SRI BHARATHI

ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)

Kaikkurichi, Pudukkottai -622 303

www.sbec.edu.in

NAAC DOCUMENTS

Quality Indicator Frame Work

Criterion – 1

CURRICULAR ASPECTS

Submitted by

IQAC

Internal Quality Assurance Cell

Sri Bharathi Engineering College for Women

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

Criterion 1	Curricular Aspects	100

1.1 Curricular Planning and Implementation(20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)
Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PREFACE OF THE COURSE FILE

BATCH : **2021-2025**

ACADEMIC YEAR : **2022-2023 / EVEN**

PROGRAM : **COMPUTER SCIENCE AND ENGINEERING**

YEAR & SEMESTER : **2nd YEAR / 4th SEMESTER**

COURSE CODE : **CS3452** NBA COURSE CODE: **C210**

NAME OF THE COURSE : **THEORY OF COMPUTATION**

FACULTY IN-CHARGE : **Mrs. S.YOGALAKSHMI,**
ASSISTANT PROFESSOR / CSE

SIGNATURE OF THE FACULTY IN-CHARGE

HoD /CSE

HOD / CSE
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
KAIKKURICHI,
PUDUKKOTTAI - 622 303

Dr. S.THILAGAVATHI M.E.,Ph.D.,
PRINCIPAL
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
Kaikkurchi - 622 303, Pudukkottai Dt.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REVIEW OF COURSE FILE

(To be pasted on the inner side of the file-backside).(#-State Yes/No.)

S.N	Details Date:	R-I-*	R-II-*&	R-III-*&	R-IV-*&$	R-V-*&$@
1.	Preface of the course file	Yes				
2.	Vision, Mission, PEOs, POs, PSOs, Blooms taxonomy	Yes				
3.	Subject handlers of yesteryears					
4.	Timetable/Workload of the staff – Distribution of teaching load – Roles and Responsibilities	Yes				
5.	Syllabus signed by staff & HoD	Yes				
6.	Lecture Schedule signed by staff & HoD	Yes				
7.	Course Committee meeting circular and minutes	Yes				
8.	Identification of Curricular gap and Content Beyond the syllabus	Yes				
9.	Self-study topics	Yes				
10.	Previous AU Question papers	Yes				
11.	Unit wise Q&A and Objective type questions	Yes				
12.	Unit wise course material	Yes				
13.	Assignment question paper with sample answer sheets and mark entry		Yes			
14.	Tutorial question paper with key and mark entry		Yes			
15.	Class test/IA test Q Paper with Key, sample answer papers and mark entry		Yes			
16.	IA Test- result analysis-CAP-evidence-root cause analysis.		Yes			
17.	Retest –Q paper-Attendance-marks		Yes			
18.	AU Web portal entry sheet		Yes			
19.	Very poor performance in first two tests-action taken.-communication to parents-evidence					
20.	Absence for two tests-action taken-communication to parents-evidence.					
21.	Indiscipline of student reported, if any					
22.	Special class/coaching class/remedial class/attendance-CAP					
23.	Conduct of Seminar, Quizzes - proof					
24.	Content beyond the syllabus - proof			Yes		
25.	Student feedback on faculty			Yes		
26.	Course end survey					
27.	Internal Assessment sheet			Yes		
28.	AU question paper with students feedback					
29.	Discrepancy of the question paper and correspondence, if any					
30.	AU result analysis-Details of arrear students.					
31.	AU grade sheet					Yes
32.	CO – PO & PSO attainment sheet					Yes
	Signature of Course handling faculty					
	Signature of HoD/CSE					

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KAIKKURICHI, PUDUKKOTTAI - 622 303

ACADEMIC YEAR (2022-23) EVEN SEMESTER

DEPARTMENT OF CSE

INDIVIDUAL STAFF WORKLOAD

S. No	STAFF NAME	SUBJECT CODE & NAME	YEAR & DEPT	TOTAL NO OF STUDENTS	NO OF HOURS	TOTAL HOURS
1.	Mr.R.Vijay	CS8603-Distributed Systems	III CSE	21	04	11
		CS8661-Internet Programming Laboratory	III CSE	21	03	
		GE8161-Problem Solving and Python Programming Laboratory	I YEAR	40	03	
		Job Seekers	IV CSE	21	01	
2.	Ms.G.Bhuvaneswari	CS8080- Information Retrieval Techniques	IV CSE	21	05	11
		CS3481- Database Management Systems Laboratory	II CSE	30	03	
		GE8161-Problem Solving and Python Programming Laboratory	I YEAR	40	03	
3.	Ms.G.Sugapriya	CS8602- Compiler Design	III CSE	21	06	12
		GE8161-Problem Solving and Python Programming Laboratory	I YEAR	40	03	
		Cs8811-Project Work	IV CSE	21	03	
4.	Ms.S.Jayapratha	CS3491- Artificial Intelligence and Machine Learning	II CSE	30	06	13
		GE3151- Problem Solving and Python Programming	I YEAR	40	05	
		CS8611-Mini Project	III CSE	21	02	
5.	M.Priyanka	CS8691-Artificial Intelligence	III CSE	21	05	13
		GE3151- Problem Solving and Python Programming	I YEAR	40	05	
		GE3171-Problem Solving and Python Programming Laboratory	I YEAR	40	03	
6.	Ms.EL.Thanga Uma	CS3451-Introduction to Operating Systems	II CSE	30	04	15
		GE3151- Problem Solving and Python Programming	I YEAR	44	05	
		CS3461-Operating Systems Laboratory	II CSE	30	03	
		GE3171-Problem Solving and Python Programming Laboratory	I YEAR	44	03	

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S. NO	STAFF NAME	SUBJECT CODE & NAME	YEAR & DEPT	TOTAL NO OF STUDENTS	NO OF HOURS	TOTAL HOURS
7.	Ms.M.Parveen Banu	CS3401-Algorithms	II CSE	30	06	13
		CS8651- Internet Programming	III CSE	21	04	
		CS8661-Internet Programming Laboratory	III CSE	21	03	
8.	Ms.G.Rajalakshmi	CS3492- Database Management Systems	II CSE	30	04	13
		EC3401-Network Security	II ECE	12	06	
		CS3481- Database Management Systems Laboratory	II CSE	30	03	
9.	Ms.S.Yogalakshmi	CS3452-Theory of Computation	II CSE	30	04	14
		CS8601- Mobile Computing	III CSE	21	04	
		CS3461-Operating Systems Laboratory	II CSE	30	03	
		CS8661-Mobile Application Development Laboratory	III CSE	21	03	
10	Ms.B.Kavipriya	GE8076-Professional Ethics in Engineering	IV CSE	21	05	12
		CS8661-Mobile Application Development Laboratory	III CSE	21	03	
		Placement Training Technical	IV CSE	21	01	
		GE3171-Problem Solving and Python Programming Laboratory	I YEAR SEC-A	33	03	

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Kaikkuruchi, pudukkottai.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEEERING

COURSEPLAN

Subject code : CS3452	**Branch/ Year/ Sem/ Section: BE/CSE/ II/ IV**
Subject Name: THEORY OF COMPUTATION	**Batch:2021-2025**
Staff name : S YOGALAKSHMI	**Academic Year: 2022-2023**

COURSEOBJECTIVE

- To understand foundations of computation including automata theory
- To construct models of regular expressions and languages.
- To design context free grammar and push down automata
- To understand Turing machines and their capability
- To understand Undecidability and NP class problems

TEXTBOOK:

T1. Hopcroft J.E., Motwani R. & Ullman J.D., "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2008.

T2. John C Martin , "Introduction to Languages and the Theory of Computation", 4th Edition, Tata McGraw Hill, 2011.

REFERENCES:

R1. Harry R Lewis and Christos H Papadimitriou , "Elements of the Theory of Computation", 2nd Edition, Prentice Hall of India, 2015.

R2. Peter Linz, "An Introduction to Formal Language and Automata", 6th Edition, Jones & Bartlett, 2016.

R3.K.L.P.Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata Languages and Computation", 3rd Edition, Prentice Hall of India, 2006.

WEB REFERENCES:

W1.https://learnengineering.in/cs3452-theory-of-computation/

W2.https://www.pit.ac.in/assets/pdf/be-cse/qb/2/CS3452-THEORY-OF-COMPUTATION.pdf

W3.https://mapmf.pmfst.unist.hr/~milica/Matem_teorija_r/MTR_web/JFLAPupute.pdf

TEACHINGMETHODOLOGIES:

- BB -BLACKBOARD
- PPT -POWERPOINT PRESENTATION
- VIDEO

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CS 3452	THEORY OF COMPUTATION	L T PC 3 003

UNIT I AUTOMATA AND REGULAR EXPRESSIONS 9

Need for automata theory - Introduction to formal proof – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA – Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ε-moves- Conversion of NFA into DFA – Minimizatio n of DFAs.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions – Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages.

UNIT III CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA 9

Types of Grammar - Chomsky's hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG – Deterministic Pushdown Automata.

UNIT IV NORMAL FORMS AND TURING MACHINES 9

Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages –Turing Machine : Basic model – definition and representation – Instantaneous Description – Language acceptance by TM – TM as Computer of Integer functions – Programming techniques for Turing machines (subroutines)

UNIT V UNDECIDABILITY 9

Unsolvable Problems and Computable Functions –PCP-MPCP- Recursive and recursively enumerable languages – Properties - Universal Turing machine -Tractable and Intractable problems - P and NP completeness – Kruskal's algorithm – Travelling Salesman Problem- 3-CNF SAT problems.

TOTAL: 45 PERIODS

SIGNATURE OF THE FACULTY IN-CHARGE

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Topic No	Topic Name	Books For reference	Page No	Teaching Methodology	No of periods required	Cumulative periods
UNITI	**AUTOMATA AND REGULAR EXPRESSIONS**					**(9)**
1.	Need for automata theory - Introduction to formal proof	T1	2-31	BB, VIDEO	1	1
2.	Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA)	T1	37-59	BB	2	3
3.	Equivalence between NFA and DFA	T1	60-62	BB	1	4
4.	Finite Automata with Epsilon transitions	T1	72-79	BB	1	5
5.	Equivalence of NFA and DFA	T1	60-65	BB	1	6
6.	Equivalence of NFAs with and without ε-moves	T1	105-107	BB	1	7
7.	Conversion of NFA into DFA	T1	109-110	BB	1	8
8.	Minimization of DFAs	T1	155-165	BB	1	9

LEARNINGOUTCOME:

At the end of unit, the students will be able to

- Know the basics of automata theory.
- Understand the basic concepts fine automata theory.
- Able to design deterministic and non-deterministic finite automata.
- Learn about Equivalence between NFA and DFA
- Gain knowledge about Conversion of NFA into DFA
- Able to minimize the DFA using different methods.

UNITII	**REGULAR EXPRESSIONS AND LANGUAGES**					**(9)**
9.	Regular expression	T1	85-91	BB	1	10
10.	Regular Languages	T2	92-96	BB	1	11
11.	Equivalence of Finite Automata and regular expressions	T1	96-107	BB	2	13
12.	Proving languages to be not regular (Pumping Lemma)	T2	205-218	BB	3	16

13.	Closure properties of regular languages.	T1	133-147	BB	2	18
14.	Automata theory simulation using JFLAP	W3	-	PPT	1	19

LEARNINGOUTCOME:

At the end of unit, the students will be able to

- Understand the concept of Regular expression and Regular Languages.
- Gain knowledge about Equivalence of Finite Automata and regular expressions.
- Understand the concept of Proving languages to be not regular (Pumping Lemma).
- Understand the concept of Closure properties of regular languages.

