PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

B.Sc. COMPUTER SCIENCE

(CLOUD COMPUTING AND CYBER SECURITY)

PEO 1	To make the students successful in their professional careers, including entrepreneurship using their knowledge in Computer Science and Applications.
PEO 2	To help the students continue to learn and adopt latest technologies to solve real life problems.
PEO 3	To motivate the students pursue research and higher education.
PEO 4	To inculcate in student's professional and ethical attitude, communication skills, teamwork skills, multi–disciplinary approach and an ability to relate computer Science issues with social awareness.
PEO 5	To prepare students to excel in post graduate programmes in Computer Science of to succeed in computing industry profession through quality education.

UNDERGRADUATE (UG) PROGRAMME OUTCOMES (POs)

Undergraduate (B.A., **B.Sc**., B.Com., B.C.A., B.B.A., etc.,) is a 3 – year degree Programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

PO 1	**Critical Thinking**: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions.
PO 2	**Problem Solving**: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution.
PO 3	**Effective Communication**: Knowledge dissemination by oral and verbal mechanisms to the various components of our society.
PO 4	**Societal/ Citizenship/ Ethical Credibility**: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions.
PO 5	**Environmental Concern and Sustainable Growth**: Understanding the emerging environmental challenges and provides the possible contribution in sustainable development that integrates environment, economy and employment.
PO 6	**Skill Development and Employable Abilities**: Adequate training in relevant skill sector and creating employable abilities among the under graduates.

PROGRAMME SPECIFIC OUTCOMES

On completion of **B.Sc., Computer Science (Cloud Computing and Cyber Security) Programme**, the students will be able to

PSO 1	think in a critical and logical based manner. Equip with Computer science Technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.
PSO 2	become familiar with suitable software tools of Computer Science and industrial applications to handle issues and solve problems in Mathematics or Statistics and real–time application related sciences.
PSO 3	know when there is a need for information, to be able to identify, locate, evaluate and effectively use that information for the issue or problem at hand.
PSO 4	understand, formulate, develop programming model with logical approaches to and address issues arising in social science, business and other contexts.
PSO 5	acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics, get adequate exposure to global and local concerns that provides platform for further exploration into multi–dimensional aspects of Computing sciences.
PSO 6	receive sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science, develop a range of generic skills helpful in employment, internships & societal activities.

DISTRIBUTION OF CREDITS (UG PROGRAMME)

Part	Semester	Courses	No. of Courses	Hours	Credits	Total Credits
I	**I–IV**	Language	**4**	**6**	**3**	**12**
II	**I–IV**	English	**4**	**6**	**3**	**12**
III	**I–VI**	Core	**17**	**4–6**	**3–5**	**66**
III	**I–IV**	Allied	**5**	**4**	**2-4**	**14**
III	**V, VI**	Elective	**3**	**5**	**4–5**	**13**
IV	**I–IV**	Skill Based Subject(SBS)	**7**	**2**	**2**	**14**
IV	**I**	Value education	**1**	**2**	**2**	**2**
IV	**II**	Environmental studies	**1**	**2**	**2**	**2**
IV	**III, IV**	Non–Major Elective(NME)	**2**	**2**	**2**	**4**
V	**IV**	Extension Activity	**1**	**-**	**1**	**1**
	V	Soft skills (Self-Study)	**1**	**-**	**1**	**-**
	VI	General Knowledge (Self-Study) (Online)	**1**	**-**	**1**	**-**
TOTAL CREDITS						**140**

Additional credit will be given to any Online Course taken in SWAYAM Portal

B.Sc. COMPUTER SCIENCE
(CLOUD COMPUTING AND CYBER SECURITY) – I YEAR
COURSE STRUCTURE – I SEMESTER

S No	CODE	Subject	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT11	**Part – I: Tamil** – கவிதையும் சிறுகதையும்	6	3	25	75	100	3
	21UACH11	**Hindi** – Hindi – I						
	21UACS11	**Sanskrit** – Sanskrit – I						
2.	21UACE11	**Part – II: English** – English For Enrichment – I	6	3	25	75	100	3
3.	23UCDC11	**Part – III: Core – 1:** Programming in C	4	3	25	75	100	4
4.	23UCDCP1	**Part – III: Core – 2: Lab – I**: Programming in C	6	3	40	60	100	4
5.	23UCDA11	**Part – III: Allied – 1:** Mathematical Foundations – I	4	3	25	75	100	4
6.	23UCDS11	**Part – IV:SBS – 1: Lab– II:** PC Assembling, Trouble Shooting and System Management	2	3	40	60	100	2
7.	21UACVE1	**Part – IV:** Value Education	2	3	25	75	100	2
	Total		**30**				**700**	**22**

II – SEMESTER

S No	CODE	Subject	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT21	**Part – I: Tamil** – செய்யுளும் புதினமும்	6	3	25	75	100	3
	21UACH21	**Hindi** – Hindi – II						
	21UACS21	**Sanskrit** – Sanskrit – II						
2.	21UACE21	**Part – II: English** – English For Enrichment – II	6	3	25	75	100	3
3.	23UCDC21	**Part – III: Core – 3:** Java Programming	4	3	25	75	100	4
4.	23UCDCP2	**Part – III: Core – 4: Lab – III**: Java Programming	6	3	40	60	100	4
5.	23UCDA21	**Part – III: Allied – 2:** Mathematical Foundations– II	4	3	25	75	100	4
6.	23UCDS21	**Part – IV: SBS – 2: Lab – IV:** Linux and Shell Programming	2	3	40	60	100	2
7.	21UACES1	**Part – IV:** Environmental Studies	2	3	25	75	100	2
	Total		**30**					**22**

SOURASHTRA COLLEGE, MADURAI – 625004

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B.Sc. COMPUTER SCIENCE (CLOUD COMPUTING AND CYBER SECURITY) – SYLLABUS

(Under CBCS based on OBE) (with effect from 2023 – 2024)

III – SEMESTER

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT31	**Part – I: Tamil** – காப்பியமும் நாடகமும்	6	3	25	75	100	3
	21UACH31	**Hindi** – Hindi – III						
	21UACS31	**Sanskrit** – Sanskrit – III						
2.	21UACE31	**Part – II: English** – English For Enrichment – III	6	3	25	75	100	3
3.	23UCDC31	**Part – III: Core – 5:** Data Structures and Computer Algorithms	3	3	25	75	100	4
4.	23UCDC32	**Part – III: Core – 6:** Data Communication and Computer Network	3	3	25	75	100	3
5.	23UCDCP3	**Part – III: Core – 7: Lab –V:** Data Structures and Computer Algorithms	4	3	40	60	100	3
6.	23UCDA31	**Part – III: Allied – 3:** Resource Management Techniques	4	3	25	75	100	2
7.	23UCDS31	**Part – IV: SBS – 3: Lab – VI:** Python Programming	2	3	40	60	100	2
8.	23UCDN31	**Part – IV: NME – 1:** Cloud Computing Fundamentals	2	3	25	75	100	2
		TOTAL	**30**				**700**	**22**

IV – SEMESTER

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT41	**Part – I: Tamil** – சங்க இலக்கியமும் அற இலக்கியமும்	6	3	25	75	100	3
	21UACH41	**Hindi** – Hindi – IV						
	21UACS41	**Sanskrit** – Sanskrit – IV						
2.	21UACE41	**Part – II: English** – English For Enrichment – IV	6	3	25	75	100	3
3.	23UCDC41	**Part – III: Core – 8:** Operating System	3	3	25	75	100	3
4.	23UCDC42	**Part – III: Core – 9:** Cloud Computing	3	3	25	75	100	4
5.	23UCDCP4	**Part – III: Core – 10: Lab – VII:** Advanced Java Programming	4	3	25	75	100	3
6.	23UCDA41	**Part – III: Allied – 4:** Numerical Methods	4	3	25	75	100	2
7.	23UCDS41	**Part – IV: SBS – 4: Lab – VIII:** Cloud Computing	2	3	40	60	100	2
8.	23UCDN41	**Part – IV: NME – 2:** Introduction to Cyber Crime and Cyber Law	2	3	25	75	100	2
9.		**Part – V:**Extension Activities	–	–	–	–	100	1
		TOTAL	**30**				**800**	**23**

