DEPARTMENT OF COMPUTER SCIENCE

Nallamuthu Gounder Mahalingam College
(Autonomous)
(An ISO 9001:2015 Certified Institution)
Re-Accredited by NAAC
Pollachi-642001

SYLLABUS

B. Sc. COMPUTER SCIENCE
BATCH 2023-2026

NGM COLLEGE

Vision

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

DEPARTMENT OF COMPUTER SCIENCE

Department Vision

Our vision is to make the department, a department of excellence at the international level by imparting need based Information Technology education of global industry standards to make students academically and technically sound, enriched with rich spiritual quotients, contribute to the overall development of the self, societyand country.

Department Mission

Developing students to become role models as technocrats by imparting technical knowledge, recent curriculum in catering the needs of Information Technology industry and quality education through dedicated faculty and rejuvenate students into technically sound, in order to make globally fit and improve the standard of life.

Programme Educational Objectives (PEOs)

The **B. Sc. Computer Science** programme describe accomplishments that graduatesare expected to attain within five to seven years after graduation	
PEO1	To enrich knowledge in core areas related to the field of computer science and Mathematics.
PEO2	To provide opportunities for acquiring in-depth knowledge in Industry 4.0/5.0 tools and techniques and there by design and implement software projects to meet customer's business objectives.
PEO3	To enable graduates to pursue higher education leading to Master and Research Degrees or have a successful career in industries associated with Computer Science or as entrepreneurs
PEO4	To enhance communicative skills and inculcate team spirit through professional activities. skills in handling complex problems in data analysis and research project to make them a better team player.
PEO5	To embed human values and professional ethics in the young minds andcontribute towards nation building.

Programme Outcomes (POs)

On successful completion of the B.Sc. **Computer Science** program

PO1	**Problem Solving:** Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.
PO2	**Disciplinary Knowledge:** Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation.
PO3	**Scientific reasoning/ Problem analysis:** Ability to link knowledge of Computer Science with other two chosen auxiliary disciplines of study.
PO4	**Environment and sustainability:** Understand the impact of software solutions in environmental and societal context and strive for sustainable development.
PO5	**Modern tool usage:** Use contemporary techniques, skills and digital tools necessary for integrated solutions.
PO6	**Design Development Solution:** Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate
PO7	**Team Work :** Ability to operate as a member, leader and manage, deploy, Configure computer network, hardware, software operation of an organization
PO8	**Communication Skills:** An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups
PO9	**Emerging Technology Usage:** Ability to appreciate emerging technologies and tools.
PO10	**Decision Making :** Ability to apply decision making methodologies to evaluate solution forefficiency, effectiveness, and sustainability

Programme Specific Outcomes (PSOs)

After the successful completion of **B.Sc. Computer Science** program, the students are expected to

PSO1	**Software Development:** Design and develop computer programs/computer -based systems Development in the areas related to algorithms, languages, networking, web development cloud computing, IoT and data analytics.
PSO2	**Education and Employment :** Ability to pursue higher studies of specialization and to take up technical employment

MAPPING OF PEOs WITH POs 2 PSOs

PEOs / POs, PSOs	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	H	M	M	L	L
PO2	M	M	H	L	L
PO3	M	H	M	H	L
PO4	M	H	M	L	L
PO5	M	H	H	H	M
PO6	M	H	H	H	L
PO7	H	M	H	H	M
PO8	M	H	H	H	M
PO9	H	H	M	H	L
PO10	H	H	H	M	L
PSO1	H	H	H	M	L
PSO2	H	M	H	H	M

B.Sc. – COMPUTER SCIENCE DEGREE COURSE

(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2023 – 2024 ONWARDS)

I to VI SEMESTERS

SCHEME OF EXAMINATIONS

SEMESTER - I										
Part	Subject Code	Title of the Paper	Hrs/ Week		Hrs/ Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	23UTL1C1	Tamil Paper-I (B)	5	-	-	3	25	75	100	3
	23UHN1C1	Hindi Paper-I								
	23UFR1C1	French Paper-I								
II	23UEN101 / 23UEN102	Communication Skills – I (Level I) / Communication Skills – I (Level II)	5	-	-	3	25	75	100	3
III	23UCS101	**CC I**: C Programming	4	-	-	3	25	75	100	4
	23UCS102	**CC II**: Digital Computer Fundamentals and Organization	5	-	-	3	25	75	100	4
	23UCS1A1/ 23UCS1A2	**GE I – Allied I**: Mathematics - Statistical Methods & Linear Algebra / Advanced Mathematics and Applied Statistics	5	-	-	3	25	75	100	4
	23UCS103	**CC Lab I**: Programming Lab in C	-	4	-	3	20	30	50	2
IV		**AECC I**: Environmental Studies	1	-	-	-	-	-	-	-
	23HEC101	Human Excellence: Personal Values& SKY Yoga Practice -I	1	-	-	2	20	30	50	1
V		Extension Activities – Annexure I	-	-	-	-	-	-	-	-
EC		Online Course (Optional) (MOOC / NPTEL / SWAYAM)	-	-	-	-	-	-	-	Grade
Total			**30**						**600**	**21**

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course

SEMESTER - II										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	23UTL2C2	Tamil Paper-II (B)	5	-	-	3	25	75	100	3
	23UHN2C2	Hindi Paper-II								
	23UFR2C2	French Paper-II								
II	23UEN202 / 23UEN203	Communication Skills – II (Level I) / Communication Skills – II (Level II)	5	-	-	3	25	75	100	3
III	23UCS204	**CC III**: Data Structures using C++	4	-	-	3	25	75	100	4
	23UCS205	**CC IV**: Data Communication and Computer Networks	4	-	-	3	25	75	100	4
	23UCS2A1 / 23UCS2A2	**GE II – Allied II**: Discrete Mathematics / Discrete Mathematical Structures	4	-	-	3	25	75	100	4
	23UCS206	**CC Lab II**: Programming Lab in Data Structures using C++	-	4	-	3	20	30	50	2
	23UCS2S1 / 23UCS2S2	**SEC I**: Naan Mudhalvan : Business English Communications / Blockchain	2	-	-	2	12	38	50	2
IV	23EVS201	**AECC I:** Environmental Studies	1	-	-	2	-	50	50	2
	23HEC202	Human Excellence - Family Values & SKY Yoga Practice – II	1	-	-	2	20	30	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-	-
EC	23CMM201	ManaiyiyalMahathuvam - I			15 Hrs.	2	-	50	50	Grade
	23CUB201	UzhavuBharatham - I			15 Hrs.	2	-	50	50	Grade
	23UCS2VA	**VAC I:** Cloud based Office Automation			30 Hrs.					2*
		Online Course (Optional) (MOOC / NPTEL / SWAYAM)								Grade
Total			**30**						**700**	**25**

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course;
SEC – Skill Enhancement Course

SEMESTER – III											
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	23UTL3C3	Tamil Paper-III (B)	3	-	-	3	25	75	100	3
	23UHN3C3	Hindi Paper-III								
	23UFR3C3	French Paper-III								
II	23UEN3C3	Communication Skills – III	3	-	-	3	25	75	100	3
III	23UCS307	CC V: Java Programming	4	-	-	3	25	75	100	4
	23UCS308	CC VI: Operating System Concepts and Linux	5	-	-	3	25	75	100	4
	23UCS3A1 / 23UCS3A2	GE III – Allied III: Computer Based Optimization Techniques / Resource Management Techniques	5	-	-	3	25	75	100	4
	23UCS309	CC Lab III: Programming Lab in Java	-	4	-	3	20	30	50	2
	23UCS310	CC Lab IV: Programming Lab in Linux	-	4	-	3	20	30	50	2
IV	23UCS3N1 / 23UCS3N2	Non-Major Elective I: Photoshop Lab/ Advanced Applications in MS Excel Lab	-	1	-	2	-	50	50	2
	23HEC303	Human Excellence - Professional Values & Ethics - SKY Yoga Practice – III	1	-	-	2	20	30	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-	-
EC	23CMM302	Manaiyiyal Mahathuvam - II			15 Hrs.	2	-	50	50	Grade
	23CUB302	Uzhavu Bharatham - II			15 Hrs.	2	-	50	50	Grade
Total			30						700	25

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; GE – Generic Elective; VAC-Department Specific Value Added Course;
*Extra Credits;

SEMESTER - IV										
Part	Subject Code	Title of the Paper	Hrs/ Week		Hrs. / Sem.	Exam Hrs	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	23UTL4C4	Tamil Paper-IV (B)	3	-	-	3	25	75	100	3
	23UHN4C4	Hindi Paper-IV								
	23UFR4C4	French Paper-IV								
II	23UEN4C4	Communication Skills – IV	3	-	-	3	25	75	100	3
III	23UCS411	CC VII: Python Programming	4	-	-	3	25	75	100	3
	23UCS412	CC VIII: Relational Database Management Systems	4	-	-	3	25	75	100	3
	23UCS4A1 / 23UCS4A2	GE IV – Allied IV: Accountancy for Decision Making / Financial Accounting	5	-	-	3	25	75	100	3
	23UCS413	CC Lab V: Programming Lab in Python	-	4	-	3	20	30	50	2
	23UCS414	CC Lab VI: Programming Lab in RDBMS	-	3	-	3	20	30	50	2
	23UCS4S1 / 23UCS4S2	SEC II: Naan Mudhalvan: Industry 4.0 / Aptitude for Placements	-	2	-	2	12/ 20	38/ 30	50	2
IV	23HEC404	Human Excellence : Social Values & SKY Yoga Practice –IV	1	-	-	2	20	30	50	1
	23UCS4N1 / 23UCS4N2	Non-Major Elective Paper -II : Flash Lab/ Internet Services and Applications Lab	-	1	-	2	-	50	50	2
V		Extension Activities - Annexure I	-	-	-	-	-	-	50	1
EC	23CMM403	Manaiyiyal Mahathuvam-III			15 Hrs.	2	-	50	50	Grade
	23CUB403	Uzhavu Bharatham – III			15 Hrs.	2	-	50	50	Grade
	23UCS4VA	VAC II: Python for Data Analytics			30 Hrs.					2*
Total			30						800	25

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; GE – Generic Elective; SEC – Skill Enhancement Course; VAC-Department Specific Value Added Course;
*Extra Credits;

SEMESTER – V										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
III	23UCS515	CC IX: Open Source Technologies	5	-	-	3	25	75	100	5
	23UCS516	CC X: Cyber Security	5	-	-	3	25	75	100	5
	23UCS5E1/ 23UCS5E2/ 23UCS5E3	DSE -I: Data Mining and Warehousing / Data Engineering with Google Cloud / Mobile Application Development	6	-	-	3	25	75	100	5
	23UCS517	CC Lab VII: Programming Lab in .NET	-	5	-	3	20	30	50	2
	23UCS518	CC Lab VIII: Programming Lab in PHP & MySQL	-	5	-	3	20	30	50	2
	23UCS5S1 / 23UCS5S2	SEC III: Azure Fundamentals / DevOps Foundation	3	-	-	2	12	38	50	2
IV	23HEC505	Human Excellence: National Values& SKY Yoga Practice-V	1	-	-	2	20	30	50	1
EC	23CSD501	Soft Skills Development – I	-		-	-	-	-	-	Grade
	23GKL501	General Knowledge	SS		-	2	-	50	50	Grade
	23UCS5AL	ALC – I: Cloud Computing	SS		-	-	-	100	100	2**
Total			30						500	22

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course
ALC-Advanced Learner Course (Optional)
*Extra Credits;**Credits – Based on course content maximum of 4 credits

SEMESTER - VI										
Part	Subject Code	Title of the Paper	Hrs/ Week		Hrs. / Sem.	Exam Hrs	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
III	23UCS619	Core XI :R Programming	5	-	-	3	25	75	100	3
	23UCS6E4 23UCS6E5 23UCS6E6	DSE–II:Artificial Intelligence and Machine Learning / FrontEnd Development with React / MongoDB	4	2	-	3	25	75	100	5
	23UCS6E7 23UCS6E8 23UCS6E9	DSE–III: Information Retrieval / HTML, Javascript and JQuery for Web Designing / Angular and NodeJS	4	2	-	3	25	75	100	5
	23UCS620	CC Lab IX: R Programming Lab	-	4	-	3	20	30	50	2
	23UCS621	CC Lab X: Programming Lab in Android	-	5	-	3	20	30	50	2
	23UCS6S1/ 23UCS6S2	SEC IV: Naan Mudhalvan: Programming, Data Structures and Algorithms using Python / Data Science Foundation	3	-	-	2	12/ 20	38/ 30	50	2
	23UCS622	Project	-	-	-	-	25	75	100	2
IV	23HEC606	Human Excellence Paper: Global Values & SKY Yoga Practice-VI	1	-	-	2	20	30	50	1
EC	23CSD602	Soft Skills Development–II	-		-	-	-	-	-	Grade
	23UCS6AL	ALC –II: Advanced Data Analysis using R	SS		-	-	-	100	100	2**
Total			30						600	22
Grand Total									3900	140

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course
CC – Core Course; DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course
ALC-Advanced Learner Course (Optional)
*Extra Credits;**Credits – Based on course content maximum of 4 credits

List of Abbreviations:

CC – Core Course
GE – Generic Elective
AECC –Ability Enhancement Compulsory Course
SEC – Skill Enhancement Course
DSE – Discipline-Specific Elective
VAC –Value Added Course
ALC – Advanced Learner Course

Grand Total = 3900; Total Credits = 140

Question Paper Pattern

(Based on Bloom's Taxonomy)

K1-Remember; K2- Understanding; K3- Apply; K4-Analyze; K5- Evaluate

1. Theory Examinations: 75 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q1 – 5 MCQ) (Q6 – 10 Define Short Answer / MCQ)	10 * 1 = 10	MCQ Define	75
K3 (Q11-15)	B (Either or pattern)	5 * 5 = 25	Short Answers	
K4 & K5 (Q16 - 20)	C (Either or pattern)	5 * 8 = 40	Descriptive/ Detailed	

2. Theory Examinations: 38 Marks (3 Hours Examination) (Part III: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q 1 – 10 MCQ)	10 * 1 = 10	MCQ	50 (Reduced to 38)
K3 (Q11 – 15)	B (Either or pattern)	5 * 3 = 15	Short Answers	
K4 & K5 (Q16-20)	C (Either or pattern)	5 * 5 = 25	Descriptive/ Detailed	

3. Theory Examinations: 38 Marks (2 Hours Examination) (Part IV: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1-10)	A (Q1 – 5 MCQ) (Q6–10 Define / Short Answer)	10 * 1 = 10	MCQ / Define	50 (Reduced to 38)
K3. K4 & K5 (Q11-15)	B (Either or pattern)	5 * 8 = 40	Descriptive/ Detailed	

4. Practical Examinations:

Paper	Maximum Marks	Marks for		Components for CIA		
		CIA	CEE	Tests	Observation Note	Record Note
Practical (Core / Elective)	50	20	30	10	05	05
Practical (Core / Elective)	75	30	45	20	05	05
Practical (Core / Elective)	100	40	60	30	05	05

5. Project:

Paper	Maximum Marks	Marks for		
		CIA	CEE	
			Evaluation	Viva-voce
Project	100	25	50	25
Project	150	40	75	35
Project	200	50	100	50

* CIA – Continuous Internal Assessment & CEE – Comprehensive External Examinations

Components of Continuous Internal Assessment (CIA)

THEORY

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Test 1	75	(75+75+15+10)/ 7	25
Test 2 / Model	75		
Assignment / Digital Assignment	15		
Others*	10		

*Others may include the following: Seminar / Socratic Seminars.Group Discussion, Role Play, APS, Class participation, Case Studies Presentation, Field Work, Field Survey, Term Paper, Workshop / Conference Participation, Presentation of Papers in Conferences, Quiz, Report / Content Writing, etc.

Maximum Marks: 50; CIA Mark: 12; CEE Mark: 38; (Part III: If applicable)

Components		Calculation	CIA Total
Test 1	50	(50+50+10+10)/ 10	12
Test 2 / Model	50		
Assignment / Digital Assignment	10		
Seminar	10		

PROJECT

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Review I	5	5+5+5+10	25
Review II	5		
Review III	5		
Report Submission	10		

Maximum Marks: 200; CIA Mark: 50; CEE Mark: 150;

Components		Calculation	CIA Total
Review I	10	10+ 10+10+20	50
Review II	10		
Review III	10		
Report Submission	20		

** Components for 'Review' may include the following:*

Originality of Idea, Relevance to Current Trend, Candidate Involvement, and Presentation of Report for Commerce, Management & Social Work.

Synopsis, System Planning, Design, Coding, Input form, Output format, Preparation of Report & Submission for Computer Science cluster.

Continuous Internal Assessment for Project

For Commerce, Management & Social Work Programme

The Final year Commerce, Management & Social Work students should undergo a project work during (V/VI) semester

- The period of study is for 4 weeks.
- Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- Students are divided into groups and each group is guided by a Mentor.
- The group should not exceed four students, also interested student can undergo individually.
- A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- Project work constitutes 100 marks, out of which 25 is CIA and 75 is CEE Marks.

Mark Split UP

CIA	CEE	Total
25	75	100

S. No	Components for CIA	Marks
1	Review – I *	5
2	Review – II *	5
3	Review – III *	5
4	Rough Draft Submission	10
	Total	**25**

* Review includes Objectives and Scope, Research Methodology, Literature Review, Data Analysis and Results, Discussion and Interpretation, Recommendations and Implications, Presentation and Format, Creativity and Originality, and Overall Impact and Contribution.

S. No	Components for CEE	Marks
1	Evaluation*	50
2	Viva-Voce	25
	Total	75

* Evaluation includes Originality of Idea, Relevance to Current Trend, Candidate Involvement, Thesis Style / Language, and Presentation of Report.

Continuous Internal Assessment for Project

For Science Stream

The final year Science students should undergo a project work during (V-VI) semester

- The period of study is for 4 weeks
- Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- Students are divided into groups and each group is guided by a Mentor.
- The group should not exceed four students, also interested student can undergo individually.
- A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- Project work constitutes 200 marks, out of which 50 is CIA and 150 is CEE Marks.

Mark Split UP

CIA	CEE	Total
50	150	200

S. No	Components for CIA	Marks
1	Review – I *	10
2	Review – II *	10
3	Review – III *	10
4	Rough Draft Submission / Report Submission	20
	Total	**50**

* **Review I:** - Problem Analysis
* **Review II:** - Data collection & Design
* **Review III:** - Data Analysis

S. No	Components for CEE	Marks
1	Evaluation *	100
2	Viva-Voce	50
	Total	**150**

* Evaluation includes Problem and Hypothesis, Experimental Design / Materials / Procedure, Variables / Controls / Sample Size, and Data Collection / Analysis.