UNIT–III CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA (9)

15.	Types of Grammar - Chomsky's hierarchy of languages	T1	171-181 272-275	BB	1	20
16.	Context-Free Grammar (CFG) and Languages	T1	261-268	BB	1	21
17.	Derivations and Parse trees	T1	183-191	BB	1	22
18.	Ambiguity in grammars and languages	T1	207-213	BB	1	23
19.	Push Down Automata (PDA): Definition – Moves	T1	225-233	PPT	1	24
20.	Instantaneous descriptions	T1	327-331	BB	1	25
21.	Languages of pushdown automata	T1	234-240	BB	1	26
22.	Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG	T1	243-251	BB	1	27
23.	Deterministic Pushdown Automata.	T1	252-256	BB	1	28

LEARNINGOUTCOME:

At the end of unit, the students will be able to

- Gain knowledge about Types of Grammar.
- Gain knowledgeon Context-Free Grammar (CFG) and Languages.

34.	Recursive and recursively enumerable languages – Properties	R1	267-271	BB	1	39
35.	Universal Turing machine	R1	247-251	BB	1	40
36.	Tractable and Intractable problems	R1	251-256	BB	1	41
37.	P and NP completeness	T1	425-458	BB	1	42
38.	Kruskal's algorithm	T1	460-465	BB	1	43
39.	Travelling Salesman Problem	T1	468-472	BB	1	44
40.	3-CNF SAT problems	R3	353-354	BB	2	46

LEARNINGOUTCOME:

At the end of unit, the students will be able to

- Understand about the concept Unsolvable Problems and Computable Functions, PCP-MPCP.
- Known about Universal Turing machine.
- Gain the knowledge about decidable and undecidable problems.

COURSEOUTCOME

At the end of the course, the student should be able to:

CO1: Construct automata theory using Finite Automata

CO2: Write regular expressions for any pattern

CO3: Design context free grammar

CO4: Design Turing machine for computational functions

CO6: Differentiate between decidable and undecidable problems

CO5: Design Pushdown Automata

INTERNAL ASSESSMENT DETAILS

ASSESMENTNUMBER	I	II
Units	Unit 1 &2 ,Unit 3(Half)	Unit 3(Half), Unit 4 &5

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- Understand the concepts of Derivations and Parse trees.
- Understand the concept of Ambiguity in grammars and languages.
- Know the basics of Pushdown Automata (PDA).
- Know the basics of Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG.

UNITIV	NORMAL FORMS AND TURING MACHINES					(9)
24.	Normal forms for CFG – Simplification of CFG	R3	201-212 189-199	BB	1	29
25.	Chomsky Normal Form (CNF) and Greibach Normal Form (GNF)	T1	272-275	BB	1	30
26.	Pumping lemma for CFL	T1	279-286	BB	1	31
27.	Closure properties of Context Free Languages	T1	287-297	BB	1	32
28.	Turing Machine : Basic model – definition and representation	T1	324-327	BB	1	33
29.	Instantaneous Description	T1	327-331	BB	1	34
30.	Language acceptance by TM	R3	283-285	BB	1	35
31.	TM as Computer of Integer functions	R3	286-293	BB	1	36
32.	Programming techniques for Turing machines (subroutines)	T1	337-343	BB	1	37

LEARNINGOUTCOME:

At the end of unit, the students will be able to

- Understand the concepts Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).
- Known about Simplification of CFG.
- Gain the knowledge about Closure properties of Context Free Languages.
- Understand the basics of Turing Machine.
- Learn about Programming techniques for Turing machines (subroutines).

UNITV	UNDECIDABILITY					(9)
33.	Unsolvable Problems and Computable Functions, PCP-MPCP	R1	254-262	BB	1	38

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ASSIGNMENT DETAILS

ASSIGNMENT NUMBER	I	II	III	IV	V	VI	VII	VIII
DATE OF SUBMISSION	18.02.23	24.02.23	3.03.23	17.03.23	04.04.23	14.04.23	25.04.23	06.05.23

ASSIGNMENT NUMBER	UNIT COVERED	DESCRIPTIVE QUESTIONS/TOPIC (Minimum of 8 Pages)
1	I	FORMAL PROOFS
2		DETERMINISTIC AND NON -DETERMINISTIC FINITE AUTOMATA
3	II	PUMPING LEMMA AND REGULAR EXPRESSION EQUIVALENCES
4	III	CONTEXT FREE GRAMMAR
5		PUSH DOWN AUTOMATA
6	IV	NORMAL FORMS OF CFG
7		TURING MACHINE
8	V	UNDECIDABILITY

PREPARED BY

S.YOGALAKSHMI NANDHAKUMAR,AP/CSE

VERIFIED BY 1/2/23

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APPROVED BY 01/02/23

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Identification of Curricular Gap & Content Beyond Syllabus(CBS)

Name of the Faculty : S.Yogalakshmi, AP/CSE
Course Code & Name : CS3452 – Theory Of Computation
Degree & Program : B.E. /CSE , Semester & Section : IV , Academic Year : 2022 -2023 /EVEN

I. Mapping of Course Outcomes with POs & PSOs.(before CBS)

Table.1 Mapping of COs, C, PSOs with POs - before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C210.1	3	3	2	2	1	-	-	-	1	1	1	1	2	2	2
C210.2	2	2	2	2	1	-	-	-	1	1	1	1	2	2	2
C210.3	2	2	2	2	1	-	-	-	1	1	1	1	2	2	2
C210.4	2	2	2	1	1	-	-	-	1	1	1	1	2	2	2
C210.5	2	2	2	1	1	-	-	-	1	1	1	1	3	3	3
C210.6	3	2	2	2	1	-	-	-	1	1	1	1	2	2	2
C210	2.3	2.2	2.0	1.7	1.0	-	-	-	1.0	1.0	1.0	1.0	2.2	2.2	2.2

II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Details of Content Beyond Syllabus(CBS) added	POs strengthened/ vacant filled	CO/Unit
Automata theory simulation using JFLAP	PO5(3) Strengthened	C210.5 /IV

III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

Table.3 Mapping of COs, C, PSOs with POs- after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C210.1	3	3	2	2	2*	-	-	-	1	1	1	1	2	2	2
C210.2	2	2	2	2	2*	-	-	-	1	1	1	1	2	2	2
C210.3	2	2	2	2	2*	-	-	-	1	1	1	1	2	2	2
C210.4	2	2	2	1	1	-	-	-	1	1	1	1	2	2	2
C210.5	2	2	2	1	1	-	-	-	1	1	1	1	3	3	3
C210.6	3	2	2	2	1	-	-	-	1	1	1	1	2	2	2
C210	2.3	2.2	2.0	1.7	1.5*	-	-	-	1.0	1.0	1.0	1.0	2.2	2.2	2.2

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REASON BEYOND THE SELEECTION

Facilitate the students to be aware of Automata theory simulation using JFLAP.

MATERIAL

JFLAP

ForJFLAPversion7.0

Introduction

JFLAPprogrammakes it possible to create and simulateautomata.Learningabout automatawithpen andpaper canbe difficult,time consuming anderror-prone.WithJFLAPwecancreateautomataof different types and itiseasy to change themaswewant.JFLAPsupports creationof DFAandNFA, Regular Expressions,PDA,TuringMachines,Grammarsand more.

Setup

JFLAPisavailablefromthehomepage:(www.JFLAP.org).Fromtherepress"GetFLAP"andfollow theinstructions. Youwill noticethat JFLAP havea.JARextension. Thismeans that you need Javato runJFLAP.WithJavacorrectlyinstalledyoucansimplyselecttheprogramtorunit.You canalsouse acommandconsolerunitfromthefilescurrent directorywith,Java–jarJFLAP.jar.

UsingJFLAP

Whenyou firststartJFLAP youwill seeasmall menuwithaselection of elevendifferentautomataand rulesets.Choosingoneofthemwillopentheeditorwhereyoucreatechosentypeofautomata. Usually you can create automata containing states and transitions but there is also creation of GrammarandRegularExpressionwhichis madewithatexteditor.

AdditionalResources

Recommended Reading: JFLAP-AnInteractiveFormalLanguagesand AutomataPackage
Rodger,Finley,ISBN:0763
738344

JFLAPassignmentsforJFLAP-AnInteractiveFormal

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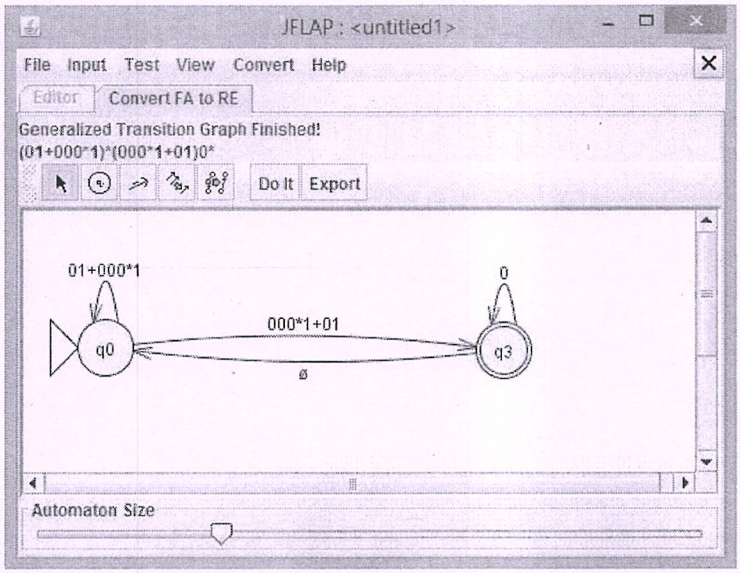
Whenallthenecessarystepsaremade,theconverted automatoncontainstheregularexpression.
Youcanalsoseethecompleteregularexpressionabovethetoolbarthatcanbeexportedu sing
Exp
ort.



JFLAPiscapabletoconverttheregularexpressiontoanNFAagain.Iftheoriginalautom atonisa DFAtheresultmight differbecauseJFLAPadda lot of lambdatransitions. Youmight need toconvert furthertoaminimizedDFAtogetyourautomataback.

REFERENCE LINK

https://mapmf.pmfst.unist.hr/~milica/Matem_teorija_r/MTR_web/JFLAPupute.pdf

SIGNATURE OF THE FACULTY IN-CHARGE

HoD/CSE

HOD / CSE
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
KAIKKURICHI,
PUDUKKOTTAI - 622 303

Dr. S.THILAGAVATHI M.E., Ph.D.,
PRINCIPAL
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
Kaikkurchi - 622 303, Pudukkottai Dt.