V – SEMESTER

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	23UCDC51	**Part – III: Core – 11:** Relational Database Management Systems	5	3	25	75	100	4
2	23UCDC52	**Part – III: Core – 12:** Network Security	5	3	25	75	100	4
3	23UCDC53	**Part – III: Core – 13:** Biometric Systems	5	3	25	75	100	4
4	23UCDCP5	**Part – III: Core – 14: Lab – IX:** Relational Database Management Systems Lab	6	3	40	60	100	4
5		**Part–III: Elective –1:**	5	3	25	75	100	4
	23UCDE51	Block Chain						
	23UCDE52	System Administration and Maintenance						
	23UCDE53	Wireless Network						
6	23UCDS51	**Part – IV: SBS – 5:** Introduction to Computers and Office Automation	2	3	25	75	100	2
7	23UCDS52	**Part – IV: SBS – 6: Lab – X:** Cryptography and Network Security	2	3	40	60	100	2
8	21USSY51	Soft Skills (Self–Study)	–	–	–	–	100	–
		TOTAL	**30**				**800**	**24**

***One elective course to be chosen from THREE courses**

VI–SEMESTER

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	23UCDC61	**Part – III: Core – 15:** Software Engineering	5	3	25	75	100	5
2	23UCDC62	**Part – III: Core – 16:** Web Technology	5	3	25	75	100	5
3	23UCDCP6	**Part – III: Core – 17: Lab – XI**: Cyber Security Practices	6	3	40	60	100	4
4	23UCDE61	**Part–III : Elective – 2:** Internet of Things	5	3	25	75	100	4
	23UCDE62	Ethical Hacking						
	23UCDE63	Data Mining and Warehousing						
5	23UCDEV1	**Part – III: Elective – 3:** Project work/ Viva–Voce	5	3	40	60	100	5
6	23UCDA61	**Part – III: Allied – 5:** Quantitative Aptitude	2	3	25	75	100	2
7	23UCDS61	**Part – IV: SBS – 7:** Introduction to Internet	2	3	25	75	100	2
8	21UGKY61	General Knowledge (Self–Study)	–	–	–	–	100	–
		TOTAL	**30**				**800**	**27**

***One elective course to be chosen from THREE courses**

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B.Sc. COMPUTER SCIENCE (CLOUD COMPUTING AND CYBER SECURITY) – SYLLABUS

(Under CBCS based on OBE) (with effect from 2023 – 2024)

COURSE STRUCTURE – V SEMESTER

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	23UCDC51	**Part – III: Core – 11:** Relational Database Management Systems	5	3	25	75	100	4
2	23UCDC52	**Part – III: Core – 12:** Network Security	5	3	25	75	100	4
3	23UCDC53	**Part – III: Core – 13:** Biometric Systems	5	3	25	75	100	4
4	23UCDCP5	**Part – III: Core – 14: Lab – IX:** Relational Database Management Systems Lab	6	3	40	60	100	4
5		**Part–III : Elective – 1:**	5	3	25	75	100	4
	23UCDE51	Block Chain						
	23UCDE52	System Administration and Maintenance						
	23UCDE53	Wireless Network						
6	23UCDS51	**Part – IV: SBS – 5:** Introduction to Computers and Office Automation	2	3	25	75	100	2
7	23UCDS52	**Part – IV: SBS – 6: Lab – X:** Cryptography and Network Security	2	3	40	60	100	2
8	21USSY51	Soft Skills (Self–Study)	–	–	–	–	100	–
		TOTAL	**30**				**800**	**24**

***One elective course to be chosen from THREE courses**

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

NME – Non –Major Elective

T – Theory

P – Practical

Passed in the BoS Meeting held on 27/02/2025 **Signature of the Chairman**

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B.Sc. COMPUTER SCIENCE (CLOUD COMPUTING AND CYBER SECURITY) – SYLLABUS

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDC51	RELATIONAL DATABASE MANAGEMENT SYSTEMS	CORE – 11	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course helps the students to understand the need for database management systems, their architecture, data models and a detailed explanation of database schema. This course also facilitates the students to acquire the skill of using SQL as a tool to accessdatabase information.

COURSE OBJECTIVE:

- To give knowledge about the basic concepts of Database management systems
- To inculcate knowledge about E–R model and E–R diagram
- To give knowledge about SQL and on–line Transaction processing
- To make the students understand the need of normalization using various normal forms and to improve database design

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	describe the purpose of Database System, Different database models and Database Architecture	Upto K3
CO 2	explain the basic concepts of relational data model, entity–relationship model, relational database design, relational algebra, relational calculus	Upto K3
CO 3	design ER–models to represent simple database application scenarios	Upto K3
CO 4	improve the ER–model to relational tables, populate relational database and understand and formulate SQL queries on data	Upto K3
CO 5	implement ACID properties on database transactions and improve the database design by normalization	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

RELATIONAL DATABASE MANAGEMENT SYSTEM

UNIT – I: OVERVIEW OF DATABASE SYSTEMS

Managing Data – A Historical Perspective File Systems Versus a DBMS – Advantages of a DBMS – Describing and Storing Data in a DBMS – Queries in a DBMS – Transaction Management – Structure of a DBMS – People Who Work with Databases. **INTRODUCTION TO DATABASE DESIGN:** Database Design and ER Diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets – Additional Features of ER Model – Conceptual Design with the ER Model.

UNIT – II: THE RELATIONAL MODEL

Introduction to the Relational Model – Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data Logical Database Design: ER to Relational – Introduction to Views – Destroying / Altering 2484 Tables and Views. **RELATIONAL ALGEBRA AND CALCULUS**: Preliminaries – Relational Algebra: Selection and Projection – Set Operations – Renaming – Joins – Division Relational Calculus: Tuple Relational Calculus – Domain Relational Calculus

UNIT – III: SQL: QUERIES, CONSTRAINTS, TRIGGERS

The Form of a Basic SQL Query – UNION, INTERSECT, and EXCEPT – Nested Queries – Aggregate Operators – Null Values – Complex Integrity Constraints in SQL – Triggers and Active Databases – Designing Active Databases

UNIT – IV: SCHEMA REFINEMENT AND NORMAL FORMS

Introduction to Schema Refinement – Functional Dependencies – Reasoning about FD's – Normal Forms – Properties of Decompositions – Normalization – Schema Refinement in Database Design – Other Kinds of Dependencies

UNIT – V: OVERVIEW OF TRANSACTION MANAGEMENT

The ACID Properties – Transactions and Schedules – Concurrent Execution of transactions – Lock Based Concurrency Control – Performance of Locking – Transaction Support in SQL – Introduction to Crash Recovery**. SECURITY AND AUTHORIZATION:** Introduction to Database Security – Access Control – Discretionary Access Control – Mandatory Access Control – Security for Internet Applications – Additional Issues Related to Security.

TEXT BOOK:

Database Management Systems, Raghu Ramakrishnan & Johannes Gehrke, McGraw Hill International Edition, Third Edition, 2003.

UNIT I: 1.1 – 1.9, 2.1 – 2.5, UNIT II: 3.1 – 3.7, 4.1 – 4.3
UNIT III: 5.2 – 5.9, UNIT IV: 19.1 – 19.8, UNIT V: 16.1 – 16.7, 21.1 – 21.6

REFERENCE BOOKS:

1. ***Database Management Systems***, Alexis leon & mathews Leon, Leon Vikas Publishing, Chennai, 2002.
2. ***Modern Database Management***, Frad R. McFadden, Jeffrey A. Hoffer & Mary. B. Prescott, 5th Edition, Pearson Education Asia, 2001.
3. ***Database System Concepts,*** Abraham Silberschatz, Henry F. Korth, S.Sudarshan, McGraw Hill, 2006.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	2	1	1
CO2	2	2	1	2	2	2
CO3	3	2	1	2	2	2
CO4	2	3	2	2	1	1
CO5	2	2	2	2	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDC52	NETWORK SECURITY	CORE – 12	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

This course is the combination of techniques and tools, which is used to secure networks, applications, and resources of an organization. It will also help students understand the tools and building–blocks of security such as cryptography and security protocols.