STUDENT SEMINAR EVALUATION RUBRIC

Grading Scale:

A	B	C	D
8-10	5-7	3-4	0-2

CRITERIA	A - Excellent	B – Good	C - Average	D - Inadequate
Organization of presentation	Information presented as an interesting story in a logical, easy-to-follow sequence	Information presented in logical sequence; easy to follow	Most of the information is presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of the subject & References	Demonstrated full knowledge; answered all questions with elaboration & Material sufficient for clear understanding AND exceptionally presented	At ease; answered all questions but failed to elaborate & Material sufficient for clear understanding AND effectively presented	At ease with information; answered most questions & Material sufficient for clear understanding but not clearly presented	Does not have a grasp of information; answered only rudimentary Questions & Material not clearly related to the topic OR background dominated seminar
Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain the text and presentation	Uses graphics that relate to text and presentation	Uses graphics that rarely support text and presentation
Eye Contact	Refers to slides to make points; engaged with the audience	Refers to slides to make points; eye contact the majority of the time	Refers to slides to make points; occasional eye contact	Reads most slides; no or just occasional eye contact
Elocution – (Ability to speak English language)	Correct, precise pronunciation of all terms The voice is clear and steady; the audience can hear well at all times	Incorrectly pronounces a few terms Voice is clear with few fluctuations; the audience can hear well most of the time	Incorrectly pronounces some terms Voice fluctuates from low to clear; difficult to hear at times	Mumbles and/or Incorrectly pronounces some terms Voice is low; difficult to hear

WRITTEN ASSIGNMENT RUBRIC

Grading Scale

A	B	C	D	F
13-15	10-12	7-9	4-6	0-3

CRITERION	A - Excellent	B - Good	C - Average	D - Below Average	F - Inadequate
Content & Focus	Hits on almost all content exceptionally clear	Hits on most key points and the writing is interesting	Hits in basic content and writing are understandable	Hits on a portion of content and/or digressions and errors	Completely off track or did not submit
Sentence Structure & Style	* Word choice is rich and varies * Writing style is consistently strong * Students own formal language	* Word choice is clear and reasonably precise * Writing language is appropriate to the topic * Words convey intended message	* Word choice is basic * Most writing language is appropriate to the topic * Informal language	* Word choice is vague * Writing language is not appropriate to the topic * Message is unclear	* Not Adequate
Sources	Sources are cited and are used critically	Sources are cited and some are used critically	Some sources are missing	Sources are not cited	Sources are not at all cited
Neatness	Typed; Clean; Neatly bound in a report cover; illustrations provided	Legible writing, well-formed characters; Clean and neatly bound in a report cover	Legible writing, some ill-formed letters, print too small or too large; papers stapled together	Illegible writing; loose pages	Same as below standard
Timeliness	Report on time	Report one class period late	Report two class periods late	Report more than one week late	Report more than 10 days late

Programme Code:	B.Sc	Programme Title:	Bachelor of Science (Computer Science)
Course Code:	23UCS101	Title: C C L C Programming	Batch: 2023 - 2026
			Semester: I
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	-
			Credits: 4

Course Objective

The course objective is to know the basic components of the computer and working of each device, the student gain experience about structured programming, understand the implementation of C language and understand various features in C.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To keep in mind the fundamentals of C programming	K1
CO2	To understand the loops and decision making statements to solve the problem	K2
CO3	To implement different operations on arrays and use functions to solve the given problem.	K3
CO4	To review the C program that uses pointers, structures and files.	K4
CO5	To understand and evaluate File Concept.	K2,K5

Mapping

PO, / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	L	L	H	L	L	M	M	H	H
CO2	H	H	H	L	L	H	M	M	H	M	H	H
CO3	H	M	H	L	M	M	L	L	H	L	M	H
CO4	H	M	H	L	M	M	L	M	H	L	M	H
CO5	H	H	H	L	M	H	M	M	H	M	H	H

H-High: M-Medium: L-Low

Syllabus

Units	Content	Hrs
Unit I	**Introduction to C** :Overview of C – History and Importance of C – Basic Structure of C programs - Development of program logic skills through Flowchart and Algorithm – Programming Style – Executing a 'C' program – Character set C Tokens Keywords Identifiers Constants Variables – Rules for defining variables- Data types. – *Declaring and initializing variables* – Operators & Expressions – Precedence of arithmetic – Type conversion in expressions – Mathematical functions – **Managing Input and output operations** : Introduction –Reading a character –Writing a character – Formatted input- Formatted output. Simple Programs.	12
Unit II	**Control Statements:** IF, *IF..ELSE Statements*, ELSE...IF ladder – Switch Statement – GOTO Statement – WHILE Statement – Do Statement – FOR Statement.-Jumps in loops. **Arrays:** One dimensional Arrays – Two Dimensional Arrays – Multi Dimensional Arrays – Structures: Arrays within Structures – Structures within structures – Structures and Functions –Union. Programs using Control Structures and Derived data types.	12
Unit III	**Functions:** User-defined functions- A-Multi-function program- Elements of user defined function, definition of function-Return value &their types, function calls & declarations-Category of functions: No arguments & No return values-arguments that No return values – Arguments with return values-No arguments that return a value-Nesting of functions-Recursion - Passing arrays and strings to functions. The scope, Visibility and Lifetime of Variables in functions. Programs using functions	12
Unit IV	**String manipulation:** Introduction - Declaring & Initializing String variables – Reading string from terminal, Writing string to screen – String handling Functions. **Pointers:** Introduction-Accessing, Declaring & Initializing pointer variables-Pointers and Character strings-Array of pointers-Pointers as function arguments-Function returning pointers-Pointers to functions- Pointers and Structures. Programs using String and Pointers	12
Unit V	**Files:** Defining and opening a file – Closing a file –I/O operations on file – Error handling during I/O operations – Random access files – Command line arguments- Preprocessor – Macro Substitution – File Inclusion – Compiler control directives. Programs using Files and Command Line Arguments.	12
	Total Contact Hrs	60

Pedagogy and Assessment Methods:

Direct Instruction Digital Presentation, Digital Assignments, Seminar, Power Point Presentation, Online Quiz, Group Talk (APS).

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	"Programming in Ansi C"	Tata McGraw-Hill Publishing Co& Ltd., Second Edition	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Yaswanth Kanishkar	LET US C	BPB Publications. Fourteenth Edition	2016
2	Ashok N. Kamthane	Programming with ANSI and Turbo C	First Edition	2009

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.R.ManickaChezian Dr. R.Nandhakumar Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

Head of the Department
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K. SRINIVASAN, M.C.A.
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
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Dr. R.MANICKA CHEZIAN, M.Sc.,M.S.,Ph.D.,
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc		Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS102		Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	CC II- Digital Computer Fundamentals and Organization	Semester:	I
				Credits:	4

Course Objective

On completion of this course, the students can understand the design of combinational and sequential digital logic circuits. Students will also have knowledge on Programmable Logic devices and its usage.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To recollect the fundamental concepts and techniques used in digital Electronics.	K1
CO2	To get the idea of basic postulates of Boolean Algebra and to apply the methods of simplifying Boolean expressions	K2
CO3	To apply knowledge about internal circuitry and logic behind any digital system and to design various synchronous and asynchronous circuits.	K3
CO4	To identify the concept of memories, and to introduce microcontroller case study.	K4
CO5	To analyze the usage of different kinds of Memory Management and mapping techniques	K5

Mapping

PO\CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	M	M	H	H	M	M	M	M	M
CO2	H	H	H	H	H	H	H	M	M	H	H	H
CO3	H	M	H	M	H	H	M	M	H	H	H	H
CO4	H	M	H	M	M	H	H	H	H	H	M	H
CO5	H	H	M	M	H	H	H	H	M	H	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**Number System and Binary Codes:** Introduction – Number System – Conversion from Binary to Decimal, Octal, Hexadecimal- Conversion from Decimal to Binary , Octal ,Hexadecimal – Conversion from Octal to Decimal, Binary , Hexadecimal – Conversion from Hexadecimal to Binary , Decimal , Octal -Floating Point Representation of Numbers – Arithmetic Operation – 1's and 2's Complements. 1's Complement Subtraction – 2's Complement Subtraction. 9's Complement – 10's Complement – BCD	15
Unit II	**Boolean algebra, Minimization Techniques and Logic Gates:** Introduction – Boolean Logic Operations – *Basic Laws of Boolean Algebra* – Demorgan's Theorems – Sum of Products and Product of Sums – Karnaugh Map. Logic Gates: OR Gate – AND Gate – NOT Gate – NAND Gate – NOR Gate.	15
Unit III	**Arithmetic Circuits and Flip Flops:** Introduction – Half Adder – Full Adder, Half Subtractor – Full Subtractor – Multiplexers – Demultiplexer – Decoders. FlipFlops: Types of Flip Flops – SR Flip Flop – JK Flip Flop – T Flip Flop. **Registers:** Shift registers- PIPO – PISO – SISO – SIPO	15
Unit IV	Input – Output Organization – Input/output Interface – I/O Bus and Interface –I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interfaces – Asynchronous Data Transfer – Store Control andHandshaking – DMA –DMA Controller, DMA Transfer.	15
Unit V	**Input – Output Processor:** CPU – IOP Communication – **Memory Organization:** Memory Hierarchy – *Main Memory* – **Associative Memory:** Hardware Organization – Match Logic – Cache Memory – Associative – Direct,set, Associative Mapping.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Direct Instruction Digital Presentation, Digital Assignments, Seminar, Power Point Presentation, Online Quiz, Group Talk (APS).

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	V.K. Puri,.	Digital Electronics Circuits and Systems	TMH.	2017
2	S.Arivazhagan, S Salivahanan	Digital Circuits and Design	Vikas Publishing House Pvt Limited	2009
3	M. Morris Mano	Computer System Architecture	PHI	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	M. Carter, Schaum's	Computer Architecture	TMH	2018
2	Albert Paul Malvino, Donald P Leach	Digital principles and applications	TMH	1996

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.M.Malathi M.MeenaKrithika Signature:	Name: Dr.R.Manicka Chezian Signature:	Name:Mr. Mr. K. Srinivasan K.SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Name: Dr.R.Manicka Chezian Signature:

Head of the Department
Department of Computer Science
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Dr. R.MANICKA CHEZIAN, M.Sc.,M.S.,Ph.D.,
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POLLACHI - 642 001.

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS1A1			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	GE I – Allied I: Mathematics - Statistical Methods & Linear Algebra	Semester:	I
					Credits:	4

Course Objective

- To apply the computational aspects of basic statistical measures and applications of small and large samples in real life problems
- To introduce the computational techniques and algebraic skills essential for the study of systems of linear equations and matrix algebra

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the statistical formula and apply them in various data analysis	K3
CO2	Understand the concept of most powerful test and analyze the samples based on most powerful test like't' and 'F' distributions	K4
CO3	Understand the concepts of probability and apply to solve real life situations	K3
CO4	Recognize the basic concepts of vectors , matrices and linear equations and examine its application in the modern science	K4
CO5	Apply the linear algebra techniques learned from determinants, differential equations to solve simple problems	K3

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	M	M	H	L	H	M	L	L	L	M	M	M
CO2	H	M	H	L	H	M	M	M	M	H	M	H
CO3	M	M	H	L	H	M	M	M	M	H	M	H
CO4	H	M	H	L	H	H	H	M	H	H	M	H
CO5	M	M	H	L	H	H	L	M	M	M	M	M

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	**Statistics:** Measure of Central Tendency - Mean, Median, Mode - Measure of Dispersion -Range, Quartile Deviation, Standard Deviation - Correlation: Definition, Rank Correlation, Co-efficient of Correlation - Regression.	15
Unit II	**Sampling Theory and Tests of Significance:** Standard Error, Tests of Significance for Attributes: Tests for Number of Successes- Tests for Proportion of Successes-Tests for Difference between Proportions- Tests of Significance for Large Samples: The Standard error of mean-testing the difference between means of two samples-Standard Error of the Difference between two Standard Deviations- Tests of Significance for Small Samples: Students' t-Distribution-Test of Hypothesis about the population Mean-Test of Hypothesis about the difference between two means-Test of hypothesis about the difference between two means with dependent samples.	15
Unit III	**Probability:** Permutation, combination, trail, event, sample space, mutually exclusive cases, exhaustive events, Independent events and dependent events, simple and compound events. Measurement: Classical, relative frequency, theory of probability, Limitations, personality view of probability and Axiomatic Approach of probability, addition and multiplication theorem, odds, miscellaneous illustrations question.	15
Unit IV	**Linear Algebra:** Introduction – Vectors and Matrices – Length and Dot Products – Solving Linear Equations – Linear Equations – The Idea of Elimination – Elimination Using Matrices – Rules for Matrix Operations – Inverse Matrices – Transposes and Permutations.	15
Unit V	Determinants – The Properties of Determinants – Permutations and Cofactors – Cramer"s Rule, Inverse, and Volumes – Eigen values and Eigenvectors – Introduction to Eigen values – Diagonalizing a Matrix – Applications to Differential Equations – Symmetric Matrices – Positive Definite Matrices – Similar Matrices.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, OnlineQuiz, Group Talk (APS), Seminar, Numerical Excercises.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	RSN Pillai &Bagavathi	Statistics Theory and Practice	S.Chand& Company Ltd/ 17/e	2017

2	Gilbert Strang	Introduction to Linear Algebra	5th Edition Wellesley Cambridge Press	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	S.P. Gupta	Statistical Methods	Sultan Chand & Sons Publishers. 13 e	2016
2	Gilbert Strang	Linear Algebra and Its Applications.	Fourth Edition. Cengage Learning	2006
3	David C. Lay, Steven R. Lay, and Judi J. McDonald	Linear Algebra and Its Applications	5th Edition. Pearson.	2014

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
K. Srinivasan G. Angayarkanni Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Level II

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	21U CS1A2			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	Allied-1: Advanced Mathematics and Applied Statistics	Semester:	I
					Credits:	4

Course Objective

- To apply the computational aspects of basic statistical measures and to enable the students to solve linear system of equations and integration using numerical methods.
- To present the concept of theoretical probability to acquaint the knowledge of testing of small and large samples which plays an important role in real life problems

Course Outcomes

On the successful completion of the course, students will be able to

CO	CO Statement	Knowledge Level
CO1	Understand and analyze the statistical formula and apply them in various data analysis problems and Measure and interpret the degree of relationship between variables.	K4.K2
CO2	Apply the distributions to infer the behavior of observation in the sample space and also learn its moment generating function.	K4
CO3	Analyze the concept of most powerful test and analyze the samples based on most powerful test like 't', 'F' and chi-square.	K4
CO4	Understand the concepts of probability and apply to solve real life situations.	K3.K2
CO5	Evaluate numerical solutions of algebraic equations and compute the integrals by using the appropriate technique.	K5

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	M	H	H	M	H	H	H	M	H
CO2	H	M	H	M	H	H	M	H	H	H	M	H
CO3	M	H	H	L	H	H	M	H	H	H	L	H
CO4	H	H	H	M	H	H	H	H	H	H	M	H
CO5	M	M	H	L	M	H	M	M	M	M	L	M

H-High; M-Medium; L-Low

Syllabus

Units	Content	Hrs
Unit I	**Statistics:** Measure of Central Tendency – Mean, Median, Mode, Geometric Mean, Harmonic Mean – Measure of Dispersion – Quartile Deviation, Standard Deviation, Coefficient of Variation – Correlation: Definition, Karl Pearson Co-efficient of Correlation, Rank Correlation, Bivariate Correlation – Regression: Lines of Regression, Co-efficient of Regression	15
Unit II	**Distributions:** Binomial, Poisson, Normal and Continuous Distribution – Moment – Moment Generating Functions of Binomial, Poisson and Normal Distribution- Fitting of Binomial, Poisson and Normal Distribution – Problems – Geometric Distribution, Multinomial Distribution, Power Series Distribution, Uniform Distribution, Gamma Distribution, Pearson Distribution (Definition only)	15
Unit III	**Large Sample test:** Standard error- Test of Significance of Large Samples – Tests for (i) single proportion (ii) Difference of two proportions (iii) difference of two means (iv) difference of two standard deviations.Small sample test based on t, – t-test for (i) single mean (ii) Difference of two means (iii) Observed sample correlation co-efficient. F-Variance Ratio Test – chi square test of goodness of fit	15
Unit IV	**Probability:** Permutation, combination, trail, event, sample space, mutually exclusive cases, exhaustive events, Independent events, and dependent events, simple and compound events. Measurement: Classical, relative frequency, theory of probability, Limitations, personalistic view of probability and Axiomatic Approach of probability, addition and multiplication theorem, odds, miscellaneous illustrations question – Bayes theorem.	15
Unit V	**Numerical Methods:** Gauss-Jordan direct method, Gauss-Seidaliterative method for linear algebric system – Bisection , Newton's Rapshon method for polynomial system-Newton forward and backward interpolation-Trapezoidal rule-Simpson 1/3 rule and 3/8 rule for Numerical Integration.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments,Online Quiz, Group Talk (APS), Numerical Exercises.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	S.C Gupta, V.K.Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand and Sons. 17/e	2017
2	RSN Pillai &Bagavathi	Statistics Theory and Practice	S.Chand& Company Ltd	2013
3	P.Kandasamy, K.Thilagavathy, K.Gunavathy	Numerical Methods	Sultan Chand & Co Ltd., 5/e	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	S.P. Gupta	Statistical Methods	Sultan Chand & Sons Publishers. Thirty-third Edition	2002
2	Santosh Kumar	Computer Oriented Statistical and Numerical Methods	S.Chand and Co , 5/e	2013

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Mr K. Srinivasan G. Angayarkanni Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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NGM College (Autonomous)
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Programme code:	B.Sc		**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	23UCS103		**Title :**	**Batch :**	2023-2026
Hrs/Week:	4	**Tutorial Hrs./Sem** -	CC Lab I: Programming Lab in C	**Semester:**	I
				Credits:	02

Course Objective

The purpose of this course is to introduce students to the field of programming using C language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To implement different operations on arrays and use functions to solve the givenproblems.	K3
CO2	To evaluate the C program that uses pointers, structures and files	K4
CO3	To validate programs with pointers and arrays, perform pointer arithmetic, and use the preprocessor	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	H	H	H	H	H	M	H	H
CO2	H	M	M	H	H	H	H	H	H	H	H	H
CO3	M	M	H	H	M	H	H	M	H	H	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
	1. C Program to find the greatest number among 'n' numbers. 2. C Program to generate Fibonacci series of the given number. 3. C Program to check whether the given number is Armstrong number or not. 4. C Program to find Prime numbers between a given ranges. 5. C Program for finding Sum of individual digits. 6. C Program to display a set of numbers in descending order. 7. C Program to display names in alphabetical order. 8. C Program to find whether a given string is a palindrome or not. 9. C Program to calculate matrix subtraction. 10. C Program to find the transpose of a matrix. 11. C Program to find the factorial numbers. 12. C Program to check the set of numbers is odd or even. **SET B** 1. C Program for binary search. 2. C Program to find a mean & median for given values. 3. C Program to calculate standard deviation and variance for given values. 4. C Program to find the mark from the list of the students. 5. C Program to find the all roots of a quadratic equation. 6. C Program to calculate Matrix multiplication. 7. C Program to find the Pascal/Floyd's triangle. 8. C Program to find the string handling function. 9. C Program to illustrate the concept of structures. 10. C Program to count vowels and white spaces in a given sentence. 11. C Program to illustrate the concept of subroutines. 12. C Program to create and process a random access file. 13. C Program using command line arguments.	60

INTERNAL MARK (20 Marks) **EXTERNAL MARK (30 Marks)**

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Programming in Ansi C	Tata McGraw-Hill Publishing Co& Ltd., Sixth Edition	2016.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Yaswanth Kanishkar	LET US C	BPB Publications. Fourteenth Edition	2016
2	Ashok N. Kamthane	Programming with ANSI and Turbo C	First Edition	2009

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.R.ManickaChezian Dr.R.Nandhakumar Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme code:	B.Sc		Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS204		Title : CC III: Data Structures using C++	Batch :	2023-2026
				Semester:	II
Lecture Hrs/Week:	4	Tutorial Hrs./Sem. -		Credits:	4

Course Objective

The objective of the course is to make the students to understand the concepts of data structures such as array, stack, queue, list, linked list, tree, searching and sorting, the principles of object oriented programming and the basics of C++.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To keep in mind the key concepts, benefits and applications of object oriented programming	K1,K2
CO2	To get an idea about classes, objects, functions and constructors in C++	K2, K4
CO3	To implement the stacks, queues, singly linked lists and doubly linked lists using C++	K3
CO4	To analyze various searching techniques like sequential search, binary search and Fibonacci search, and sorting techniques like insertion sort, quick sort, merge sort and heap sort	K3
CO5	To evaluate the expressions using prefix, infix and postfix notations	K4

