

ANNAMALAI UNIVERSITY
(Affiliated Colleges)

215 – B. Sc. Information Technology

Programme Structure and Scheme of Examination (under CBCS)

(Applicable to the candidates admitted from the academic year 2023 -2024 onwards)

Part	Course Code	Study Components & Course Title	Credit	Hours/Week	Maximum Marks		
					CIA	ESE	Total
SEMESTER – I							
I	23UTAML11/ 23UHINL11/ 23UFREL11	Language– I பொது தமிழ் -I: தமிழிலக்கிய வரலாறு-1/ Hindi-I/ French-I	3	6	25	75	100
II	23UENGL12-I	General English – I	3	6	25	75	100
III	23UINTC13	Core – I: Programming in C	5	5	25	75	100
	23UINTP14	Core – II : Practical – I : C Programming Practical	5	5	25	75	100
	23UMAFE15	Elective – I: Mathematical Foundations – I	3	4	25	75	100
IV	23UTAMB16 23UTAMA16	Skill Enhancement Course-I * NME-I / Basic Tamil – I / Advanced Tamil – I	2	2	25	75	100
	23UINTF17	Foundation Course: Fundamentals of Computers	2	2	25	75	100
	Total			23	30		
SEMESTER – II							
I	23UTAML21/ 23UHINL21/ 23UFREL21	Language– II பொது தமிழ் -II: தமிழிலக்கிய வரலாறு-2/ Hindi-II French-II	3	6	25	75	100
II	23UENGL22-II	General English – II	3	6	25	75	100
III	23UINTC23	Core –III: Java Programming	5	5	25	75	100
	23UINTP24	Core – IV: Practical-II: Java Programming & Data Structures Practical	5	5	25	75	100
	23UMAFE25	Elective – II: Mathematics Foundations – II	3	4	25	75	100
IV	23UTAMB26 23UTAMA26	Skill Enhancement Course – II * NME-II / Basic Tamil – II /	2	2	25	75	100
	23USECG27	Skill Enhancement Course – III: Internet and its Applications (Common Paper)	2	2	25	75	100
	23UNMSD01	Language Proficiency for employability: Overview of English Communication**	2	-	25	75	100
Total			25	30			800

SEMESTER – III							
23UTAML31/ 23UHINL31/ 23UFREL3	I	Language – III: பொது தமிழ் – III: தமிழக வரலாறும், பண்பாடும்/ Hindi-III/ French-III	3	6	25	75	100
23UENGL32	II	General English-II	3	6	25	75	100
23UINTC33	III	Core – V: Python Programming	5	5	25	75	100
23UINTP34		Core – VI: Python Programming Lab	5	4	25	75	100
23USTAE35 23UPHYE35		Elective III: Statistics-I/ Physics-I	2	3	25	75	100
23USTAEP3 23UPHYEP3		Statistics Practical-I/ Physics Practical-I	1	2	25	75	100
23UINTS36	IV	Skill Enhancement Course – IV: Digital Computer Fundamentals	1	1	25	75	100
23UINTS37		Skill Enhancement Course – V: R Programming - Practical	2	2	25	75	100
		Environmental Studies	-	1			
		Total	22	30			800
SEMESTER – IV							
23UTAML41/ 23UHINL41/ 23UFREL41	I	Language – IV: பொது தமிழ் – IV: தமிழும் அறிவியலும்/ Hindi-IV/ French-IV	3	6	25	75	100
23UENGL42	II	English	3	6	25	75	100
23UINTC43	III	Core – VII (Core Industry Module) Operating System	5	5	25	75	100
23UINTP44		Core – VIII: Linux Operating System Lab	5	3	25	75	100
23USTAE45 23UPHYE45		Elective IV: Statistics-II/ Physics-II	2	3	25	75	100
23USTAEP4 23UPHYEP4		Statistics Practical-I/ Physics Practical-II	1	2	25	75	100
23UINTS46	IV	Skill Enhancement Course – VI: Internet of Things	2	2	25	75	100
23UINTS47		Skill Enhancement Course – VII: Cloud Computing	2	2	25	75	100
23UEVSG48		Environmental Studies	2	1	25	75	100
		Total	25	30			800

SEMESTER – V							
23UINTC51	III	Core – IX : Computer Networks	4	5	25	75	100
23UINTC52		Core – X : Database Management System	4	5	25	75	100
23UINTP53		Core – XI : Database Management System Lab	4	5	25	75	100
23UINTD54		Core – XII: Project with viva-voce	4	5	25	75	100
23UINTE55-1 23UINTE55-2 23UINTE55-3		Elective V: Information Security ERP Multimedia Systems	3	4	25	75	100
23UINTE56-1 23UINTE56-2 23UINTE56-3		Elective VI : Web Application Development Mobile Adhoc Network Software Engineering	3	4	25	75	100
23UVALG57		IV	Value Education	2	2	25	75
23UINTI58	Summer Internship ⁺⁺		2	–	25	75	100
Total			26	30			800

SEMESTER – VI							
23UINTC61	III	Core – XIII: Machine Learning	4	6	25	75	100
23UINTC62		Core – XIV: Android Programming	4	6	25	75	100
23UINTP63		Core – XV: Android Programming Lab	4	6	25	75	100
23UINTE64-1 23UINTE64-2 23UINTE64-3		Elective VII: PHP Programming Open Source Software Technologies Human Computer Interaction	3	5	25	75	100
23UINTE65-1 23UINTE65-2 23UINTE65-3		Elective VIII: Fuzzy Logic Cyber Security E-Commerce	3	5	25	75	100
23UINTF66	IV	Professional Competency Skill: Big Data Analytics	2	2	25	75	100
23UINTX67	V	Extension Activity	1	-	25	75	100
Total			21	30			700
Grand Total			142				

Non-major (NME) Electives offered to other Departments

IV	23UINTN16	Basics of Internet	2	2	25	75	100
	23UINTN26	Fundamentals of Information Technology	2	2	25	75	100

* PART-IV: NME / Basic Tamil / Advanced Tamil (Any one)

Students who have not studied Tamil upto 12th Standard and have taken any Language other than Tamil in Part-I, must choose Basic Tamil-I in First Semester & Basic Tamil-II in Second Semester.

Students who have studied Tamil upto 10th & 12th Standard and have taken any Language other than Tamil in Part-I, must choose Advanced Tamil-I in First Semester and Advanced Tamil-II in Second Semester.