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)
Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Assignment Answer Sheet

Name of the Student : ISHWARYA S

AU Register Number : 912621104011

Assignment – 01			Date of Issue:	08.02.23	Marks	10
Course code	CS3452	Course Title	Theory Of Computation			
Year	II	Semester/Section	IV	Date of Submission:	18.02.23	

Q.No	Questions	CO
1	Explain the need of automata theory.	C210.1
2	List out the different types of formal proofs.	C210.1
3	Define finite automata.	C210.1
4	Define DFA.	C210.1
5	Define NFA.	C210.1
6	Prove $n! >= 2^{n-1}$.	C210.1
7	Prove $2^n > n^3$ where $n >= 10$.	C210.1
8	Prove that for every integer $n >= 0$ the number $4^{2n+1} + 3^{n+2}$ is multiple of 13.	C210.1
9	Prove for every $n > -1$ by mathematical induction $\Sigma i^3 = (n(n+1)/2)^2$.	C210.1
10	Explain about formal proof types.	C210.1

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	8
Presentation Quality	2	1
Timely submission	2	1
Total marks	10	8

Name and Signature of the Faculty In-charge

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IQAC Academic Audit Form

ACADEMIC YEAR: 2022-2023 EVEN SEMESTER

Name of Department :	CSE	Year / Sem :	II / IV	No. of Students Registered :	30

Details of Examination : ✓ CT - 1 / CT - 2 / CT - 3 / Model Test

S.No.	Course Code	List of Reg.No Verified	Course Log Book Verified (Y / N)	Course File Verified (Y / N)	No of students Attended	No of Absentees	No of Failures	Pass %	Remarks
1.	CS3452	912621104009	Yes	Yes	26	04	08	69%	Total Mistake Found
2.	CS3491	912621104016	Yes	Yes	28	02	12	57%	-
3.	CS3492	912621104022	Yes	Yes	28	02	04	86%	-
4.	CS3401	912621104024	Yes	Yes	27	03	03	89%	-
5.	CS3451	912621104028	Yes	Yes	21	09	06	71%	-
6.	GE3451	912621104701	Yes	Yes	28	02	04	86%	-

Verified by

External Member Name and Signature:	T. Parthiban
Internal Member Name and Signature:	G. Sugapriya

Overall Remarks:

Try to improve pass percentage in CS3491 Subject

HoD/ CSE

27/6/23
IQAC Coordinator

Principal

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

STUDENT FEEDBACK ON FACULTY

S.NO.	DESCRIPTION	SCORED OUT OF 4	SCORED OUT OF 100
1.	Syllabus coverage as prescribed by university	3.73	93.3
2.	Technical knowledge of the teacher	3.63	90.8
3.	Teacher's communication skill	3.70	92.5
4.	Regularity in taking classes	3.67	91.7
5.	Helping the students in conducting the experiment through set of instruction and demonstrations	3.77	94.2
6.	Tendency of inviting opinion and question on subject matter from students	3.67	91.7
7.	Knowledge of the Teacher in latest development of field	3.70	92.5
8.	Perfectness of valuation	3.77	94.2
OVERALL SCORE		3.70	92.61

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REPORT SHEET

S .NO	REG.NO	NAME	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
1.	912621104001	ABINAYA K	4	4	4	3	3	4	4	4
2.	912621104002	AMEERA N	4	3	4	3	4	4	3	4
3.	912621104003	ANJUGAM C	4	4	3	3	4	4	4	3
4.	912621104004	ARUNDATHI S	3	3	4	4	3	4	3	4
5.	912621104005	ASHIKA B	4	4	4	4	4	4	4	4
6.	912621104006	DIVYA T	4	3	4	3	3	3	3	3
7.	912621104007	ELACKIYA G	3	4	4	4	4	3	4	4
8.	912621104008	GAYATHRI K	4	3	4	4	3	3	4	4
9.	912621104009	GEETHA M	4	4	4	3	4	4	4	4
10.	912621104010	HARSHITHA P	4	4	4	4	3	4	4	4
11.	912621104011	ISHWARYA S	3	4	4	4	4	3	3	4
12.	912621104012	JANANI R	4	4	3	4	4	4	4	4
13.	912621104015	LAVANYA S	4	4	3	3	3	4	4	3
14.	912621104016	MAHASREE P	3	3	4	4	4	3	3	4
15.	912621104018	PRIYA M	4	4	4	4	4	4	4	4
16.	912621104019	RABIKA R	4	4	4	3	4	4	4	4
17.	912621104021	SAHEENA BEGAM A	4	3	3	4	4	4	3	3
18.	912621104022	SASIPRIYA R	4	4	4	3	4	3	3	4
19.	912621104023	SHAMIMA P	4	4	3	4	4	4	4	3
20.	912621104024	SHEERA BANU A	4	4	3	4	4	4	4	4
21.	912621104025	SIVAJOTHIKA S	3	4	4	3	4	3	4	3
22.	912621104026	SIVAPRIYA R	4	2	4	4	4	4	4	4
23.	912621104027	SUBHA DHARSHINI S	4	3	4	4	3	4	4	4

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24.	912621104028	SUBIKSHA S	3	4	3	4	4	4	4	4
25.	912621104029	VINITHA K	4	4	4	4	4	3	4	4
26.	912621104030	VISALATCHI S	4	4	4	4	4	4	4	4
27.	912621104301	VAISHNAVI	3	3	3	4	4	4	3	4
28.	912621104302	VISHNU PRIYA	4	4	4	4	4	3	4	4
29.	912621104701	AARTHI	4	4	4	4	4	4	4	4
30.	912621104702	SWATHI	3	3	3	3	4	3	3	3
		AVERAGE	**3.73**	**3.63**	**3.70**	**3.67**	**3.77**	**3.67**	**3.70**	**3.77**
		PERCENTAGE	**93.3**	**90.8**	**92.5**	**91.7**	**94.2**	**91.7**	**92.5**	**94.2**

EXCELLENT	VERY GOOD	GOOD	AVERAGE	POOR
4	3	2	1	0

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22-23 Even

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN
KAIKKURICHI, PUDUKKOTTAI – 622 303.

Circular Date: 15.03.2023

The First cycle test will be conducted from 20.03.2023 to 28.03.2023 for the IV, VI & VIII semester (II, III & IV year) students.

The following instructions are to be followed by the faculty members.

- Total marks for which the question paper to be set will be for 60 marks. **(PART A** 10X2=20, **PART B** 2X13=26 **& PART C** 1X14=14)
- It is the responsibility of the **question paper** setter to take the Xerox copies of the required number of question papers and it should be handed over to the Exam cell Coordinators Ms. G.Gayathri AP/ CIVIL / Mrs. G. Sugapriya AP/CSE along with **answer key** on or before **17.03.2023**.
- The Exam Coordinators (exam cell) are requested to make necessary arrangements (hall arrangements, invigilation duty etc.,) for conducting the test.
- Faculty members are requested to handover the valued answer scripts to the students on or before 29.03.2023 and the class in-charges are requested to send the consolidated mark sheet along with the attendance percentage (from 1st February 2023 to 28th March 2023) to the parents on or before 31.03.2023.

PRINCIPAL

15/03/23

Cc:

- All HoD's CIVIL/CSE/EEE/ECE
- All faculty
- IQAC Co-ordinator
- Exam cell
- Office file

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Circular

Date: 15.03.2023

The First cycle test will be conducted from 20.03.2023 to 28.03.2023 for the IV semester (II year) B.E students for 60 marks as per the time table given below. Students are directed to prepare well and score good marks.

Date	10.00 am -12.00 noon
20-03-2023	CE3401- Applied Hydraulics Engineering (CIVIL) CS3491- Artificial Intelligence and Machine Learning (CSE) EE3402- Linear Integrated Circuits(EEE) EC3491- Communication Systems(ECE)
21-03-2023	CE3403- Concrete Technology (CIVIL) CS3492- Database Management Systems (CSE) EE3404- Microprocessor and Microcontroller(EEE) EC3401- Network and Security(ECE)
24-03-2023	CE3405- Highway and Railway Engineering (CIVIL) CS3401- Algorithms (CSE) EE3403- Measurements & Instruments(EEE) EC3492- Digital Signal Processing(ECE)
25-03-2023	CE3404 Soil Mechanics (CIVIL) CS3451- Introduction to Operating Systems (CSE) EE3405- Electrical Machines-II(EEE) EC3451- Linear Integrated Circuits(ECE)
27-03-2023	CE3402 -Strength Of Materials (CIVIL) CS3452- Theory of Computation(CSE) EE3401- Transmission and Distribution(EEE) EC3452- Electromagnetic Fields(ECE)
28-03-2023	GE3451- Environmental Science and Sustainability(CIVIL/CSE/EEE/ECE)

PRINCIPAL

15/03/23

Cc:

- All II year B.E Classes
- All faculty
- IQAC Co-ordinator
- Exam cell
- Notice Board
- Office file

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Register Number:											

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Cycle Test - I			Date/Session	27/3/2023	Marks	100
Course code	CS3452	Course Title	Theory of Computation			
Regulation	2021	Duration	3 hours	Academic Year	2022-2023	
Year	II	Semester	IV	Department	CSE	

COURSE OUTCOMES

C210.1:	Construct automata theory using Finite Automata
C210.2:	Write regular expressions for any pattern
C210.3:	Design context free grammar
C210.4:	Ability to design Pushdown Automata
C210.5:	Design Turing machine for computational functions
C210.6:	Differentiate between decidable and undecidable problems

Q.No.	Question	CO	BTL
	PART A **(Answer all the Questions 10 x 2 = 20 Marks)**		
1	List any four ways of theorem proving.	C210.1	K1
2	Define symbols, alphabets and strings.	C210.1	K1
3	What is the need for finite automata?	C210.1	K1
4	Define DFA.	C210.1	K1
5	How will you represent the finite automata?	C210.1	K1
6	Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings ending in 00.	C210.1	K3
7	Define Regular expression. Give an example.	C210.2	K1
8	Write Regular Expression for the language that have the set of strings over{a,b,c} containing at least one a and at least one b.	C210.2	K1
9	Define derivation tree for a CFG.	C210.3	K1
10	Explain about ambiguous grammar.	C210.3	K2
	PART B **(Answer all the Questions 5 x 13 = 65 Marks)**		
11a(i)	If L is accepted by an NFA with ε-transition then show that L is accepted by an NFA without ε-transition.(6)	C210.1	K3
(ii)	Construct a DFA equivalent to the NFA. M=({p,q,r},{0,1}, δ,p,{q,s}) Where δ is defined in the following table. (7)	C210.1	K3

Δ	0	1
P	{q,s}	{q}
Q	{r}	{q,r}
R	{s}	{p}
S	-	{p}

OR

11b(i)	Show that the set L={$a^n b^n$ /n>=1} is not a regular. (6)	C210.1	K3
(ii)	Prove for every n>-1 by mathematical induction $\Sigma i^3=(n(n+1)/2)^2$. (7)	C210.1	K3
12a(i)	Construct DFA equivalent to the NFA given below: (9)	C210.1	K6

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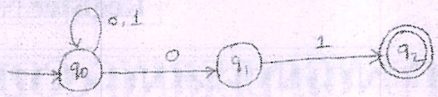
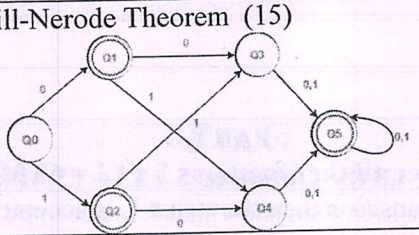
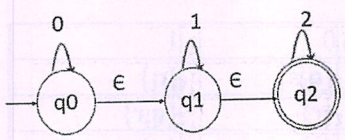
			
(ii)	Prove $2^n > n^3$ where n>=10. (4)	C210.1	K2
	OR		
12b(i)	Construct the DFA from given NFA.(9)	C210.1	K6
(ii)	Explain the procedure to minimize the DFA using table partitioning method with example (4)	C210.1	K2
13a(i)	Design a finite automata for the regular expression $(0+1)^*(00+11)(0+1)^*$ (8)	C210.2	K5
(ii)	Prove that the class of regular sets is closed under complementation.(5)	C210.2	K3
	OR		
13b(i)	Show that id* id can be generated by two distinct leftmost derivation in the grammar E->E+E / E*E / (E) / id (8)	C210.2	K5
(ii)	Find the language generated by a grammar G=({S},{a,b},{S->aSb, S->ab},S) (5)	C210.2	K3
14a(i)	Construct DFA that accepts all strings with three consecutive 0's.(8)	C210.1	K6
(ii)	Relate pumping lemma for regular set. (5)	C210.2	K4
	OR		
14b (i)	Construct a LM derivation and RM derivation and parse tree for aaabbabbba with the productions. P : S -> aB / bA, A-> a /S / bAA, B - >b / bS / aBB (8)	C210.1	K6
(ii)	Differentiate DFA from NFA. (5)	C210.2	K4
15a (i)	Prove for every n>0 by mathematical induction $\Sigma i^2 = n(n+1)(2n+1)/6$ (8)	C210.1	K3
(ii)	Construct DFA that accepts all strings on {0,1} except those containing the substring 101. (5)	C210.1	K6
	OR		
15b (i)	Construct closure properties of regular automata languages.(8)	C210.1	K3
(ii)	Construct a NFA to accept string containing the substring 0101. Write the regular expression for the same. (5)	C210.1	K6
	PART C **(Answer all the Questions 1 x 15 = 15 Marks)**		
16a	Minimize the DFA using Myhill-Nerode Theorem (15)	C210.1	K3
	OR		
16b	Convert the given NFA with epsilon to NFA without epsilon. (15)	C210.1	K3

δ	A	B
Q0	{q0,q1}	{q1}
Q1	-	{q0,q1}





Course Faculty
(Name /Sign / Date)
[S. Yogalakshmi]

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(Name /Sign / Date)

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Cycle Test - I

Part - A

1) Theorem proving Technique:
   - ↳ Proof by Contradiction
   - ↳ Proof by Contrapositive
   - ↳ Proof by Counter example
   - ↳ Proof by principle of Mathematical Induction

2) Symbols, Alphabets & Strings:
   - ↳ Symbol is a user defined entity.
   - ↳ Alphabet - Σ - Set of symbols.
   - ↳ String - Sequence of Symbols of finite length.