COURSE OBJECTIVES:

- To know about various encryption techniques.
- To understand the concept of Public key cryptography.
- To study about message authentication and hash functions
- To impart knowledge on Network security

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	illustrate working of classical encryption techniques.	Upto K3
CO 2	describe the working of symmetric encryption techniques	Upto K3
CO 3	summarize Application and transport layers' security mechanisms.	Upto K3
CO 4	experiment the working of public key cryptography algorithms such as RSA, DES	Upto K3
CO 5	apply Hash functions and message authentication techniques.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

NETWORK SECURITY

UNIT – I: **Introduction:** Security Goals – Attacks – Services and Mechanism – 642 Techniques. Mathematics of Cryptography: Integer Arithmetic – Modular Arithmetic – Matrices – Linear Congruence – Traditional Symmetric Key Ciphers: Instruction – Substitution Ciphers – Transposition Ciphers – Stream and Block Ciphers. Introduction to Modern Symmetric Key Ciphers: Modern Block Ciphers – Modern Stream Ciphers.

UNIT – II: **Data Encryption Standard (DES):** Introduction – DES Structure – DES Analysis – Multiple DES – Security of DES. Advanced Encryption Standard (AES): Introduction – Transformations – Key Expansion – Ciphers – Examples – Analysis of AES.

UNIT – III:

Asymmetric Key Cryptography: Introduction – RSA Crypto System. Message Integrity and Message Authentication: Message Integrity – Random Oracle Model – Message Authentication.

UNIT – IV: **Cryptographic Hash Functions**

Introduction – SHA – 512 – WHIRLPOOL. Digital Signature: Comparison – Process – Services – Attacks on Digital Signature – Digital Signature Schemes.

UNIT – V: **ENTITY AUTHENTICATION**

Introduction – Passwords – Challenge Response – Zero Knowledge – Bio Metrics. Key Management: Symmetric Key Distribution – Kerberos – Symmetric Key Agreement – Public Key Distribution.

TEXT BOOK:

***Cryptography and Network Security* –** Behrouz A. Forouzan, The McGraw Hill,2011.

Unit I: Chapters 1, 2, 3 and 5
Unit II: Chapters 6 and 7
Unit III: Chapters10 and 11
Unit IV: Chapters 12 and13
Unit V: Chapters 14 and 15

REFERENCE BOOKS:

1. ***Cryptography and Network Security*** – William Stallings, PHI, 2008.
2. ***Cryptography and Network Security*** – Atul Kahate, McGraw Hill Education, 2013.
3. ***Network Security: The Complete Reference*** – Roberta Bragg, Mark Rhodes Ousley andStrassberg – McGraw Hill Education, 2003.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	3	2	2	1
CO2	2	3	1	3	2	2
CO3	1	1	3	2	2	3
CO4	2	2	2	2	2	3
CO5	2	2	1	1	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDC53	BIOMETRIC SYSTEMS	CORE–13	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:

This course includes scientific foundations needed for the design, implementation, and evaluation of large–scale biometric identification systems.

COURSE OBJECTIVES:

- To understand the technologies of fingerprint, iris, face and speech recognition
- To understand the general principles of design of biometric systems and the underlying tradeoffs.
- To recognize personal privacy and security implications of biometrics–based identification technology.
- To identify issues in the realistic evaluation of biometrics–based systems

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom'sTaxonomy)
CO 1	understand and analyze biometric system at the component level and design basic biometric system application.	Upto K3
CO 2	design and develop a biometric security system.	Upto K3
CO 3	evaluate and design security system with biometrics.	Upto K3
CO 4	gain knowledge in building blocks of research fields like pattern recognition, image processing and machine learning etc.	Upto K3
CO 5	learn about global biometric standards ensures compliance and interoperability in various applications.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

BIOMETRIC SYSTEMS

UNIT – I: INTRODUCTION

Benefits of biometric versus traditional techniques – Key biometric terms and processes – Verification and identification – Enrollment and template creation

UNIT – II: BIOMETRIC MATCHING. ACCURACY IN BIOMETRIC SYSTEMS

False match rate – False non– match rate – Failure–to–enroll rate – Derived metrics – Equal error rate – Ability–to– verify rate

UNIT – III: PHYSIOLOGICAL BIOMETRICS

Finger scan – Facial scan – Iris scan – Components – Working principles – Competing technologies – Strengths and weaknesses – Automatedfingerprint Identification systems.

UNIT – IV: BEHAVIOURAL BIOMETRICS

signature scan – Keystroke scan – Components – Working principles – Strengths and weaknesses. Biometric applications: Categorizing biometric applications – Criminal identification – Citizen identification – Surveillance.

UNIT – V:

PC/network access – Physical access/time and attendance – Customer facingapplications – E–commerce/telephony – Retail/ ATM/point of sale applications. Biometric markets: Law enforcement – government sector – Financial sector – Healthcare – travel and immigration – Biometric standards.

TEXT BOOK:

Samir Nanavati, Michael Thieme, Raj Nanavati, ***Biometrics – Identity Verification in a Networked World***, Wiley–dreamtech India Pvt Ltd, New Delhi, 2003.

REFERENCE BOOK:

James Wayman, Anil Jain, David Maltoni, Dario Maio (Eds), ***Biometric Systems***,Springer International Edition, 2004.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	1
CO2	2	3	3	3	2	2
CO3	2	3	3	2	2	3
CO4	2	2	2	2	2	3
CO5	2	2	1	1	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDCP5	LAB: RELATIONAL DATABASE MANAGEMENT SYSTEMS	CORE–14 LAB	-	6	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

This course aims at facilitating the students to understand the skill of using SQL as a tool to access database information.

COURSE OBJECTIVES:

- To explain basic database concepts, applications, data models, schemas and instances.
- To demonstrate the use of constraints and relational algebra operations. IV. Describe the basics of SQL and construct queries using SQL
- To emphasize the importance of normalization in databases.
- To facilitate students in Database design
- To familiarize issues of concurrency control and transaction management.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	apply the basic concepts of Database Systems and Applications.	Upto K3
CO 2	use the basics of SQL and construct queries using SQL in database creation and interaction.	Upto K3
CO 3	design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.	Upto K3
CO 4	analyze and Select storage and recovery techniques of database system.	Upto K3
CO 5	understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, view and embedded SQL.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

LAB: RELATIONAL DATABASE MANAGEMENT SYSTEMS

The following concepts must be introduced to the students:

DDL Commands

Create table, alter table, drop table

DML Commands

- Select, update, delete and insert statements
- Condition specification using Boolean, Arithmetic operators and comparison operators (and, or, not, =, <>,>, <, > =, <=)
- Aggregate functions (Count, Sum, Avg, Min, Max)
- Multiple table queries (join on different and same tables)
- Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by having
- Arranging using order by

1. Create a table Student–master with the following fields client_no, name, address, city, state, pincode, remarks, bal_due with suitable data types.
   (i) Create another table supplier_table from client_master. Select all the fields and rename client_no with supplier_no and name with supplier_name.
   (ii) Insert data into client_master
   (iii) Insert data into supplier_master from client_master.(iv)Delete the selected row in the client_master.
2. Create a table sales_order with s_order_no and product_no as primary key. Set other fields to store client number, delivery address, delivery date, order status.
   (i) Add a new column for storing salesman number using ALTER Command.
   (ii) Set the s_order_no as foregin key as column constraints.
   (iii) Set the s_order_no as foreign key as table constraints.(iv)Enforce the integrity rules using CHECK.
3. Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.
   (i) Select the student's name column.
   (ii) Eliminate the duplicate entry in table
   (iii) Sort the table in alphabetical order
   (iv) Select all the Students of a particular department
4. Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.
   (i) Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.
   (ii) Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.
   (iii) Select product_no, description, profit_percent, sell_price where profit_percentis not between 20 and 30.
   (iv) Select the supplier name and product_no where supplier name has„r‟ or „h‟as second character.