** The course “23UNMSD01: Overview of English Communication” is to be taught by the experts from Naan Mudhalvan Scheme team. However, the faculty members of Department of English should coordinate with the Naan Mudhalvan Scheme team for smooth conduct of this course.

⁺⁺Students should complete two weeks of internship before the commencement of V semester.

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System for all UG courses including Lab Hours

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part I	Language – Tamil	3	6
Part II	English	3	6
Part III	Core Theory, Practical & Elective Courses	13	14
Part IV	Skill Enhancement Course SEC-1 (NME-I)	2	2
	Foundation Course	2	2
		23	30

Semester-II

Part	List of Courses	Credit	No. of Hours
Part I	Language – Tamil	3	6
Part II	English	3	6
Part III	Core Theory, Practical & Elective Courses	13	14
Part IV	Skill Enhancement Course -SEC-2 (NME-II)	2	2
	Skill Enhancement Course -SEC-3 (Discipline / Subject Specific)	2	2
		23	30

Second Year – Semester-III

Part	List of Courses	Credit	No. of Hours
Part I	Language - Tamil	3	6
Part II	English	3	6
Part III	Core Theory, Practical & Elective Courses	13	14
Part IV	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5 (Discipline / Subject Specific)	2	2
	E.V.S	-	1
		22	30

Semester-IV

Part	List of Courses	Credit	No. of Hours
Part I	Language - Tamil	3	6
Part II	English	3	6
Part III	Core Theory, Practical & Elective Courses	13	13
Part IV	Skill Enhancement Course -SEC-6 (Discipline / Subject Specific)	2	2
	Skill Enhancement Course -SEC-7 (Discipline / Subject Specific)	2	2
	E.V.S	2	1
		25	30

Third Year

Semester-V

Part	List of Courses	Credit	No. of Hours
Part III	Core Theory, Practical, Project & Elective Courses	22	28
Part IV	Value Education	2	2
	Internship / Industrial Visit / Field Visit	2	-
		26	30

Semester-VI

Part	List of Courses	Credit	No. of Hours
Part III	Core Theory, Practical & Elective Courses	18	28
Part IV	Professional Competency Skill	2	2
Part V	Extension Activity	1	-
		21	30

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	22	18	92
Part IV	4	4	3	6	4	2	23
Part V	-	-	-	-	-	1	1
Total	23	23	22	25	26	21	140

***Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components Part IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

CREDIT DISTRIBUTION FOR U.G. PROGRAMME

Part	Course Details	No. of Courses	Credit per course	Total Credits
Part I	Tamil	4	3	12
Part II	English	4	3	12
Part III	Core Courses	15	4/5	68
	Elective Courses: Generic / Discipline Specific (3 or 2+1 Credits)	8	3	24
Part I, II and III Credits				116
Part IV	Skill Enhancement Courses / NME / Language Courses	7	1/2	15
	Professional Competency Skill Course	1	2	2
	Environmental Science (EVS)	1	2	2
	Value Education	1	2	2
	Internship	1	2	2
Part IV Credits				23
Part V	Extension Activity (NSS / NCC / Physical Education)	1	1	1
Total Credits for the UG Programme				140

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze(K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate(K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations	

<p>Programme Outcomes:</p>	<p>PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study</p> <p>PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.</p> <p>PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p>PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real life situations.</p> <p>PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.</p> <p>PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation</p> <p>PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team</p> <p>PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.</p> <p>PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.</p>
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	<p>PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.</p> <p>PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.</p> <p>PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.</p> <p>PO 13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one’s life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one’s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.</p> <p>PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.</p> <p>PO 15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.</p>
<p>Programme Specific Outcomes:</p>	<p>PSO1: To enable students to apply basic microeconomic, macroeconomic and monetary concepts and theories in real life and decision making.</p> <p>PSO 2: To sensitize students to various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment.</p> <p>PSO 3: To familiarize students to the concepts and theories related to Finance, Investments and Modern Marketing.</p> <p>PSO 4: Evaluate various social and economic problems in the society and develop answer to the problems as global citizens.</p> <p>PSO 5: Enhance skills of analytical and critical thinking to analyze effectiveness of economic policies.</p>

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
PSO 1	Y	Y	Y	Y	Y	Y	Y	Y
PSO 2	Y	Y	Y	Y	Y	Y	Y	Y
PSO3	Y	Y	Y	Y	Y	Y	Y	Y
PSO 4	Y	Y	Y	Y	Y	Y	Y	Y
PSO 5	Y	Y	Y	Y	Y	Y	Y	Y

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – I

CORE – I: PROGRAMMING IN C

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTC13	5	0	0	I	5	5	25	75	100
Learning Objectives									
LO1	To familiarize the students with the understanding of code organization								
LO2	To improve the programming skills								
LO3	Learning the basic programming constructs.								
Prerequisites:									
Unit	Contents								No. of Hours
I	Studying Concepts of Programming Languages- Language Evaluation Criteria - Language design - Language Categories - Implementation Methods – Programming Environments - Overview of C: History of C- Importance of C- Basic Structure of C Programs-Executing a C Program- Constants, Variables and Data types - Operators and Expressions - Managing Input and Output Operations								15
II	Decision Making and Branching: Decision Making and Looping - Arrays - Character Arrays and Strings								15
III	User Defined Functions: Elements of User Defined Functions- Definition of Functions- Return Values and their Types- Function Call- Function Declaration- Categories of Functions- Nesting of Functions-Recursion								15
IV	Structures and Unions: Introduction- Defining a Structure- Declaring Structure Variables Accessing Structure Members- Structure Initialization- Arrays of Structures- Arrays within Structures- Unions- Size of Structures.								15
V	Pointers: Understanding Pointers- Accessing the Address of a Variable- Declaring Pointer Variables- Initializing of Pointer Variables- Accessing a Variable through its Pointer- Chain of Pointers- Pointer Expressions- Pointer and Scale Factor- Pointer and Arrays- Pointers and Character Strings- Array of Pointers- Pointer as Function Arguments- Functions Returning Pointers- Pointers to Functions- File Management in C								15
TOTAL								75	