3) Need of Automata theory:
   - ↳ Important role in Compiler design
   - ↳ To prove the correctness of the program
   - ↳ In switching theory - design & analysis of digital circuits automata theory is applied.

4) DFA:

$DFA = \{Q, \Sigma, \delta, q_0, F\}$

$Q \rightarrow$ Set of states, $F \rightarrow$ Final states

$\Sigma \rightarrow$ Set of I/p symbols, $\delta \rightarrow$ Transition function.

$q_0 \rightarrow$ Starting Symbol

5) Representation of Finite automata:

① Transition diagram — ○ → Represent the state; ⟶ → Represent transition; →(S0) → Starting state; (SF) → Final state

Transition table

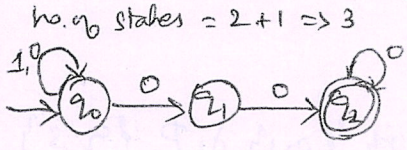
States	a	b
→ q_0	q_1	—
* q_1	q_2	q_1

6) DFA → all strings ends with "00"

$L = \{00, 000, 100, 1100 \ldots\}$

Minimum no. of states = 2

no. of states = 2+1 => 3



7) Regular Expression:-

Let Σ be an alphabet which is used to denote the input set. The regular expression over Σ can be defined as follows.

↳ ϕ is a regular expression, denotes the empty set.

↳ For each 'a' in Σ 'a' is a regular expression that denotes the set {a}.

↳ ε is a regular expression & denotes the set $\{\varepsilon\}$

8) R.E for Language, that have the set of strings over {a, b, c} containing at least one a & one b.

The string must have at least 1 'a' & 1 'b'. Then there can be any number of a's, b's & c's anywhere.

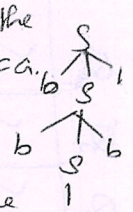
R.E : $(a+b+c)^*((c^*ac^*bc^*)(a+b+c)^*$

9) Derivation tree of CFG:

↳ Graphical representation of derivation of the given production rules for a given CFG.

↳ also called as Parse tree.

↳ Simple way to show how the derivation can be done to obtain some string from given set of production rule.



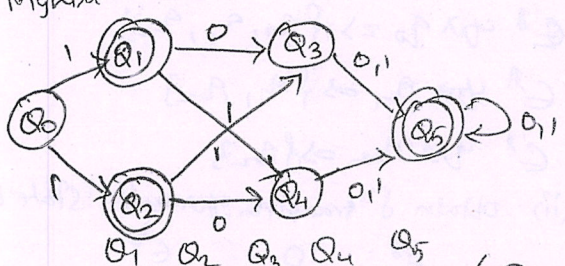
10) Ambiguous Grammar:-

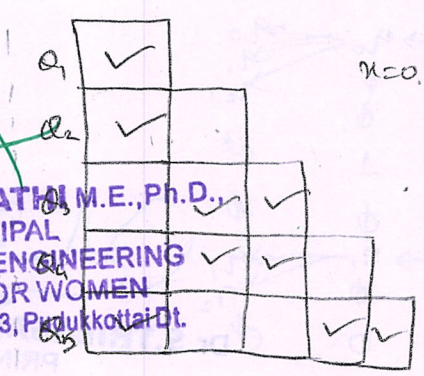
↳ Exists more than one parse trees for a given grammar

↳ either more than one leftmost (or) rightmost derivation possible, then that grammar is said to be ambiguous grammar.

Part - B

16 (a) Myhill - Nerode theorem:





(Q_2, Q_1)

$x=0, \delta(Q_2,0) = Q_4$

$\delta(Q_1,0) = Q_3$

$x=1, \delta(Q_2,1) = Q_3$

$\delta(Q_1,1) = Q_4$

$x=0, \delta(Q_3,0) = Q_5$

$\delta(Q_0,0) = Q_1$

$x=1, \delta(Q_3,1) = Q_5$

$\delta(Q_0,1) = Q_2$

(Q_3, Q_0)

(Q_4, Q_0) $x=0, \delta(Q_4,0)=Q_5$ $x=1, \delta(Q_4,1)=Q_5$

$\delta(Q_0,0)=Q_1$ $\delta(Q_0,1)=Q_2$

(Q_4, Q_3)

$x=0, \delta(Q_4,0)=Q_5$ $x=1, \delta(Q_4,1)=Q_5$

$\delta(Q_3,0)=Q_5$ $\delta(Q_3,1)=Q_5$

(Q_5, Q_1)

$x=0, \delta(Q_5,0)=Q_5$

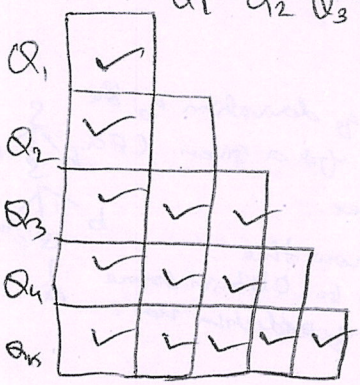
$\delta(Q_1,0)=Q_3$

(Q_5, Q_2)

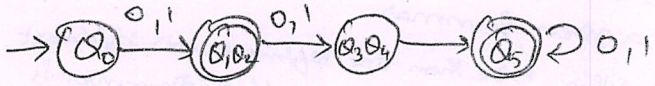
$\delta(Q_5,0)=Q_5$

$\delta(Q_2,0)=Q_4$

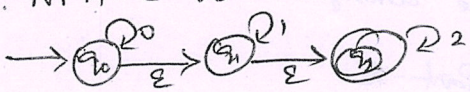
Q_0 Q_1 Q_2 Q_3 Q_4 Q_5



States	δ | P 0	1
Q_0	Q_1Q_2	Q_1Q_2
Q_1Q_2	Q_3Q_4	Q_3Q_4
Q_3Q_4	Q_5	Q_5
Q_5	Q_5	Q_5



2). NFA-ε to NFA without ε.



Step (i): Obtain ε closure.

ϵ^* for $q_0 \Rightarrow \{q_0, q_1, q_2\}$

ϵ^* for $q_1 \Rightarrow \{q_1, q_2\}$

ϵ^* for $q_2 \Rightarrow \{q_2\}$

Step (ii): Obtain δ' transition for each State & each I/ps.

States.

ϵ^* 0 ϵ^*

q_0 → q_0 ϕ q_1 q_2 → q_0 q_1 q_2

ϵ^* 1 ϵ^*

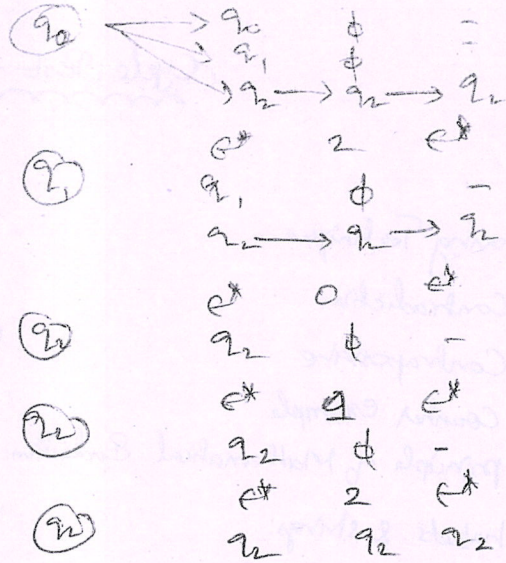
q_1 → ϕ q_1 q_2 → q_1 q_2

ϵ^* 0 ϵ^*

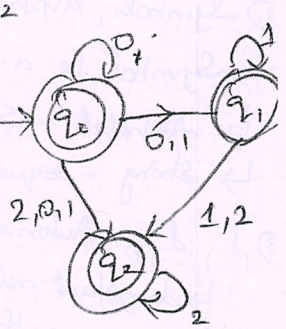
q_2 → q_2 ϕ $-$

ϵ^* 2 ϵ^*

q_2 q_2 q_2



δ' | I	0	1	2
q_0	$\{q_0,q_1,q_2\}$	$\{q_1,q_2\}$	$\{q_2\}$
q_1	ϕ	$\{q_1,q_2\}$	$\{q_2\}$
q_2	ϕ	ϕ	$\{q_2\}$



Part - 'B'

11)(a) (i) Theorem:

Basis: $|x|=1$, Then x is a Symbol a.

$\delta'(q_0, a) = \delta''(q_0, a)$

Induction: $|x| \geq 1$, let $x = wa$.

$\delta'(q_0, wa) = \delta'(\delta'(q_0, w), a)$

By Induction hypothesis,

$\delta'(q_0, w) = \delta''(q_0, w) = p$

$\delta'(p, a) = \cup \delta'(q, a) = \cup \delta''(q, a)$

$p = \delta''(q_0, w)$

we have $\cup \delta''(q, a) = \delta''(q_0, wa)$ q in p

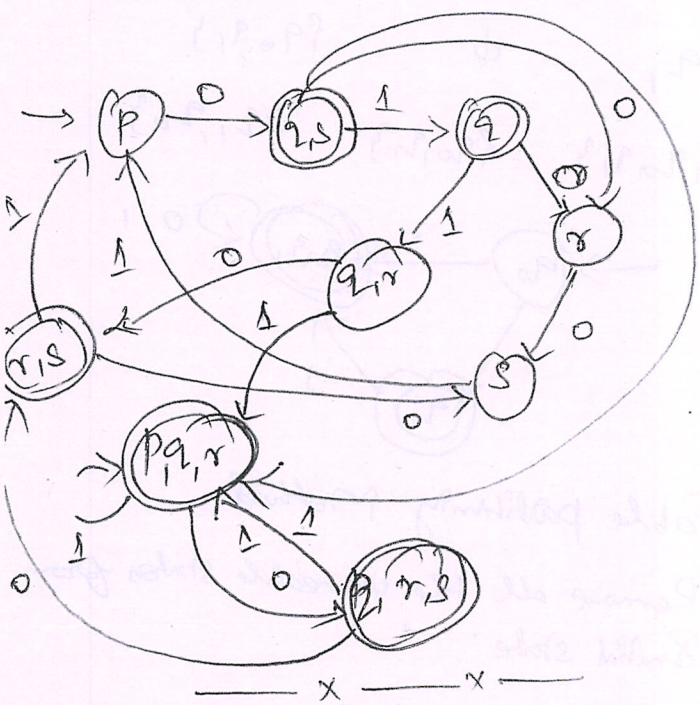
$\delta'(q_0, wa) = \delta''(q_0, wa)$

(i) (a) (ii)

$\{P, Q, R, S\}, \{0, 1\}, \delta, P, \{Q, S\}$

δ | I	0	1
P	$\{q,s\}$	$\{q\}$
Q	$\{r\}$	$\{q,r\}$
R	$\{s\}$	$\{p\}$
S	—	$\{r\}$

δ	0	1
→ p	{q,s}	{q}
(q)	{r}	{q,r}
r	{s}	{p}
(s)	-	{p}
{q,s}	{r}	{p,q,r}
{q,r}	{r,s}	{p,q,r}
{p,q,r}	{q,r,s}	{p,q,r}
{r,s}	{s}	{p}
{q,r,s}	{r,s}	{p,q,r}



1) b) (ii) Pumping lemma:

$L = \{a^n b^n, n > -1\}$

Assume that A is regular.