5. Create and use the following database schema to answer the given queries

EMPLOYEE			
DEFAULT			
Field	**Type**	**Null**	**Key**
Eno	Char(3)	No	Primary
Ename	Varchar(50)	No	
Job_type	Varchar(50)	No	
Manager	Char(3)	Yes	Foreign
Hiredate	Date	No	
Dno	Integer	Yes	Foreign
Commission	Decimal(10,2)	Yes	
Salary	Decimal(7,2)	No	

DEPARTMENT			
DEFAULT			
Field	**Type**	**Null**	**Key**
Dno	Integer	No	Primary
Dname	Varchar(50)	Yes	

Perform the following queries:

a. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
b. Query to display unique Jobs from the Employee Table.
c. Query to display the Employee Name concatenated by a Job separated by a comma.
d. Query to display all the data from the Employee Table. Separate each Columnby a comma and name the said column as THE_OUTPUT.
e. Query to display the Employee Name and Salary of all the employees earning more than $2850.
f. Query to display Employee Name and Department Number for the Employee No= 7900.
g. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
h. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
i. Query to display Name and Hire Date of every Employee who was hired in 1981.
j. Query to display Name and Job of all employees who don,,t have a current Manager.
k. Query to display the Name, Salary and Commission for all the employees who earn commission.
l. Sort the data in descending order of Salary and Commission.
m. Query to display Name of all the employees where the third letter of their name is_A,,.
n. Query to display Name of all employees either have two _R,,s or have two _A,,s in their name and are either in Dept No = 30 or their Manger,,s Employee No = 7788.

o. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
p. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
q. Query to display Name and calculate the number of months between today and the date each employee was hired.
r. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with _J,,,
s. ,,A,, and _M,,.
t. Query to display Name, Department Name and Department No for all the employees.
u. Query to display Unique Listing of all Jobs that are in Department # 30.
v. Query to display Name, Job, Department No. And Department Name for all the employees working at the Mumbai location.
w. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. and the salary of any employee who earns a commission.
x. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
y. Query to display the Employee No. And Name for all employees who earn more than the average salary.
z. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T,,.

6. Create a table master, book to contain the information of magazine code, magazine name and publisher. Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update and delete operations on the above table.
7. Create a table to contain phone number, user name, address of the phone user. Writea function to search for a address using phone numbers.
8. Create a table stock to contain the item–code, item–name, current stock, date of last purchase. Write a stored procedure to seek for an item using item–code and delete it,if the date of last purchase is before 1 year from the current date. If not, update the current stock.
9. Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary. Use Cursor to update the employee salaries.
10. Create a table to contain the information about the voters in a particular constituency.
11. Write a proper trigger to update or delete a row in the table.

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDE51	BLOCKCHAIN	ELECTIVE – 1	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

To give students the understanding of emerging abstract models for Blockchain Technology and to familiarize with the functional/operational aspects of cryptocurrency eco–system.

COURSE OBJECTIVES:

The Objectives of this course are

- To assess blockchain applications in a structured manner.
- To impart knowledge in block chain techniques and able to present the concepts clearly and structured.
- To get familiarity with future currencies and to create own crypto token.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom'sTaxonomy)
CO 1	understand the various technologies and its business use.	Upto K3
CO 2	analyze the block chain applications in a structure manner.	Upto K3
CO 3	explain the modern concepts of block chain technology systematically.	Upto K3
CO 4	handle the cryptocurrency and understand the modern currencies and its market usage	Upto K3
CO 5	understand the modern currencies and its market usage	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

BLOCKCHAIN

UNIT–I:

Introduction To Blockchain –History of Blockchain – Types of Blockchain – Consensus Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization Platforms for Decentralization.

UNIT–II:

Design Primitives of Blockchain:–Protocols –Security –Consensus –Permissions – Privacy–Cryptographic Primitive:–Hash –Signature –Hash chain to Blockchain –Basic consensus –mechanisms. Bitcoin mechanics: –Bitcoin Nuts and Bolts –Wallets: managing and protecting crypto assets

UNIT–III:

Ethereum –The Ethereum Network – Components of Ethereum Ecosystem – Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language.

UNIT–IV:

Privacy on a Public Block chain –Privacy on a public block chain– De–anonymizing the block chain and mixing –zk–SNARKs description and how it is used. Scalability in Block chain–Scalability in Block chain –Payment channels and state channels. – Optimistic Rollup, ZK–Rollup, and Validium –Recursive SNARKs. –Block chain and its Future–Block chain interoperability, miner extractable value (MEV), and governance– The future of block chains

UNIT–V:

Alternative Blockchains and Next Emerging Trends–Kadena – Ripple – Rootstock – Quorum – Tender mint – Scalability – Privacy – Other Challenges – Blockchain Research – Notable Projects – Miscellaneous Tools.

TEXT BOOK:

Imran Bashir, ***Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained***, Second Edition, Packt Publishing, 2018.

REFERENCE BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, ***Blockchain Applications: A Hands On Approach***, VPT, 2017.
2. Andreas Antonopoulos, Satoshi Nakamoto, ***Mastering Bitcoin***, O Reilly, 2014.
3. Roger Wattenhofer, ***The Science of the Blockchain*** Create Space Independent Publishing, 2016.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	2	2	2	1
CO2	1	1	1	2	2	1
CO3	1	1	2	2	1	1
CO4	1	1	2	2	2	1
CO5	1	1	2	1	1	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDE52	SYSTEM ADMINISTRATION AND MAINTENANCE	ELECTIVE–1	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

This course focuses on managing Windows–like operating systems. This course enables student to combine the theory of debugging, troubleshooting, management and configuration with the reality of systems administration. and disaster preparedness.

COURSE OBJECTIVES:

To

- explain the roles and responsibilities of a system administrator and the key components of IT infrastructure
- perform installation, configuration, and upgrading of operating systems
- create, modify, and manage user accounts, groups, and access control to ensure secure and efficient system usage
- diagnose and resolve common hardware, software, and network problems affecting system performance or availability

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	describe the system boot process	Upto K3
CO 2	distinguish between server and client services	Upto K3
CO 3	evaluate various operating systems and recommend a particular operating system to satisfy given needs	Upto K3
CO 4	install at least one server operating system including setup and manage user accounts and groups	Upto K3
CO 5	configure various server and client services including configure and manage simple network and security services on a Linux system	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

SYSTEM ADMINISTRATION AND MAINTENANCE

UNIT– I:
System Start up and Operation – Disk Partitioning – File system Installation – File system – Device Manipulation Process

UNIT–II:
User/Group Security and Permissions Log Analysis – Start–up Scripts – Configuration Files – Print– Spooling File Formats

UNIT–III:
Firewalls & Security – Privacy – Backup – Scheduling Maintenance Functions.

UNIT–IV:
Media Access DNS Service: Concepts – DNS Service: Configuration.

UNIT–V:
DNS & Service: Client Resolver – File Service.

TEXT BOOK:
Jan Bergstra and Mark Burgess, ***Handbook of Network and System Administration***, 2008

REFERENCE BOOK:
Eleen Frisch, ***Essential System Administration***, 3rd Edition, O'Reilly Media, Inc.,2002.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	2	2	2	1
CO2	1	1	1	2	2	1
CO3	1	1	2	2	1	1
CO4	1	1	2	2	2	1
CO5	1	1	2	1	1	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDE53	WIRELESS NETWORKS	ELECTIVE –1	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:

To give students the understanding of emerging abstract models for Blockchain Technology and to familiarize with the functional/operational aspects of cryptocurrency eco–system.

COURSE OBJECTIVES:

The Objective of this course is

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom'sTaxonomy)
CO 1	be conversant with the latest 3G/4G and Wi–MAX networks and its architecture.	Upto K3
CO 2	design and implement wireless network environment for any application using latest wireless protocols and standards	Upto K3
CO 3	implement different type of applications for smart phones and mobile devices with latest network strategies	Upto K3
CO 4	compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks. w	Upto K3
CO 5	classify network protocols, ad hoc and sensor networks, wireless MANs, LANs and PANs	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

WIRELESS NETWORKS

UNIT–I:

Introduction: Application – History of wireless Communication – Market for mobile communications – A Simplified Reference Model – Multiplexing: Space Division Multiplexing – Frequency Division Multiplexing – Time Division Multiplexing – Code Division Multiplexing.

Modulation: Amplitude Shift Keying – Frequency Shift Keying – Phase Shift Keying.

UNIT–II:

Telecommunications System: GSM: Mobile Services – System Architecture – Radio Interface – Protocols – Handover – Securing – DECT: System Architecture – Protocol Architecture – UMTS: Release and Standardization – System Architecture – UMTS Radio Interface.

UNIT–III:

Mobile Network Layer: Mobile IP : IP Packet Delivery – Agent Discovery – Tunneling and Encapsulation – IPV6 – Dynamic host Configuration Protocol – Mobile Ad hoc Networks – Routing – Destination Sequence Distance Vector – Dynamic Source Routing.

UNIT–IV:

Mobile Transport layer: Traditional TCP – Congestion Control – Slow Start – Fast Retransmit Fast Recovery – Classical TCP Improvement – Indirect TCP – Snooping TCP – Mobile TCP – Transaction Oriented TCP – TCP Over 2.5/3G Wireless Networks.