CO	Course Outcomes
CO1	Outline the fundamental concepts of C programming languages, and its features
CO2	Demonstrate the programming methodology.
CO3	Identify suitable programming constructs for problem solving.
CO4	Select the appropriate data representation, control structures, functions and concepts based on the problem requirement.
CO5	Evaluate the program performance by fixing the errors.
Textbooks	
➤	Robert W. Sebesta, (2012), —Concepts of Programming Languages, Fourth Edition, Addison Wesley (Unit I : Chapter – 1)
➤	E. Balaguruswamy, (2010), —Programming in ANSI C, Fifth Edition, Tata McGraw Hill Publications
Reference Books	
1.	Ashok Kamthane, (2009), —Programming with ANSI & Turbo C, Pearson Education
2.	Byron Gottfried, (2010), —Programming with C, Schaums Outline Series, Tata McGraw Hill Publications
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://www.tutorialspoint.com/cprogramming/
2.	http://www.cprogramming.com/
3.	http://www.programmingsimplified.com/c-program-examples
4.	http://www.programiz.com/c-programming
5.	http://www.cs.cf.ac.uk/Dave/C/CE.html
6.	http://fresh2refresh.com/c-programming/c-function/

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	2	2
Weightage of course contributed to each PSO	15	14	11	15	10	10

CORE – II: Practical - I
C Programming Practical

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTP14	0	0	5	I	5	5	25	75	100
Learning Objectives									
LO1	The Course aims to provide exposure to problem-solving through C programming								
LO2	It aims to train the student to the basic concepts of the C -Programming language								
LO3	Apply different concepts of C language to solve the problem								
Prerequisites:									
Contents									
1. Programs using Input/ Output functions 2. Programs on conditional structures 3. Command Line Arguments 4. Programs using Arrays 5. String Manipulations 6. Programs using Functions 7. Recursive Functions 8. Programs using Pointers 9. Files 10. Programs using Structures & Unions									
CO	Course Outcomes								
CO1	Demonstrate the understanding of syntax and semantics of C programs.								
CO2	Identify the problem and solve using C programming techniques.								
CO3	Identify suitable programming constructs for problem solving.								
CO4	Analyze various concepts of C language to solve the problem in an efficient way.								
CO5	Develop a C program for a given problem and test for its correctness.								

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	3	2

Weightage of course contributed to each PSO	15	14	11	15	11	10
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Elective – I
(Generic/Discipline Specific)
MATHEMATICAL FOUNDATIONS - I

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UMAFE15	0	0	5	I	3	4	25	75	100

UNIT-I: SYMBOLIC LOGIC

Proposition, Logical operators, conjunction, disjunction, negation, conditional and Bi-conditional operators, converse, Inverse, Contra Positive, logically equivalent, tautology and contradiction. Arguments and validity of arguments.

UNIT-II: SET THEORY

Sets, set operations, Venn diagram, Properties of sets, number of elements in a set, Cartesian product, relations & functions

Relations : Equivalence relation. Equivalence class, Partially and Totally Ordered sets

Functions: Types of Functions, Composition of Functions.

UNIT-III: BINARY OPERATIONS

Types of Binary Operations: Commutative, Associative, Distributive and identity, Boolean algebra: simple properties. Permutations and Combinations.

UNIT-IV: DIFFERENTIATION

Differentiation, Successive differentiation, Leibnitz theorem, Applications of differentiation, Tangent and normal, angle between two curves.

UNIT-V: TWO DIMENSIONAL ANALYTICAL GEOMETRY

Straight Lines - Pair Straight Lines

Text Book

P.R. Vittal, Mathematical Foundations – Maragham Publication, Chennai

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V. Sundaram & Others, Discrete Mathematical Foundation - A.P. Publication, Sirkali.

3. P. Duraipandian & Others, Analytical Geometry 2 Dimension - Emerald publication 1992 Reprint.

COURSE OUTCOMES

The students after undergoing this course will be able to

CLO1: Understand operators and solve problems using operators

CLO2: Know the concept of set theory, relations and functions

CLO3: Solve problems using permutation and combination

CLO4: Know the concept of limits, differentiation

CLO5: Solve Problems on straight lines and pair straight lines

Outcome Mapping:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	1	2	3	2	2
CLO2	2	2	3	3	-	3	3	3	1
CLO3	3	2	2	3	-	-	2	3	2
CLO4	2	2	3	3	3	-	2	3	2
CLO5	3	2	3	3	3	-	3	3	1

Foundation Course -I Fundamentals of Computers

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTF17	2	0	0	II	2	2	25	75	100
Learning Objectives									
LO1	To analyze a problem with appropriate problem solving techniques								
LO2	To understand the main principles of imperative, functional and logic oriented programming languages and								
LO3	to increase the ability to learn new programming languages.								
Prerequisites: Basic knowledge about programming concepts									
Unit	Contents								No. of Hours
I	Introduction: Characteristics of Computers - Evolution of Computers Basic Computer Organization: I/O Unit - Storage Unit - Arithmetic Logic Unit - Control Unit - Central Processing Unit								6
II	Computer Software: Types of Software - System Architecture Computer Languages: Machine Language - Assembly Language - High Level Language - Object Oriented Languages								6
III	Problem Solving Concepts: Problem Solving in Everyday life - Types of Problems - Problem solving with computers - Difficulties with Problem Solving								6
IV	Problem Solving concepts for the computer: Constant Variables - Data Types - Functions -Operators - Expressions and Equations - Organizing the Solution: Analyzing the problem - Algorithm - Flowchart - Pseudo code								6
V	Programming Structure: Structuring a solution - Modules and their function - Local and Global variables - Parameters - Return values - Sequential Logic Structure - Problem solving with Decision - Problem Solving with Loops								6
TOTAL								30	
CO	Course Outcomes								
CO1	Outline the Computer fundamentals and various problem solving concepts in Computers								
CO2	Describe the basic computer organization, software, computer languages,								

	software development life cycle and the need of structured programming in solving a computer problem
CO3	Identify the types of computer languages, software, computer problems and examine how to set up expressions and equations to solve the problem.
CO4	Choose most appropriate programming languages, constructs and features to solve the problems in diversified domains.
CO5	Analyze the design of modules and functions in structuring the solution and various Organizing tools in problem solving.
Textbooks	
➤	Pradeep K.Sinha and Priti Sinha, (2004) —Computer Fundamentals, Sixth Edition, BPB Publications. (Unit I : Chapter 1 & 2, Unit II : Chapter 10 & 12)
➤	Maureen Sprankle and Jim Hubbard, (2009) —Problem Solving and Programming Concept, Ninth Edition, Prentice Hall. (Unit III: Chapter 1,2 &3) Unit IV : Chapter 3, Unit V : Chapter 4,5 ,6,7 & 8)
Reference Books	
1.	R.G. Dromey, (2007), —How to Solve it by Computer, Prentice Hall International Series in Computer Science.
2.	C. S. V. Murthy, (2009), —Fundamentals of Computers, Third Edition, Himalaya Publishing House.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://www.tutorialspoint.com/computer_fundamentals/
2.	http://www.comptechdoc.org/basic/basicut/
3.	http://www.homeandlearn.co.uk/
4.	http://www.top-windows-tutorials.com/computer-basics/
5.	https://www.programiz.com/article/flowchart-programming (Algorithm and flow chart)