Pumping length = P.

$S = a^P b^P$

$\because P = 7, \; S \Rightarrow aaaaaaabbbbbbb$

Case 1: The y is in the 'a' part.

aaaaaaaabbbbbbb

x y z

Case 2: y is in the b part.

aaaaaaabbbbbbb

x y z

Case 3: The 'y' is in the 'a' & 'b' part.

aaaaaaabbbbbbb

x y z

For case 1: $xy^1z \Rightarrow xy^2z$

aa aaaaaaaa abbbbbbbb

$11 \neq 7$

For case 2: aaaaaaaa bbbbbbbbbbb

$7 \neq 11$

For case 3: $xy^1z = xy^2z$

aaaaaaaabbaabbbbbbbb , $a^n b^n$

$|xy| \leq P, \; P = 7.$

Hence proved. Hence given R.L L is not regular.

11)(b)(ii) $\sum i^3 = \{n(n+1)/2\}^2$

Base Case: $n = 1$,

LHS: $1^3 = 1$, RHS $= \left(\frac{1(1+1)}{2}\right)^2 \Rightarrow \left(\frac{2}{2}\right)^2 = 1$

$\therefore$ LHS = RHS,,

Inductive Hypothesis: $n = k$ is true.

$1^3+2^3+3^3+\ldots+k^3 = \left(\frac{k(k+1)}{2}\right)^2$ is also true

$1^3+2^3+3^3+\ldots+k^3 = \left(\frac{k(k+1)}{2}\right)^2 \ldots (1)$

Inductive step:

$n = k+1$ is also true.

LHS: $1^3+2^3+3^3+\ldots+k^3+(k+1)^3$

RHS: $\left(\frac{(k+1)(k+2)}{2}\right)^2$

From eqn (1),

$$\left(\frac{k(k+1)}{2}\right)^2 + (k+1)^3 = \frac{k^2(k+1)^2}{4} + (k+1)^3$$

$$= k^2(k+1)^2 + 4(k+1)^3 / 4$$

$$= \frac{k^2(k^2+2k+1) + 4(k^3+3k^2+3k+1}{4}$$

$$= \frac{k^2(k^2+2k+1) + 4k^3+12k^2+12k+4}{4}$$

$$= \frac{k^4+2k^3+k^2+4k^3+12k^2+12k+4}{4}$$

$LHS = k^4+6k^3+13k^2+12k+4 / 4$ — (2)

R.H.S $= \left(\frac{(k+1)(k+2)}{2}\right)^2$

$= (k+1)^2 (k+2)^2 / 4$

$= (k^2+2k+1)(k^2+4k+4)/4$

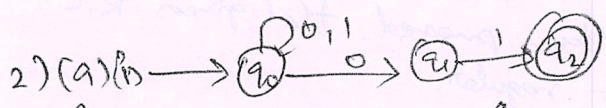
$= (k^4+4k^3+4k^2+2k^3+8k^2+8k+k^2+4k+4)/4$

$= k^4+6k^3+13k^2+12k+4/4$ → (3)

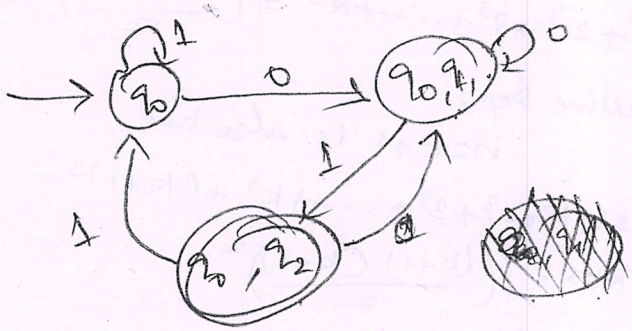
$\therefore$ LHS = RHS // Thus the given Expression is true.

——x——x——

2) (a) (ii)



State	0	1
→ q_0	$\{q_0, q_1\}$	$\{q_0\}$
q_1	ϕ	$\{q_2\}$
* q_2	ϕ	ϕ
$\{q_0, q_1\}$	$\{q_0, q_1\}$	$\{q_0, q_2\}$
* $\{q_0, q_2\}$	$\{q_0, q_1\}$	$\{q_0\}$



12) (a) (ii) $2^n > n^3$, $n \geq 10$.

Basis: $n = 10$,

$2^{10} > (10)^3$ is true

Induction hypothesis:

$n = k$ then $2^k > k^3$

Inductive step:

LHS $= 2^{(k+1)} \Rightarrow 2 \cdot 2^k$

$\geq \left(1 + \frac{1}{10}\right)^3 \cdot 2^k$

$\geq \left(1 + \frac{1}{k}\right) \cdot 2^k$

But, $2^k > k^3$, replace 2^k by k^3.

$\geq \left(1 + \frac{1}{k}\right)^3 \cdot k^3$

$\geq \left(\frac{k+1}{k}\right)^3 k^3$

$\geq \frac{(k+1)^3}{k^3} \cdot k^3$

$\geq (k+1)^3$

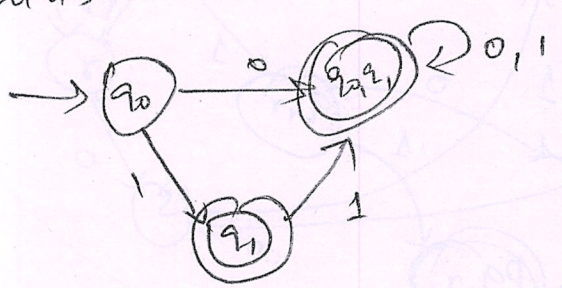
= R.H.S //.

——x——x——

12) b) (i)

δ	A	B
→ q_0	$\{q_0, q_1\}$	$\{q_1\}$
q_1	-	$\{q_0, q_2\}$

	A	B
→ q_0	$\{q_0, q_1\}$	$\{q_1\}$
q_1	ϕ	$\{q_0, q_1\}$
$\{q_0, q_1\}$	$\{q_0, q_1\}$	$\{q_1, q_0\}$



(ii) Table partitioning Method.

(1) Remove all the unreable states from Initial state

(2) Draw Transition Table

(3) Split the Transition Table into T_1 & T_2.

T_1 → Contains all final states

T_2 → Contains non-final states

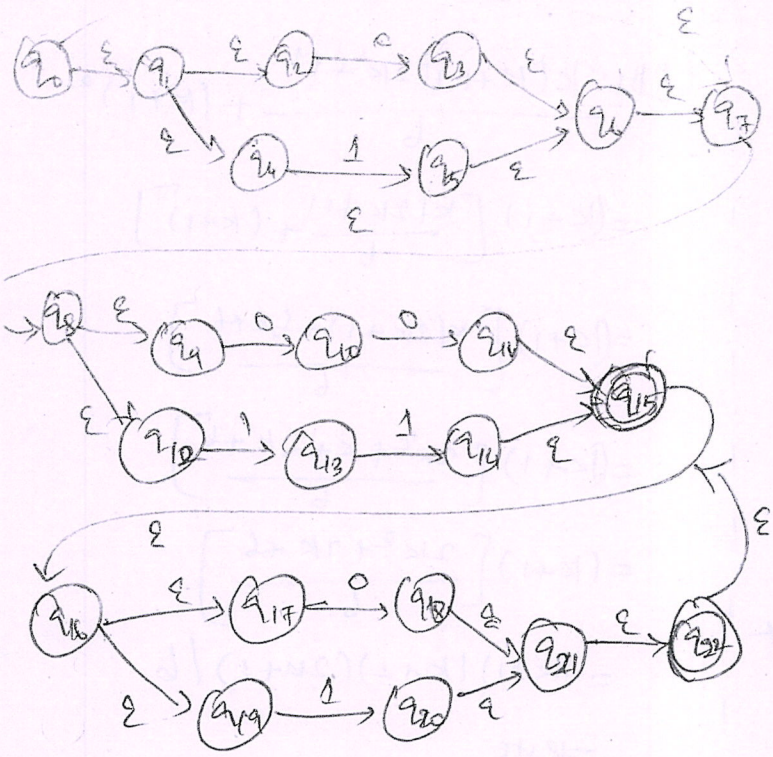
(4) Find similar rows from T_1 & T_2, By if it is same, replace one of them by another one

(5) Repeat Step 3 until find no similar rows

(6) Repeat 3 & 4th step for table T_2 also.

(7) Now Combine reduced T_1 & T_2.

13) (a) (ii) $(0+1)^*(00+11)(0+1)^*$



13) (b) (i) Regular sets closed under Complementation.

Let A, B are Regular languages.

$COR(A,B) = \{x : x \notin A \text{ or } x \notin B\}$

$\Rightarrow \{x : x \in A\text{'s Complement}\} \cup$

$\{x : x \in B\text{'s Complement}\}$

$\because$ A & B are regular,

$M_1 = \{Q_1, \Sigma, \delta_1, q_{01}, F_1\}$ &

$M_2 = \{Q_2, \Sigma_2, \delta_2, P_0, F_2\}$ be DFA's that accept A & B.

Then DFA's M_1's complement $= \{Q_1, \Sigma_1, \delta_1, q_{01}, Q_1 - F_1\}$

M_2's Complement $= \{Q_2, \Sigma, \delta_2, P_0, Q_2 - F_2\}$.

accept A's complement & B's complement.

Thus $\{x : x \notin A\}$ & $\{x : x \notin B\}$ are regular.

$\therefore$ That Complementation operation of (A, B) is regular.

Staff Incharge

(b) (i) DFA, three consecutive 0's. Ambiguous grammar.

$E \to E+E \mid E*E \mid E \mid id$

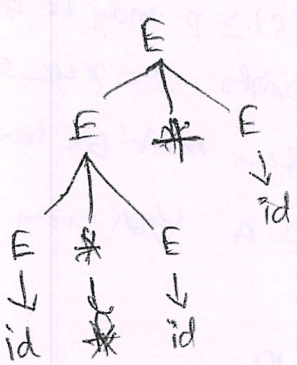
id * id+id → string.

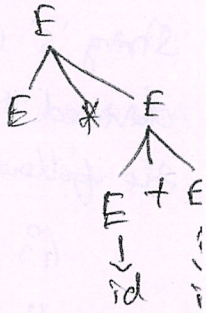
LDT 1:

$E \to E*E$
$\to id * E$
$\to id * id+E$
$\to id * id+id$

LDT 2:

$E \to E+E$
$\to E*E+E$
$\to id * id+E$
$\to id * id+id$





13) (b) (ii) $\{S\}, \{a,b\}, \{S \to aSb\}$

$\{S \to ab\}, S\}$

S
$\downarrow$
aSb
$\downarrow$
$aaSbb$
$\downarrow$
$aaaSbbb$
$\downarrow$
$aaaabbb$

$L = \{a^n b^n, n \geq 1\}$

13) (b) (iii) Operations on the Set.

