



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Department Vision

To excel in the field of Computer Science and Engineering with technological innovations.

Department Mission

M1: To impart quality technical education to the students through creative teaching learning process especially to the rural based students

M2: To create facilities and expertise in cutting-edge computer technologies through industry institute partnership.

M3: To motivate the students to apply their innovative ideas to construct research models.

M4: To transform the students into socially and ethically responsible professionals.

COURSE PLAN – PART I

Name of the programme and specialization	B. E (CSE)		
Course Title	THEORY OF COMPUTATION		
University Course Code / NBA Code	CS8501 / C304	No. of Credits	03
Teaching Scheme (L: T: P)	3 : 0 : 0	Total Periods required	45
Course Year / Semester	III Year / V Semester		
Academic Year / Semester	2022-23 / ODD		
Name of Faculty	K. KRISHNAKUMARI	Department	CSE
Email	krishnakumari@avccengg.net		
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	

COURSE OBJECTIVES

- To understand the language hierarchy
- To construct automata for any given pattern and find its equivalent regular expressions
- To design a context free grammar for any given language
- To understand Turing machines and their capability
- To understand undecidable problems and NP class problems

CS8501 THEORY OF COMPUTATION

UNIT I AUTOMATA FUNDAMENTALS

9

Introduction to formal proof – Additional forms of Proof – Inductive Proofs – Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions

UNIT II REGULAR EXPRESSIONS AND LANGUAGES

9

Regular Expressions – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata.

UNIT III CONTEXT FREE GRAMMAR AND LANGUAGES

9

CFG – Parse Trees – Ambiguity in Grammars and Languages – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES

9

Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT V UNDECIDABILITY

9

Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P and NP.

TOTAL: 45 PERIODS

TEXT BOOKS:

T1. J.E.Hopcroft, R.Motwani and J.D Ullman, —Introduction to Automata Theory, Languages and Computationsl, Second Edition, Pearson Education, 2003.

REFERENCES:

- R1. H.R.Lewis and C.H.Papadimitriou, —Elements of the theory of Computationl, Second Edition, PHI, 2003.
R2. J.Martin, —Introduction to Languages and the Theory of Computationl, Third Edition, TMH, 2003.
R3. Micheal Sipser, —Introduction of the Theory and Computationl, Thomson Brokecole, 1997.

WEB REFERENCES:

1. https://nptel.ac.in/courses/nptel_download.php?subjectid=106105196
2. <https://www.youtube.com/watch?v=-aIRqNnUvEg>
3. <https://www.youtube.com/watch?v=IhyEGNn-7Uo>

PSO

- ✔ To analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering
- ✔ To apply software engineering principles and practices for developing quality software for scientific and business applications
- ✔ To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Course Outcome –After the successful completion of the course, the students are able to,															
Course	Course Outcome Statement														
C304.1	Construct NFA and DFA. (Unit I)														
C304.2	Deriveregular expressions, regular grammar and minimization of automata. (Unit II)														
C304.3	Design PDA for any CFG. (Unit III)														
C304.4	Apply closure properties of CFL and design Turing machines for any CFL. (Unit IV)														
C304.5	Differentiate recursive and recursively enumerable problems. (Unit V)														
C304.6	Prove NP complete problems. (Unit V)														
MAPPING OF COs with POs/PSOs															
PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO	K3	K4	K4												
C304.1 – K3	3	2	2										2		2
C304.2 – K2	2	1	1										2		2
C304.3 – K3	3	2	2										2		2
C304.4 – K3	3	2	2										2		2
C304.5 – K2	2	1	1										2		2
C304.6 – K2	2	1	1										2		2
	2.50	1.50	1.50										2.00		2.00
Correlation level: 3 – High 2 – Medium 1 - Low															
TEACHING METHODS															
Conventional: Chalk and Talk								Collaborative Learning: Problem analysis, Coding							
Tehcnology Enabled: Video Lectures, LCD Presentation, MOOCs								Participative Learning : Group Presentation, Inplant Training							
UNIT-WISE LESSON PLAN															