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	2	2	3
CO2	3	2	2	2	3	2
CO3	3	3	3	3	2	2
CO4	3	2	2	2	2	3
CO5	3	3	2	2	3	2
Weightage of course contributed to each PSO	15	12	11	11	12	12

FIRST YEAR – SEMESTER – II

CORE – III: JAVA PROGRAMMING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks			
							CIA	External	Total	
23UINTC23	5	0	0	II	5	5	25	75	100	
Learning Objectives										
LO1	To provide knowledge on fundamentals of object-oriented programming									
LO2	to have the ability to use the SDK environment to create, debug and run servlet programs									
Prerequisites: Basic knowledge about programming concepts										
Unit	Contents								No. of Hours	
I	Fundamentals of Object- Oriented Programming: Introduction – Object Oriented Paradigm – Concepts of Object – Oriented Programming – Benefits of OOP – Evolution: Java History- Java Features - Differs from C and C++ - Overview of Java Language: Java Program-Structure – Tokens – Java Statements – Java Virtual Machine – Command Line Arguments								15	
II	Constants, Variables and Data Types – Operators and Expressions – Decision making and Branching – Looping – Arrays - Strings – Collection Interfaces and classes								15	
III	Classes objects and methods: Introduction – Defining a class – Method Declaration – Constructors - Method Overloading – Static Members – Nesting of methods – Inheritance – Overriding – Final variables and methods – Abstract methods and classes								15	
IV	Multiple Inheritance: Defining Interfaces – Extending Interfaces – Implementing Interfaces – Packages: Creating Packages – Accessing Packages – Using a Package – Managing Errors and Exceptions - Multithreaded Programming								15	
V	Layout Managers - JDBC – Java Servlet: - Servlet Environment Role – Servlet API – Servlet Life Cycle – Servlet Context – HTTP Support – HTML to Servlet Communication								15	
TOTAL								75		
CO	Course Outcomes									
CO1	Outline the basic terminologies of OOP, programming language techniques, JDBC and Internet programming concepts									

CO2	Solve problems using basic constructs, mechanisms, techniques and technologies of Java
CO3	Analyse and explain the behavior of simple programs involving different techniques such as Inheritance, Packages, Interfaces, Exception Handling and Thread and technologies such as JDBC and Servlets
CO4	Assess various problem-solving strategies involved in Java to develop a high-level application.
CO5	Design GUI based JDBC applications and able to develop Servlets using suitable OOP concepts and techniques
Textbooks	
➤	E Balagurusamy(2010), “Programming with Java”, Tata McGraw Hill Edition India Private Ltd, 4th Edition
➤	C Xavier,”Java Programming – A Practical Approach”, Tata McGraw Hill Edition Private Ltd
Reference Books	
3.	P.Naughton and H.Schildt (1999), “Java 2 The Complete Reference”, TMH, 3rd Edition
4.	Jaison Hunder & William Crawford (2002),”Java Servlet Programming”, O’Reilly
5.	Jim Keogh (2002), “J2EE: The Complete Reference”, Tata McGraw Hill Edition.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
6.	http://javabeginnerstutorial.com/core-java/
7.	http://www.tutorialspoint.com/java/
8.	http://beginnersbook.com/java-tutorial-for-beginners-with-examples/
9.	http://www.homeandlearn.co.uk/java/java.html
10.	http://www.journaldev.com/1877/servlet-tutorial-java (Unit V : Servlet API)

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	3	3	3	2	2
CO4	2	3	2	2	2	2
CO5	3	3	2	2	2	2
Weightage of course contributed to each PSO	12	14	11	11	10	10

CORE – IV: Java Programming & Data Structures Practical

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTP24	0	0	5	II	5	5	25	75	100
Learning Objectives									
LO1	To design and develop applications using different Java programming language techniques, JDBC & Servlets								
LO2	To organize and manipulate the data with the help of fundamental data structures								
Prerequisites:									
Contents									
1. Basic Programs 2. Arrays 3. Strings 4. ArrayList, HashSet and Vector collection classes 5. Classes and Objects 6. Interfaces 7. Inheritance 8. Packages 9. Exception Handling 10. Threads 11. Linked List 12. Stacks 13. Queue 14. Sorting 15. Binary Tree Representation 16. Working with Database using JDBC 17. Web application using Servlet									
CO	Course Outcomes								
CO1	Identify and explain the way of solving the simple problems								
CO2	Use appropriate software development environment to write, compile and execute object-oriented Java programs								
CO3	Analyze and identify necessary mechanisms of Java needed to solve real-world problem								
CO4	Test for defects and validate a Java program with different inputs								
CO5	Design, develop and compile Core Java , GUI , JDBC and servlet applications that utilize OOP and data structure concepts								

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	3	3	2	2
CO2	3	3	3	3	2	2
CO3	3	3	3	2	2	3
CO4	3	3	3	3	3	2
CO5	3	3	2	3	2	2
Weightage of course contributed to each PSO	15	14	14	14	11	11

Elective – II
(Generic/Discipline Specific)
MATHEMATICAL FOUNDATIONS - II

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UMAFE25	0	0	5	I	3	4	25	75	100

UNIT-I: MATRICES

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermitian, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by Cramer's rule.

UNIT-II: MATRICES

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem,

UNIT-III: INTEGRATION

Integration Simple problems, integration of rational function involving algebraic expressions of the form $\frac{1}{ax^2+bx+c}$, $\frac{1}{\sqrt{a^2+bx+c}}$, $\frac{px+q}{ax^2+bx+c}$, $\frac{px+q}{\sqrt{a^2+bx+c}}$

Integrations using simple substitutions, integrations involving trigonometric functions of the form $\frac{1}{a+b\cos x}$, $\frac{1}{a^2\sin^2x + b^2\cos^2x}$, integration by parts.

UNIT-IV : INTEGRATION

Applications of Integration for (i) Area under plane curves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book.