(i) Union
(ii) Intersection
(iii) Concatenation
(iv) Complementation

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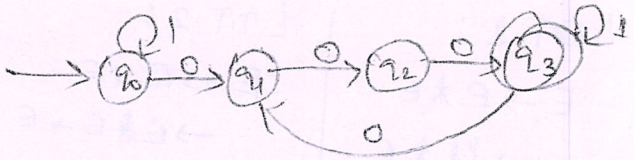
12) (a) (i) Strings with 3 consecutive 0's

$L = \{000, 0001, 1000, 10001, \ldots\}$

Minimum no. of states = 3

No. of states = 3 + 1 = 4



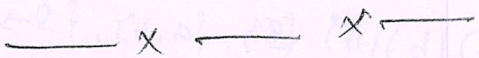
(ii) Pumping lemma:

Pumping lemma 'p', such that any string 's' where $|s| \geq p$ may be ~~depend~~ divided into 3 parts. $s = xyz$ such that the following conditions must be true.

(i) $xy^iz \in A$ for every $i \geq 0$

(ii) $|y| > 0$

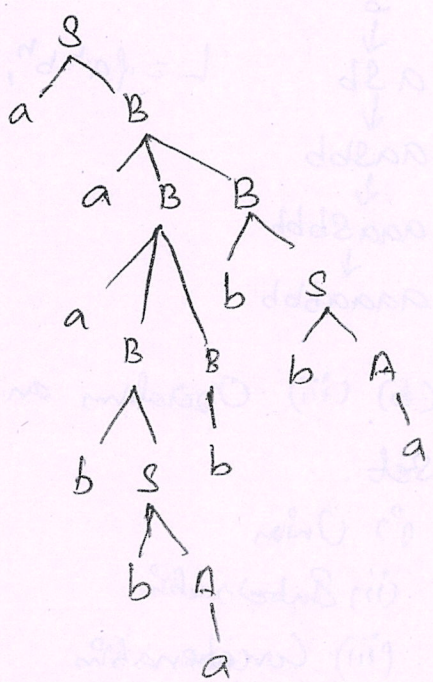
(iii) $|xy| < p$.



14) (b) (i) aaabbabbba

RDT:

LDT:



S

aB

aaBB

aaBbS

aaBbbA

aaBbbba

aaaBBbbba

aaaBbbba

aaabSbbba

aaabbAbbba

aaabbabbba

15) (a) (i) $\sum i^2 = n(n+1)(2n+1)/6$.

LHS: $\frac{k(k+1)(2k+1)}{6} + (k+1)^2$

$= (k+1)\left[\frac{k(2k+1)}{6} + (k+1)\right]$

$= (k+1)\left[\frac{k(2k+1)+6k+6}{6}\right]$

$= (k+1)\left[\frac{2k^2+k+6k+6}{6}\right]$

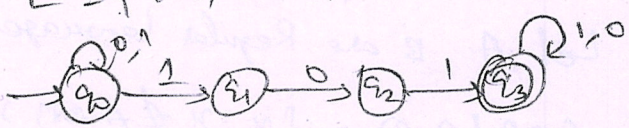
$= (k+1)\left[\frac{2k^2+7k+6}{6}\right]$

$= (k+1)(k+2)(2k+3)/6$

$=$ RHS.

(ii) DFA, Substring (101)

$L = \{101, 0101, 1010 \ldots\}$

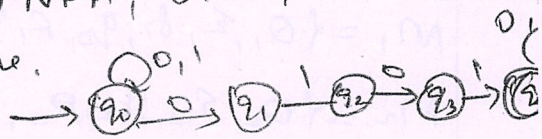


15) (b) (i) closure properties of R.L

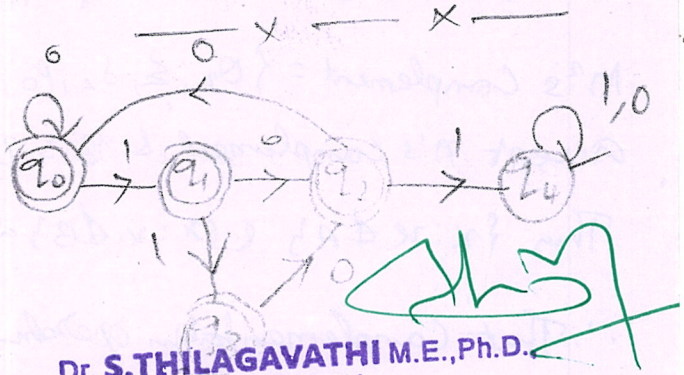
Union, Complement, Intersection, Reversal, difference, closure, Concatenation, Inverse homomorphism, Homomorphism.

15) (b) (ii) NFA, 0101, R.E for it.

Same.



$(0+1)^*0101(0+1)^*$.



15) (b) (iii) Differentiate DFA & NFA

DFA	NFA
① I/p string to unique state	More than 1 next state.
② Complex to convert from RE	Easy to convert from RE

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Cycle Test Answer Book

Name	Shamima P			**Year/ Semester/Section**	II / IV
Reg No.	912621104020	**Date/Session**	27/3/23 FN	**Department**	CSE
Course code	CS 3452	**Course Title**	Theory of Computation		
Cycle Test		**CT 1** ☑	**CT 2** ☐	**CT 3** ☐	**Model** ☐
Name and Signature of the Invigilator with date		M.P 27/3/23	[M. PARVEEN BANU]		

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B / Part C					Total Marks
Q. No.	✓	Marks	Q. NO.	✓	a Marks	✓	b Marks	
1		2	11	✓	12			12
2		2	12			✓	13	13
3		2	13	✓	13			13
4		2	14	✓	13			13
5		2	15	✓	13			13
6		2	16			✓	14	14
7		2					Grand Total	78
8		2	98					
9		2						
10		2						
Total		20	Grand Total				Name and Signature of the Examiner with date	

[S. Yogalakshmi] 28/3/23

To be filled by the examiner							
Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	54	30	16				100
Marks Obtained	53	30	15				98

IQAC Audit - Remarks

B Priya 29/3/23

Name and Signature of the IQAC member

[MRS. B. PRIYA]

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2022 – 2023 (EVEN SEMESTER)

STUDENTS MARK STATEMENT- CO BASED

CYCLE TEST-I

SUBJECT CODE &TITLE: CS3452 – THEORY OF COMPUTATION

YEAR/SEM: II YEAR & IV SEMESTER **MONTH & YEAR : MARCH - 2023**

S.NO	REG NO	STUDENT NAME	CO1 (54)	CO2 (30)	CO3 (16)	TOTAL (100)
1.	912621104001	ABINAYA K	-	-	-	AB
2.	912621104002	AMEERA N	45	28	14	87
3.	912621104003	ANJUGAM C	45	14	12	71
4.	912621104004	ARUNDATHI S	46	26	13	85
5.	912621104005	ASHIKA B	55	22	11	88
6.	912621104006	DIVYA T	20	14	7	41
7.	912621104007	ELACKIYA G	28	24	12	64
8.	912621104008	GAYATHRI K	16	16	8	40
9.	912621104009	GEETHA M	31	24	12	67
10.	912621104010	HARSHITHA P	52	28	14	94
11.	912621104011	ISHWARYA S	40	26	13	79
12.	912621104012	JANANI R	10	12	5	27
13.	912621104015	LAVANYA S	-	-	-	AB
14.	912621104016	MAHASREE P	21	16	8	45
15.	912621104018	PRIYA M	30	22	11	63
16.	912621104019	RABIKA R	-	-	-	AB
17.	912621104021	SAHEENA BEGAM A	53	29	14	96
18.	912621104022	SASIPRIYA R	48	16	8	72
19.	912621104023	SHAMIMA P	53	30	15	98
20.	912621104024	SHEERA BANU A	33	14	7	54
21.	912621104025	SIVAJOTHIKA S	49	16	8	73

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22.	912621104026	SIVAPRIYA R	13	8	4	25
23.	912621104027	SUBHA DHARSHINI S	-	-	-	AB
24.	912621104028	SUBIKSHA S	6	10	5	21
25.	912621104029	VINITHA K	3	6	3	12
26.	912621104030	VISALATCHI S	36	14	7	57
27.	912621104301	VAISHNAVI B	38	20	10	68
28.	912621104302	VISHNU PRIYA A	38	28	14	80
29.	912621104701	AARTHI S	14	10	5	29
30.	912621104702	SWATHI A.R	44	24	12	80

MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
1	4	1	2	2	4	6	3	3

Total No.of Candidates Present	**26**
Total No.of Candidates Absent	**04**
Total No.of Students Pass	**18**
Total No. of Students Fail	**08**
Percentage of Pass	**69.3**

FACULTY IN-CHARGE **HoD/CSE** **PRINCIPAL**

28/3/23

28/3/23

HOD / CSE
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ROOT CAUSE ANALYSIS

Name of the Faculty : S. YOGALAKSHMI.
Degree & Program : B.E & CSE
Cycle Test : I /II/III
Target : 100 %

Course Code & Name: CS3452 Theory of computation
Semester : IV
Exam/Month & Year : May 2023
Achieved : 97 %

S.NO	REG NO	NAME OF THE STUDENT	CAUSES FOR FAILURE	CORRECTIVE ACTION TAKEN
1.	912621104028	Subiksha. S	ABSENT	Advice to attend the exam without fail; informed to parents
2.	912621104030	visalatchi. S	Not study well because of illness	Advice to take good care of health.
3.				
4.				
5.				
6.				

Signature of the Faculty in-charge

Signature of the HoD/CSE

Dr. S.THILAGAVATHI M.E., Ph.D.,
PRINCIPAL
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
Kaikkurchi - 622 303, Pudukkottai Dt.

22-23-EVEN-R

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN
KAIKKURICHI, PUDUKKOTTAI – 622 303.

Date: 29.03.2023

Circular

Retest for First cycle test will be conducted from 03.04.2023 to 8.04.2023 for the IV, VI & VIII semester (II, III & IV year) students.

The following instructions are to be followed by the faculty members.

- Total marks for which the question paper to be set will be for 50 marks. **(PART A** 5X2=10, **PART B** 2X13=26 **& PART C** 1X14=14)
- It is the responsibility of the **question paper** setter to take the Xerox copies of the required number of question papers.
- Concerned Faculty members are requested to conduct the examination as per the schedule and handover the valued answer scripts to the students on or before 10.04.2023.

PRINCIPAL

Cc:

- All HoD'S /CIVIL/CSE/EEE/ECE
- All faculty
- IQAC Co-ordinator
- Exam cell
- Office file

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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN
KAIKKURICHI, PUDUKKOTTAI – 622 303.

Circular

Date: 29.03.2023

Retest for First cycle test will be conducted from 03.04.2023 to 8.04.2023 for the IV semester (II year) B.E students for 50 marks as per the time table given below. Students are directed to prepare well and score good marks.