UNIT I AUTOMATA FUNDAMENTALS

COs COVERED: CO1

TOPICS & SUB TOPICS	PAGE NO	REF BOOK NO	PERIODS REQ./.	PO/PSO	Teaching Methods
Introduction to Finite Automata	15 - 19	T1	1	PO1, PO2/ PSO1	Conventional
Introduction to formal proof	19 – 27	T1	1	PO1, PO2/ PSO1, PSO3	Conventional
Additional forms of Proof	27 – 31	T1	1	PO1, PO2/ PSO1	Conventional
Inductive Proofs	33 – 42	T1	1	PO1, PO2/PSO1	Conventional
Finite Automata	51 – 59	T1	1	PO1 PO2,	Conventional
Deterministic Finite Automata	59 – 67	T1	2	PO1, PO2/PSO1, PSO2	Conventional
Non-deterministic Finite Automata	69 – 79	T1,R1	1	PO1 PO2, PO3, / PSO1	Conventional
Finite Automata with Epsilon Transitions	86 - 91	T1,R1	2	PO1,PO3/PSO1	Conventional
Problems in NFA / DFA Conversions	-	-	1	PO1, PO2/ PSO1, PSO3	Conventional
Total Periods Required: 11					

UNIT II REGULAR EXPRESSIONS AND LANGUAGES

COs COVERED: CO2

TOPICS & SUB TOPICS	PAGE NO	REF BOOK NO	PERIODS REQ/.	PO/PSO	Teaching Methods
Regular Expressions	97 - 104	T1	1	PO1, PO2, PO3, / PSO1	Conventional
FA and Regular Expressions	104 -120	T1, R2	1	PO1, PO2, PO3, / PSO1	Conventional
Proving Languages not to be regular	140 -145	T1, R2	2	PO1, PO2, PO3, / PSO1, PSO2	Conventional
Closure Properties of Regular Languages	145 -159	T1	2	PO1, PO2, PO3, / PSO1, PSO2	Conventional
Equivalence and Minimization of Automata.	168 - 178	T1, R2	2	PO1, PO2, PO3, / PSO1	Conventional
Problems on Pumping Lemma	-	T1	1	PO1, PO2/ PSO1, PSO2	Conventional
Problems on Minimization of automata	-	T1	1	PO1, PO2, PO3, / PSO1, PSO2	Conventional
GATE Problems	-	T1	1	PO1, PO2/ PSO1, PSO2	Conventional
Total Periods Required: 11					

UNIT III CONTEXT FREE GRAMMAR AND LANGUAGES**COs COVERED: CO3**

TOPICS & SUB TOPICS	PAGE NO	REF BOOK NO	PERIODS REQ/.	PO/PSO	Teaching Methods
CFG	183 - 192	T1	1	PO1, PO2, PO3, / PSO1, PSO3	Conventional
Parse Trees	193 - 205	T1	1	PO1, PO2, PO3, / PSO1	Conventional
Ambiguity in Grammars and Languages	219 - 228	T1	2	PO1, PO2, PO3, / PSO1	Conventional
Definition of the Pushdown Automata	233 - 242	T1	1	PO1, PO2, PO3, / PSO1, PSO3	Conventional
Languages of a Pushdown Automata	242 - 250	T1, R2	2	PO1, PO2, PO3, / PSO1	Conventional
Equivalence of Pushdown Automata and CFG	251 - 259	T1	2	PO1, PO2, PO3, / PSO1	Conventional
Deterministic Pushdown Automata	260 - 265	T1	2	PO1, PO2, PO3, / PSO1, PSO3	Conventional
Problems in PDA (CBS)	-	T1, R2	-	PO1, PO2, PO3, / PSO1, PSO3	Conventional
CFG / PDA Conversions	-	T1	-	PO1, PO2, PO3, / PSO1, PSO3	Conventional
Total Periods Required: 12					

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES**COs COVERED: CO4**

TOPICS & SUB TOPICS	PAGE NO	REF BOOK NO	PERIODS REQ/.	PO/PSO	Teaching Methods
Normal Forms for CFG CNF, GNF	269 - 283	T1	3	PO1, PO2, PO3, / PSO1, PSO3	Conventional
Pumping Lemma for CFL	288 - 294	T1	2	PO1, PO2, PO3, / PSO1, PSO3	Conventional
Closure Properties of CFL	295 - 305	T1	2	PO1, PO2/ PSO1	Conventional
Turing Machines	330 - 341	T1	2	PO1, PO2, PO3, / PSO1, PSO3	Conventional
Programming Techniques for TM	343 - 348	T1	2	PO1, PO2, PO3, / PSO1	Conventional
Problems in Normal Forms	-	-	1	PO1, PO2, PO3, / PSO1	Conventional
Problems in TM (CBS)	-	-	1	PO1, PO2, PO3, / PSO1	Conventional
Total Periods Required					13