P.R. Vittal, Mathematical Foundations – Maragham Publication, Chennai

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V. Sundaram & Others, Discrete Mathematical Foundation - A.P. Publication, Sirkali.
3. Manicavachagompillay & Natarajan. Analytical Geometry part II - Three Dimension S. Viswanathan (printers & publication) Put Ltd., 1991.

COURSE OUTCOMES

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

CLO1: Understand different types of matrix operators

CLO2: Know the concept of Consistency and Inconsistency of linear equations

CLO3: Solve different forms of Integration

CLO4: Find the Area and volume using integration for real world problems.

CLO5: Know the concept of Planes, straight lines

Outcome Mapping:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	1	2	3	2	2
CLO2	2	2	3	2	-	3	3	3	1
CLO3	3	3	2	3	-	-	3	3	2
CLO4	3	3	3	3	3	-	2	3	2
CLO5	3	2	3	2	3	-	3	3	1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23UIN16	BASICS OF INTERNET	Specific Elective	2	-	-		2	25	75	100
Learning Objectives										
LO1	Knowledge of Internet medium									
LO2	Internet as a mass medium									
LO3	Features of Internet Technology,									
LO4	Internet as source of infotainment									
LO5	Study of internet audiences and about cyber crime									
UNIT	Contents								No. Of. Hours	
I	The emergence of internet as a mass medium – the world of ‘world wide web’.								6	
II	Features of internet as a technology.								6	
III	Internet as a source of infotainment – classification based on content and style.								6	
IV	Demographic and psychographic descriptions of internet ‘audiences’ – effect of internet on the values and life-styles.								6	
V	Present issues such as cyber crime and future possibilities.								6	
TOTAL HOURS								30		
CO	Course Outcomes									
CO1	Knows the basic concept in HTML Concept of resources in HTML									
CO2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.									
CO3	Understand the page formatting. Concept of list									
CO4	Creating Links. Know the concept of creating link to email address									
CO5	Concept of adding images Understand the table creation.									
Textbooks										
1	“Mastering HTML5 and CSS3 Made Easy”, TeachUComp Inc., 2014.									
2	Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”									

Web Resources	
1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2.	https://www.w3schools.com/html/default.asp

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23UJNTN26	FUNDAMENTALS OF INFORMATION TECHNOLOGY	Specific Elective	2	-	-	I	2	25	75	100
Learning Objectives										
LO1	Understand basic concepts and terminology of information technology.									
LO2	Have a basic understanding of personal computers and their operation									
LO3	Be able to identify data storage and its usage									
LO4	Get great knowledge of software and its functionalities									
LO5	Understand about operating system and their uses									
UNIT	Contents								No. Of. Hours	
I	Introduction to Computers: Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer								6	
II	Basic Computer Organization: Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.								6	
III	Storage Fundamentals: Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives								6	
IV	Software: Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w								6	
V	Operating System: Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.								6	
TOTAL HOURS									30	

Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with different software, Write program in the software and applications of software.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	Anoop Mathew, S. Kavitha Murugesan (2009), “ Fundamental of Information Technology”, Majestic Books.	
2	Alexis Leon, Mathews Leon,” Fundamental of Information Technology”, 2 nd Edition.	
3	S. K Bansal, “Fundamental of Information Technology”.	
Reference Books		
1.	Bhardwaj Sushil Puneet Kumar, “Fundamental of Information Technology”	
2.	GG WILKINSON, “Fundamentals of Information Technology”, Wiley-Blackwell	
3.	A Ravichandran , “Fundamentals of Information Technology”, Khanna Book Publishing	
Web Resources		
1.	https://testbook.com/learn/computer-fundamentals	
2.	https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html	
3.	https://www.javatpoint.com/computer-fundamentals-tutorial	
4.	https://www.tutorialspoint.com/computer_fundamentals/index.htm	
5.	https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	3	3	3
CO 4	3	3	3	3	2	3
CO 5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	15	14	15	14	14

S-Strong-3 M-Medium-2 L-Low-1

III SEMESTER

CORE – V: Python Programming

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTC33	4	0	0	I	5	5	25	75	100

Course Title : Python Programming

Course Type : Theory

General Objective :

- Describe the core syntax and semantics of Python programming language.
- Discover the need for working with the strings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- Understand the usage of packages and Dictionaries.

Course Objective :

S. NO	COURSE OUTCOME
CO-1	Overview and execute simple Python programs
CO-2	Basic programming concepts in Python
CO-3	Apply various functional strategies for Python-based solutions to real world problems
CO-4	Designing Python data structures using lists, tuples, dictionaries.
CO-5	Performing input/output operations with files in Python.

UNIT I

Introduction: Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output- Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection.

UNIT II

Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops-Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs, using ranges.

UNIT III

Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions

UNIT IV

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes- Text Files: Opening, reading and writing text files- String Processing - Exception Handling.

UNIT V

Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc.

PRESCRIBED TEXT :

1. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.
2. Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition
3. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016

BOOKS FOR REFERENCE :

1. Python: The Complete Reference Paperback Edition 2018 by Martin C. Brown
2. John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410

WEB REFERENCE:

<https://www.tutorialspoint.com/python/index.htm>

<https://www.w3schools.com/python/>

<https://www.geeksforgeeks.org/python-programming-language/>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	L	M	S	M	L	S
CO 2	S	S	L	M	L	M
CO 3	M	L	M	L	M	L
CO 4	L	L	S	M	L	S
CO 5	M	M	S	S	L	M

S-Strong M-Medium L-Low

CORE – VI: Python Programming Lab

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTP34	0	0	4	I	5	4	25	75	100

Course Objective:

S. NO	COURSE OUTCOME
CO-1	Overview and execute simple Python programs
CO-2	Basic programming concepts in Python
CO-3	Apply various functional strategies for Python-based solutions to real world problems
CO-4	Designing Python data structures using lists, tuples, dictionaries.
CO-5	Performing input/output operations with files in Python.

LIST OF EXERCISES:

- Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
- Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:
 Grade A: Percentage ≥ 80 Grade B: Percentage ≥ 70 and < 80
 Grade C: Percentage ≥ 60 and < 70 Grade D: Percentage ≥ 40 and < 60
 Grade E: Percentage < 40
- Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
- Write a Python script that prints prime numbers less than 20.
- Program to find factorial of the given number using recursive function.
- Write a Python program to count the number of even and odd numbers from array of N numbers.
- Write a Python class to reverse a string word by word.
- Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3)
 - Create a SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance).
 - Write a Python program to construct the following pattern, using a nested loop
- Read a file content and copy only the contents at odd lines into a new file.
- Create a Turtle graphics window with specific size.
- Write a Python program for Towers of Hanoi using recursion
- Create a menu driven Python program with a dictionary for words and their meanings.
- Devise a Python program to implement the Hangman Game.