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	M	M	H	H	M	H	M	H	H
CO2	H	M	H	H	H	H	M	H	H	H	H	M
CO3	M	H	H	H	H	M	H	H	H	H	M	H
CO4	M	H	M	H	H	M	H	M	H	H	M	H
CO5	H	M	H	H	M	M	H	M	H	H	M	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**Introduction:** Arrays – Ordered Lists – Representation of Arrays-**Stacks and Queues:** Fundamentals – Evaluation of Expressions – Multiple stacks and queues **Linked List:** Singly Linked lists-Linked Stacks and Queues–Polynomial addition– More on Linked lists–Sparse matrices-Doubly Linked List	10
Unit II	**Trees:** Basic Terminology – Binary Trees – Binary Trees Representation – Binary Trees Traversal – **Internal Sorting** – Searching –Sequential search – Binary search-Fibonacci search –Insertion sort – Quick sort - 2-way Merge – Heap sort –**Symbol Tables:** Hash Tables.	12
Unit III	**Principles of object oriented programming:** Software Evolution – Procedure-Oriented Programming – Object-Oriented Programming Paradigm – Key Concepts of Object-Oriented Programming–Benefits of OOP– Object-Oriented Languages – Applications of OOP. **Beginning with C++:** What is C++? – A Simple C++ Program – Output Operator – Input Operator –Cascading of I/O Operators – Structure of C++ Program. **Tokens, Expressions and Control Structures:** Introduction– Tokens–Keywords-Identifiers and Constants–Basic Data Types– User-Defined Data Types–Derived Data Types – Symbolic Constants - Declaration of Variables – Dynamic Initialization of Variables–Reference Variables-Operators in C++ -Scope Resolution Operator – Member Dereferencing Operators – Memory Management Operators – Manipulators – Type Cast Operator – Expressions and Their Types –Special Assignment Expressions – Implicit Conversions– Operator Precedence –Control Structures.	12
Unit IV	**Functions in C++:** Introduction – The Main Function – Function Prototyping–Call by Reference – Return by Reference – Inline Functions – Default Arguments –const Arguments – Function Overloading – Friend and Virtual Functions – Math Library Functions. **Classes and Objects:** Introduction – C Structures Revisited – Specifying a Class – Defining Member Functions – Making an Outside Function Inline – Nesting of Member Functions – Private Member Functions – Arrays within a Class – Memory Allocation for Objects – Static Data Members – Static Member Functions – Array of Objects – Objects as Function Arguments – Friendly Functions – Returning Objects.	14
Unit V	**Constructor and Destructor:** Introduction – Constructors – Parameterized Constructors– Multiple Constructors in a Class–Dynamic Initialization of Objects Copy Constructor–Dynamic Constructors–Constructor with Default Arguments - Destructors. **Operator Overloading and Type Conversions:** Introduction – Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operator using Friends–Manipulation of Strings using Operators –Rules for Overloading Operators–Type Conversions.	12
	Total Contact Hrs	**60**

Pedagogy & Assessment Methods

Direct Instruction Digital Presentation. Digital Assignments, Seminar, Power Point Presentation. Online Quiz, Group Talk (APS).

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Ellis Horowitz & Sartaj Sahni	Fundamentals of Data Structures	Galgotia Book Source	1999
2.	E. Balagurusamy	Object Oriented Programming with C++	Tata McGraw Hill Publication, Seventh Edition	2015

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Paul G Sorenson, Jean Paul. Tremblay	An Introduction to Data Structures with Applications	Tata McGraw Hill Publication, Second Edition	2008
2.	D. Ravichandran	Programming with C++	Tata McGraw Hill Publication, Fourteenth Edition	2001
3.	Ashok Kamathane	Programming in C++	Prentice Hall	2015

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Mr. K. Srinivasan N.Arulkumar Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Dr. R.MANICKA CHEZIAN, M.Sc.,M.S.,Ph.D.,
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NGM College (Autonomous)
POLLACHI - 642 001.

Programme code:	B.Sc		Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS205		Title:	Batch :	2023-2026
Lecture Hrs/Week:	4	Tutorial Hrs./Sem. 4	CC IV: Data Communication and Computer Networks	Semester:	II
				Credits:	4

Course Objective

To enable the students to understand the concepts and principles of data communication and networking including topology, protocols, and types of networks along with concepts of the OSI reference model.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of Networks	K1
CO2	Get the idea on Connection-oriented and Connection-less networks	K2
CO3	Apply design principles and functionalities in OSI Reference Layers	K3
CO4	Analyze ISDN network, TCP/IP, etc..	K4
CO5	Knowledge about different computer networks, reference models and thefunctions of each layer in the models	K5

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	L	H	M	L	M	H	H	H	L
CO2	H	M	H	L	H	M	L	M	H	M	L	L
CO3	H	M	H	M	L	M	M	M	M	L	H	M
CO4	H	M	M	L	M	M	M	M	L	M	L	L
CO5	H	M	M	L	M	M	M	M	L	H	M	L

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**Introduction:** Communications and Networking-Fundamental concepts-Data communications-Protocols-Standards-Signal Propagation-Analog and Digital Signals-Parallel and Serial Communications-Simplex, Half-duplex and Full duplex communications-Multiplexing-Transmission errors- Detection and Correction - Error classification-Delay Distortion-Attenuation- noise. Types of Errors - Error Detection.	12
Unit II	**Transmission Media:** Guided Media-Twisted Pair-Coaxial Cable-Optical Fiber-Unguided Media –Microwave Communication-Satellite Communication FDMA, TDMA and CDMA. **Network Topology:** Mesh Topology-Star Topology-Tree Topology-Ring Topology-Bus Topology-Hybrid Topology. **Switching and Routing:** Switching basics-Circuit switching-Packetswitching- Message switching-Router and Routing.	12
Unit III	**Networking protocols and OSI Model:** Protocols in Computer Communication- OSI Reference Models-Physical Layer-Data link Layer-Network Layer-Transport Layer-Session Layer-Presentation Layer-Application Layer.	12
Unit IV	Local Area Network (LAN)-Ethernet-Ethernet properties- CSMA/CD- Metropolitan Area Network (MAN)-Distributed Queue Dual Bus(DQDB)-Switched Multimegabit Data Services(SMDS)-Wide Area Network(WAN)-WAN Architecture.	12
Unit V	Integrated Services Digital Network (ISDN)-ISDN Architecture-ISDN Interfaces-X.25 Protocol-Understanding and Working of X.25 protocol. **TCP/IP:** An Introduction to TCP/IP- Basics- IP Addresses-Logical Addresses-TCP/IP Example. ARP-RARP.	12
	Total Contact Hrs	**60**

Pedagogy & Assessment Methods

Direct Instruction Digital Presentation. Digital Assignments. Seminar. Power Point Presentation. Online Quiz. Group Talk (APS).

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Achyut S. Godbole	Data Communications and Computer Networks	Tata Mc GrawHill	2007

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1	Prakash. C. Gupta	Data Communication and Computer Networks	PHI Publicaitons. Second Edition	2013
2	Brijendra Singh	Data Communication and Computer Networks	PHI Publicaitons. Fourth Edition	2014

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)
Course Code:	23UCS2A1			Title :	Batch : 2023-2026
Hrs/Week:	4	Tutorial Hrs./Sem.	-	GE II – Allied II Discrete Mathematics	Semester: II Credits: 4

Course Objective

On successful completion of the course the students are able to understand the concepts and principles of relations, functions, fuzzy sets, partial ordering, algebraic structures, mathematical logic, and formal languages and graph theory.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To keep in mind about the fundamental ideas and notation of discrete mathematics withexamples	K1
CO2	To Understand and evaluate the concepts of Relations	K2.K5
CO3	To get the idea of relations and its types and fuzzy sets and its operations	K2
CO4	To analyze the formal language such as formation of words with examples .groups andmonoids	K4
CO5	To Understand and apply basic properties of graphs and types of graphs, and be able torelate these to practical examples	K2.K3

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P1O	PSO1	PSO2
CO1	H	M	H	M	H	H	H	L	M	M	H	M
CO2	H	H	H	H	M	L	H	M	M	H	H	H
CO3	H	M	H	M	H	H	H	M	M	H	H	M
CO4	H	M	H	H	H	M	M	H	H	H	H	H
CO5	H	M	H	H	H	M	M	H	H	H	H	H

H: High M: Medium L: Low

Syllabus

Units	CONTENTS	Hours
Unit I	**Mathematical logic:** Connectives – Tautology and contradiction-Equivalence of Propositions- Duality law- Normal forms – Disjunctive and conjunctive normal Forms-PDNF-PCNF – Worked examples-Predicate calculus – Quantifiers – Free and bound variables(Definitions only).	11
Unit II	**Relations:** Types of relations-some operation of relation- Composition of Relations – Properties of relation-Equivalence Classes-matrix representation of relation-Worked Examples. ***Fuzzy Sets:*** Fuzzy sets – Crisp Sets –Overview of operations on fuzzy sets – Fuzzy complement – Fuzzy union – Fuzzy Intersection – Aggregation operations.	12
Unit III	**Functions:** Representation of function-*Types of function*- Composition of functions – inverse of functions-Worked Examples. **Partial ordering:** Hasse diagrams for partial ordering-terminology related to posets-Lattice- Properties of Lattices Worked Examples.	13
Unit IV	**Algebric Structure:** Semigroups & monoids- Homomorphism of semigroups and monoids- sub semigroups and submonoids-groups **Formal languages:** Basic definitions-phase structure grammar- types of phase structure grammar-Worked examples	11
Unit V	**Graph Theory:** Graph –Degree of the vertex – some special simple graphs-*Matrix representation of graphs*-Paths. Cycles and connectivity- Eulerian Graphs - Hamiltonian graphs- Connectedness in directed graphs- Shortest path algorithm-Dijkstra's Algorithm-Worked Examples	13
	Total Hours	**60**

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and Talk, Quiz, Assignments, Group Task

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	T.Veerarajan	Discrete mathematics	Tata McGraw Hill	2007
2	GeorgeKlir& Tina A Folger	Fuzzy Sets, Uncertainity& Information	Prentice hall of India, Eighth Edition	2003
3	Narasingh Deo	Graph theory with applications to Engineering and computer science	Prentice hall	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	V. Sundaresan, K.S.Ganapathi Subramanian, K. Ganesan	Discrete Mathematics	A.P.Publications, Sirkali	2006
2	RamiSivommani	Formal Languages	The Christian Literature Society, First Edition	1984
3	J.P.Tremplay & R. Manohar	Discrete Mathematical structures with Applications to Computer Science	Tata Mc Graw-Hill Pub.Co. Ltd. New Delhi	2003

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
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Programme Code:	B.Sc.	Programme Title :	Bachelor of Science (Computer Science)
Course Code:	23UCS2A2	Title :	Batch : 2023-2026
Hrs/Week: 4	Tutorial Hrs./Sem -	GE II – Allied II Discrete Mathematical Structures	Semester: II Credits: 4

Course Objective

On successful completion of the course the students are able to understand the concepts and principles of relations, functions, set theory, partial ordering, mathematical logic, and formal languages and graph theory and trees.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To keep in mind about the fundamental ideas and notation of discrete mathematics with examples	K1
CO2	To get the idea of relations, types of relations and functions, types of functions	K2,K5
CO3	To analyze the formal language such as formation of words and monoids with examples	K2
CO4	To apply algebraic structures	K4
CO5	To Understand some basic properties of graphs, types of graphs, trees and be able to relate these to practical examples	K2,K3

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P1O	PSO1	PSO2
CO1	H	M	H	M	H	H	H	L	M	M	H	M
CO2	H	H	H	H	M	L	H	M	M	H	H	H
CO3	H	M	H	M	H	H	H	M	M	H	H	M
CO4	H	M	H	H	H	M	M	H	H	H	H	H
CO5	H	M	H	H	H	M	M	H	H	H	H	H

H: High M: Medium L: Low

Syllabus

Units	CONTENTS	Hours
Unit I	**Set Theory:**-Introduction-Set & its Elements-Set Description-Types of sets. Venn-Euler Diagrams- Set operations & Laws of set theory-Fundamental products-partitions of sets-Minsets- Algebra of sets and Duality- The Inclusion and Exclusion principle	11
Unit II	**Mathematical logic:** Introduction- Statements and Notation-Connectives-Negation- Conjunction-Disjunction-Statement formulas and Truth tables-Conditional and Biconditional-Tautologies. Equivalence of Formulas-Duality Law-Tautological Implications-Normal Forms-DNF-CNF-PDNF-PCNF-Predicate Calculus-Predicates-The statement function, variables, and Quantifiers-Predicate Formulas-Free and Bound Variables-The Universe of Discourse.	12
Unit III	**Relations:** – Introduction- Cartesian Product of Sets- Binary Relations – Set operations on relations-Types of Relations – Partial order relations – Equivalence relation – Composition of relations. **Functions:** – Types of functions – Invertible functions – Composition of functions.	13
Unit IV	**Algebric Structure:** Semigroups & monoids- Homomorphism of semigroups and monoids- sub semigroups and submonoids-groups **Formal languages:** Basic definitions-phase structure grammar- types of phase structure grammar-Worked examples	11
Unit V	**Graph Theory:** – Basic concepts of Graph theory-Basic Definitions-Paths, Reachability and Connectedness- Matrix Representation of graphs-Trees-Storage representation and Manipulation of Graphs- Trees: Their Representation and Operations-List structures and Graphs	13
	Total Hours	**60**

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and Talk, Quiz, Assignments, Group Task

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	J.K. Sharma (Unit I & III)	Discrete mathematics	Macmillan India Ltd. Second Edition	2005
2	J.P.Tremplay & R. Manohar (Unit II & V)	Discrete Mathematical structures with Applications to computer Science	Tata Mc Graw-Hill Companies	2008
3	T.Veerarajan (Unit IV)	Discrete mathematics	Tata McGraw Hill	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Dr.M.K Venketaramen, Dr N.Sridharan, N.Chandarasekaran	Discrete Mathematics	The National publishing Company Chennai.	2006
2	V. Sundaresan, K.S. Ganapathi Subramanian, K. Ganesan	Discrete Mathematics	A.P.Publications, Sirkali	2006
3	RaniSironmani	Formal Languages	The Christian Literature Society, First Edition	1984

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS206			Title :	Batch :	2023-2026
				CC Lab II: Programming Lab in Data Structures using C++	Semester:	II
Hrs/Week:	4	Tutorial Hrs. Sem.	-		Credits:	2

Course Objective

The objective of this course is to make the students to write and execute programs in C++ to solve problems using data structures such as arrays, linked lists, stacks, queues, trees and binary search trees, and also to implement various sorting and searching algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To apply the data structures such as stacks, queues and trees to solve various computing problems	K3
CO2	To analyze various tree traversals in a binary search tree	K4
CO3	To validate various kinds of searching and sorting techniques	K5

Mapping

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	H	M	H	H	H	M	M	L	H	M
CO2	H	H	M	H	M	M	H	M	M	L	M	H
CO3	M	M	H	H	M	M	H	M	M	L	H	H

H: High M: Medium L: Low

Syllabus

Units	Contents	Hrs
	SET A • C++ Program to implement Stack using array • C++ Program to implement Queue using array • C++ Program to implement singly linked lists • C++ Program to implement doubly linked lists • C++ Program to add given two polynomials • C++ Program to insert an element in to a binary search tree • C++ Program to search an element in a binary search tree • C++ Program to delete an element from a binary search tree • C++ Program to search for a key element in a list of elements using sequential search **SET B** • C++ Program to perform preorder traversal in a binary search tree • C++ Program to perform inorder traversal in a binary search tree • C++ Program to perform postorder traversal in a binary search tree • C++ Program to search for a key element in a list of sorted elements using binary search. • C++ Program to perform Fibonacci search • C++ Program to perform Insertion sort • C++ Program to perform Quick sort • C++ Program to perform Merge sort • C++ Program to perform Heap sort **INTERNAL MARK(20 Marks)** **EXTERNAL MARK (30 Marks)**	60
	Total Contact Hrs	**60**

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Programme Code:	B.Sc		Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS2S2		Title :	Batch :	2023-2026
			SEC I: Naan Mudhalvan : Block chain	Semester:	II
Hrs/Week:	2	Tutorial Hrs./Sem. -		Credits:	2

Course Objective

To impart knowledge on Block chain and Crypto currency and make the students to design, build and deploy distributed applications by integrating the ideas from Block chain technology.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of Cryptography.	K1
CO2	Understand emerging abstract models for Block chain technology	K2
CO3	Design, build, and deploy a distributed application.	K3
CO4	Analyze the differences between proof-of-work and proof-of-stake consensus.	K4
CO5	Evaluate security, privacy, and efficiency of a Block chain system.	K5

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	L	H	M	L	M	H	H	H	L
CO2	H	M	H	L	H	M	L	M	H	M	L	L
CO3	H	M	H	M	L	M	M	M	M	L	H	M
CO4	H	M	M	L	M	M	M	M	L	M	L	L
CO5	H	M	M	L	M	M	M	M	L	H	M	L

H-High; M-Medium;L-Low

Syllabus

Units	Contents	Hrs
Unit I	**Introducing Blockchain:** Beginning at the Beginning. What Blockchains Are - What blockchains do - Why blockchains matter - The Structure of Blockchains - Blockchain Applications - The Blockchain Life Cycle. **Picking a Blockchain** - Where Blockchains Add Substance - Determining your needs - Defining your goal - Choosing a Solution - Drawing a blockchain decision tree - Making a plan.	6
Unit II	**Cryptography:** Types of Cryptography - Use of Cryptography in Blockchain - Hash function. Digital Signature - ECDSA. Memory Hard Algorithm. Zero Knowledge Proof.	6
Unit III	**Basic Distributed Computing & Crypto primitives:** Atomic Broadcast. Consensus. Byzantine Models of fault tolerance. Hash functions. Puzzle friendly Hash. Collison resistant hash. digital signatures. public key crypto. verifiable random functions. Zero-knowledge systems.	6
Unit IV	**Getting Your Hands on Blockchain** - Diving into the Bitcoin Blockchain - Creating your first Bitcoin wallet - Creating a second Bitcoin wallet - Generating a Bitcoin vanity address - Transferring your vanity address - Making an entry into the Bitcoin blockchain - Reading a blockchain entry in Bitcoin - Using Smart Contracts with Bitcoin - Checking the status of your contract.	6
Unit V	**Encountering the Ethereum Blockchain** - Exploring the Brief History of Ethereum - Ethereum: The Open-Source World Wide Computer - Decentralized applications: Welcome to the future - The power of decentralized autonomous organizations - Hacking a Blockchain - Understanding smart contracts - Discovering the crypto currency Ether - Getting Up and Running on Ethereum - Mining for ether - Setting up your Ethereum wallet.	6
	Total Contact Hrs	**30**

Pedagogy and Assessment Methods:

Seminar. Power Point Presentation. Chalk and Talk. Quiz. Assignments, Group Task

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \EDITION	YEAR OF PUBLICATION
1	Tiana laurence	Blockchain for dummies	1st Efotion. John Wiley & Sons. Inc	2017
2	Arvind Narayanan. Joseph Bonneau. Edward Felten. Andrew Miller. and Steven Goldfeder	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction	Illustrated Edition	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Daniel Drescher	Blockchain Basics: A Non-Technical Introduction in 25 Steps	Apress, 2nd Edition	2017

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	B.Sc.	Programme Title:	Bachelor of Science (Computer Science)
Course Code:	23UCS2VA	Title	VAC I: Cloud based Office Automation
Batch:	2023 - 2026	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week	-	Tutorial Hrs./Sem.	30
Credits:	2*		

Course Objective

To reinforce human connections is even more important when people are working remotely and interactingwith their customers digitally.