UNIT–V:

Support For Mobility: File Systems – Consistency – Coda – Little Work – Ficus – MI0 – NFS – Rover – WWW – HTTP – HTML – System Architecture – WAP(I.X) – Architecture – Datagram Protocol – Transport layer Securing – Transaction Protocol – Session Protocol – WML – Scrpt – Wireless Telephony Application.

TEXT BOOK:

Jochen Schiller, ***Mobile Communications***, Second Edition, Pearson Education2012.

Unit I : Chapters: 1.1 – 1.5,2.5.1 – 2.5.4, and 2.6.1 – 2.6.3
Unit II : Chapters: 4.1.1 – 4.1.4, 4.1.6, 4.1.7. 4.2 and 4.4.1 – 4.4.3
Unit III : Chapters: 8.1.1 – 8.1.4, 8.1.6, 8.1.9, 8.2 and 8.3.1 – 8.3.3
Unit IV : Chapters: 9.1.1 – 9.1.3, 9.2.1 – 9.2.3, 9.2.7 and 9.3
Unit V : Chapters: 10.1.2– 10.1.6, 10.2.1,10.2.2,10.2.4,10.3.1 – 10.3.5 and 10.3.7 – 10.3.9

REFERENCE BOOKS:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, ***3G Evolution HSPA and LTE for Mobile Broadband***, Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, ***Wireless Networking***, First Edition, Elsevier, 2011.
3. Simon Haykin, Michael Moher, David Koilpillai, ***Modern Wireless Communications***, First Edition, Pearson Education 2013

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	2	2	2	1
CO2	1	1	1	2	2	1
CO3	1	2	2	2	1	1
CO4	1	1	2	2	2	1
CO5	1	1	2	1	1	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDS51	INTRODUCTION TO COMPUTERS AND OFFICE AUTOMATION	SBS–5	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:

To train students in automating the office work using MS – WORD, MS – EXCEL, MS POWERPOINT and MS – ACCESS

COURSE OBJECTIVES:

- To create an awareness about fundamentals of computers to Non – Computer Science students
- To give knowledge about document handling using MS – WORD, creating worksheets and graphs using MS – EXCEL
- To impart knowledge on Slide presentation using MS – POWER POINT
- To impart knowledge on creating and accessing database using MS – ACCESS

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom'sTaxonomy)
CO 1	gain an awareness about fundamentals of computers	Upto K3
CO 2	get knowledge about document handling using MS – WORD	Upto K3
CO 3	create worksheets and graphs using MS – EXCEL create worksheets and graphs using MS – EXCEL	Upto K3
CO 4	gain knowledge on Slide presentation using MS – POWER POINT	Upto K3
CO 5	receive knowledge on creating and accessing database using MS – ACCESS	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

INTRODUCTION TO COMPUTERS AND OFFICE AUTOMATION

UNIT–I:

Introduction to Computer and Information Technology: History, Computer system concepts– Computer system characteristics– Capabilities and limitations–Types of computers– Generations. Computer organization and working: Introduction–The Control Unit ALU– Memory–Read only memory (ROM).

UNIT–II:

Input Devices: Introduction– Keyboards–Mouse–Joysticks–Optical Recognition input– Scanners– Bar coders–Digital camera–MICR–Card reader–Web Cameras–Light pens– Trackball– Touch screens–Touch pad–Digitizer–Voice input–Voice recognizers. Output Devices: Introduction– Monitors and Displays– Multimedia Projector–Printers–Graphics Output Devices–Plotters–Flatbed Plotters–Drum Plotters. Storage Devices: Introduction– Hard Disk Drives –CD–ROMs and DVDs – Magnetic tape –Erasable disks.

UNIT–III:

Microsoft Office 2007 and Word Processing: Introduction to Microsoft Office2007 – Microsoft Word Screen. Microsoft Word: Working with Document in Word 2007 – Introduction – saving the file – Formatting, Alignment of text, Applying fonts–Spell checking– Borders and shading – Closing of the file, Editing document, Autocorrect– Auto format–Find and Replace, Page numbering, header and footer– Footnotes and endnotes– splitting panes–Tiling of the documents– using mail merge in Word 2007.

UNIT–IV:

Microsoft Office Excel 2007: Understanding Spreadsheets–Creating a Worksheet in Microsoft Excel 2007– Copying formula – Styles –functions in Excel – Using Auto calculate–References – Sum, Average functions.

UNIT–V:

Creating Charts in Excel 2007–Auditing a workbook – Comments Inserting –Function wizard– Goal seeking– Typing with Auto fill– Formatting numbers and Labels – changing the size of Rows and columns– Add or Remove a sheet –Protect a worksheet– Applying themes.

TEXT BOOK:

Learning Computer Fundamentals, MS Office and Internet & Web Technology, Dinesh Maidasani, Firewall Media, Third Edition, 2014.

Unit I : Section A–1, 2
Unit II : Section A– 3, 4, 5
Unit III : Section B– 2, 3
Unit IV : Section B– 4 (up to Functions in Excel)
Unit V : Section B– 4(From Creating Charts in Excel)

REFERENCE BOOKS:

1. ***A Beginners Guide to Computers*** – Alexis Leon & Mathews Leon–Vikas Publishing House Pvt. Ltd., 2001.
2. ***Fundamentals of Computers***, P. Mohan, Himalaya Publishing House, RevisedEdition, 2010.
3. ***Fundamentals of Computers***, V. Rajaraman, PHI Publication, Fifth Edition,2010.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	2	2	2	1
CO2	1	1	1	2	2	1
CO3	1	2	2	2	1	1
CO4	1	1	2	2	2	1
CO5	1	1	2	1	1	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDS52	LAB: CRYPTOGRAPHY AND NETWORK SECURITY	SBS–6 LAB	–	2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	V	40	60	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	✓

COURSE DESCRIPTION:

To give practical exposure on basic security attacks, encryption algorithms, authentication techniques. Apart from security algorithms, firewall configuration is also introduced.

COURSE OBJECTIVES:

- To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
- To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
- To familiarize symmetric and asymmetric cryptography.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom'sTaxonomy)
CO1	understand security concepts and type of attacks and network security algorithms	Upto K3
CO2	apply symmetric and asymmetric key cryptography technique to encrypt and decrypt text.	Upto K3
CO3	apply the knowledge of symmetric key.	Upto K3
CO4	apply the knowledge of public key algorithm and Apply Cryptography Hash Function for message authentication and to solve other applications..	Upto K3
CO5	understand the concept of security with different key management things.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

LAB: CRYPTOGRAPHY AND NETWORK SECURITY

1. Write a C program that contains a string (char pointer) with a value \ Hello World". The program should XOR each character in this string with 0 and displays the result.

2. Write a C program that contains a string (char pointer) with a value \Hello World". The program should AND or and XOR each character in this string with 127 and display theresult.

3. Write a Java program to perform encryption and decryption using Ceaser Cipher algorithms.

4. Write a Java program to perform encryption and decryption using Substitution Cipher algorithms.

5. Write a Java program to perform encryption and decryption using Hill Cipher algorithms

6. Write a Java program to implement the DES algorithm logic.

7. Write a C/JAVA program to implement the BlowFish algorithm logic.

8. Write a C/JAVA program to implement the Rijndael algorithm logic.

9. Using Java Cryptography, encrypt the text Hello world using BlowFish. Create your own key using Java key tool.

10. Write a Java program to implement RSA Algorithm.

11. Calculate the message digest of a text using the SHA–1 algorithm in JAVA.

12. Calculate the message digest of a text using the MD5 algorithm in JAVA.

COURSE STRUCTURE – VI SEMESTER

S. No.	Course Code	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	23UCDC61	**Part – III: Core – 15:** Software Engineering	5	3	25	75	100	5
2	23UCDC62	**Part – III: Core – 16:** Web Technology	5	3	25	75	100	5
3	23UCDCP6	**Part – III: Core – 17: Lab – XI**: Cyber Security Practices	6	3	40	60	100	4
4	23UCDE61	**Part–III : Elective – 2:** Internet of Things	5	3	25	75	100	4
	23UCDE62	Ethical Hacking						
	23UCDE63	Data Mining and Warehousing						
5	23UCDEV1	**Part – III: Elective – 3:** Project work/ Viva–Voce	5	3	40	60	100	5
6	23UCDA61	**Part – III: Allied – 5:** Quantitative Aptitude	2	3	25	75	100	2
7	23UCDS61	**Part – IV: SBS – 7:** Introduction to Internet	2	3	25	75	100	2
8	21UGKY61	General Knowledge (Self–Study)	–	–	–	–	100	–
		TOTAL	**30**				**800**	**27**

***One elective course to be chosen from THREE courses**

CA – Class Assessment (Internal)

SE – Summative Examination

SBS – Skill Based Subject

NME – Non –Major Elective

T – Theory

P – Practical

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDC61	SOFTWARE ENGINEERING	CORE –15	5	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

It deals with the technological and Managerial aspects of systematic way of software development and Maintenance.