PRESCRIBED TEXT:

1. Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem solving Focus", Wiley India Edition, 2015.
2. Mark Lutz, "Learning Python Powerful Object Oriented Programming", O'reilly Media 2018, 5th Edition
3. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education, 2016

BOOKS FOR REFERENCE:

1. Python: The Complete Reference Paperback Edition 2018 by Martin C. Brown
2. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410

WEB REFERENCE:

- <https://www.tutorialspoint.com/python/index.htm>
<https://www.w3schools.com/python/>
<https://www.geeksforgeeks.org/python-programming-language/>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	L	M	S	M	L	S
CO 2	S	S	L	M	L	M
CO 3	M	L	M	L	M	L
CO 4	L	L	S	M	L	S
CO 5	M	M	S	S	L	M

S-Strong M-Medium L-Low

Elective III: Statistics – I

SEMESTER: III PART: III ELECTIVE III THEORY	23USTAE35: STATISTICS - I	CREDIT: 2 HOURS: 3
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OBJECTIVE

To understand and computing statistical Methods by which to develop the programmingSkills.

UNIT-I

Introduction - scope and limitations of statistical methods - classification of data -Tabulation of data

- Diagrammatic and Graphical representation of data - Graphical determination ofQuartiles ,Deciles and Percentiles.

UNIT-II

Measures of location : Arithmetic mean, median, mode, geometric mean and Harmonicmean and

their properties.

UNIT-III

Measures of dispersion : Range, Quartile deviation, mean deviation, Standard deviation,combined

Standard deviation, and their relative measures.

UNIT-IV

Measures of Skewness Karl Pearson's, Bowley's, and kelly's and co-efficient ofSkewness and

kurtosis based on moments.

UNIT-V

Correlation - Karl Pearson - Spearman's Rank correlation – concurrent deviation methods.

Regression Analysis: Simple Regression Equations.

BOOKS FOR REFERENCE:

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
3. Elements of Statistics - Mode . E.B. - Prentice Hall
4. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	2	2	2	3	2
CO3	3	3	2	2	2
CO4	3	2	3	3	2
CO5	2	2	2	2	2

1-LOW 2- MODERATE 3-HIGH

SEMESTER: III PART: III ELECTIVE III THEORY	23UPHYE35- PHYSICS - I	CREDIT: 2 HOURS: 3
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COURSE OBJECTIVES

To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.

UNITS COURSE DETAILS

UNIT-I

WAVES, OSCILLATIONS AND ULTRASONICS: simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – lithotripsy, ultrasonography – ultrasonoimaging- ultrasonics in dentistry – physiotherapy, ophthalmology – advantages of noninvasive surgery – ultrasonics in green chemistry.

UNIT-II

PROPERTIES OF MATTER: Elasticity: elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum

Viscosity: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula – comparison of viscosities – burette method,

Surface tension: definition – molecular theory – droplets formation – shape, size and lifetime – COVID transmission through droplets, saliva – drop weight method – interfacial surface tension.

UNIT-III

HEAT AND THERMODYNAMICS: Joule-Kelvin effect – Joule Thomson porous plug experiment – theory – temperature of inversion

– liquefaction of Oxygen– Linde's process of liquefaction of air– liquid

Oxygen for medical purpose– importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy – change of entropy in reversible and irreversible process.

UNIT-IV

ELECTRICITY AND MAGNETISM: potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit – types of switches in household and factories– Smart wifi switchesfuses and circuit breakers in houses

UNIT-V

DIGITAL ELECTRONICS AND DIGITAL INDIA: logic gates,

OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan’s theorem – verification – overview of Government initiatives: software technological parks under MeitY, NIELIT- semiconductor laboratories under Dept. of Space – an introduction to Digital India

TEXT BOOKS

1. R.Murugesan (2001), AlliedPhysics,S. Chand&Co,NewDelhi.
2. BrijlalandN.Subramanyam (1994), WavesandOscillations,VikasPublishing House,NewDelhi.
3. BrijlalandN.Subramaniam (1994), PropertiesofMatter,S.Chand&Co.,NewDelhi.
4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8th edition), S.Chand&Co.,New Delhi.
5. R.Murugesan(2005), OpticsandSpectroscopy,S.Chand&Co,NewDelhi.
6. A.Subramaniam, AppliedElectronics2ndEdn.,NationalPublishingCo.,Chennai.

REFERENCE

BOOKS

1. ResnickHallidayandWalker(2018).FundamentalsofPhysics(11th edition),JohnWilleyand Sons, Asia Pvt.Ltd., Singapore.
2. V.R.KhannaandR.S.Bedi (1998), TextbookofSound1stEdn. KedharnaathPublish&Co, Meerut.
3. N.S.KhareandS.S.Srivastava (1983), ElectricityandMagnetism10thEdn.,AtmaRam&Sons, New Delhi.
4. D.R.KhannaandH.R. Gulati(1979). Optics,S. Chand &Co.Ltd.,New Delhi.
5. V.K.Metha(2004).Principlesofelectronics6th Edn. S.Chandandcompany.

WEBLINKS

1. https://youtu.be/M_5KYncYNyc
2. <https://youtu.be/ljJLJgIvaHY>
3. https://youtu.be/7mGqd9HQ_AU
4. <https://youtu.be/h5jOAw57OXM>
5. <https://learningtechnologyofficial.com/category/fluid-mechanicslab/>
6. <http://hyperphysics.phyastr.gsu.edu/hbase/permot2.html><https://www.youtube.com/watch?v=gT8Nth9NWPM><https://www.youtube.com/watch?v=9mXOMzUruMQ&t=1s><https://www.youtube.com/watch?v=m4uSuaSu1s&t=3s><https://www.biolinscientific.com/blog/what-aresurfactants-and-how-do-they-work>

COURSE OUTCOMES:

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

CO1

Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field.

CO2

Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life.

Connect droplet theory with Corona transmission.

CO3

Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.

CO4

Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field and analyze them mathematically verify circuits and apply the concepts to construct circuits and study them.

