduction to computer Theor,R-Theory of Computation	PPT,Video Lecture	CO5
3	37	Turing Machines	Unsolvable Problems: A Non recursive Language and an Unsolvable Problem	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
3	38	Turing Machines	PCP Problem and MPCP Problem	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
3	39	More General Languages and Grammars	Recursively Enumerable	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
3	40	More General Languages and Grammars	Recursive Languages	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
3	41	More General Languages and Grammars	Unrestricted grammars	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
3	42	More General Languages and Grammars	Chomsky hierarchies of grammars introduction	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO5
3	43	More General Languages and Grammars	Type 0 and 2	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO5

3	44	More General Languages and Grammars	Type 1 and 3	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO1
3	45	Revision	Unit 3	,T-Introduction to Automata Theor,T-Introduction to Languages and ,R-Theory of Computation	PPT,Video Lecture	CO5

Assessment Model			
Sr No	Assessment Name	Exam Name	Max Marks
1	20EU01	External Theory	60
2	20EU01	Assignment	10
3	20EU01	Attendance Marks	2
4	20EU01	Mid-Semester Test-1	40
5	20EU01	Quiz	4
6	20EU01	Surprise Test	12
7	20EU01	Mid-Semester Test-2	40

CO vs PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	NA	NA	1	NA	NA	NA	NA	NA	NA	NA	1	NA
CO2	3	2	NA	1	NA	NA	NA	NA	NA	NA	NA	NA	1	NA
CO3	3	2	NA	1	NA	NA	NA	NA	NA	NA	NA	NA	1	NA
CO4	3	2	1	2	NA	NA	NA	NA	NA	NA	NA	NA	1	NA
CO5	3	2	3	1	1	NA	NA	NA	NA	NA	NA	NA	2	NA
Target	3	2	2	1.25	1	NA	NA	NA	NA	NA	NA	NA	1.2	NA