COURSE OBJECTIVES:

- To impart knowledge on systematic way of software development and Maintenance
- To give knowledge about the important activities of the various phases of Software life cycle
- To introduce the basic concepts of Software Project Management

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the Introduction about Software Engineering and phase–I of software life cycle: Planning a software Project	Upto K3
CO 2	gain knowledge about the software cost factors andCost estimation techniques	Upto K3
CO 3	know about the Software Requirements Specification (SRS) and various Relational, State Oriented notations	Upto K3
CO 4	understand about the various Design Notations and Design Techniques. Also gain knowledge about Unit testing and Debugging techniques	Upto K3
CO 5	know about Software Maintenance activities and also gain knowledge about Software Project Management	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

SOFTWARE ENGINEERING

UNIT–I:

Introduction to Software Engineering: Some Definitions–Some Size factors–Quality and Productivity Factors – Managerial Issues. Planning a Software Project: Defining the Problem–Developing a Solution Strategy–Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.

UNIT–II:

Software Cost Estimation: Software Cost Factors–Software Cost Estimation Techniques – Staffing–Level Estimation – Estimating Software Maintenance Costs.

UNIT–III:

Requirements Definitions: The Software Requirements Specification–Formal Specification Techniques – Languages and Processors for Requirements Specification.

UNIT–IV:

Software Design: Fundamental Design Concepts–Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real– Time and Distributed System Design – Test Plans – Milestones, Walkthroughs, and Inspections – Design Guidelines.

UNIT–V:

Verification and Validation Techniques: Quality Assurance–Static Analysis– Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification. Software Maintenance: Enhancing Maintainability During Development–Managerial Aspects of Software Maintenance – Configuration Management – Source–Code Metrics – Other Maintenance Tools and Techniques.

TEXT BOOK:

Software Engineering Concepts, Richard Fairley, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.

Unit I	:	Chapters: 1.1 – 1.4, 2.1–2.5
Unit II	:	Chapters: 3.1 – 3.4
Unit III	:	Chapters: 4.1 – 4.3
Unit IV	:	Chapters: 5.1 – 5.9
Unit V	:	Chapters: 8.1, 8.3 – 8.7, 9.1 – 9.5

REFERENCE BOOKS:

1. R.S. Pressman, ***Software Engineering – A practitioners approach***, Eighth Edition,McGraw Hill International editions, 2014.
2. Ian Somerville, ***Software Engineering***, Tenth Edition, Pearson Education, 2015.
3. Hans van Vliet, ***Software Engineering: Principles and Practice***, Third Edition, JohnWiley & Sons, 2008.
4. Rajib Mall, ***Fundamentals of Software Engineering***, Fourth Edition, Prentice–Hall ofIndia Pvt. Ltd., 2014.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	2	1	1
CO2	2	2	1	2	2	2
CO3	3	2	1	2	2	2
CO4	2	3	2	2	1	1
CO5	2	2	2	2	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDC62	WEB TECHNOLOGY	CORE–16	5	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course is intended to provide knowledge necessary to design and develop dynamic web pages using open–source technology PHP and MySQL. Also enhances the skill to connect and develop programs and applications using Database in XAMPP.

COURSE OBJECTIVE:

- To develop an ability to design and code server–side scripting
- To create dynamic and interactive web pages connecting with server
- To get knowledge about various objects, features and apply it
- To develop skill for state management of a web page using cookies and session
- To manage dynamic content and databases

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom'sTaxonomy)
CO 1	understand the basic concepts of PHP and using variables, operators, data types and creating scripts	Upto K3
CO 2	identify the conditional control statements in PHP Working with String and Numeric Functions	Upto K3
CO 3	understand the concepts of Data in Arrays and Processing Arrays with Loops and Iterations working with Dates and Times	Upto K3
CO 4	describe the procedures for Working with Files and Directories in PHP	Upto K3
CO 5	understand the basics of using MySQL ,Simple XM Land DOM Extension	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

WEB TECHNOLOGY

UNIT–I:
Introducing PHP – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.

UNIT–II:
Controlling Program Flow: Writing Simple Conditional Statements – Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

UNIT–III:
Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms – Working with Array Functions – Working with Dates and Times.

UNIT–IV:
Using Functions and Classes: Creating User–Defined Functions – Creating Classes – Using Advanced OOP Concepts. Working with Files and Directories: Reading Files– Writing Files–Processing Directories.

UNIT–V:
Working with Database and SQL: Introducing Database and SQL– Using My SQL– Adding and modifying Data– Handling Errors – Using SQLite Extension and PDO Extension. Introduction XML – Simple XML and DOM Extension.

TEXT BOOK:
Vikram Vaswani, ***PHP A Beginner's Guide***, Tata McGraw Hill 2008.

REFERENCE BOOKS:
1. Steven Holzner, ***The PHP Complete Reference***, Tata McGraw Hill, 2007.
2. Steven Holzer, ***Spring into PHP***, Tata McGraw Hill 2011, 5thEdition.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	2	1	1
CO2	2	2	1	2	2	2
CO3	3	2	1	2	2	2
CO4	2	3	2	2	1	1
CO5	2	2	2	2	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDCP6	LAB: CYBER SECURITY PRACTICES	CORE–17	–	6	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	40	60	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:

This lab course aims to equip students with hands–on skills in securing personal computers, mobile devices, social media accounts, and email communications. Students will learn how to apply security policies, implement technical controls, and report cyber threats effectively.

COURSE OBJECTIVES:

- To provide hands–on experience in cybersecurity practices, including password policies, security controls for personal computing devices.
- To familiarize social media privacy settings, cybercrime reporting, and phishing attack prevention.
- To analyze and report cyber threats successfully.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom'sTaxonomy)
CO 1	implement Strong Authentication and Security Controls	Upto K3
CO 2	apply Security Measures to Personal Computing Devices	Upto K3
CO 3	manage Social Media Privacy and Secure Online Interactions	Upto K3
CO 4	report and Respond to Cybersecurity Threats	Upto K3
CO 5	detect and Prevent Phishing & Cyber Attacks	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

LAB: CYBER SECURITY PRACTICES

Module 1: Device Security & Password Management

- **Lab 1:** Creating and implementing a **password policy** for computers and mobile devices
- **Lab 2:** Configuring **multi–factor authentication (MFA) and biometric security**

Module 2: Security Controls for Personal Computers & Mobile Devices

- **Lab 3:** Listing and implementing **technical security controls** on a **personal computer** (firewall settings, antivirus, software updates)
- **Lab 4:** Listing and implementing **technical security controls** on a **mobile phone** (app permissions, security settings, encryption)

Module 3: System Security Policies & Administrative Access

- **Lab 5:** Logging into a computer system as an **administrator** and analyzing **security policies**

Module 4: Social Media Security & Privacy

- **Lab 6:** Configuring **privacy settings** on various **social media platforms**
- **Lab 7:** Learning about **Do's and Don'ts** for posting content on social media

Module 5: Cyber Crime Reporting & Complaint Registration

- **Lab 8:** Registering complaints on a **social media platform** (e.g., reporting fake profiles, harassment, impersonation)
- **Lab 9:** Creating a **checklist for reporting cyber crimes** at a **Cyber Crime Police Station**
- **Lab 10:** Creating a **checklist for online cyber crime reporting**

Module 6: Email Security & Phishing Awareness

- **Lab 11:** Reporting phishing emails and identifying phishing attempts
- **Lab 12: Demonstrating an email phishing attack** (controlled environment) and learning **preventive measures.**

Students may investigate and submit a report regarding cybercrime.