CO5

Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their use as universal building blocks. Infer operations using Boolean algebra and acquire elementary ideas of IC circuits. Acquire information about various Govt. programs/ institutions in this field.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	2	2	2	3	2
CO3	3	3	2	2	2
CO4	3	2	3	3	2
CO5	2	2	2	2	2

1-LOW 2- MODERATE 3-HIGH

SEMESTER: III PART: III ELECTIVE III PRACTICAL	23USTAEP3 - STATISTICS - I LAB	CREDIT: 1 HOURS: 2
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LIST OF EXPERIMENTS

1. Calculation of Mean, Median, Mode, Geometric Mean and Harmonic Mean for raw data.
2. Calculation of Mean, Median and Mode for discrete data.
3. Calculation of Mean, Median and Mode for frequency distribution with Class Intervals.
4. Calculation of raw and central moments for raw data.
5. Calculation of raw and central moments for frequency distribution.
6. Calculation of range, Quartile Deviation, Standard Deviation, Mean Deviation, Coefficient of Variation and Variance for raw data.
7. Calculation of range, Quartile Deviation, Standard Deviation, Mean Deviation, Coefficient of Variation and their relative measures for frequency distribution.
8. Calculation of Pearson's, Bowley's Coefficient of Skewness and Kelly's Coefficient of Skewness.
9. Calculation of Simple Correlation, Rank Correlation and Regression Coefficients.
10. Forming of Regression Lines and Predictions from Bivariate Data.

BOOKS FOR REFERENCE:

1. Statistical Methods by S.P. Gupta, Sultan chand & Sons
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor

Note:

Use of Scientific Calculator shall be permitted for Practical Examination. Statistical Table may be provided to the students at the Examination Hall.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	2	2	2	3	2
CO3	3	3	2	2	2
CO4	3	2	3	3	2
CO5	2	2	2	2	2

1-LOW 2- MODERATE 3-HIGH

SEMESTER: III PART: III ELECTIVE III PRACTICAL	23UPHYEP3 - PHYSICS – I LAB	CREDIT: 1 HOURS: 2
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COURSE OBJECTIVES

Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

ANY Seven only

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever, scale and telescope
3. Rigidity modulus by static torsion method.
4. Rigidity modulus by torsional oscillations without mass
5. Surface tension and interfacial Surface tension – drop weight method
6. Comparison of viscosities of two liquids – burette method
7. Specific heat capacity of a liquid – half time correction
8. Verification of laws of transverse vibrations using sonometer
9. Calibration of low range voltmeter using potentiometer
10. Determination of thermo emf using potentiometer
11. Verification of truth tables of basic logic gates using ICs
12. Verification of De Morgan's theorems using logic gate ICs.
13. Use of NAND as universal building block.

Note : Use of digital balance permitted

SEC-4 – IV: Digital Computer Fundamentals

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTS36	3	0	0	1	1	1	25	75	100

Course Title: Digital Computer Fundamentals

Learning Objective:

- The primary objective of this paper is to learn the fundamentals of digital computer and an introduction to Microprocessor.

Course Objectives:

1. To understand the basic number systems
2. Get the knowledge of basic logic gates
3. To gain the knowledge on sequential circuits
4. Understand combinatorial circuits
5. To apply in design of circuits

Course Outcomes:

CO-NO.	COURSE OUTCOMES
CO1	Understand the fundamental concepts and techniques of digital logic.
CO2	Apply arithmetic operations in number system and various methods to implement simplification of Boolean functions.
CO3	Analyze the design of various combinational and sequential circuits.
CO4	Ability to identify requirements for a design application using logic gates, combinational and sequential circuits.
CO5	Build a digital circuit using the design procedure.

Unit I:

Binary Systems: Digital Computers and Digital Systems-Binary Numbers-Number base Conversion-Octal and Hexa decimal numbers-Complements-Binary codes-Binary logic.

Unit II:

Boolean Algebra and Logic gates: Basic definitions-Axiomatic definition of Boolean algebra -Basic theorems and properties of Boolean algebra-Digital logic gates. Simplification of Boolean function: The Map method-Upto five variables.

Unit III:

Combinational logic: Introduction-Design procedure-Adders-Subtractors. Combinational logic with MSI and LSI: Decoders-Multiplexers.

Unit IV:

Sequential logic: Introduction-Flip-Flops-Trigging of Flip-Flops-Design of Counters. Registers, Counters and the memory unit: Introduction-Registers-Shift registers- ripple counters-Synchronous counters.

Unit V:

Processor Logic Design: Design of Arithmetic logic unit-Status register-Design of Accumulator.

Text Book:

1. Logic and computer design fundamentals, M.M.Mano, 5th Edition, 2016, PHI
2. T.C.Bartee-1997, Computer Architecture and logic design, International Edition, Mc Graw Hill.
3. J. F.Wakerly, Digital Design, Fourth Edition, Pearson/PHI, 2006

Reference Book:

1. John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning, 2002.
2. Charles H.Roth. Fundamentals of Logic Design, Thomson Learning, 2003.

Web References:

1. www.asic-World.com/digital/tutorial.html
2. https://course.ie.cuhk.edu.hk/~ieg2810/.../Lab_tutorial1_08.pdf
3. <https://www.electronics-tutorials.ws/logic/>

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	S	M	S	M	S
CO2	S	S	L	S	S	S
CO3	L	M	S	L	M	M
CO4	S	M	L	M	L	L
CO5	M	S	S	S	S	S

S-Strong M-Medium L-Low

SEC-5: R Programming - Practical

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTS37	2	0	0	1	2	2	25	75	100

Course title: R Programming - Practical

Course type: Practical

GENERAL OBJECTIVES:

- Acquire programming skills in core R Programming
- Acquire Object-oriented programming skills in R Programming.
- Develop the skill of designing graphical-user interfaces (GUI) in R Programming
- Acquire R Programming skills to move into specific branches

Course Outcomes

1. Familiarize with the constructs and running of R programs
2. Apply control structures of R for several suitable problems
3. Demonstrate the working of various data structures supported by R
4. Understand the role of R in data handling and visualization
5. Recognize the type of problem and solve it using R

Course Outcomes:

CO. NO	COURSE OUTCOME
CO-1	Implement the various problem solving approaches
CO-2	Develop programs using the programming constructs in R
CO-3	Apply various computing strategies of R Programming based solutions to real world problems
CO-4	Design data structures using lists, tuples, dictionaries.
CO-5	Execute various input/output operations using files in R Programming.