Syllabus

Programs	Hrs
• Calendar: Create and manage events • Docs: Create and manage comments and action items, set preferencesuit your work style, and use the Google Docs Explore tool. • Drive: Organize, protect, and share files. • Gmail : Compose, send, and reply to messages. • Meet & Chat : Manage video meetings and collaborate using instantmessages • Sheets: Create and edit spreadsheets directly in your browser—no other software is required. • Sheets Advanced Topic: Apply themes and conditional formatting, and use advanced formulas and functions • Slides: Create and collaborate on professional presentations forproposals, sales, marketing, or training • Form: To create online forms and surveys with multiple question types.	
Total Contact Hrs	30

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
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Programme Code:	B.Sc.		Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS307		Title	Batch:	2023 - 2026
				Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem. -	CC V: Java Programming	Credits:	4

Course Objective

The objective of this course is to make the students to understand the various features of Java such as Packages, Applets, AWT controls, Stream classes and Files and make the students to apply the same for writing the programs.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember and understand the OOPs concepts such as class, methods, inheritance, encapsulation and polymorphism etc.	K1, K2
CO2	To understand the differences between application programs and applets, applet life cycle and graphics programming.	K2
CO3	To implement programs using Thread, Applet and AWT controls, Swings, Beans and Servlets	K3
CO4	To evaluate java programs using stream classes and files.	K4
CO5	To design webpage using Applets	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	M	H	L	H	M	M	H	M	H
CO2	M	M	M	M	M	L	M	M	M	M	M	M
CO3	M	M	H	H	H	M	H	H	H	M	H	H
CO4	H	H	M	M	H	M	M	H	M	L	M	H
CO5	H	M	H	M	M	L	M	M	M	M	M	M

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	Java Evolution-Overview of Java Language-Constants, Variables & Data types-Operators & Expressions-Decision making & branching-Decision making & looping	11
Unit II	Classes, Objects & methods- Arrays, Strings & Vectors-Interfaces: Multiple Inheritance – Packages: Putting classes together - Multithreaded Programming.	12
Unit III	Managing Errors & Exceptions- Applet Programming: Introduction-How Applets differ from application-Preparing to Write Applets Building applet code- Applet lifecycle-Creating an Executable Applet - Designing Web page-Applet tag-Adding Applet to HTML file - Running the Applet-Passing Parameters to Applets - Graphics Programming.	12
Unit IV	The Java Library: String Handling - Networking - Event Handling - Introducing the AWT: Working with Windows, Frames, Graphics, and Text - Using AWT Controls,Layout Managers, and Menus - JDBC.	12
Unit V	Managing Input/Output in files in Java: Introduction-Concept of Streams-Stream Classes-Byte Stream classes-Character Stream Classes-Using Streams-other useful I/O Classes- using the File Class-I/O Exceptions-Creation of Files-Reading/Writing Characters - Reading/Writing Bytes.	13
	Total Contact Hrs	**60**

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy (Unit-I,II,III and V)	Programming with Java – A Primer	Tata McGraw Hill Publishing Company Limited, New Delhi, 5th Edition.	2019
2	Herbert Schildt (Unit- IV)	Java: The Complete Reference	ORACLE Press, Tenth Edition	2017

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS308			Title	Batch:	2023 - 2026
				CC VI. Operating System Concepts and Linux	Semester:	III
Lecture Hrs./Week	5	Tutorial Hrs./Sem	-		Credits:	4

Course Objective

Understand the fundamental concepts of operating systems, including process management, memory management, and virtual storage management and also learn about the different storage management strategies, job and processor scheduling algorithms

Understand the basics of Linux, including the GNU Project and the Free Software Foundation, shell programming, and Linux commands and Gain knowledge of processes, threads, and interprocess communication and file system permissions.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Develop a solid understanding of operating system fundamentals, including process concepts, process states and transitions, operations on processes, interrupt processing, and real storage management strategies	K1
CO2	Understands the use of different process scheduling algorithm and virtual storage techniques	K2
CO3	Apply the concept of Disk Performance Optimization to improve system performance and can be effectively navigate and utilize the Linux environment for various tasks.	K3
CO4	Design, develop, and manage processes and threads, enable to build robust and efficient software systems.	K4
CO5	Evaluate the different methods of interprocess communication and implement secure communication and access control mechanisms in software systems.	K5

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	M	M	M	M	M	M	H	M
CO2	M	M	H	M	H	M	H	H	L	M	M	H
CO3	M	M	M	H	H	M	M	L	M	L	H	H
CO4	H	H	M	H	M	M	M	M	L	M	H	M
CO5	M	M	M	H	M	H	M	L	M	M	H	M

H-High; M-Medium; L-Low

Syllabus

Units	Content	Hrs
Unit I	**OPERATING SYSTEM:** What is an Operating System? – **Process Concepts:** Definition of Process - Process States - Process States Transition Operations on Processes – Interrupt Processing **Storage Management: Real Storage:** Real Storage Management Strategies – Contiguous versus Non-contiguous storage allocation – Single User Contiguous Storage allocation- Fixed partition multiprogramming – Variable partition multiprogramming.	15
Unit II	**Virtual Storage:** Basic Concepts - Virtual Storage Management Strategies – Page Replacement Strategies – Working Sets – Demand Paging – Page Size. **Processor Management:** Job and Processor Scheduling: Scheduling Levels - Preemptive Vs Non-preemptive scheduling – Priorities – Deadline scheduling – FIFO - Round Robin – Shortest Job First – Shortest Remaining Time – Highest Response Ration Next Scheduling.	15
Unit III	**Disk Performance Optimization:** Operation of moving head disk storage – Need for disk scheduling – Seek Optimization. **LINUX:** What Is Linux? - The GNU Project and the Free Software Foundation - Shell Programming: What Is a Shell? - Shell as a Programming Language – **Linux Commands:** Basic Commands – File Permission Commands – Environmental Variable Commands - Vi Editing commands – User Management Commands – Network Commands – Process Commands.	15
Unit IV	**Processes:** Looking at Processes - Creating Processes – Signals - Process Termination – **Threads:** Thread Creation - Thread Cancellation - Synchronization and Critical Sections - GNU/Linux Thread Implementation - Processes Vs. Threads	15
Unit V	**Interprocess Communication:** Introduction - Shared Memory - Processes Semaphores - Mapped Memory – Pipes – Sockets – **Security:** Users and Groups - Process User IDs and Process Group IDs - File System Permissions.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	H.M. Deitel	Operating Systems	2nd Edition, Perason	2003
2	Neil Matthew Richard Stones	Beginning Linux® Programming	4th Edition, Wiley Publishing, Inc	2008
3	Mark Mitchell, Jeffrey Oldham, Alex Samuel	Advanced Linux Programming	New Riders Publishing	2001

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Achyut S. Godbole.	Operating systems	TMH	2002.
2	Petersen and Richard	LINUX: The Complete Reference	McGraw Hill,Sixth edition	2007

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
K.Srinivasan G.Angayarkanni Signature:	Name:Dr.R.Manicka Chezian Signature:	Name: Mr. K. Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc		**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	23UCS3A1		**Title :**	**Batch :**	2023-2026
Lecture Hrs/Week:	5	Tutorial Hrs/Sem. -	**GE III – Allied III:** Computer Based Optimization Techniques	**Semester:**	III
				Credits:	4

Course Objective

To enable the students to understand and to apply the resource management techniques available in OR including linear programming transportation assignment problem, inventory control queuing theory and network problems.

Course Outcomes (CO)

On the successful completion of the course, students will beable to

CO Number	CO Statement	Knowledge Level
CO1	Remember and understand the concepts of relations	K1,K2
CO2	Understand the concept of transportation, networking, replacement, etc.,	K2
CO3	Apply the appropriate optimization techniques to solve the computer based business problems	K3,K5
CO4	Become familiar with, LPP, Hungarian method, Game theory, Replacement problem.	K4,K5
CO5	Analyze the ability of critical thinking, to find shortest time duration	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P1O	PSO1	PSO2
CO1	H	H	H	M	M	H	H	M	M	M	M	H
CO2	H	M	H	H	H	M	M	M	M	H	H	M
CO3	M	H	H	M	M	M	M	M	M	H	M	M
CO4	H	H	H	H	M	H	M	M	M	M	M	H
CO5	H	H	H	H	M	M	M	H	M	M	M	M

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	Origin and development of OR – *Applications of OR* – Linear programming problem – Mathematical formulation of the problem – Graphical Method – Simplex Method.	15
Unit II	**Transportation Problem:** Balanced Transportation problem and Un-Balanced Transportation problem-Row Minimum-Column Minimum-North-West Corner-Matrix Minima Method-Vogel's Approximation Methods-U-VMethod for OBFS. **Assignment Problem:** Balanced Assignment Problem and Un-Balanced Assignment Problem– Hungarian method .	15
Unit III	**Network Scheduling:** Network and Basic components – *Logical sequencing:* Formation of a Loop, Dangling, Redundancy-Network Construction- Rules of Network construction –Time calculation in Network-Numbering the events– Critical Path Method (CPM)– PERT Calculations.	15

Unit IV	**Replacement Problem and System Reliability:** Model 1: Value of Money does not change with time Model 2: Value of Money change with time. **Game and Strategies**: Introduction-Two-Person Zero-Sum games-Pure Strategies-Maximin-Minimax Principles-Saddle Point and Value of the Game-Rule for Determining a Saddle Point- Mixed Strategies- Games without Saddle Points- 2x2 Rectangular Games.	15
Unit V	**Sequencing problem:** Problems with n jobs and 2 machines – Problems with 'n' jobs and 'k' machines. **Inventory control** – Types of inventory-Economic Order Quantity: Model 1: EOQ problem with no shortages Model 2: EOQ problem with no shortages and several production runs of unequal length Model 3: EOQ problem with shortages.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kanti Swarup, PK Gupta, Man Mohan	Operations Research	Sultan Chand and Sons	2020

References Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. DharaniVenkatakrishnan	Operations Research	Keerthi Publishing P.Ltd	2015
2	PK Gupta , Man Mohan	Problems in Operations Research	3rd Edition	2018
3	G. Srinivasan	Operations Research: principles and Applications	2nd Edition	2017

Course Designedby	Verified by HOD	Checked by	Approved by
		CDC	COE
Name and Signature	Name with Signature		
Dr. M.Malathi Dr.R.Nandhakumar Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc			**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	23UCS3A2			**Title :**	**Batch :**	2023-2026
Lecture Hrs/Week:	5	Tutorial Hrs/Sem.	-	**GE III – Allied III:** Resource Management Techniques	**Semester:**	III
					Credits:	4

Course Objective

To enhance the students' knowledge in decision analysis, sequencing of the jobs to be carried out based on cost optimization, replacement policies and analyze the cases according to their categories.

Course Outcomes (CO)

On the successful completion of the course, students will beable to

CO Number	CO Statement	Knowledge Level
CO1	Know the principles and applications of information theory	K1,K2
CO2	To understand sequencing, replacement problems.	K2
CO3	Demonstrate skills to achieve their objective using sequencing models.	K3,K5
CO4	Apply decision making under different business environments.	K4,K5
CO5	Determine a solution to a rectangular game using simplex method	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P1O	PSO1	PSO2
CO1	H	H	H	M	M	H	H	M	M	M	M	H
CO2	H	M	H	H	H	M	M	M	M	H	H	M
CO3	M	H	H	M	M	M	M	M	M	H	M	M
CO4	H	H	H	H	M	H	M	M	M	M	M	H
CO5	H	H	H	H	M	M	M	H	M	M	M	M

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**Decision Analysis:** Decision Making environment – Decisions under uncertainty – Decision under risk – Decision –Tree Analysis.	15
Unit II	**Sequencing Problems:** Introduction-problem of sequencing - basic terms used in sequencing- processing n-jobs through 2 machines - processing n –jobs through k machines - processing 2 jobs through k machines (Problems only).	15
Unit III	**Replacement Problems:** Introduction - Replacement of equipment / assets that deteriorates gradually - replacement of equipment that fails suddenly and problems.	15
Unit IV	**Information Theory:** Introduction- A measure of Information-Axiomatic Approach to Information- Entropy-The expected information- Some properties of entropy function- Joint and conditional entropies.	15
Unit V	Applications: General solution of (mxn) rectangular games using simplex method - Reliability and system failure rates using replacement problems.	15
	Total Contact Hrs	**75**

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments,Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kanti Swarup, PK Gupta, Man Mohan	Operations Research	S.Chand & sons education publications : New Delhi	2014

References Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. DharaniVenkatakrishnan	Operations Research	Keerthi Publishing P.Ltd	2015
2	PK Gupta , Man Mohan	Problems in Operations Research	3rd Edition	2018
3	G. Srinivasan	Operations Research: principles and Applications	2nd Edition ..	2017

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Programme code:	B.Sc	Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23U CS309	Title :	Batch :	2023-2026
		CC Lab III: Programming Labin Java	Semester:	III
Hrs/Week:	4		Credits:	2

Course Objective

The objective of this course is to make the students to implement various features of Javaprogramming by using Java SDK environment to create, debug and run Java programs.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To apply the basic concepts of Java such as class, methods, constructors, arrays and interfaces to solve the problems.	K3
CO2	To analyze programs using method overloading, methodoverriding, packages and threads.	K4
CO3	To validate programs using event handling, applets, AWT controls andfiles.	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	M	M	M	H	H	H	L	M	M
CO2	H	H	M	M	H	H	H	M	M	L	M	H
CO3	H	H	M	M	M	M	H	H	H	H	M	M

H-High: M-Medium: L-Low

Syllabus

Units	Contents	Hrs
	SET-A • Program to sort the given names in alphabetical order. • Program to determine whether two strings are anagram or not. • Program to calculate area of different shapes using method overloading. • Program for command line Argument. • Program to illustrate the use of single inheritance. • Program to implement the concept of Multithreading. • Program to create an Exception called Pay out of bounds & throw the Exception. • Program to draw smiley using Applet. • Program to perform method overriding. • Program to get the parts of the URL using networking concepts. • Program for Key Events. • Program to create Thread by implementing Runnable interface. • Program to draw several shapes. **SET-B** • Program for processing Bank details using the concept of multiple inheritance using the interfaces. • Program for Employee salary details using Packages. • Program to demonstrate the multiple selection List-Box. • Program to create menu Bars and pull down menus. • Program to create a frame with four Text Fields. name. street. city and pincode with suitable Labels. Also add a Button called my details. when the Button is clicked is corresponding details to be displayed. • Program to create a frame with three text fields for name. age and qualification and a text field for multiple lines for Address. • Program to perform arithmetic operations using AWT controls. • Program to display the student information system using Swing. • Program to extract a portion of character string and print the extractedstring. • Program for Mouse Events. • Program for processing Random Access File. • Program to copy one file to another file. • Program for creating a simple JDBC application INTERNAL MARK (20 Marks) EXTERNAL MARK (30 Marks)	60

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Programme Code:	B.Sc		**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	23UCS310		**Title**	**Batch:**	2023 - 2026
Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	**CC Lab IV** Programming Lab in Linux	**Semester:**	III
				Credits:	2

Course Objective

The objective of this course is to make effective use of Linux utilities and shell scripting language to solve problems.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To Develop shell scripts for simple applications.	K3, K4, K5
CO2	To Develop programs to create and manage processes.	K3, K4, K5
CO3	To Develop programs for system administration	K3, K4, K5

Mapping

POs, PSOS / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	L	L	H	H	M	L	M	H	H	H
CO2	H	H	L	L	H	H	H	L	M	H	H	H
CO3	H	H	L	L	H	H	H	L	M	H	H	H

H-High; M-Medium; L-Low

Syllabus

Content	Hrs
SET A • Write programs for various commands like cat, tail, head, sort, grep, cut, paste, join, etc.. • Write programs using file related commands. • Write programs using directory related commands. • Write programs to create user, group and assign various permissions to access a directory • Write programs to create user, group and assign various permissions to access a directory • Write a shell script program to display list of users currently logged in & process. • Write a shell script program to develop a scientific calculator. • Write a shell script to compute GCD & LCM of two numbers • Write a shell script program to display telephone tariff of a customer. • Write a shell script program to search whether element is present is in the list or not. • Write a shell script program to search whether element is present is in the list or not. • Write a Shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it. **SET B** • Write a shell-script that takes a command line argument and reports on whether it is a directory, a file or something else. • Write a shell script that displays a list of all files in the current directory to which the • user has read, write and execute permissions • Write a shell script program to change the access mode of all the files and directories within the specified directory • Write a shell script to count number of lings in a file that does not contain vowels • Write a shell script to find the no of characters ,words and lines in a file • Write a shell script program to copy contents of one file to another using command line. • Write a shell script program to display the process attributes. • Write a shell script program to change the priority of process and terminate. • Write a shell script program to allow only user1, user2, user3 to use crontab • Write a shell script program to create an archive by bundling files and directories together, and extract them into a specific directory.	60
INTERNAL MARK (20 Marks) **EXTERNAL MARK (30 Marks)**	
Total Contact Hrs	**60**

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Mr.K.Srinivasan G.Angayarkanni Signature:	Name: Dr.R.Manicka Chezian Signature:	Name:Mr.K.Srinivasan Signature:	Name: Dr.R.ManickaChezian Signature:
Head of the Department Department of Computer Science NGM College, Pollachi - 642 001		K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) Pollachi - 642 001.	Dr. R.MANICKA CHEZIAN, M.Sc.,M.S.,Ph.D., Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001.