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDE61	INTERNET OF THINGS	ELECTIVE–2	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

COURSE OBJECTIVES:

- To familiarize the students to the basics of Internet of things and protocols.
- To expose the students to some of the electrical engineering application areas where Internet of Things can be applied

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	describe what IoT is and how it works today and Recognize the factors that contributed to the emergence of IoT	Upto K3
CO 2	implement interfacing of various sensors with Arduino/Raspberry Pi.	Upto K3
CO 3	use real IoT protocols for communication	Upto K3
CO 4	demonstrate the ability to transmit data wirelessly between different devices	Upto K3
CO 5	show an ability to upload/download sensor data on cloud and server.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

INTERNET OF THINGS

UNIT–I:

Fundamentals OF IoT –Evolution of Internet of Things –Enabling Technologies–IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack —Fog, Edge and Cloud in IoT –Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT–II:

IoT Protocols – IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN –Network Layer: IP versions, Constrained Nodes and Constrained Networks –Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks –Application Transport Methods: Supervisory Control and Data Acquisition–Application Layer Protocols: CoAP and MQTT

UNIT–III:

Design And Development –Design Methodology –Embedded computing logic –Micro controller, System on Chips –IoT system building blocks –Arduino –Board details, IDE programming –Raspberry Pi –Interfaces and Raspberry Pi with Python Programming.

UNIT–IV:

Data Analytics and Supporting Services–Structured Vs Unstructured Data and Datain Motion Vs Data in Rest –Role of Machine Learning –No SQL Databases –Hadoop Ecosystem –Apache Kafka, Apache Spark –Edge Streaming Analytics and Network Analytics –Xively Cloud for IoT, Python Web Application Framework –Django –AWS for IoT –System Management with NETCONF–YANG106

UNIT–V:

Case Studies/Industrial Applications– Cisco IoT system –IBM Watson IoT platform– Manufacturing –Converged Plant wide Ethernet Model (CPwE) –Power Utility Industry–Grid Blocks Reference Model –Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

TEXT BOOK:

IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017

REFERENCE BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, ***—Internet of Things –A hands–on approach*** , Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi , ***—The Internet of Things – Key applications and Protocols***, Wiley, 2012 (for Unit 2).
3. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle, ***From Machine–to–Machine to the Internet of Things – Introduction to a New Age of Intelligence***, Elsevier, 2014.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	2	1	1
CO2	2	2	1	2	2	2
CO3	3	2	1	2	2	2
CO4	2	3	2	2	1	1
CO5	2	2	2	2	2	1

3.Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDE62	ETHICAL HACKING	ELECTIVE–2	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:

Introduces the ethical hacking methodologies. Covers applying cyber security concepts to discover and report vulnerabilities in a network. Explores legal and ethical issues associated with ethical hacking.

COURSE OBJECTIVES:

- To understand and analyse Information security threats & countermeasures
- To perform security auditing & testing
- To understand issues relating to ethical hacking
- To study & employ network defense measures
- To understand penetration and security testing issues

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand vulnerabilities, mechanisms to identify vulnerabilities/threats/attacks	Upto K3
CO 2	perform penetration & security testing	Upto K3
CO 3	become a professional ethical hacker	Upto K3
CO 4	critically evaluate the potential countermeasures to advanced hacking techniques.	Upto K3
CO 5	analyze and critically evaluate techniques used to break into an in secure web application and identify relevant countermeasures	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

ETHICAL HACKING

UNIT–I:

Introduction to Hacking: Introduction to Hacking – Important Terminologies – Penetration Test – Vulnerability Assessments versus Penetration Test – Pre– Engagement – Rules of Engagement – Penetration Testing Methodologies – OSSTMM – NIST – OWASP – Categories of Penetration Test – Types of Penetration Tests – Vulnerability Assessment Summary –Reports.

UNIT–II:

Network Attacks: Vulnerability Data Resources – Exploit Databases – Network Sniffing – Types of Sniffing –Promiscuous versus Non promiscuous Mode – MITM Attacks – ARP Attacks – Denial of Service Attacks –Hijacking Session with MITM Attack.

UNIT–III:

SSL Strip: Stripping HTTPS Traffic –DNS Spoofing – ARP Spoofing Attack Manipulating the DNS Records – DHCP Spoofing –Remote Exploitation – Attacking Network Remote Services – Overview of Brute Force Attacks – Traditional Brute Force – Attacking SMTP – Attacking SQL Servers – Testing for Weak Authentication.

UNIT–IV:

Wireless and Web Hacking–Wireless Hacking – Introducing Air crack– Cracking the WEP – Cracking a WPA/WPA2 Wireless Network Using Air crack–ng – Evil Twin Attack – Causing Denial of Service on the Original AP – Web Hacking.

UNIT–V:

Attacking the Authentication – Brute Force and Dictionary Attacks – Types of Authentications – Log–In Protection Mechanisms – Captcha Validation Flaw – Captcha RESET Flaw – Manipulating User–Agents to Bypass Captcha and Other Protection – Authentication Bypass Attacks – Testing for the Vulnerability – Automating It with Burp Suite – Session Attacks – SQL Injection Attacks – XSS (Cross–Site Scripting) – Types of Cross–Site Scripting – Cross–Site Request Forgery (CSRF) – SSRF Attacks.

TEXT BOOK:

Rafay Baloch, ***Ethical Hacking and Penetration Testing Guide***, CRC Press, 2014.

REFERENCE BOOKS:

1. Kevin Beaver, ***Ethical Hacking for Dummies***, Sixth Edition, Wiley, 2018.
2. Jon Erickson , ***Hacking: The Art of Exploitation***, Second Edition, Rogunix, 2007.

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	1
CO2	2	3	3	3	2	2
CO3	2	3	3	2	2	3
CO4	2	2	2	2	2	3
CO5	2	2	1	1	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDE63	DATA MINING AND WAREHOUSING	ELECTIVE–2	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

It deals with data mining techniques and data warehousing techniques to extract knowledge from large data bases.

COURSE OBJECTIVES:

- To give knowledge in Data Mining and Data Warehousing
- To inculcate knowledge on Association Rule mining, Clustering and Classification techniques
- To make the students learn various applications of data mining techniques.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the data mining concepts regarding types of data, knowledge, techniques and applications	Upto K3
CO 2	understand the data warehousing concepts, data cube,OLAP & OLTP and Attribute–Oriented Induction	Upto K3
CO 3	gain knowledge about Association rule mining algorithms such as Apriori, FP–Growth for extracting Knowledge from large data bases	Upto K3
CO 4	learn the classification techniques using various classification algorithms such as decision tree induction, Bayesian for extracting knowledge from large data bases	Upto K3
CO 5	learn the clustering techniques using various clustering algorithms such as k–means, k–medoids, etc., for Extracting knowledge from large data bases. Also learnabout various data mining applications	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

DATA MINING AND WAREHOUSING

UNIT– I:

Introduction: Data mining application–data mining techniques–data mining case studies the future of data mining – data mining software. Association rules mining: Introduction –Basics–task and a Naive algorithm– Apriori algorithm – improve the efficiency of the Apriori algorithm – mining frequent pattern without candidate generation (FP–growth) – performance evaluation of algorithms.

UNIT–II:

Data warehousing: Introduction – Operational data sources– data warehousing – Data Warehousing design – Guidelines for data warehousing implementation – Data warehousing – Metadata. Online analytical processing (OLAP): Introduction – OLAP characteristics of OLAP system – Multidimensional view and data cube – Data cube implementation – Data Cube operations OLAP implementation guidelines.

UNIT–III:

Classification: Introduction–decision tree–over fitting and pruning – DT rules–Naïve Bayesmethod– estimation predictive accuracy of classification methods – otherevaluation criteria for classification method – classification software.

UNIT–IV:

Cluster analysis: cluster analysis – types of data – computing distances–types of cluster analysis methods – partitioned methods – hierarchical methods – density based methods – Dealing with large databases – quality and validity of cluster analysis methods–cluster analysis software.

UNIT–V:

Web data mining: Introduction– web terminology and characteristics– locality and hierarchy in the web– web content mining–web usage mining– web structure mining – web mining software. Search engines: Search engines functionality– search engines architecture–Ranking of web pages.

TEXT BOOK:

Introduction to Data mining with case studies, G.K. Gupta, PHI Private limited,New Delhi, 2014.

Unit I : Chapters 1 & 2
Unit II : Chapters 7 & 8
Unit III : Chapter 3
Unit IV :Chapter 4
Unit V : Chapters 5 & 6

REFERENCE BOOKS:

1. ***Data Warehousing, Data Mining & OLAP,*** Alex Berson and Stephen J. Smith, Tata McGraw Hill Edition, Tenth Reprint 2007
2. ***Data Mining Concepts and Techniques***, Jiawei Han and MichelineKamber, Second Edition, Elsevier, 2007
3. ***Insights into Data Mining*** K.P. Soman, ShyamDiwakar, V. Ajay, Theory andPractice, PHI Publications Eastern Economy Edition 6th Printing, 2012

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	2	1
CO2	2	3	3	3	2	2
CO3	2	3	3	2	2	3
CO4	2	2	2	2	2	3
CO5	2	2	1	1	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDEV1	PROJECT & VIVA–VOCE	ELECTIVE –3	–	5	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	40	60	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:

The Project & Viva–Voce gives an exposure about software development and documentation.