Date	4.00 pm -5.30 pm
03-04-2023	CE3401- Applied Hydraulics Engineering (CIVIL) CS3491- Artificial Intelligence and Machine Learning (CSE) EE3402- Linear Integrated Circuits(EEE) EC3491- Communication Systems(ECE)
04-04-2023	CE3403- Concrete Technology (CIVIL) CS3492- Database Management Systems (CSE) EE3404- Microprocessor and Microcontroller(EEE) EC3401- Network and Security(ECE)
05-04-2023	CE3405- Highway and Railway Engineering (CIVIL) CS3401- Algorithms (CSE) EE3403- Measurements & Instruments(EEE) EC3492- Digital Signal Processing(ECE)
06-04-2023	CE3404 Soil Mechanics (CIVIL) CS3451- Introduction to Operating Systems (CSE) EE3405- Electrical Machines-II(EEE) EC3451- Linear Integrated Circuits(ECE)
07-04-2023	CE3402 -Strength Of Materials (CIVIL) CS3452- Theory of Computation(CSE) EE3401- Transmission and Distribution(EEE) EC3452- Electromagnetic Fields(ECE)
08-04-2023	GE3451- Environmental Science and Sustainability(CIVIL/CSE/EEE/ECE)

PRINCIPAL

29/3/23

Cc:

- All II year B.E Classes
- All faculty
- IQAC Co-ordinator
- Exam cell
- Notice Board
- Office file

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PRINCIPAL
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Kaikkurchi - 622 303, Pudukkottai Dt.

Register Number:											

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

Cycle Test – I (Retest)			Date/Session	7/4/2023	Marks	50
Course code	CS3452	Course Title	Theory of Computation			
Regulation	2021	Duration	90 Minutes	Academic Year	2022-2023	
Year	II	Semester	IV	Department	CSE	

COURSE OUTCOMES

C210.1:	Construct automata theory using Finite Automata
C210.2:	Write regular expressions for any pattern
C210.3:	Design context free grammar
C210.4:	Ability to design Pushdown Automata
C210.5:	Design Turing machine for computational functions
C210.6:	Differentiate between decidable and undecidable problems

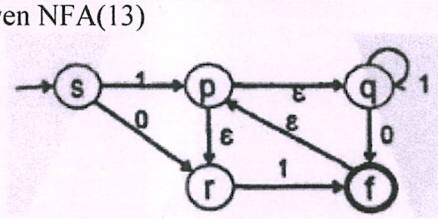
Q.No.	Question	CO	BTL
	PART A **(Answer all the Questions 5 x 2 = 10 Marks)**		
1	Write the operations that are performed on languages.	C210.2	K1
2	Define transition graph.	C210.1	K1
3	Explain kleen closure.	C210.1	K2
4	Define kleen plus.	C210.2	K1
5	Define regular expression.	C210.2	K1
	PART B **(Answer all the Questions 2 x 13 = 26 Marks)**		
6(a)	Consider the following ε–NFA. Compute the ε–closure of each state and find it's equivalent DFA (13)	C210.1	K6
6(b)	Design a finite automata for the regular expression $(a+b)^*(aa+bb)(a+b)^*$ (13)	C210.1	K6
7(a)	Determine the DFA from given NFA.(13)	C210.1	K4
7(b)	Determine the DFA from given NFA(13)	C210.1	K4
	PART C **(Answer all the Questions 1 x 14 = 14 Marks)**		
8(a)	Minimize the DFA using Myhill-Nerode Theorem (14)	C210.1	K3

	E	A	b	C
p	{q}	{p}	Φ	Φ
q	{r}	Φ	{q}	Φ
*r	Φ	Φ	ϕ	{r}

OR

δ	A	B
Q0	{q0,q1}	{q1}
Q1	-	{q0,q1}

OR



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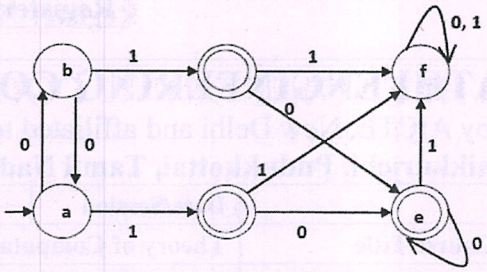
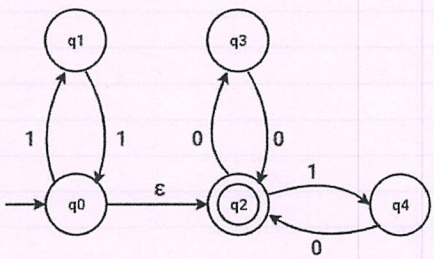
			
	OR		
8(b)	Convert the given NFA with epsilon to NFA without epsilon.(14) 	**C210.1**	**K3**

Course Faculty
(Name /Sign / Date)

HoD
(Name /Sign / Date)

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PUDUKKOTTAI - 622 303.

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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)
KAIKURICHI,PUDUKKOTTAI -622 303
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
ACADEMIC YEAR 2022 – 2023 (EVEN SEMESTER)
ATTENDANCE SHEET FOR RETEST

RETEST FOR CYCLE TEST-I

PROGRAM : B.E / CSE
YEAR/SEM : II/IV
SUBJECT CODE & TITLE : CS3452 – THEORY OF COMPUTATION
DATE : 7.04.2023

S.NO	REG.NO	NAME	SIGNATURE
1	912621104001	ABINAYA K	
2	912621104006	DIVYA T	
3	912621104008	GAYATHRI K	
4	912621104012	JANANI R	
5	912621104015	LAVANYA S	
6	912621104016	MAHASREE P	
7	912621104019	RABIKA R	
8	912621104026	SIVAPRIYA R	
9	912621104027	SUBHA DHARSHINI S	
10	912621104028	SUBIKSHA S	
11	912621104029	VINITHA K	
12	912621104701	AARTHI S	

SIGNATURE OF THE FACULTY

HoD/CSE
HOD / CSE
SRI BHARATHI ENGINEERING
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PUDUKKOTTAI - 622 303.

Dr. S.THILAGAVATHI M.E.,Ph.D.,
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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

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KAIKKURICHI,PUDUKKOTTAI-622 303
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
ACADEMIC YEAR 2022 – 2023 (EVEN SEMESTER)
STUDENTS MARK STATEMENT –CO BASED
SECTION -A
RETEST FOR CYCLE TEST-I

PROGRAM : B.E / CSE
YEAR/SEM : II/IV
SUBJECT CODE & TITLE : CS3452 – THEORY OF COMPUTATION
DATE : 07.04.2023

SI .NO	REG.NO	NAME	CO1 (44)	CO2 (6)	TOTAL (50)	MARKS (100)
1	912621104001	ABINAYA K	25	4	29	58
2	912621104006	DIVYA T	23	2	25	50
3	912621104008	GAYATHRI K	26	2	28	56
4	912621104012	JANANI R	29	2	31	62
5	912621104015	LAVANYA S	25	-	25	50
6	912621104016	MAHASREE P	26	4	30	**60**
7	912621104019	RABIKA R	25	2	27	54
8	912621104026	SIVAPRIYA R	20	2	22	**44**
9	912621104027	SUBHA DHARSHINI S	32	4	36	72
10	912621104028	SUBIKSHA S	23	2	25	50
11	912621104029	VINITHA K	18	2	20	**40**
12	912621104701	AARTHI S	29	2	31	**62**

MARK RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
-	-	1	4	4	2	1	-	-

Total Number of Students Present	**12**
Total Number of Students Absent	**00**
Total Number of Candidates Pass	**10**
Total Number of Candidates Fail	**02**
Percentage of Pass	**83%**

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8/4/23

SIGNATURE OF THE FACULTY **HoD/CSE** **PRINCIPAL**

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SRI BHARATHI ENGINEERING
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KAIKKURICHI,
PUDUKKOTTAI - 622 303.

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PUDUKKOTTAI DISTRICT

SRIBHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

KAIKKURICHI, PUDUKKOTTAI – 622 303

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2022 – 2023 (EVEN SEMESTER)

INTERNAL MARK STATEMENT (OUT OF 40)

SUBJECT CODE &TITLE: CS3452 – THEORY OF COMPUTATION

YEAR/SEM: II YEAR & IV SEMESTER

S.NO	REG NO	STUDENT NAME	TOTAL (40)
1.	912621104001	ABINAYA K	25
2.	912621104002	AMEERA N	36
3.	912621104003	ANJUGAM C	30
4.	912621104004	ARUNDATHI S	36
5.	912621104005	ASHIKA B	34
6.	912621104006	DIVYA T	24
7.	912621104007	ELACKIYA G	30
8.	912621104008	GAYATHRI K	26
9.	912621104009	GEETHA M	30
10.	912621104010	HARSHITHA P	39
11.	912621104011	ISHWARYA S	36
12.	912621104012	JANANI R	25
13.	912621104015	LAVANYA S	24
14.	912621104016	MAHASREE P	26
15.	912621104018	PRIYA M	31
16.	912621104019	RABIKA R	23
17.	912621104021	SAHEENA BEGAM A	39
18.	912621104022	SASIPRIYA R	35
19.	912621104023	SHAMIMA P	39
20.	912621104024	SHEERA BANU A	28
21.	912621104025	SIVAJOTHIKA S	34

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22.	912621104026	SIVAPRIYA R	24
23.	912621104027	SUBHA DHARSHINI S	29
24.	912621104028	SUBIKSHA S	23
25.	912621104029	VINITHA K	23
26.	912621104030	VISALATCHI S	26
27.	912621104301	VAISHNAVI B	33
28.	912621104302	VISHNU PRIYA A	33
29.	912621104701	AARTHI S	24
30.	912621104702	SWATHI A.R	36

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STAFF IN-CHARGE

HoD/CSE 16/5/23

HOD / CSE
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
KAIKKURICHI,
PUDUKKOTTAI - 622 303

PRINCIPAL 16/5/23

PRINCIPAL
SRI BHARATHI ENGINEERING
COLLEGE FOR WOMEN
KAIKKURICHI - 622 303.
PUDUKKOTTAI DISTRICT

SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

KAIKKURICHI, PUDUKKOTTAI – 622 303

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2022-2023 (EVEN SEMESTER)

UNIVERSITY EXAM RESULT

SUBJECT CODE &TITLE: CS8452 THEORY OF COMPUTATION

YEAR/SEM: II/IV

S.NO	REG NO	STUDENT NAME	GRADE
1.	912621104001	ABINAYA K	C
2.	912621104002	AMEERA N	A
3.	912621104003	ANJUGAM C	U
4.	912621104004	ARUNDATHI S	U
5.	912621104005	ASHIKA B	B+
6.	912621104006	DIVYA T	U
7.	912621104007	ELACKIYA G	B
8.	912621104008	GAYATHRI K	B
9.	912621104009	GEETHA M	U
10.	912621104010	HARSHITHA P	B+
11.	912621104011	ISHWARYA S	B+
12.	912621104012	JANANI R	C
13.	912621104015	LAVANYA S	C
14.	912621104016	MAHASREE P	C
15.	912621104018	PRIYA M	B
16.	912621104019	RABIKA R	C
17.	912621104021	SAHEENA BEGAM A	B+
18.	912621104022	SASIPRIYA R	B+
19.	912621104023	SHAMIMA P	B+
20.	912621104024	SHEERA BANU A	U
21.	912621104025	SIVAJOTHIKA S	B+

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22.	912621104026	SIVAPRIYA R	U
23.	912621104027	SUBHA DHARSHINI S	B
24.	912621104028	SUBIKSHA S	C
25.	912621104029	VINITHA K	U
26.	912621104030	VISALATCHI S	U
27.	912621104301	VAISHNAVI .B	B+
28.	912621104302	VISHNU PRIYA. A	B
29.	912621104701	AARTHI. S	U
30.	912621104702	SWATHI. A.R	B+

STAFF INCHARGE

HoD/CSE

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PUDUKKOTTAI DISTRICT

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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN,KAIKKURUCHI

Department of Computer Science and Engineering

Internal Assessment -Attainment of Course Outcomes (Through Direct Assessment)