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)
Course Code:	23UCS3N1	**Title :** Non-Major Elective Paper I Photoshop Lab	**Batch :** 2023-2026
Hrs/Week:	1		**Semester:** III
			Credits: 2

Course Objective

The objective of this course is to make the students to gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the toolbar, layers, and the adjustments panel.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To apply the different type of tools available in Photoshop to create simple applications.	K3
CO2	To interpret programs using various filters in Photoshop	K4
CO3	To Identify the basic tools and components of multimedia components.	K5

Syllabus

Units	Contents	Hrs
	SET A • Image Menu using Photoshop • Reduce Picture Size using Photoshop • Replace color in an image using Photoshop • Make a simple book cover by using basic functionalities using Photoshop • Transfer an object from one image to another and erase background using Photoshop • Add a pattern as background using Photoshop SET B • Create India Map using Photoshop • Retouching photos using Photoshop • Take a logo and modify it using Photoshop • Alter an image using filters using Photoshop • Special Effects-Color in black and white image using Photoshop • Special Effects-Feathered Portraits (Soft fade) using Photoshop EXTERNAL MARK (50 Marks)	15

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)
Course Code:	23UCS5N2	**Title :** Non-Major Elective Paper-I: Advanced Applications in MS Excel Lab	**Batch :** 2023-2026
			Semester: III
Hrs/Week:	1		**Credits:** 2

Course Objective

This course was designed for the intermediate student who has already mastered the basic skills andwants to gain more advanced skills to put to work in a business environment or for personal use.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To apply the different type of tools available in Photoshop to create simple applications.	K3
CO2	To interpret programs using various filters in Photoshop	K4
CO5	To Identify the basic tools and components of multimedia components	K5

Syllabus

Units	Contents	Hrs
	SET A • In a new worksheet, create a table and insert information of student details. Use features of Format Menu. • Create employee table and calculate the salary. Use mathematical functions for the worksheet. • Create own templates in Excel. • Create and use data validation rules. • Create, manage, and format pivot tables and pivot charts. • Create a data and use sumif and countif formulas **SET B** • Create and write complex formulas. • Create and use IF statements. • Apply custom and prebuilt conditional formatting. • Work with functions to manipulate strings of text and data. • Create charts in excel • Create a data and using that data perform Match and index • Create a data and using that data perform Vlookup concept **EXTERNAL MARK (50 Marks)**	15

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
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Programme Code:	B.Sc	**Programme Title:**	Bachelor of Science (Computer Science)
Course Code:	23UCS411	**Title**	**Batch:** 2023 - 2026
Lecture Hrs./Week	4	**CC VII** Python Programming	**Semester:** IV
	Tutorial Hrs./Sem. -		**Credits:** 3

Course Objective

On successful completion of this course the students should understand the core principles of the Python Language and use the tools to produce well designed programs in python and create effective GUI applications.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the principles of structured programming and to understand basics of python.	K1
CO2	To understand the common programming idioms: variables. loop. branch. subroutine and input/output	K2
CO3	To deploy the concepts of functions. standard libraries.modular programming and the design of user interfaces	K3
CO4	To figure out ability to analyze and solve the problems usingadvanced facilities of the Python Language	K4
CO5	To evaluate the object oriented features in python using functions and standard libraries.	K5

Mapping

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	H	H	M	L	H	H	M	H	H
CO2	H	M	H	H	H	L	L	H	L	H	M	H
CO3	H	H	H	H	M	M	M	M	M	H	H	H
CO4	M	H	M	M	H	L	L	L	L	M	H	M
CO5	H	H	M	H	M	M	M	M	M	H	H	M

H-High: M-Medium; L-Low

Syllabus

Units	Content	Hrs
Unit I	**BASICS :** Python - Variables - Executing Python from the Command Line - Editing Python Files - Python Reserved Words - Basic Syntax-Comments - Standard Data Types - Relational Operators - Logical Operators - Bit Wise Operators - Simple Input and Output	12
Unit II	**CONTROL STATEMENTS:** Control Flow and Syntax - Indenting - if statement else Statement - elif statement - conditional expression - while statement - for statement - break statement - continue statement - pass statement - Iterators and the iter( ) function- break and continue - for Loop - Lists - Tuples - Sets - Dictionaries.	12
Unit III	**FUNCTIONS:** Definition - calling functions - creating functions - passing functions - Mapping Functions in a Dictionary -Built-in Functions: apply( ), filter( ), map( ) andreduce( ) - Lambda – Modules and Files-module-Build-in-Functions.	12
UnitIV	**ERROR HANDLING:** Run Time Errors - Exception Model - Exception Hierarchy - Handling Multiple Exceptions - Data Streams - Access Modes Writing - Data to a File Reading - Data From a File - Additional File Methods - Using Pipes as Data Streams - Handling IO Exceptions - Working with Directories.	12
UnitV	**OBJECT ORIENTED FEATURES:** Classes Principles of Object Orientation - Creating Classes - Instance Methods - File Organization - Special Methods - Class Variables – Inheritance – Polymorphism - Type Identification - Simple Character Matches - Special Characters - Character Classes – Quantifiers - Dot Character - Greedy Matches – Grouping - Matching at Beginning or End - Match Objects – Substituting - Splitting a String - Compiling Regular Expressions.	12
	Total Contact Hrs	**60**

Pedagogy and Assessment Methods:

Seminar. Power Point Presentation. Chalk and talk. Quiz. Assignments. APS

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Mark Summerfield	Programming in Python 3: A Complete introduction to the Python Language	Addison-Wesley Professional	2009
2	Martin C. Brown	PYTHON: The Complete Referencel	McGraw-Hill	2001

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Allen B. Downey	Think Python: How to Think Like a Computer Scientist	Shroff O'Reilly Publishers	2016
2	Guido van Rossum and Fred L. Drake Jr	An Introduction to Python	Network Theory Ltd	2011
3	Wesley J Chun	Core Python Applications Programming	Prentice Hall	2012

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS412			Title:	Batch :	2023-2026
				CC VIII: Relational Database Management Systems	Semester:	IV
Lecture Hrs/Week:	4	Tutorial Hrs./ Sem.	-		Credits:	3

Course Objective

The objective of this course is to make the students to understand and apply the principles of data modeling using Entity Relationship and normalization techniques and understand the use of Structured Query Language (SQL) and its syntax.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic concepts and applications of database systems and SQL.	K1
CO2	To understand the relational database theory, and be able to write relational algebra expressions for queries	K2
CO3	To apply design principles using the E-R method and normalization approach	K3
CO4	To interpret SQL interface of a relational DBMS package to create, secure, populate, maintain, and query a database and PL/SQL programming using Triggers and Cursors.	K4
CO5	To attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	K5

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	M	M	M	M	M	M	H	M
CO2	M	M	H	M	H	M	H	H	L	M	M	H
CO3	M	M	M	H	H	M	M	L	M	L	H	H
CO4	H	H	M	H	M	M	M	M	L	M	H	M
CO5	M	M	M	H	M	H	M	L	M	M	H	M

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	**Database Concepts: A Relational Approach:** An Introduction- Relationships- Database Management System- The Relational Database Model – Integrity Rules – Theoretical Relational Languages – Relational Algebra. Applications of Relational Algebra. Relational Calculus. **Database Design:** Data Modeling – Dependency – Database Design – Entity – Relationship Model – DFD Diagrams- Codd's Rules for RDBMS.	12
Unit II	**Normalization:** Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF) – Dependency Diagrams – *Denormalization* **Oracle SQL:** Personal Databases-Client/Server Databases- Structured Query Language (SQL)-SQL *Plus Commands. **Oracle Table: Data Definition Language (DDL):** Naming rules and conventions-Data Types-Constraints-Creating an Oracle Table-Displaying Table Information-Altering. Dropping. Renaming a Table-Truncating a Table.	12
Unit III	**Working with Table: Data Management and Retrieval:** DML – Adding a new Row /Record – Customized Prompts – Updating and Deleting an existing Rows/Records – Retrieving data from table – Arithmetic Operations – Restricting data with WHERE Clause – Sorting – Revisiting substitution variables – DEFINE Command – CASE structure. Functions and Grouping:Built-in functions- Grouping Data.	12
Unit IV	**Multiple Tables: Joins and Set Operations:** Join – Set Operations. **PL/SQL:** Introduction – Block Structure – Comments – *Data types* – Other data types – Declaration – Assignment Operators. **Control Structures and Embedded SQL:** Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control Statements.	12
Unit V	**PL/SQL Cursors and Exceptions:** Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR Loops – SELECT...FOR UPDATE – WHERE CRRENT OF Clause – Cursor with parameters – Cursor Variables – Exceptions– Types of Exceptions. **PL/SQL Composite Data Types: Records – Tables – arrays. Named Blocks: Procedures – Functions – Packages –Triggers –Data Dictionary Views.**	12
	Total Contact Hrs	**60**

Pedagogy and Assessment Methods:

Seminar. Power Point Presentation. Chalk and talk. Quiz. Assignments. Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Nilesh Shah	Database Systems using Oracle	PHI .2nd edition	2004
2	Diana Lorentz	Oracle® Database SQL Reference	ORACLE	2005
3	Bill Pribyl, Steven Feuerstein	Oracle PL/SQL Programming	O'Reilly Media. Inc., 6 th Edition,	2014

Reference Books

S.No	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Ivan Bayross	SQL, PL/SQL - The programming language of Oracle	BPB Publication. 3rd edition	2010
2	Ivan Bayross	Commercial Application Development using Oracle.	BPB Publication	2000
3	George Koch	The Complete Reference - Oracle 8i	Tata McGraw Hill publication.	2000

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr. Aruchamy Rajini M.Meenakrithika Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K. Srinivasan Signature:	Name:Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	23UCS413			**Title**	**Batch:**	2023 -2026
				CC Lab V: Programming Lab in Python	**Semester:**	IV
Practical Hrs./Week	4	**Pratical Hrs./Sem.**	-		**Credits:**	2

Course Objective

On successful completion of the course the students should write well-documented programs in the Python language, including use of the logical constructs of that language.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To implement, Interpret, Contrast of various operators.	K3
CO2	To review and analyze database with variables, loop, branch, subroutine, and input/output.	K4
CO3	To validate how databases are integrated with components, modular programming and the design of user interfaces.	K5

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	M	M	M	M	M	M	H	M
CO2	M	M	H	M	H	M	H	H	L	M	M	H
CO3	M	M	M	H	H	M	M	L	M	L	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
	SET A • Write a Python Program to solve quadratic equation. • Write a Python Program to generate a random number. • Write a Python Program by implementing tuples. • Write a Python Program for Insertion sort. • Write a Python Program to Make a Simple Calculator. • Write a Python Program to print the elements of an array in reverse order. • Write a Python Program using strings and their built-in functions. • Write a Python Program to find the product of two matrices. • Write a Python Program that writes a series of random numbers to a file from 1 to n and display. • Write a Python Program using apply ( ), filter ( ), map ( ) and reduce ( ) functions. **SET B** • Write a Python Program to convert list to dictionary, sort a dictionary, and Merge two Dictionaries. • Write a program for linear search and Binary Search. • Write a program to create file, write the content and display the contents of File. • Write a function in Python to count the words "this" and "these" present in a text file • Write a function in Python to count number of words, number of characters in a File. • Write a GUI program that converts Celsius temperatures to Fahrenheit temperatures. • Write a GUI program that displays your details when a button is clicked. • Write a program to delete or remove elements from a list. • Write a program to slice lists in Python • Write a Program to Illustrate Different Set Operations. **INTERNAL MARK (20 Marks) EXTERNAL MARK (30 Marks)**	60

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Mr. K.Srinivasan Dr.S.Sharmila Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc.		**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	23UCS414		**Title**	**Batch:**	2023 - 2026
			CC Lab VI Programming Lab in RDBMS	**Semester:**	IV
Practical Hrs./Week	3	**Tutorial Hrs./Sem.**	-	**Credits:**	2

Course Objective

The objective of this lab is to provide a strong formal foundation in database concepts, technology and practice to theparticipants to groom them into well-informed database application developers.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To apply the normalization techniques for development of application software to realisticproblems and ability to formulate queries using SQL DML/DDL/DCL commands	K3
CO2	To interpret SQL interface of a relational DBMS package to create, secure, populate, maintain, and query a database and PL/SQL programming using Triggers and Cursors.	K4
CO3	To access data stored in an Oracle Relational DBMS using Oracle SQL, PL/SQL	K5

Mapping

PO/ CO	PO1	PO2	PS3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H

Syllabus

Units	Contents	Hrs

SET A

- Write the SQL Commands for DDL
- Write the SQL Commands for DML
- Write the SQL Commands for TCL
- Write the SQL Commands to perform SQL Operations
- Write the SQL Commands for Views
- Write the SQL Commands for Joins
- Write the SQL Commands to perform Set Operations
- Write the SQL Commands for Sub Queries
- Write a PL/Sql program to Reverse a given number
- Write a PL/Sql program to find given number is Odd Or Even
- Write a PL/Sql program to display Fibonacci Series
- Write a PL/Sql program to find given number is Prime Or Not

SET B

- Apply Normalizations (1st, 2nd & 3rd) to the following table:

Table Name: Users

Name	Company	Company_Address	Url1	Url2
Joe	ABC	Work Lane	abc.com	xyz.com
Jill	XYZ	1 Job Street	abc.com	xyz.com

45

- Salary Calculation Using Cursor
- Write a PL/Sql program to generate all prime numbers below 100
- Write a program to demonstrate %type and %rowtype attributes
- Create a trigger before/after update on employee table for each row/statement
- Create a trigger before/after delete on employee table for each row/statement
- Create a trigger before/after insert on employee table for each row/statement
- Create a cursor, which displays all employee numbers and names from the EMP table
- Create a cursor, which update the salaries of all employees as per the given data
- Create a cursor, which displays names of employees having salary > 50000
- Cursor For Loop
- **Database Schema for a Employee-pay scenario**
  Tables: Employee , department, pay details, payroll
  For the above schema, perform the following—
- Create the tables with the appropriate integrity constraints
- Insert around 10 records in each of the tables
- List the employee details department wise
- List all the employee names who joined after particular date
- List the details of employees whose basic salary is between 10,000 and 20,000
- Give a count of how many employees are working in each department
- Give a names of the employees whose netsalary>10,000
- List the details for an employee_id=5
- Create a view which lists out the emp_name, department, basic, deductions, netsalary
- Create a view which lists the emp_name and his netsalary

INTERNAL MARK (20Marks) **EXTERNAL MARK (30 Marks)**

Course Designed by Name and Signature	Verified by HOD Name with Signature	Checked by CDC	Approved by COE
Dr. Aruchamy Rajini M.Meenakrithika Signature:	Name:Dr.R.Manicka Chezian Signature:	Name:Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme code:	B.Sc	Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS4S1	Title : SEC II: Naan Mudhalvan: Industry 4.0	Batch :	2023-2026
			Semester:	IV
Hrs/Week:	2		Credits:	2

Course Objective

The objective of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, learning creative and critical decision making, developing awareness of how to work with people and to resolve stress.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand the importance of augmented reality in Industry 4.0 with real-time	K1
CO2	To impart the importance of AI technologies in assistive technology	K2
CO3	To discuss the available applications of AI for promoting early diagnosis of diseases	K3
CO4	To understand the various AI technologies	K4
CO5	To provide Big Data scope into different application areas	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	Introduction to Augmented Reality: Augmented reality characteristics-History- types -Hardware technology- virtual scenes– 3D objects-Technologies used in AR- Real world uses of AR- AR technological components-Technology use and integration in industrial settings-Micro learning techniques-Virtual Reality-VR technology-VR in Education- Tools available for Augmented Reality and Virtual reality.	6
Unit II	History of AI- AI Environment- Challenges in AI- use of AI – Future of AI- AI Environment -AI Powered technology for an inclusive world-AI in medical diagnosis-Emerging Agricultural Technologies-Motivations to develop AI-Based systems for Radiation protection.	6
Unit III	Machine Learning: Importance of Machine Learning- Types of Machine Learning-Machine Learning Algorithm- Machine learning methods-Application areas of Machine Learning- Influence of AI and ML in Clinical and Genomic Diagnostics.	6
Unit IV	Big Data Analytics: Data: Terminologies -Data Evolution-Data Formats and sources-Data Integration Methodologies- Big Data related technologies – Big Data Industry 4.0 Applications	6
Unit V	Big Data for Education 4.0: Education 4.0 in India- Digital Revolution of Education 4.0 –Education 4.0 –Requirements of Education 4.0 in Industry-Business Analytics- Business Intelligence- Applications of Big Data- Big Data in Biomedical Research.	6
	Total Contact Hrs	30

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Kaliraj P. Devi T. (2021)	Artificial Intelligence Theory, Models, and Applications	CRC Press. Taylor & Francis Group. Boca Raton,	ISBN 9781032008097 Auerbach Publications.

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Kaliraj, P. Devi, T.	Big Data Applications in Industry 4.0	(P. Kaliraj, Ed.) (1st ed.).	Auerbach Publication

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.M.Malathi M.MeenaKrithika Signature:	Name:Dr.R.Manicka Chezian Signature:	Name:Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme code:	B.Sc	Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS4S2	Title :	Batch :	2023-2026
Hrs/Week:	2	SEC II: Naan Mudhalvan: Aptitude for Placements	Semester:	IV
			Credits:	2

Course Objective

The objective of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, learning creative and critical decision making, developing awareness of how to work with people and to resolve stress.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic mathematics and its functions.	K1
CO2	To understand the various problems in the real world related to shapes, purchase, sales, interest.	K2
CO3	To apply the skills required for various problems.	K3
CO4	To analyze the illustration and steps involved in problem solving approach.	K4
CO5	To build the quantitative aptitude skills for solving various mathematical and application.	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	Numeral- Place Value or Local Value of a Digit in a Numeral- Face Value- Types – Of Numbers- Tests Of - Multiplication By Short Cut Methods Divisibility- Basic Formulae-Progression.	6
Unit II	Time – Speed – Distance – Heights And Distances -Races - Problems On Trains – Boats & Streams- Time And Work - Ratio Proportion- Partnership - - Pipes and Cisterns -Chain Rule- Mixtures & Solutions- Clocks – Calendar.	6
Unit III	LCM AND GCD - Unit digit. Number of zeroes. Factorial notation - Sets- Functions Square root. Cube roots. Remainder concepts—Identities- Fractions and Decimals. Surds.	6
Unit IV	Problems On Ages- Percentage- Profit And Loss- Discount- . Simple Interest- Compound Interest-Installments- Stocks And Shares- True Discount.	6
Unit V	Logarithms- Linear Equations - Quadratic Equations And In-Equations Volume And Surface Area- Permutations And Combinations - Probability – Bar Graphs-Pie Charts-Line Graphs.	6
	Total Contact Hrs	30

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	R.S Agarwal	Quantitative Aptitude	S.Chand Publications.	2015

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Abhijit Guha	Quantitative Aptitude for Competitive Exams	McGrawhill Education. 6th edition	2016
2.	Dilip KumarYugnirmal	Quantitative Aptitude for Competitive Exams	Trail Blazer Winning Edge Series Publications.	2017

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
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Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	23UCS4N1	**Title :**	**Batch :**	2023-2026
Hrs/Week:	1	Non-Major Elective Paper-II: Flash Lab	**Semester:**	IV
			Credits:	2

Course Objective

The objective of this course is to make the students to learn about Macromedia Flash and develop their skills increating animations and special effects by using the tools.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To Remember the concepts of animation with flash Software.	K1
CO2	To understand various applications and view its presentations.	K2
CO3	To apply the various tools available in Flash for creating animations.	K3
CO4	To get the idea about timeline, frames and motion tweens.	K4
CO5	To validate the animations by running the test movies.	K5

Syllabus

Units	Contents	Hrs
	SET A • Wind mill effect using flash • Drawing and creating text with effects using Flash • Logo using Flash • Moving car using Flash • Eye ball rotation using Flash • Growing moon using Flash. **SET B** • Rotating globe using Flash • Fog Effect using Flash • Lightning Effect using Flash • Animated Effect using Flash • Raining Effect using Flash • Bouncing ball using Flash. **EXTERNAL MARK (50 Marks)**	15

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.M.Malathi Dr. S. Sharmila Signature:	Name: Dr.R.Manicka Chezian Head of the Department Department of Computer Science NGM College, Pollachi - 642 001. Signature:	Name:Mr.K.Srinivasan K. SRINIVASAN, M.C.A., Co-ordinator Curriculum Development Cell (UG) NGM College (Autonomous) Pollachi - 642 001. Signature:	Name: Dr.R.Manicka Chezian Dr. R.MANICKA CHEZIAN, M.Sc., M.S. Ph.D., Controller of Examinations NGM College (Autonomous) POLLACHI - 642 001. Signature:

Programme code:	B.Sc	**Programme Title :**	Bachelor of Science (Computer Science)	
Course Code:	23UCS4N2	**Title :**	**Batch :**	2023-2026
Hrs/Week:	1	Non-Major Elective Paper-II: Internet Applications Lab	**Semester:**	IV
			Credits:	2

Course Objective

To enable the students to know how to work with internet, the usage of internet and its applications.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To Know about basic of internet	K3
CO2	To analyze the concept through online.	K4
CO3	To get idea about online applications.	K5

Syllabus	Hrs
Contents	
SET A • Download a information about "Power of Indian president" from a website by using a search engine. • Select two electronics items by e-shopping. • Select mobile phone items by e-shopping. • Book Online train Tickets from Coimbatore to Chennai. • Using Search Engine download information on "Benefits of Yoga". • Open an email account in your names in gmail/yahoomail/hotmail. • Write e-mail to Pradeep by marking a blind copy to Priya. • Download information about "greatness of Himalayas for tourism interest" in PowerPoint presentation. • Create an electronic greeting card with personal remarks and pictures. • Create an album edited by using online photo editor tools. • Create a questions and post it to any online evaluation tool to conduct a test • Download information about greatness of Himalayas for tourism interest. **SET B** • Write a congratulating letter to your friend on his promotion using mail. • Download research articles on "Information technology Applications" and save as doc. Files. • Download M.Phil application form in Bharathiar university • Search the information about " PowerPoint creation" in youtube • Download pdf about the concept of "Environmental studies". • Convert word to pdf and pdf to word using online convertor. • Pay EB-Bill through online • Create a new video using online video editing tools **EXTERNAL MARK (50 Marks)**	15

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
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Programme code:	B.Sc	Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS4VA	Title : VAC II: Python for Data Analytics	Batch :	2023-2026
			Semester:	IV
Hrs/semester:	30		Credits:	2*

Course Objective

To introduce the concepts of python programming constructs

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the concept of Decision making statements, looping constructs , functions forsolving basic programs	K3
CO2	Analyze the concepts of Lists, tuples and error handling mechanisms	K4
CO3	Evaluate a program incorporating all the python language constructs	K5

Syllabus

Contents	Hrs
SET A • Write a python program that displays the following information: Yourname, Full address Mobile number, College name, Course subjects. • Write a python program to find the largest three integers using if-else and conditional operator • Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of theseries) and the program should display the numbers in order and their sum. SET B • Write a python program to find the product of two matrices [A]mxp and[B]pxr • Write recursive functions for GCD of two integers. • Write recursive functions for the factorial of positive integer. • Write recursive functions for Fibonacci Sequence up to given number n. • Write recursive functions to display prime number from 2 to n. • Write a python program that writes a series of random numbers to a filefrom 1 to n and display. • Write a python program to sort a given sequence: String, List and Tuple.	30

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr.M.Malathi M.Dhavapriya Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K.Srinivasan Signature:	Name:Dr.R.Manicka Chezian Signature:

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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS515			Title:	Batch :	2023-2026
					Semester:	V
Lecture Hrs/Week:	5	Tutorial Hrs./ Sem.	-	CC IX: Open Source Technologies	Credits:	5

Course Objective

On successful completion of the course the students are enabling to learn about creating dynamic web pages using different open source technology like PHP, MYSQL and Apache.