UNIT V UNDECIDABILITY

COs COVERED: CO5, CO6

TOPICS & SUB TOPICS	PAGE NO	REF BOOK NO	PERIODS REQ/.	CO	PO/PSO	Teaching Methods
Non Recursive Enumerable (RE) Language	381 - 386	T1	1	CO5	PO1, PO2, PO3, / PSO1,PSO3	Conventional
Undecidable Problem with RE	387 - 395	T1	2	CO5	PO1, PO2, PO3, / PSO1,PSO3	Conventional
Undecidable Problems about TM	397 - 404	T1	2	CO5	PO1, PO2, PO3, / PSO1,PSO3	Conventional
Post's Correspondence Problem	406 - 417	T1,R2	2	CO5	PO1, PO2, PO3, / PSO1,PSO3	Conventional
The Class P and NP	428 - 430	T1,R2	3	CO6	PO1, PO2, PO3, / PSO1,PSO3	Conventional
NP complete problems	431-437	T1	1	CO6	PO1, PO2, PO3, / PSO1,PSO3	Conventional
Revision on all units – NPTEL Video Tutorials, Quiz – WR1			1	-	-	Conventional
Total Periods Required: 12						
Consolidated Periods: 58						

CONSOLIDATED PLAN

S. No.	Units	No. of periods
1	Unit - I	11
2	Unit - II	11
3	Unit - III	11
4	Unit - IV	13
5	Unit - V	12
Total no. of periods		58

COURSE ASSESSMENT METHODS

Internal Assessment (IA) Methods:

- Class Test (CT) - For Theory
- Continuous Internal Assessment (CIA) - For Theory
- Model Exam – For Theory and Laboratories
- Lab Work – For Laboratories
- Review – For Seminar papers, Mini and Major Projects

End Semester University Examinations

- End Semester University Examinations (UE)

S. No	Mode of Assessment	Phase	Duration	% Weightage
1.	CIA – I	I	1 Hour	100
2.	CIA – II	II	1 Hour	100
3.	Model Exam	III	1 Hour	100
4.	UE	-	1 Hour	100

Examination Scheme

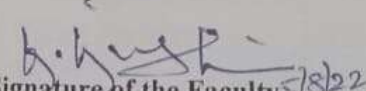
For Theory

Assessment	Marks	Web Portal Entry	IE Weightage	UE Weightage	Total
Attendance	-	University Portal Entry -1	-	-	-
Assessment I	100	University Portal Entry -2	20	-	20
Assessment II	100	University Portal Entry -3			
Assessment III	100	University Portal Entry -4			
UE	100	-	-	80	80
Total Marks					100

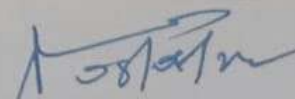
CURRICULAR GAPS

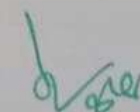
In order to achieve the course objectives, the following topics are planned.

S. No	Contents beyond the Syllabus	Action Plan	Date	PO/PSO Mapping
1.	Design CFG and PDA for a complex application.	Technology Enabled	06/09/2022	PO1-3, PSO1, PSO3
2.	Problems on Turing machine	Technology Enabled	4/10/2022	PO1-3, PSO1, PSO3


Signature of the Faculty 5/8/22
(Dr. K. Krishnakumari)


HoD


Dean (Academics)


Principal

After the end of the course, the course shall be assessed by Google Forms / forms based on the course outcomes described.

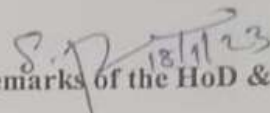
COURSE EXIT SURVEY

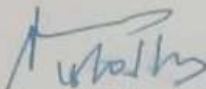
To be collected from the Students and Analyze the CO Attainment by the Subject Faculty


Number of Students : 62/65
CO Attained Level :

(in %)	CO1	CO2	CO3	CO4	CO5	CO6
Strongly Agree	85.5	71	69.4	53.2	54.8	61.3
Partially Agree	9.7	22.6	17.7	32.3	30.6	21
Agree	4.8	6.5	12.9	12.9	14.5	17.7
Disagree	-	-	-	1.6	-	-


Faculty Member


Remarks of the HoD & Sign


Dean(Academics)


Principal