ACADEMIC YEAR - 2022 - 23		BATCH	2021 - 2025					
COURSE CODE/TITLE	CS83452 (C210) /THEORY OF COMPUTATION	COURSE OUTCOME	1	2	3	4	5	6
YEAR/SEM	II/IV	TARGET(%)	65	65	65	65	65	65
COURSE COORDINATOR	S YOGALAKSHMI,AP/CSE	TOTAL STRENGTH	30					

ATTAINMENT LEVEL	Level	Range
	1	UP TO 60% of the students scored more than target
	2	61 - 79% of the students scored more than target
	3	80% & ABOVE of the students scored more than target

S.NO	REG NO	NAME OF THE STUDENT	IAT 1 - MARKS ALLOTED						IAT 2 - MARKS ALLOTED						IAT 3 - MARKS ALLOTED						Assignment / Mini Project /Tutorial / Seminar						TOTAL COURSE OUTCOME					
			C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6
			40	30	30							40	30	30								10	10		10	10	40	40	40	40	40	40
1	912621104001	ABINAYA K	20	15	23							30	23	23								9	9		9	9	20	24	32	30	32	32
2	912621104002	AMEERA N	36	27	27							36	27	27								9	9		8	9	36	36	36	36	35	36
3	912621104003	ANJUGAM C	31	23	21							28	21	21								9	9		9	9	31	32	30	28	30	30
4	912621104004	ARUNDATHI S	35	26	28							37	28	28								9	8		9	9	35	35	36	37	37	37
5	912621104005	ASHIKA B	36	27	24							32	24	24								9	7		9	9	36	36	31	32	33	33
6	912621104006	DIVYA T	23	17	19							26	19	19								9	9		9	9	23	26	28	26	28	28
7	912621104007	ELACKIYA G	30	23	22							29	22	22								9	8		9	9	30	32	30	29	31	31
8	912621104008	GAYATHRI K	23	17	22							29	22	22								9	9		9	9	23	26	31	29	31	31
9	912621104009	GEETHA M	30	23	22							30	22	22								9	9		9	9	30	32	31	30	31	31
10	912621104010	HARSHITHA P	38	29	29							39	29	29								9	9		8	8	38	38	38	39	37	37
11	912621104011	ISHWARYA S	34	25	29							38	29	29								9	9		8	8	34	34	38	38	37	37
12	912621104012	JANANI R	20	15	23							30	23	23								9	9		8	7	20	24	32	30	31	30
13	912621104015	LAVANYA S	20	15	20							27	20	20								9	9		9	9	20	24	29	27	29	29
14	912621104016	MAHASREE P	26	19	20							27	20	20								9	9		9	9	26	28	29	27	29	29
15	912621104018	PRIYA M	30	23	23							31	23	23								9	8		9	9	30	32	31	31	32	32
16	912621104019	RABIKA R	20	15	19							25	19	19								8	8		9	9	20	23	27	25	28	28
17	912621104021	SAHEENA BEGAM A	39	29	29							38	29	29								9	8		9	8	39	38	37	38	38	37
18	912621104022	SASIPRIYA R	33	25	28							37	28	28								8	9		9	9	33	33	37	37	37	37
19	912621104023	SHAMIMA P	40	30	29							39	29	29								8	9		9	8	40	38	38	39	38	37
20	912621104024	SHEERA BANU A	27	20	22							29	22	22								9	9		8	8	27	29	31	29	30	30
21	912621104025	SIVAJOTHIKA S	33	25	26							34	26	26								9	9		8	8	33	34	35	34	34	34

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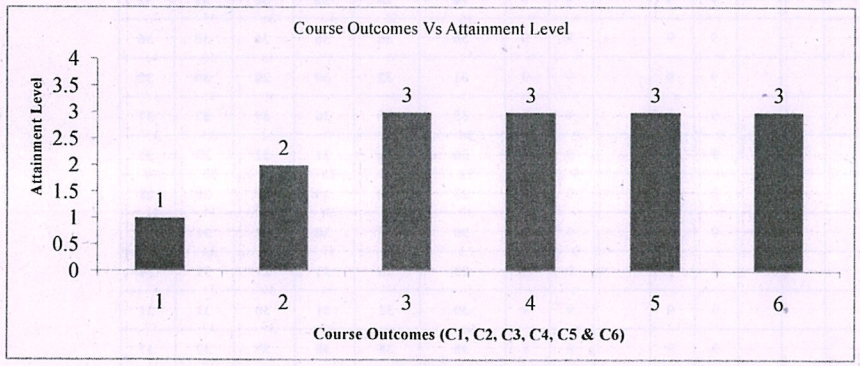
22	912621104026	SIVAPRIYA R	20	15	22							29	22	22								9	9		8	7	20	24	31	29	30	29
23	912621104027	SUBHA DHARSHINI S	20	15	29							38	29	29								9	9		9	9	20	24	38	38	38	38
24	912621104028	SUBIKSHA S	20	15	20							27	20	20								9	9		9	9	20	24	29	27	29	29
25	912621104029	VINITHA K	20	15	20							27	20	20								9	8		9	9	20	24	28	27	29	29
26	912621104030	VISALATCHI S	28	21	17							23	17	17								8	8		8	9	28	29	25	23	25	26
27	912621104301	VAISHNAVI .B	32	24	26							34	26	26								9	8		9	8	32	33	34	34	35	34
28	912621104302	VISHNU PRIYA. A	34	26	24							32	24	24								8	9		8	9	34	34	33	32	32	33
29	912621104701	AARTHI. S	21	16	20							27	20	20								8	9		9	8	21	24	29	27	29	28
30	912621104702	SWATHI. A.R	34	26	29							38	29	29								8	9		8	8	34	34	38	38	37	37

CO's Target Value	26.0	26.0	26.0	26.0	26.0	26.0
No. of Students scored above CO's Target Value	18	21	29	27	29	30
Percentage of Students scored above Target	60.0	70.0	96.7	90.0	96.7	100.0
CO Attainment	1	2	3	3	3	3
CO attainment Values to plot the Graph	1	2	3	3	3	3



Faculty Incharge

HOD/CSE

HOD / CSE
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KAIKKURICHI,
PUDUKKOTTAI - 622 303

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SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN
DEPARTMENT OF CSE
COURSE OUTCOME ATTAINMENT - UNIVERSITY EXAMINATION
ACADEMIC YEAR : 2022 - 2023 (EVEN SEM)

YEAR/SEM: II CSE / IV **Batch:2021-2025**
SUBJECT :CS3452(C210) / THEORY OF COMPUTATION
CO Attainment Level: 1 - (UPTO 60%) 2- (61%-79%) 3-(80% and Above)
TOTAL STRENGTH : 30

S.NO	Register No	NAME	Univ. Grade
1	912621104001	ABINAYA K	C
2	912621104002	AMEERA N	A
3	912621104003	ANJUGAM C	U
4	912621104004	ARUNDATHI S	U
5	912621104005	ASHIKA B	B+
6	912621104006	DIVYA T	U
7	912621104007	ELACKIYA G	B
8	912621104008	GAYATHRI K	B
9	912621104009	GEETHA M	U
10	912621104010	HARSHITHA P	B+
11	912621104011	ISHWARYA S	B+
12	912621104012	JANANI R	C
13	912621104015	LAVANYA S	C
14	912621104016	MAHASREE P	C
15	912621104018	PRIYA M	B
16	912621104019	RABIKA R	C
17	912621104021	SAHEENA BEGAM A	B+
18	912621104022	SASIPRIYA R	B+
19	912621104023	SHAMIMA P	B+
20	912621104024	SHEERA BANU A	U
21	912621104025	SIVAJOTHIKA S	B+
22	912621104026	SIVAPRIYA R	U
23	912621104027	SUBHA DHARSHINI S	B
24	912621104028	SUBIKSHA S	C
25	912621104029	VINITHA K	U
26	912621104030	VISALATCHI S	U
27	912621104301	VAISHNAVI .B	B+
28	912621104302	VISHNU PRIYA. A	B
29	912621104701	AARTHI. S	U
30	912621104702	SWATHI. A.R	B+

No. of O Grade		0	0
No. of A+ Grade		0	0
No. of A Grade		1	1
No.of B+ Grade		9	9
No. of B Grade		5	5
No. of C Grade		6	6
No. of U Grade		9	9
Target for course outcome Attainment		60	30
No of students above the target		16	
CO-Attainment University (%)		53.33	

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Faculty

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Overall Attainment Sheet – COs - POs & PSOs attainment calculation

CO	CO-Attainment Internal (CO-INT) (Avg. Attainment of All section) (%)	CO-Attainment University (CO-UNI) (Avg. Attainment of All section) (%)	Direct CO Attainment (0.20xCO-INT + 0.80xCO-UNI) (%)	CO Attainment Level
C210.1	60.0	53.33	54.7	1
C210.2	70.0	53.33	56.7	1
C210.3	96.7	53.33	62.0	2
C210.4	90.0	53.33	60.7	2
C210.5	96.7	53.33	62.0	2
C210.6	100.0	53.33	62.7	2

Closure of the Quality Loop:

CO	CO-Target for Academic Year						CO Attainment Gap for (%) 16-17	Action Proposed to Bridge the Gap
	14-15		15-16		16-17			
C210.1	65	79.71	65	69	65	54.7	-	-
C210.2	65	79.71	65	71.17	65	56.7	-	-
C210.3	65	79.71	65	63.15	65	62.0	-	-
C210.4	65	79.71	65	75.11	65	60.7	-	-
C210.5	65	79.71	65	73.57	65	62.0	-	-
C210.6	65	79.71	65	68.44	65	62.7	-	

Expected CO-PO Level

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C210.1	3	3	2	2	1	-	-	-	1	1	1	1	2	2	2
C210.2	2	2	2	2	1	-	-	-	1	1	1	1	2	2	2
C210.3	2	2	2	2	1	-	-	-	1	1	1	1	2	2	2
C210.4	2	2	2	1	1	-	-	-	1	1	1	1	2	2	2
C210.5	2	2	2	1	1	-	-	-	1	1	1	1	3	3	3
C210.6	3	2	2	2	1	-	-	-	1	1	1	1	2	2	2
C210	**2.3**	**2.2**	**2**	**1.7**	**1**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**2.2**	**1**	**1**

PO Attainment Level

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C210.1	1	1	0.67	0.67	0.33	-	-	-	0.33	0.33	0.33	0.33	0.67	0.67	0.67
C210.2	0.67	0.67	0.67	0.67	0.33	-	-	-	0.33	0.33	0.33	0.33	0.67	0.67	0.67
C210.3	1.33	1.33	1.33	1.33	0.67	-	-	-	0.67	0.67	0.67	0.67	1.33	0.67	0.67
C210.4	1.33	1.33	1.33	0.67	0.67	-	-	-	0.67	0.67	0.67	0.67	1.33	0.67	0.67
C210.5	1.33	1.33	1.33	0.67	0.67	-	-	-	0.67	0.67	0.67	0.67	2	1	1
C210.6	2	1.33	1.33	1.33	0.67	-	-	-	0.67	0.67	0.67	0.67	1.33	0.67	0.67
C210	1.28	1.17	1.11	0.89	0.56	-	-	-	0.56	0.56	0.56	0.56	1.22	0.33	0.33

Attainment of POs and PSOs:

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C210	2.3	2.2	2	1.7	1	-	-	-	1	1	1	1	2.2	1	1
Attainment	1.28	1.17	1.11	0.89	0.56	-	-	-	0.56	0.56	0.56	0.56	0.33	0.33	0.33

Comments by Program Coordinator	
Remarks by HoD	

Name and Signature of the Faculty Member

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