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	To understand PHP functions and arrays	K1
CO2	To remember PHP basic syntax for variables types, operators and flow controls	K2
CO3	To analyze basic MySQL commands	K3
CO4	To apply MYSQL commands to create and connect PHP application	K4
CO5	To evaluate application accessing restrictions, logging and monitoring Apache webserveractivity, optimizing and tuning MYSQL	K5

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	M	H	L	L	M	M	H	L	M	H	L	L
CO2	H	H	L	L	M	H	H	L	M	H	L	L
CO3	H	H	H	M	H	H	H	M	H	M	H	M
CO4	H	H	H	M	H	H	M	H	M	H	H	M
CO5	M	H	H	H	H	M	M	M	H	H	H	H

H-High; M-Medium; L-Low.

Syllabus

Units	Contents	Hrs
Unit I	**PHP Language Structure:** The Building Blocks of PHP Variables Data Types-Operators and Expressions-Constants-Flow Control Functions in PHP-Switching Flow-Loops-Code Blocks and Browser Output.	15
UnitII	**Working with Functions:** What Is a Function?-Calling Functions- Defining a Function- Returning Values from User-Defined Functions-Variable Scope-Saving State Between Function Calls with the static Statement-More About Arguments-Testing for the Existence of a Function. **Working with Arrays:** Arrays:- Creating Arrays-Some Array-Related Constructs and Functions.	15
Unit III	**PHP and MySQL Integration.** Learning Basic SQL Commands- Learning the MySQL Data Types-Learning the Table-Creation Syntax-Using the INSERT Command-Using the SELECT Command-Using WHERE in Your Queries-Selecting from Multiple Tables-Using the UPDATE Command to Modify Records-Using the REPLACE Command-Using the DELETE Command-Frequently Used String Functions in MySQL-Using Date and Time Functions in MySQL.	15
Unit IV	**Using Transactions and Stored Procedures in MySQL:** What Are Transactions?-What Are Stored Procedures?-Interacting with MySQL Using PHP-MySQL or MySQLi Functions?-Connecting to MySQL with PHP-Working with MySQL Data.	15
Unit V	**Restricting Access to Your Applications:** Authentication Overview-Apache Authentication Module Functionality-Using Apache for Access Control-Combining Apache Access Methods-Limiting Access Based on HTTP Methods-Restricting Access Based on Cookie Values. Logging and Monitoring Web Server Activity-Standard Apache Access Logging. Standard Apache Error Logging-Managing Apache Logs-Logging Custom Information to a Database. **Optimizing and Tuning MySQL:** Building an Optimized Platform. Benchmarking Your Database Server-MySQL Startup Options, Optimizing Your Table Structure-Optimizing Your Queries-Using the FLUSH Command-Using the SHOW Command.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods

Seminar. Power Point Presentation. Chalk and talk. Quiz. Assignments. Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Julie C.Meloni	Sams Teach Yourself PHP, MSQL and Apache	Pearson Education. Inc.	2012

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER EDITION	YEAR OF PUBLICATION
1	Robert Sheldon, Geoff Moes	Beginning MySQL	Wiley Publishing	2005
2	Jason Gerner, Elizabeth Naramore, Morgan L. Owens, Matt Warden	Professional LAMP Linux, Apache, MySQL, and PHP5 Web Development	Wiley Publishing	2006

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.M.Malathi N.ArulKumar Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc.			**Programme Title:**	Bachelor of Science (Computer Science)	
Course Code:	23UCS516			**Title**	**Batch:**	2023 - 2026
					Semester:	V
Lecture Hrs./Week	5	**Tutorial Hrs./Sem.**	-	CC X: Cyber Security	**Credits:**	5

Course Objective

This course provides students with concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques. Upon the completion of this course, students should be able to understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Evaluate the computer network and information security needs of an organization.	K5
CO2	Assess cyber security risk management policies in order to adequately protect an organization's critical information and assets.	K2
CO3	Troubleshoot, maintain and update an enterprise-level information security system.	K3
CO4	Implement continuous network monitoring and provide real-time security solutions.	K4
CO5	Formulate, update and communicate short- and long-term organizational cyber security strategies and policies.	K5

Mapping

POs,PSOs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	H	M
CO2	M	M	H	H	H	M	M	H	H	H	M	M
CO3	H	H	H	H	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	M	H	H	H	H	M
CO5	M	H	M	H	M	M	H	M	H	M	M	H

Syllabus

Units	Contents	Hrs
Unit I	Introduction: Why Network Security is needed – Management principles Security principles - Network management - Security attacks – Qualities of a Good Network. Organizational Policy and Security: Security policies. Standards and Guidelines – Information Policy – Security Policy - Physical Security – Social Engineering – Security Procedures – Building a Security Plan. Security Infrastructure: Infrastructure Components – Goals of Security Infrastructure – Design Guidelines – Security Models	15
Unit II	Cryptography: Terminology and background – Data Encryption Methods – Cryptographic Algorithms- Secret Key Cryptography - Public key cryptography – Message Digest – Security Mechanisms. Database Security: Introduction to Database – Characteristics of a Database Approach – Database Security Issues - Database Security – Vendor-Specific Security – Data Warehouse Control and Security	15
Unit III	Intrusion Detection Systems: What is not ad IDS – Infrastructure of IDS – Classification of Intrusion Detection Systems – Host-Based IDS – Network-Based IDS - Anomaly Vs Signature Detection – Manage an IDS – Intrusion Detection Tools – IDS Products and Vendors. Network Security: Fundamental Concepts – Identification and Authentication – Access Control – A Model for Network Security – Malicious Software – Firewalls	15
Unit IV	Network Management: Goal of Network Management – Network Management Standards – Network Management Model – Infrastructure for Network Management - Simple Network Management Protocol (SNMP). Security Management: Security Plan - Security Analysis - Change Management - Systems Security Management - Protecting Storage Media- Exchanges of Information and Software – Security Requirements of Systems.	15
Unit V	Electronic Mail Policy: Electronic Mail – What are the E-mail threats that organization's face - Why do you need an E-mail Policy - How do you create an E-mail Policy - Publishing the E-mail Policy - University E-mail Policy. Security of Internet Banking Systems: Introduction Banking System – Security Problem – Methodology for Security Problem – Schematic flow of Internet Banking – A layered approach to security.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Brijendra Singh	Network Security and Management	PHI	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Rick Howard	Cyber Security Essentials	Auerbach Publications	2011.

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
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Programme Code:	B.Sc			Programme Title:	Bachelor of Science (ComputerScience)	
Course Code:	23UCS5E1			Title	Batch:	2023 - 2026
Lecture Hrs./Week	6	Tutorial Hrs./Sem.	-	DSE I : Data Mining and Warehousing	Semester:	V
					Credits:	5

Course Objective

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and in.plementation of data mining and data ware housing concepts.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the basics of data mining and data warehousing	K1
CO2	To understand the methodology of data mining and its best practices	K2
CO3	To analyze how data mining fits in with data warehousing, OLAP as well as Architecture of data warehousing.	K4
CO4	To apply data for data mining	K3
CO5	To evaluate different kinds of patterns with many data mining algorithms	K5

Mapping

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	L	H	M	L	M	H	M	M	M	H	M	H
CO2	M	H	H	M	M	H	H	M	H	H	M	H
CO3	M	H	H	M	H	H	H	M	H	H	H	H
CO4	M	H	M	M	H	H	M	H	H	H	H	H
CO5	H	H	H	H	H	M	M	H	H	H	H	M

H- High; M-Medium: L-Low

Syllabus

Units	Content	Hrs
Unit I	Introduction: Data Mining- Analytic Customer Relationship Management, What IsData Mining?, What Tasks Can Be Performed with Data Mining?, Why Now?, How Data Mining Is Being Used Today.	16
Unit II	Data Mining Methodology and Best Practices: The Methodology, Step One: Translate the Business Problem into a Data Mining Problem, Step Two: Select Appropriate Data, Step Three: Get to Know the Data, Step Four: Create a Model Set, Step Five: Fix Problems with the Data Step Six: Transform Data to Bring Information to the Surface, Step Seven: Build Models, Step Eight: Assess Models, Step Nine: Deploy Models, Step Ten: Assess Results, Step Eleven: Begin Again.	18

Unit III	Data Warehousing, OLAP, and Data Mining: The Architecture of Data, A General Architecture for Data Warehousing, Where Does OLAP Fit In?, What's in a Cube?, Where Data Mining Fits in with Data Warehousing.	18
Unit IV	Preparing Data for Mining: What Data Should Look Like, The Customer Signature, The Columns, Model Roles in Modeling, Variable Measures, Data for Data Mining, The Dark Side of Data, Computational Issues.	19
Unit V	Association Pattern Mining: Introduction, The Frequent Pattern Mining Model, The Apriori algorithm, Cluster Analysis: Introduction, The K-Means Algorithm, Data Classification: Introduction, Decision Trees, Split Criteria, Stopping Criterion and Pruning, Practical Issues, Mining Web Data: Introduction, Ranking Algorithms, Page Rank.	19
	Total Contact Hrs	90

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Michael J.A. Berry, Gordon S.Linoff	Data Mining Techniques - For Marketing, Sales, and Customer Relationship Management	Wiley Publishing, Inc.	2004
2	Charu C. Aggarwal	Data Mining: The Textbook	Springer	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Margaret H. Dunham	Data mining Introductory and Advanced Topics	Pearson education	2003
2	C.S.R. Prabhu	Data warehousing concepts, techniques, products and a applications	PHI	2008
3	Arun K. Pujari	Data Mining Techniques	Universities Press (India) Private Limited	2008

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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS5E2			Title:	Batch :	2023-2026
				DSE 1: Data Engineering with Google Cloud	Semester:	V
Lecture Hrs/Week:	6	Tutorial Hrs./ Sem.	-		Credits:	5

Course Objective

On successful completion of the course the students are enabling to data-driven decision making by collecting, transforming, and publishing data.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the concepts of Data and storage.	K1
CO2	To understand the idea of designing data models	K2
CO3	To Apply Data Engineering Concepts in building Data Processing Systems	K3
CO4	To Analyze the Operational zing of Data Processing Systems.	K4
CO5	To evaluate the Data Processing System.	K5

Mapping

POs,PSOs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	H	H	H	H
CO2	M	H	H	M	M	M	M	H	M	M	M	M
CO3	H	M	H	H	M	H	H	H	M	H	M	H
CO4	H	H	H	M	H	H	H	M	H	H	H	H
CO5	H	H	H	H	H	H	M	H	H	H	H	H

H-High;M-Medium;L-Low.

Syllabus

Units	Contents	Hrs
Unit I	**Selecting the appropriate storage technologies:** Mapping storage systems to business requirements-Data modeling-Tradeoffs involving latency-throughput, transactions-Distributed systems-Schema design. **Designing data pipelines:** Data publishing and visualization-Batch and streaming data-Online vs. batch predictions Job automation and orchestration. **Designing a data processing solution:** Choice of infrastructure System availability and fault tolerance-Use of distributed systems-Capacity planning, Hybrid cloud and edge computing- Architecture options-event processing. **Migrating data warehousing and data processing:** Awareness of current state and how to migrate a design to a future state migrating from on-premises to cloud validating a migration.	18

Unit II	**Building and operationalizing storage systems:** Effective use of managed services (Cloud Bigtable, Cloud Spanner, Cloud SQL, BigQuery, Cloud Storage, Cloud Datastore, Cloud Memorystore)-Storage costs and performance-Lifecycle management of data. **Building and operationalizing pipelines:** Data cleansing Batch and streaming-Transformation Data acquisition and import integrating with new data sources. **Building and operationalizing processing infrastructure:** Provisioning resources Monitoring pipelines Adjusting pipelines testing and quality control.	18
Unit III	**Operationalizing machine learning models:** Leveraging pre-built ML models as a service ML APIs (e.g., Vision API, Speech API)-Customizing ML APIs (e.g.,AutoML Vision, Auto ML text) Conversational experiences (e.g., Dialogflow).Deploying an ML pipeline ingesting appropriate data retraining of machine learning- models (Cloud Machine Learning Engine, BigQuery ML, Kubeflow, and Spark ML) Continuous evaluation. **Choosing the appropriate training and serving infrastructure:** Distributed vs. single machine Use of edge compute Hardware accelerators (e.g., GPU, TPU).	18
Unit IV	**Measuring, monitoring, and troubleshooting machine learning models:** Machine learning terminology (e.g., features, labels, models, regression, classification, recommendation, supervised and unsupervised learning, evaluation metrics)-Impact of dependencies of machine learning models Common sources of error (e.g., assumptions about data) **Designing for security and compliance:** Identityand access management (e.g., Cloud IAM)-Data security (encryption, key management)-Ensuring privacy (e.g., Data Loss Prevention API)Legal compliance (e.g., Health Insurance Portability and Accountability Act (HIPAA)-Children's Online Privacy Protection Act (COPPA)-FedRAMP-General Data Protection Regulation (GDPR))	18
Unit V	**Ensuring scalability and efficiency:** Building and running test suites Pipeline monitoring (e.g., Stackdriver)-Assessing-troubleshooting and improving data representations and data processing infrastructure-Resizing and autoscaling resources **Ensuring reliability and fidelity:** Performing data preparation and quality control (e.g., Cloud Dataprep)-Verification and monitoring Planning, executing, and stress testing data recovery (fault tolerance, rerunning failed jobs, performing retrospective re-analysis)-Choosing between ACID, idempotent, eventually consistent requirements **Ensuring flexibility and portability:** Mapping to current and future business requirements-Designing for data and application portability (e.g., multi-cloud, data residency requirements) -Data staging-cataloging and discovery.	18
	Total Contact Hrs	90

Pedagogy and Assessment Methods

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Books

NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Dan Sullivan	Professional Data Engineer Study Guide	SYBEX Imprint, First Edition	2020

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER EDITION	YEAR OF PUBLICATION
1.	Alasdair Gilchrist	Google Cloud Platform for Data Engineering: Learn Fundamental to advanced data Engineering concepts and techniques using 30+ real-world use cases	Kindle Edition	2019.
2	Laura Lemay, Rafe Colburn, Jennifer Kyrnin	Data Analytics with Google Cloud Platform: Build Real time data Analytics on Google Cloud Platform.	BPB Publications. Kindle Edition	2019.

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.R.Manicka Chezian P.Jayapriya Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS5E3			Title	Batch:	2023 - 2026
Lecture Hrs./Week	6	Tutorial Hrs./Sem.	-	DSE I:Mobile Application Development	Semester:	V
					Credits:	5

Course Objective

On successful completion of the course the students can design the right user interface of mobile application, and develop mobileapplications using various tools and platforms.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals and characteristics of mobile applicationand apply the right user interface for designing mobile application	K2. K3
CO2	Implement mobile application using UI toolkits and frameworks and also implement android application with multimedia support	K3
CO3	Design a mobile application that is aware of the resource constraints of mobile devices.	K5
CO4	Develop web based mobile application that accesses internet and location data	K5
CO5	Implement android application to use telephony for SMS communication	K3

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	M	M	H	H	H	M	H	M	M	M
CO2	M	H	M	L	H	H	H	M	H	L	H	H
CO3	M	H	L	L	M	H	M	M	M	M	H	H
CO4	H	H	L	H	H	H	H	M	H	L	H	H
CO5	H	H	L	II	II	II	M	L	II	L	II	II

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	INTRODUCTION Mobile Applications – Characteristics and Benefits – Application Model – Infrastructure and Managing Resources – Mobile Device Profiles – Frameworks and Tools.	18
UnitII	USER INTERFACE Generic UI Development – Designing the Right UI – Multimodal and Multichannel UI – Gesture Based UI – Screen Elements and Layouts – Voice XML.	18
UnitIII	APPLICATION DESIGN Memory Management – Design Patterns for Limited Memory – Work Flow for Application Development – Java API – Dynamic Linking – Plug-ins and Rule of Thumb for using DLLs – Concurrency and Resource Management.	18
UnitIV	APPLICATION DEVELOPMENT I Mobile OS: Android, iOS – Android Application Architecture – Android basic Components – Intents and Services – Storing and Retrieving data – Packaging and Deployment – Security and Hacking.	18
UnitV	APPLICATION DEVELOPMENT II Communication via the Web – Notification and Alarms – Graphics and Multimedia: Layer Animation, Event Handling and Graphics Services – Telephony – Location Based Services.	18
	Total Contact Hrs	90

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Reto Meier	Professional Android 4 Application Development	Wiley	2012
2	Zigurd Mednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura	Programming Android	O'Reilly	2012
3	Alasdair Allan	iPhone Programming	O'Reilly	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Charlie Collins, Michael Galpin and Matthias Kappler	Android in Practice	Dream Tech	2012
2	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson.	Beginning iOS 6 Development: Exploring the iOS SDK	Apress	2013

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Programme code:	B.Sc		Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS517		Title :	Batch :	2023-2026
				Semester:	V
Hrs/Week:	5	Tutorial Hrs./Sem	-	CC Lab VII: Programming Lab in .NET	Credits:	2

Course Objective

This Lab course will help students to achieve the following objectives:

1. Introduce to .Net IDE Component Framework.
2. Programming concepts in .Net Framework.
3. Creating website using ASP.Net Controls.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To Create user interactive web pages using ASP.Net. K3 CO2 K4 CO3 K5	K3
CO2	To Create simple data binding applications using ADO.Net connectivity	K4
CO3	Performing Database operations for Windows Form and web applications.	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	M	M	H	H	H	M	H	M	M	M
CO2	M	H	M	L	H	H	H	M	H	L	H	H
CO3	M	H	L	L	M	H	M	M	M	M	H	H