COURSE OBJECTIVES:

- To give exposure on software development and maintenance
- To train students, a systematic way of Report writing
- To practice students for project presentation

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	do Planning and write software requirements specifications of a software project	Upto K3
CO 2	do architectural & detailed design of a software project	Upto K3
CO 3	write the source code of the software project	Upto K3
CO 4	do unit testing, debugging, Integration & Acceptance testing of the software project	Upto K3
CO 5	write the report of a software project	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

PROJECT & VIVA–VOCE

UNIT–I:
Analysis Phase – To formulate and formalize the system's requirements. This is accomplished by establishing what the system is to do, according to the requirements and expectations of the system's end users.

UNIT– II:
Design Phase–To transform the requirements into complete and detailed system design specifications.

UNIT– III:
Implementation Phase–It is concerned with translating software design specification into the source code.

UNIT– IV:
Testing Phase–Four main stages of testing can be performed on any build. They are the; Unit Tests, Integration Tests, System Tests, and Acceptance Tests

UNIT– V:
Report Writing Phase–Project Report writing deals with reports about Analysis, Design, Coding and testing phases

TEXT BOOKS:

1. ***Software Engineering Concepts*** – Richard E. Fairley – Tata McGraw – Hill Publishing Company Limited, New Delhi 1997.
2. ***Software Project Management*** – Mike Cotterell Andbob Hughes, International Thomson Publishing

REFERENCE BOOKS:

1. ***Software Engineering*** – K.L. James, Prentice Hall of India Pvt. Ltd., New Delhi – 2009.
2. ***Software Engineering*** – Pressman.
3. Rajib Mall, ***Fundamentals of Software Engineering***,3rd Edition, Prentice Hall of India Private Limited, 2008

DIGITAL TOOLS:

1. **https://acecollege.in/CITS_Upload/Downloads/Books/1035_File.pdf**
2. **https://gacbe.ac.in/pdf/ematerial/18BIT41C–U1.pdf**
3. **https://ddegjust.ac.in/studymaterial/mca–3/ms–12.pdf**

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

RULES & REGULATIONS:

1. A maximum of two students can join to do the project work
2. Students must undertake the project work under the guidance of a faculty member
3. Progressive reports have to be submitted to the guide periodically
4. The internal test marks is 40 and is divided into the following components.
   (i) Two Presentations – 2 X 10 = 20 marks
   (ii) Progressive Reports – 10 marks
   (iii) Internal Viva–voce – 10 marks
5. The external examination will be jointly conducted by both the Internal and external examiners
6. The students must submit 3 copies (2 copies for 2 students + 1 copy for the Dept.) of their Project Report two weeks before the external examination.
7. The maximum marks for the external examination is 60 and it may be divided into the following components.
   (i) Project Report – 20 marks
   (ii) Project Presentation – 20 marks
   (iii) Project viva–voce– 20 marks

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDA61	QUANTITATIVE APTITUDE	ALLIED–5	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	✓

COURSE DESCRIPTION:

Quantitative aptitude is an inseparable and an integral part of aptitude exams in India. It **tests the quantitative skills along with logical and analytical skills**. One can test their own number of handling techniques and problem–solving skills by solving these problems.

COURSE OBJECTIVES:

- To give numerical aptitude and to prepare students for competitive examinations
- To impart knowledge on solving various types of numerical problems
- To give practice to students by giving variety of problems and enrich their analytical skills

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom'sTaxonomy)
CO 1	solve problems on Numbers, HCF & LCM of numbers and Decimal Fractions.	Upto K3
CO 2	solve problems on Square roots & Cube roots, Average, Problems on Numbers, Problems on Ages.	Upto K3
CO 3	solve problems on Percentage, Profit & Loss, Ratio & Proportion.	Upto K3
CO 4	solve problems on Time & Work, Time & Distance	Upto K3
CO 5	solve problems on Simple Interest, Compound Interest, Area , Volume & Surface areas.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

QUANTITATIVE APTITUDE

UNIT – I:
Numbers – HCF & LCM of numbers – Decimal Fractions.

UNIT – II:
Square roots & Cube roots – Average – Problems on Numbers – Problems on Ages.

UNIT – III:
Percentage – Profit & Loss – Ratio & Proportion.

UNIT – IV:
Time & Work – Time & Distance.

UNIT – V:
Simple Interest – Compound Interest – Area –Volume & Surface areas.

TEXT BOOK:
Quantitative Aptitude, R.S. Aggarwal, Reprint 2007, S. Chand & Company Ltd,
Unit I : Chapters: 1, 2, 3
Unit II : Chapters: 5, 6, 7, 8
Unit III : Chapters: 10, 11, 12
Unit IV : Chapters: 15, 17
Unit V : Chapters: 21, 22, 24, 25

REFERENCE BOOKS:
1. ***Quantitative Aptitude For Competitive Examination***, by Abhijit Guha, 5th Edition, Mc Graw Hill
2. ***Quantitative Aptitude and Reasoning***, by Praveen R. V, January 2012

DIGITAL TOOLS:
1. https://www.tutorialspoint.com/quantitative_aptitude/aptitude_profit_loss_examples.htm
2. https://www.youtube.com/playlist?list=PLpyc33gOcbVA4qXMoQ5vmhefTrUk5t9lt
3. https://www.javatpoint.com/aptitude/quantitative

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	2	1
CO2	2	3	3	2	2	2
CO3	1	3	2	2	2	3
CO4	3	2	1	3	2	2
CO5	2	3	2	2	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
23UCDS61	INTRODUCTION TO INTERNET	SBS–7	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
III	VI	25	75	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course aims to impart skills to design and develop web pages using HTML and todesign website using open source package.

COURSE OBJECTIVES:

- To give knowledge on the basic concepts of Internet
- To prepare the students to design their own web pages.
- To use and to customize the templates as per the requirement.
- To enable the students to develop dynamic web pages and to upload the documents.
- To give basic knowledge on social networks

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the basic concepts of Internet and Create simpleweb page using physical tags of HTML	Upto K3
CO 2	present the information in standard form in a web page using structure tags supported by the browsers	Upto K3
CO 3	design the layout for a web page using browser support tags	Upto K3
CO 4	develop a web site with the provision to go around all pages	Upto K3
CO 5	design a website using a theme available in Frame and Forms.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2 – UNDERSTANDING, K3 – APPLY

INTRODUCTION TO INTERNET

UNIT – I:

Introduction – Internet – History – How the Web Works – Web Server and Clients – Connections – ISDN – Dialup or leased – DNS – Registering – Intranet – Overview of Web Browsers.

UNIT – II:

HTML – Basic Components of HTML – Formatting – URL – PROTOCOL – Server Name – Linking to other HTML Documents – Linking Inside the same document – FTP – GOPHER – FTP Commands.

UNIT – III:

Lists – Ordered lists – Unordered lists – Directory lists – Definition lists – Combining List types – Graphics and Web pages

UNIT – IV:

Image Formats – Graphics In HTML – Images and Hyper link anchors – Image Maps. Tables –Frames in HTML – Frame set Container.

UNIT – V:

HTML Forms – Input tag – Form elements – Background graphics and color – MS Internet – Extensions – Font Tag – Scrolling Marquees – Introduction to social network – Face book , Twitter, WhatsApp – Introduction to E – shopping.

TEXT BOOK:

Computer Fundamentals and Windows with Internet Technology. By N. Krishnan, Publisher Scitech

REFERENCE BOOKS:

1. ***The Internet Book,*** Douglas E. Comer Fourth Edition, PHI Learning Pvt. Ltd, New Delhi – 2009.
2. ***Using the Internet the easy way,*** Young Kai Seng Minerva Publications, First Edition, 2000.

DIGITAL TOOLS:

www.wikipedia.com
www.w3schools.Com
www.webopedia.com

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	2	1
CO2	2	3	3	2	2	2
CO3	1	3	2	2	2	3
CO4	3	2	1	3	2	2
CO5	2	3	2	2	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level