H-High; M-Medium; L-Low

	Total Hours
SET A	
• Develop a project for performing arithmetic, relational and logical operators.	
• Develop a project for demonstrating polymorphism abstraction	
• Develop a project for demonstrating switch statements.	
• Create a form that is the main window of a program using window class.	
• Develop an application which is similar to notepad using menus	
• Develop an application for facilitating purchasing order .	
• Develop an application which is similar to login form.	
• Develop an application using tree view control	
• Develop an application using font dialog control	
• Develop an application using color dialog control.	
• Develop an application to display the file selected by the user in a web browser control	
SET B	
• Create a form which is displays the given inputs in the form of a tree view Structure.	
• Develop a project for implementing exception handling in c#.	
• Develop an application for billing system in coffee shop	75
• Develop an application for fruits billing	
• Develop an application using the data reader to read from a database.	
• Develop a project which displays the student information in the relevant fields from the database which already exists.	
• Design an application with simple bulleted list control.	
• Design an application for selecting a single day in the calendar control..	
• Design an application by using the new scroll bar feature with the panel server control.	
INTERNAL MARK (20 Marks) **EXTERNAL MARK (30 Marks)**	

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Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS818			Title	Batch:	2023 - 2026
				CC Lab VIII Programming Lab in PHP & MySQL	Semester:	V
Practical Hrs./Week	5	Practical Hrs./Sem.	-		Credits:	2

Course Objective

To learn about creating dynamic web pages using different open source technology like PHP, MYSQL and Apache.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember PHP basic syntax for variables types, operators and flow controls	K1
CO2	To understand PHP functions and arrays	K2
CO3	To analyze basic MySQL commands	K4
CO4	To apply MYSQL commands to create and connect PHP application	K3
CO5	To evaluate application accessing restrictions, logging and monitoringApache web server activity, optimizing and tuning MYSQL	K5

Mapping

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	M	H	L	L	M	M	H	L	M	L	M	L
CO2	H	M	L	L	M	H	L	L	M	M	H	L
CO3	H	H	H	M	M	M	M	M	L	M	H	M
CO4	H	H	H	M	H	H	M	H	M	L	M	M
CO5	M	M	H	H	H	M	M	M	M	H	M	M

H-High; M-Medium; L-Low

Units	Contents	Hrs
	Set A • Write a PHP program to check student grade based on the marks using if-else statement. • Write a PHP program to convert a string into uppercase. • Write a PHP program to reverse the string. • Write a PHP program to count the words in the string. • Write a Program to create following pattern with * using for loops.  • Write a PHP program using nested for loop that creates a chess board. • Write a PHP program to find factorial of a number using recursive function. • Write a PHP program for shopping cart. • Create a table and implement all DCL commands. • Write a query to get the first 3 characters of first name from employees table • Write a query to get unique department ID from employee table. • Write a query to get the firstname, lastname who joined in the month of June. **Set B** • Write a PHP program for students marklist preparation using database connection. • Write a PHP program to check if a person is eligible to vote or not. • write a program in PHP to remove specific element by value from an array using PHP program. • Write a simple calculator program in PHP using switch case • Create a table and implement all DDL Commands. • Create a table and implement all DML commands. • Write a SQL statement to create a table named jobs including columns	75

job_id, job_title, min_salary, max_salary and check whether the max_salary amount exceeding the upper limit 25000.

- Write a SQL statement to create a table named countries including columns country_id, country_name and region_id and make sure that the country_id column will be a key field which will not contain any duplicate data at the time of insertion
- Write a SQL statement to increase the minimum and maximum salary of PU_CLERK by 2000 as well as the salary for those employees by 20% and commission percent by 10.
- Create salesman table with fields like salesman_id, name, city, commission and create cusstomer table with column names like customer_id, cust_name, city, grade, salesman_id. Write a SQL statement to prepare a list with salesman name, customer name and their cities for the salesmen and customer who belongs to the same city.
- Create salesman table with fields like salesman_id, name, city, commission and create cusstomer table with column names like customer_id, cust_name, city, grade, salesman_id. Write a SQL statement to know which salesman are working for which customer.
- Create a MYSQL database for electricity bill processing.
- Create salesman table with fields like salesman_id, name, city, commission and create cusstomer table with column names like customer_id, cust_name, city, grade, salesman_id. Write a query to display all salesmen and customer located in London.

INTERNAL MARK (20 Marks) EXTERNAL MARK (30 Marks)

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.M.Malathi P.Jayapriya Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (ComputerScience)	
Course Code:	23UCS5S1			Title	Batch:	2023- 2026
				SEC III: Azure Fundamentals	Semester:	V
Lecture Hrs./Week	3	Tutorial Hrs./Sem.	-		Credits:	2

Course Objective

The objective of the course is to make the students to understand the basics of cloud computing and explore Microsoft Azure Storage services and their functionalities.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the basics of cloud computing.	K1
CO2	Understand the fundamental concepts of Azure Virtual Machines.	K2
CO3	Apply availability options and scale sets for VMs	K3
CO4	Utilize Azure Load Balancer, Application Gateway, and Traffic Manager.	K4
CO5	Implement lifecycle management for Azure Blob storage.	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**Introduction:** Cloud computing concepts - Benefits and considerations of using cloud services – Cloud service types – Types of cloud.	9
Unit II	**Azure services:** Azure architectural Components- workload products available in Azure	9
Unit III	**Core solutions and management tools in Azure:** Core solutions available in Azure- Azure management tools.	9
Unit IV	**General security and network security features:** Azure security features- Azure network security.	9
Unit V	**Identity, governance, privacy, and compliance features:** Azure identity services- Azure governance features- Privacy and compliance resources.	9
	Total Contact Hrs	45

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Jim Cheshire	Exam AZ-900 Microsoft Azure Fundamentals	Pearson Education, 2nd Edition	2021

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Ritesh Modi	Azure for Architects	Packt Publishing	2017
2.	Chris Hay	Azure in Action	Manning Publications	2011

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	B.Sc.		Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS582		Title	Batch:	2023 - 2026
			SEC III: DevOps Foundation	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem. -		Credits:	2

Course Objective

The objective of the course is to provide the principles and practices of DevOps, focusing on the integration of development and operations to achieve efficient and collaborative software delivery.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the core concepts and principles of DevOps	K1
CO2	Understand the mechanisms to improve software quality and performance	K2
CO3	Apply DevOps practices and tools to streamline software development and deployment processes	K3
CO4	Analyze and evaluate the benefits and challenges of implementing DevOps in organizations	K4
CO5	Implement continuous integration, delivery, and deployment pipelines	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H -	M	M	M	M	M

H - High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**INTRODUCTION:** Software Engineering - traditional and Agile process models - DevOps -Definition - Practices - DevOps life cycle process - need for DevOps - Barriers	9
Unit II	**DEVOPS PLATFORM AND SERVICES:** Cloud as a platform - IaaS, PaaS, SaaS - Virtualization - Containers –Supporting Multiple Data Centers - Operation Services - Hardware provisioning- software Provisioning - IT services - SLA - capacity planning - security - Service Transition - Service Operation Concepts.	9
Unit III	**BUILDING , TESTING AND DEPLOYMENT:** Microservices architecture - coordination model - building and testing - Deployment pipeline - Development and Pre-commit Testing -Build and Integration Testing - continuous integration - monitoring - security - Resources to Be Protected - Identity Management	9
Unit IV	**DEVOPS AUTOMATION TOOLS:** Infrastructure Automation- Configuration Management - Deployment Automation - Performance Management - Log Management -Monitoring	9
Unit V	**MLOPS:** MLOps - Definition - Challenges -Developing Models - Deploying to production - Model Governance - Real world examples	9
	Total Contact Hrs	45

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Len Bass, Ingo Weber and Liming Zhu	DevOps: A Software Architect's Perspective	Pearson Education	2016
2	Joakim Verona	Practical DevOps	Packet Publishing	2016

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Mark Treveil, and the Dataiku Team	Introducing MLOps	O'Reilly Media	2020
2.	Viktor Farcic	The DevOps 2.1 Toolkit: Docker Swarm	Packet Publishing	2017

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.M.Malathi N. Arulkumar Signature::	Name:Dr.R.Manicka Chezian Signature:	Name:Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS619			Title	Batch:	2023 - 2026
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	-	Core XI : R Programming	Semester:	VI
					Credits:	3

Course Objective

This course is laid to master techniques like data exploration, data visualization, and predictive analytics anddescriptive analytics with the help of R language.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the core to provide a conceptual understanding of the basics of R programming	K1
CO2	To understand the common programming Variable classes, Data frames and lists	K2
CO3	To deploy the concepts of Reading, creating and storing R -CSV file	K3
CO4	To figure out appropriate statistical tests using R	K4
CO5	To describe the various data visualization methods.	K5

Mapping

POs, PSOs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	M	H	H	M	H	M	H
CO3	H	H	H	H	H	H	H	H	H	H	H	H
CO4	M	H	M	M	M	H	M	M	H	H	H	M
CO5	H	H	M	H	H	H	M	H	H	M	H	M

H – High; M: Medium L: Low

Syllabus

Units	Contents	Hrs
Unit I	**OVERVIEW OF THE R LANGUAGE:** Defining the R project, Obtaining R, Generating R codes, Scripts, Comments, Text editors for R, Graphical User Interfaces (GUIs) for R, Packages.	15
Unit II	**R OBJECTS AND DATA STRUCTURES:** Variable classes, Vectors and matrices, Data frames and lists, Array and Factors.	15
Unit III	**MANIPULATING OBJECTS IN R:** Mathematical operations, Decision making, loops, functions and Strings.	15
Unit IV	**EXPLORATORY DATA ANALYSIS:** Reading, creating and storing R -CSV file, Excel File, Binary file, XML File - R -Mean, Median, Mode- Regression.	15
Unit V	**GRAPHICAL REPRESENTATION:** R-PIE chart – Bar chart – Box plots- Histograms – line graphs - Scatter plots.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jared Lander	R for everyone	Pearson Education	2017
2	Norman Matloff	The Art of R Programming	No Starch Press	2011

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Garrett Grolemund	Hands on Programming with R	O'Reilly Media	2014
2	Nina Zumel &John Mount	Practical data science with R	Manning Publications	2014

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS6E4			Title:	Batch :	2023-2026
					Semester:	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	Tutorial Hrs./ Sem.	-	DSE-II: Artificial Intelligence and Machine learning	Credits:	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To recall the basic logical searches, learning algorithms and improve decision makingsystems.	K1
CO2	To Summarize the idea about knowledge representation and reasoning	K2
CO3	To illustrate new knowledge with probabilistic reasoning solutions	K3
CO4	To Analyze Decision making system and its different process	K4
CO5	To evaluate the learning skills with many observations and machine learning algorithms	K5

Mapping

POs, PSOs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	M	H	H	M	H	M	H
CO3	H	H	H	H	H	H	H	H	H	H	H	H
CO4	M	H	M	M	M	H	M	M	H	H	H	M
CO5	H	H	M	H	H	H	M	H	H	M	H	M

H – High; M: Medium L: Low

Syllabus

Units	Contents	Hrs
Unit I	INTRODUCTION: The Introduction of AI - The History of AI - Intelligent agents – Agent based system. PROBLEM SOLVING: State Space models - Searching for solution - Uninformed/Blind search - Informed/ Heuristic search - A* search - Hill- climbing search - Meta Heuristic: Genetic Algorithm - Adversary based search : Minimax - Expectimax – Alpha Beta pruning – Constraint satisfaction problem - Backtracking search	18
Unit II	KNOWLEDGE REPRESENTATION AND REASONING: Knowledge representation - Logics - bivalent logic - inference - Fuzzy logic: membership - Fuzzy rules and reasoning - Fuzzy inference.	18

Unit III	UNCERTAIN KNOWLEDGE AND PROBABILISTIC REASONING: Uncertainty - Probabilistic reasoning - Semantics of Bayesian network - Exact inference in Bayesian network- Approximate inference in Bayesian network - Probabilistic reasoning over time – Inference in temporal models - Hidden Markov Models – Dynamic Bayesian Networks	18
Unit IV	DECISION-MAKING: Basics of utility theory. Utility functions - Sequential decision problems - Markov decision process - Value iteration - Policy iteration - Decisions in Multi agent system: Multi agent decision theory - Group decision making	18
Unit V	**Machine learning:** Introduction- Probability distributions: Binary variables. Multinomial variables. Neural networks –feed forward network function-Error propagation. Kernel methods- radial bias function networks .Graphical models- Bayesian networks-Discrete variables. linear Gaussian model. Mixture models and EM-K means clustering-.Combining models-Boosting Algorithm.	18
	Total Contact Hrs	90

Pedagogy and Assessment Methods:

Seminar. Power Point Presentation. Chalk and talk. Quiz. Assignments. Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Stuart Russell and Peter Norvig	Artificial Intelligence: AModern Approach	Pearson Education	2014
2.	David Pool and Alan Mackworth,	Artificial Intelligence: Foundations of Computational agents	Cambridge University Press,	2017
3	Christopher M.Bishop	Pattern Recognition and Machine Learning	Springer	2013.

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	C. S. Krishnamoorthy, S.Rajeev	Artificial Intelligence and Expert Systemsfor Engineers	CRC Press,	1996
2.	Nils J. Nilsson	The Quest for Artificial Intelligence: A History of Ideas and achievements	Cambridge University press	2010.
3.	Alpaydin Ethem,	Introduction to Machine Learning	Massachusetts Institute of Technology Press,	2009.

Course Designed by	Verified by HOD	Checked by	Approved by
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Dr.Aruchamy Rajini M.Dhavapriya Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS6E5			Title:	Batch :	2023-2026
					Semester:	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	Tutorial Hrs./ Sem.	-	DSE-II: Front-End Development with React	Credits:	5

Course Objective

On successful completion of the course the students are able to build a real world application along the way in plain react without complicated tooling.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the concepts of front end design.	K1
CO2	To understand the idea of designing and scripting web pages	K2
CO3	To Apply essential hacks and simple techniques to solve React application development challenges.	K3
CO4	To Analyze the to wield complex topics such as Web pack and server-siderendering..	K4
CO5	To Learn to maximize the performance of React applications .	K5

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	M	H	H	M	H	M	H
CO3	H	H	H	H	H	H	H	H	H	H	H	H
CO4	M	H	M	M	M	H	M	M	H	H	H	M
CO5	H	H	M	H	H	H	M	H	H	M	H	M

H – High; M- Medium L: Low

Syllabus

Units	Contents	Hrs
Unit I	Introduction to React101: Structure-Objective-React is Component based-React is declarative-Quick JS version-Classes-Closures-More JavaScript.	18
Unit II	Setting up react: Structure-objective-choosing an text editor-Setting up nNode and NPM-Setting up React projects-JSX-Moving to type script.	18
Unit III	Components: Structure-Objective-About the Component-class versus functional component-Functional Component-Class Component-Life cycle management.	18
Unit IV	Introduction to Next.JS-Structure-Objective-what is Next.JS- Istallation-Next.JSdefault-pages-routing-Next.JS Component-Important of CSS files.	18
Unit V	Bleeding edge React: Structure-Objective-How does React work- Concurrent mode-Opting in Concurrent mode-suspense (code fetching)-Suspense(Data fetching).	18
	Total Contact Hrs	90

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation. Chalk and talk. Quiz. Assignments, Group Task.

Text Books

S.No.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Mehul Mohan	Advanced Web Development with React: SSR and PWA with Next.js using Reactwith advanced concepts	First Edition	2020

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Robin Wieruch	The Road to Learn React: Your Journey toMaster Plain Yet Pragmatic React.Js	BPB Publications. FirstEdition	2018.
2	Carlos Santana Roldán	React Cookbook: Createdynamic web apps with React using Redux, Webpack, Node.js, and GraphQL	Packt Publishing Ltd.,Kindle Edition	2018.

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS6E6			Title	Batch:	2023 -2026
				DSE II: MongoDB	Semester:	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	Tutorial Hrs./Sem	-		Credits:	5

Course Objective

To understand fundamentals of NoSQL and apply MongoDB (NoSQL) for Data Analysis using CURDand User Management.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand NoSQL database Design multiple tables, and using group queries.	K3
CO2	Design a database based on a data model normalization to a specified level	K4
CO3	Understand and apply various operators and queries in Mongo DB	K3
CO4	Develop a text processing skill set and able to apply in creation of	K4,K5
CO5	Design a secure database and analyze with security protocols	K4, K6

Mapping

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	L	M	M	M	M	H	M	H	H
CO2	H	M	H	L	H	M	M	H	H	M	H	H
CO3	H	M	H	L	H	H	M	H	H	L	H	H
CO4	H	M	H	L	H	H	M	H	H	H	H	H
CO5	H	M	H	L	H	M	H	M	H	H	H	H

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	**NoSQL** : Indexing and Hashing – Query Processing - Transaction Processing - Concurrency Control and Recovery - Advanced Database Concepts and Emerging Applications: Distributed Databases – Object Oriented Databases - Object Relational Databases- Data mining and Data Warehousing – Big Data - Big Databases- SQL –NoSQL Tradeoffs–CAP Theorem–Eventual Consistency - NoSQL–database types – Document Oriented – Columnar – Graph – Key Value Pair - NoSQL database. design for performance / quality parameters. documents and information retrieval .	18
Unit II	**MongoDB Introduction** : MongoDB- Introduction - MongoDb – Need - MongoDBVs RDBMS – MongoDB- Driver Installation – Configuration – Import and Export – MongoDB Server Configuration - Data Extraction Fundamentals - Intro to Tabular Formats - Parsing CSV -Parsing XLS with XLRD- Parsing XML - Intro to JSON - Getting Data into MongoDB - MongoDB- CURD – Database Creation – Update – Read – Delete	18
Unit III	**MongoDB Operators** : Using mongoimport -Operators like $gt. $lt. $exists. $regex -Querying Arrays and using $in and $all Operators -Changing entries: $update. $set. $unset - Data Analysis - Field Queries - Projection Queries- Limiting – Sorting - Aggregation - Examples of Aggregation Framework - The Aggregation Pipeline - Aggregation Operators: $match. $project. $unwind. $group	18
Unit IV	**Indexes and Advanced MongoDB:** Indexes – Create – Find – Drop – Backup – MongoDB – Relationships – Analyzing Queries – MongoDB Objectid MapReduce – MongoDB - Text Processing - Regular Expression – Case Studies – Text processing of large datasets, Map Reduce using MongoDB - Data Security – Performance – Data Safety – Resource Utility – High – Advanced MongoDB: Map Reduce – MongoDB - Text Processing	18
Unit V	**Contemporary Issues:** Availability User Management – MongoDb Data Replication in Servers – Data Sharding – MongoDB Data Security – Performance – Data Safety – Resource Utility – High Availability Expert lectures, online seminars - webinars	18
	Total Contact Hrs	90

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments. Online Quiz, Group Talk(APS)

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kristina Chodorow	The Definitive Guide-Mongo DB	'O'Reilly Med'a, Reilly Media/ 3rd	2013
2	Guy Harrison	Next Generation Databases: NoSQL, New SQL and Big Data	Apress /2nd	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Shamkant B. Navathe. Ramez Elamsri	Fundamentals of Database Systems ".	Pearson Education Limited. 7th	2017
2	David Hows . Peter Membrey . EelcoPlugge . Timm Hawkins .	The Definitive Guide to MongoDB. 3	Apress/ 2nd	2015

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS6E7			Title:	Batch :	2023-2026
					Semester:	VI
Lecture Hrs/Week:	4&2	Tutorial Hrs./ Sem.	-	DSE-III: Information Retrieval	Credits:	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the concepts of artificial intelligence and Information retrieval systems.	K1
CO2	To understand the idea of retrieval models with similarity measures and ranking	K2
CO3	To Apply Queries using categorization and clustering	K3
CO4	To Analyze the filtering techniques using web search.	K4
CO5	To evaluate the extraction and integration of data with many applications.	K5

Mapping

POs,PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	L	M	M	M	M	H	M	H	H
CO2	H	M	H	L	H	M	M	H	H	M	H	H
CO3	H	M	H	L	H	H	M	H	H	L	H	H
CO4	H	M	H	L	H	H	M	H	H	H	H	H
CO5	H	M	H	L	H	M	H	M	H	H	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**INTRODUCTION:** Overview of IR Systems - Historical Perspectives - Goals of IR - The impact of the web on IR - The role of artificial intelligence (AI) in IR. **TEXT REPRESENTATION:** Statistical Characteristics of Text: Zipf's law; Porter stemmer; morphology; index term selection; using thesauri. **BasicTokenizing, Indexing:** Simple tokenizing, stop-word removal, and stemming; inverted indices; Data Structure and File Organization for IR - efficient processing with sparse vectors.	18
Unit II	**RETRIEVAL MODELS:** Similarity Measures and Ranking - Boolean Matching – Extended Boolean models - Ranked retrieval - Vector Space Models -, text-similarity metrics - TF-IDF (term frequency/inverse document frequency) weighting - cosine similarity, Probabilistic Models, Evaluations on benchmark text collections.	18

Unit III	**QUERY PROCESSING: Query Operations and Languages**- Query expansion: Experimental Evaluation of IR: Performance metrics: recall, precision, and F-measure. **TEXT CATEGORIZATION AND CLUSTERING:** Categorization: Rocchio: Naive Bayes, KNN: Clustering: Agglomerative clustering, k-means, Expectation Maximization (EM): Dimension Reduction: LSI, PCA	18
Unit IV	**INFORMATION FILTERING TECHNIQUES:** Introduction to Information Filtering, Relevance Feedback-Applicationsof Information Filtering:**RECOMMENDER SYSTEMS:** Collaborativefiltering and Content-Based recommendation of documents and products. **WEB SEARCH:** IR Systems and the WWW - Search Engines: Spidering, Meta Crawlers: Link analysis : Hubs and Authorities, Google PageRank, Duplicate Detection	18
Unit V	**INFORMATION EXTRACTION AND INTEGRATION:** Extracting data from text: Basic Techniques: NE Recognition, Co-reference Resolution, Relation Extraction, Event Extraction: Extracting and Integrating specialized information on the web, Web Mining and Its Applications.	18
	Total Contact Hrs	90

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Christopher D. Manning, PrabhakarRaghavan and HinrichSchütze	Introduction to Information Retrieval	Cambridge University Press	2012.
2	Ricardo Baeza-Yates and Berthier Ribeiro-Neto	Modern Information Retrieval	Pearson Education,	2010.
3	Croft B., Metzler D., Strohman T	Information Retrieval in Practice	Pearson Education,	2010

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Stephan Buttcher, Charles L. A. Clarke and Gordon Gormack,.	Information Retrieval Implementing and Evaluating Search Engines	MIT Press	2010.
2	Francesco Ricci, LiorRokach, BrachaShapira, Paul B. Kantor	Recommender Systems – Handbook		2011.
3	AnandRajaraman and Jeffrey Ullman	Mining Massive Data sets	Cambridge University Press,	2014.

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr.R.Manicka Chezian Dr.S.Sharmila Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr.K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS6L8			Title: DSE-III :HTML JavaScriptand JQuery For Web Designing	Batch :	2023-2026
					Semester:	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	Tutorial Hrs./ Sem.	-		Credits:	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To remember the concepts of basic web designing languages.	K1
CO2	To understand the idea of designing and scripting web pages	K2
CO3	To Apply Queries using categorization and clustering	K3
CO4	To Analyze the validation and querying techniques using Javascript and jQuery.	K4
CO5	To evaluate the web forms for different applications.	K5

Mapping

PO /PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	L	M	M	M	M	H	M	H	H
CO2	H	M	H	L	H	M	M	H	H	M	H	H
CO3	H	M	H	L	H	H	M	H	H	L	H	H
CO4	H	M	H	L	H	H	M	H	H	H	H	H
CO5	H	M	H	L	H	M	H	M	H	H	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
UnitI	HTML : Introduction – Getting started – Creating and saving an HTML document – Document Layout of HTML Page – HTML elements – Some other formatting Styles – Hypertext Links.CSS: CSS syntax and Style-Class Selectors-Id –Selectors-Cascading-Style attribute-Style Container-CSS Properties-Color-Font-Text-Border-Element Box-Padding Property-Margin Property.	18

Unit II	HTML Tables and CSS Layout: Table Elements-Formatting a Data Table-CSS Pseudo class Selectors- thead and tbody elements-Cell spanning-Web Accessibility – CSS Display properties with Table values- Links and Images: Introduction- a Element- Relative URLs-index.html file-webdesign-Navigation within a Webpage-CSS for Links-img element.	18
Unit III	**Javascript:** Introduction-History of Javascript-Hello World Webpage-Buttons-Funtions –DOMs-Forms and Event Handlers-window object-if Statement-Strings-Numbers and Input Validation. Loops-Additional Controls-Manipulating CSS with Javascript.	18
Unit IV	JS Arrays-JS Array Methods-JS Array Sort-JS Date-JS Switch-JS Type Conversion-Java Script Arrays-Math.Number.Date objects- Strings-Form Validation.	18
Unit V	jQuery Overview-Basics-Selectors-Attributes-jQuery Traversing-Events-jQuery Ajax-jQuery UI: Interactions-Widgets-Theming	18
	Total Contact Hrs	90

Pedagogy and Assessment Methods:

Direct Instruction. Digital Presentation. Digital Assignments. Online Quiz, Group Talk(APS)

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	John Dean	Web Programming with HTML5, CSS, and JavaScript	Jones &Bartlett Learning, Fifth Edition	2018
2	John Pullock	Java Script-A Beginners Guide	Tata McgrawHill, Fifth Edition	2020
3	Jonathan Chaffer, Karl Swedberg	jQuery	Packt, Fourth Edition	2010

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Jon Duckett	Web Design with HTML, CSS, JavaScript and jQuery Set	Wiley Publications	2014.
2	Laura Lemay, Rafe Colburn, Jennifer Kyrnin	Mastering HTML, CSS, and Java Script Web Publishing	BPB Publications	2016.
3	Mary Delamater, ZukRuvalcaba	Java Script and jQuery	Mike Murach and Asscociates Inc.	2020.

Course Designed by	Verified by HOD	Checked by	Approved by
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Dr.M.Malathi M.Meenakrithika Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme Code:	B.Sc. CS			Programme Title:	Bachelor of Computer Science	
Course Code:	23UCS6F9			Title	Batch:	2023 - 2026
				DSE III: Angular and Node JS	Semester:	VI
Lecture Hrs./Week & Practical Hrs./Week	4&2	Tutorial Hrs./Sem.	-		Credits:	5

Course Objective

Able to understand the theory and practical front end tools of web full stack developments: Angular and Node JS

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand Client Side MVC and SPA	K2
CO2	Explore AngularJS Component and develop an Angular JS	K3,K4
CO3	Develop an AngularJS Single Page Application from scratch	K3,K6
CO4	Demonstrate an Understanding of the use of and Node.js core modules	K1,K3
CO5	Apply MongoDB ,Middleware and make connectivity with front end tools	K3,K6

Mapping

PO, PSO / COs	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO 8	PO9	PO10	PSO1	PSO2
CO1	H	M	H	L	M	M	L	L	M	L	H	H
CO2	H	H	H	L	H	H	M	M	H	L	H	H
CO3	H	H	H	L	H	H	H	M	H	M	H	H
CO4	H	H	H	L	M	M	M	M	H	M	H	H
CO5	H	M	H	L	H	H	L	M	H	L	H	H

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	**AngularJS Core Concepts:** Introduction AngularJS, Advantages of Angular, AngularJS MVC ,Introduction to SPA, Setting up the environment, First App using MVC architecture, Understanding ng attributes, Expression and Data Binding, Working with directives, Angular Modules,Controller, Scope and View ,Create Controller and Module, $scope hierarchy	18

Unit II	**Filter, Forms and Ajax** Filters - Built-in filters - upper case and lower case filters, date ,currency and number formatting ,orderBy, filter ,custom filter, Angular JS Forms – Working with AngularJS forms, model binding, form controller ,Using CSS classes, form events ,custom model update triggers ,custom validation ,$http service ,Ajax implementation using $http	18
Unit III	**Dependency Injection, Services ,Routing and Navigation** What is dependency injection?, Using dependency injection, Angular JS service – Understanding services , Using built-in service, Creating custom service, Injecting dependency in service, Routing – What is Routing?, Routing using ngRoute and UIRouter, ngView Directive, Configuring $routeProvider ,$stateProvider, Animating Angular App	18
Unit IV	**Introduction to Node.js** What is Node.js?, Features of Node.js, Setup Development Environment- Installing Node.js, Working with REPL, Node.js Console, Node.js Module, Node Package Manager, Node.js Basics, File System ,HTTP and HTTPs, Creating Web Server-Handling http request, Node.js Callbacks, Node.js Events	18
Unit V	**Database Connectivity** Promises, Express.js, Database Connectivity – Connecting to RDBMS and NoSQL database, Performing CRUD operations	18
	Total Contact Hrs	90

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Online Quiz.Digital Assignments, Grouptask: APS

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Brad Dayley	Node.js, MongoDB and AngularJS Web Development	Addison-Wesley 2nd Edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Adam Freeman	Pro Angular JS	Apress 1ST Edition	2014
2	Agus Kurniawan	AngularJS Programming by Example	PE Press 1ST Edition	2014

3	Amos Q. Haviv	MEAN Web Development	Packt Publishing Limited 1st Edition	2014

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Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	23UCS620			Title CC Lab IX: R Programming Lab	Batch:	2023 - 2026
					Semester:	VI
Practical Hrs./Week	4	Tutorial Hrs./Sem.	-		Credits:	2

Course Objective

On successful completion of the course the students learn the practical aspects of the R programming language

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To implement Vector R operations	K3
CO2	To review and analyze data frames and objects	K4
CO3	To validate how Bar charts and Pie charts are implemented	K5

Mapping

POs, PSOs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	H	H	M	H	M	H	H	M
CO2	H	M	M	H	H	M	M	H	M	H	M	M
CO3	M	H	H	M	M	H	H	M	H	M	H	H

H - High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
	1. R Program for Vector operations. 2. Create a R- list. 3. Implement matrices addition, subtraction and Multiplication. 4. Create a Data frame. 5. Create a factor object. 6. Import data, copy data from CSV file to R. 7. Create a R program for Mean median and mode. 8. Draw Bar charts and Pie charts in R. 9. Make visual representations of data for plotting functions in R. 10. Create a R program for Regression Model. INTERNAL MARK (20 Marks) EXTERNAL MARK (30 Marks)	60

Course Designed by	Verified by HOD	Checked by	Approved by
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Dr.Aruchamy Rajini Dr.R.Nandhakumar Signature:	Name: Dr.R.Manicka Chezian Signature:	Name: Mr. K.Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature:

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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	23UCS621			Title :	Batch :	2023-2026
Hrs/Week:	5	Tutorial Hrs./Sem	-	CC Lab X: Programming Lab in Android	Semester:	VI
					Credits:	2

Course Objective

The objective of this course is to make the students to understand the Android platform's organization, patternsand programming mechanisms and be able to use them effectively to develop their own Android applications.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand Android OS, gradle, Android Studio	K3
CO2	Design and develop an application using Database	K4
CO3	Develop UI based Mobile Application using Android Studio	K5

Mapping

POs, PSOs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	M	H	L	H	H	M	H	M	H
CO2	H	H	M	H	H	H	H	M	M	M	H	H
CO3	M	H	H	H	H	H	H	H	H	M	H	H

H - High; M-Medium; L-Low

Syllabus

	SET A 1. Develop an application that uses Layout Managers. 2. Develop an application that uses event listeners. 3. Develop an application that uses Adapters. Toast. 4. Develop an application that uses Spinner 5. Design an android application Using Radiobuttons. **SET B** 6. Develop an application that makes use of database. 7. Write a mobile application that creates alarm clock. 8. Design an android application Send SMS using Intent. 9. Create an android application using Fragments 10. Design an android application for menu. **INTERNAL MARK (20 Marks)** **EXTERNAL MARK (30 Marks)**	Total Hours 75

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)
Course Code:	23UCS622			Title	Project
				Batch:	2023 – 2026
				Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	-	Tutorial Hrs./Sem.	-	Credits:	2

Components for CIA: 25 Marks

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments) Planning Stage	05	25
II	Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design OR UI and UX Design Application Architect and Prototyping	05	
III	Coding, Input forms, Output format, Testing OR Development, Testing	05	
IV	Preparation of Report & Submission	10	

ComponentsforCEE: 75 Marks

Components for CEE	Marks	Total	Grand Total
Evaluation			75
Title Relevance of the Industry/institute	10	50	
Technology	10		
Design and Development Publishing	10		
Testing, Report	20		
Viva Voce			
Project Presentation	10	25	
Q&A Performance	15		

COMPUTER SCIENCE PROJECT and VIVA VOCE
Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of computer science lab as well as in the organization. Periodical review will be conducted to monitor the progress of the project work. Project report will be prepared and submitted at the end of the semester. External examiner appointed by the Controller of Examination will conduct the viva voce examination along with respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc..
- System Software
- Web Security Projects
- Image Processing

Methodology

Arrangement of Contents:

The sequence in which the project report material should be arranged and bound as follows:

1. Cover Page & Title Page
2. Bonafide Certificates
3. Declaration
4. Acknowledgement
5. Synopsis
6. Table of Contents
7. Chapters
8. Appendix
9. References

Format of Table of Contents

TABLE OF CONTENTS

Chapter No.	Title	Page No.
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1.	Introduction	
	1.1 Introduction	
	1.2 Objective of the Project	
	1.3 Company Profile	
	1.4 System Specification	
	1.4.1 Hardware Specification	
	1.4.2 Software Specification	
2	System Study	
	2.1 Existing System	
	2.1.2 Drawbacks	
	2.2 Proposed System	
	2.3 Planning and Scheduling	
3	System Design	
	3.1 Overview of the Project	
	3.2 Modules of the Project	
	3.3 Input Design Format	
	3.4 Output Design	
	3.5 Table Design	
	3.6 Supporting Diagrams (ER/DFD/Use Case)	
4	Implementation and Testing	
	4.1 Coding Methods	
	4.2 Testing Approach	
	4.3 Implementation and Maintenance	
5	Project Evaluation	
	5.1 Project Outcome	
	5.2 Limitations of the Project	
	5.3 Further Scope of the Project	
6	Conclusion	
7	Appendix	
	7.1 Source Code	
	7.2 Screenshots and Reports	
8	References	

Size of the Project

The Project Report contents should be maximum of not exceeding 70 pages.

Programme code:		B.Sc		Programme Title :	Bachelor of Science (Computer Science)	
Course Code:		23UCS6S1		Title : SEC IV: Naan Mudhalvan: Programming, Data Structures and Algorithms using Python	Batch :	2023-2026
					Semester:	VI
Practical Hrs./Week	3	Tutorial Hrs./ Sem	-		Credits:	2

Course Objective

The objective of this course is to enable the student to understand in-depth data structures and to know how to apply them to resolve practical issues using Python.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the fundamentals of writing Python scripts	K1
CO2	Understand Lists, Dictionaries and Regular expressions in Python.	K2
CO3	Apply linear and non-linear data structures using Python	K3
CO4	Analyze searching and sorting techniques	K4
CO5	Create, run and manipulate Python Programs using core data structures like Lists	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**Oops Concepts**- class, object, constructors, types of variables, types of methods, Inheritance: single, multiple, multi-level, hierarchical, hybrid, **Polymorphism**: with functions and objects, with class methods, with inheritance, **Abstraction**: abstract classes.	9
Unit II	**Data Structures** – Definition.Linear Data Structures.Non-Linear Data Structures, **Python Specific Data Structures**: List.Tuples, Set, Dictionaries, Comprehensions and its Types.Strings.slicing.	9
Unit III	**Arrays** - Overview, Types of Arrays, Operations on Arrays, Arrays vs List, **Searching** -Linear Search and Binary Search, **Sorting** - Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.	9
Unit IV	**Linked Lists** – Implementation ofSingly Linked Lists, Doubly Linked Lists, Circular Linked Lists, **Stacks** - Overview of Stack, Implementation of Stack (List & Linked list), Applications of Stack, **Queues**:Overview of Queue, Implementation of Queue(List & Linked list), Applications of Queues, Priority Queues	9
Unit V	**Graphs** -Introduction, Directed vs Undirected Graphs, Weighted vs Unweighted Graphs, Representations, Breadth First Search, Depth First Search, **Trees** - Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications, Tree Traversals, Binary Search Trees: Introduction, Implementation, AVL Trees: Introduction, Rotations, Implementation	9
	Total Contact Hrs	45

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Michael T. Goodrich	Data structures and algorithms in Python	Wiley	2013
2	NarasimhaKarumanchi	Data Structures and Algorithmic Thinking with Python	Careermonk Publications	2016

REFERENCEBOOKS

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	R. Nageswara Rao	Core Python Programming	Dreamtech Press	2016

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme code:		B.Sc		Programme Title :	Bachelor of Science (Computer Science)	
Course Code:		23UCS6S2		Title : SEC IV: Naan Mudhalvan: Data Science Foundation	Batch :	2023-2026
					Semester:	VI
Practical Hrs/Week:	3	Tutorial Hrs./ Sem	-		Credits:	2

Course Objective

The Objective is to explore, sort and analyze mega data from various sources in order to take advantage of them and reach conclusions to optimize business processes or for decision support

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To understand the importance of data science and to discover patterns in data.	K1
CO2	To makes sense of the data through a variety of statistical techniques.	K2
CO3	To discuss the data extraction, wrangling, and pre-processing.	K3
CO4	To understand the various ML technologies	K4
CO5	To explore and visualizing data.	K5

Mapping

POs, PSOs / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	H	M	M	H	H	M	H
CO2	H	H	M	M	M	H	H	M	M	M	M	M
CO3	M	H	M	H	M	H	H	M	H	M	M	H
CO4	H	M	M	H	H	H	M	M	H	H	M	H
CO5	H	H	M	M	M	H	H	M	M	M	M	M

H - High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	**Introduction:** Definition - Basic terminology of data science - Need for data science – Components of data science-Data science process- Data Science Venn Diagram –Application of Data Science.	9
Unit II	**Life Cycle of Data Science.** Discovery - Understanding data - Data preparation - Data analysis - Model planning - Model building and deployment - Communication of results - Challenges of Data Science Technology.	9
Unit III	**Data Analytics:** Descriptive – Diagnostic – Predictive – Prescriptive – What is Big data – Characteristic of Big Data -Quantitative versus qualitative data- Structured data - Semi-structured data - Unstructured data –Benefits of Big Data and Data Science.	9
Unit IV	**Machine Learning:** What is machine learning - Types of Machine Learning- Role of Machine learning in the data science process - Machine learning Vs Data Science.	9
Unit V	**Tools and Techniques:** Solving Data Problems using data science - Tools for Data Science - Data Visualization in data science - Data Science Jobs Roles.	9
	Total Contact Hrs	45

Pedagogy and Assessment Methods:

Direct Instruction. Digital Presentation, Digital Assignments, Online Quiz, Group Talk(APS)

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Kaliraj P, Devi T,	Artificial Intelligence Theory, Models, and Applications	CRC Press, Taylor & Francis Group, Boca Raton,	2021, ISBN 9781032008097 Auerbach Publications.

REFERENCEBOOKS

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Kaliraj, P. Devi, T.	Big Data Applications in Industry 4.0	(P. Kaliraj, Ed.) (1st ed.).	

Course Designed by	Verified by HOD	Checked by	Approved by
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