LIST OF EXERCISES:

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Write a program to find list of even numbers from 1 to n using R-Loops.
4. Create a function to print squares of numbers in sequence.
5. Write a program to join columns and rows in a data frame using cbind() and rbind() in R.
6. Implement different String Manipulation functions in R.
7. Implement different data structures in R (Vectors, Lists, DataFrames)
8. Write a program to read a csv file and analyze the data in the file in R.
9. Create pie chart and bar chart using R.
10. Create a data set and do statistical analysis on the data using R.
11. Program to find factorial of the given number using recursive function
12. Write a R program to count the number of even and odd numbers from array of N numbers.

PRESCRIBED TEXT :

1. Roger D. Peng, "R Programming for Data Science", 2012
2. Norman Matloff, "The Art of R Programming- A Tour of Statistical Software Design", 2011

BOOKS FOR REFERENCE :

1. Garrett Golemund, Hadley Wickham, "Hands-On Programming with R: Write Your Own Functions and Simulations", 1st Edition, 2014
2. Venables, W.N., and Ripley, "S programming", Springer, 2000.
3. Tilman M. Davies, "The Book of R: A First Course in Programming and Statistics", 1st Edition, 2015

WEB REFERENCE:

- <https://www.javatpoint.com/r-tutorial>
<https://www.w3schools.com/r/>
<https://www.tutorialspoint.com/r/index.htm>

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	S	M	S
CO 2	S	M	M	L	M	L
CO 3	S	S	S	S	M	S
CO 4	S	M	M	S	S	M
CO 5	S	S	M	M	S	M

SEMESTER – IV

CORE-VII: OPERATING SYSTEM

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTEC43	4	0	0	I	5	5	25	75	100

<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> Understanding the design of the Operating System Imparting knowledge on CPU scheduling, Process and Memory Management. To code specialized programs for managing overall resources and operations of the computer. 		
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: Define the fundamentals of OS and identify the concepts relevant to process, process life cycle, Scheduling Algorithms, Deadlock and Memory management</p> <p>CO2: know the critical analysis of process involving various algorithms, an exposure to threads and semaphores</p> <p>CO3: Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock. .</p> <p>CO4: Have complete knowledge of Scheduling Algorithms and its types.</p> <p>CO5: understand memory organization and management</p>		
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>		
Units	Contents	Required Hours
I	<p>Introduction: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation.</p> <p>Process concepts: definition of process, process states- Life cycle of a process, process management- process state transitions, process control block(PCB), process operations, suspend and resume, context switching, Interrupts - Interrupt processing, interrupt classes, Inter process communication-signals, message passing.</p>	12

II	<p>Asynchronous concurrent processes: mutual exclusion-critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson’s algorithm, software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores.</p> <p>Concurrent programming: monitors, message passing</p>	12
III	<p>Deadlock and indefinite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra’s Banker’s algorithm, deadlock detection, deadlock recovery</p>	12
IV	<p>Job and processor scheduling: scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms- FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling</p>	12
V	<p>Real Memory organization and Management:: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping</p> <p>Virtual Memory organization: virtual memory basic concepts, multilevel storage organization, block mapping, paging basic concepts, segmentation, paging/segmentation systems.</p> <p>Virtual Memory Management: Demand Paging, Page replacement strategies</p>	12

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
<p>Learning Resources:</p> <ul style="list-style-type: none"> • Recommended Texts <ol style="list-style-type: none"> 1. H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011 • Reference Books <ol style="list-style-type: none"> 1. William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012. 2. A. Silberschatz, and P.B. Galvin., Operating Systems Concepts, Ninth Edition, John Wiley & Sons(ASIA) Pte Ltd.,2012 <p>Web resources: Web resources from NDL Library, E-content from open-source libraries</p>		

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	S	M	S
CO 2	S	M	M	L	M	L
CO 3	S	S	S	S	M	S
CO 4	S	M	M	S	S	M
CO 5	S	S	M	M	S	M

CORE-VIII: LINUX OPERATING SYSTEM LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTP44	0	0	4	I	5	5	25	75	100

Course title : OPERATING SYSTEM LAB

Course Type : Practical

Course Objectives

1. To learn Process management and scheduling.
2. To understand the concepts and implementation of memory management policies.
3. To understand the various issues in Inter Process Communication.

LIST OF EXERCISES:

HOURS: 48

1. Implement Basic I/O programming.
2. Implement Shortest Job First Algorithm in CPU Scheduling.
3. Implement First Come First Served Algorithm in CPU Scheduling.
4. Implement Round Robin and Priority Scheduling Algorithms in CPU Scheduling.
5. Implement reader/writer problem using semaphore.
6. Implement Banker's algorithm for Deadlock avoidance.
7. Implement First in First Out Algorithm for page replacement.
8. Implement Least Recently Used Algorithm for page replacement.
9. Implement first fit, best fit and worst fit algorithm for memory management.
10. Program for Inter-process Communication.

Course Outcomes

1. Understand the process management policies and scheduling process by CPU.
2. Analyze the memory management and its allocation policies.
3. Evaluate the requirement for process synchronization.
4. Understand the concept of deadlock.
5. Analyze the Inter-process Communication.

Mapping with Programme Outcomes:

S-Strong M-Medium L-Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	L	S	M	S	M	S
CO 2	S	L	S	L	S	L
CO 3	M	S	L	M	S	M
CO 4	L	S	S	L	S	M
CO 5	S	M	M	S	L	S

Elective IV: Statistics – II

SEMESTER: IV PART: III ELECTIVE IV THEORY	23USTAE45 - STATISTICS - II	CREDIT: 3 HOURS: 3
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OBJECTIVE

To understand and computing statistical Methods by which to develop the programmingSkills.

UNIT-I

Curve fitting by the methods of least squares -

$Y = a x + b$, $Y = a x^2 + b x + c$, $Y = a x^b$, $Y = a e^{bx}$ and $Y = abx$

UNIT-II

Sample Space - events - probability - Addition and Multiplication Theorem - conditional probability -Baye’s Theorem. Mathematical expectation Addition and Multiplication theorem,

Chebychev’s Inequality.

UNIT-III

Standard distributions - Binomial, Poisson, Normal distribution and fitting of these distributions.

UNIT-IV

Test of Significance- small sample and large sample test based on mean, S.D. correlationand proportion - confidence interval.

UNIT-V

Analysis of variance - One and Two way classifications - Basic principle of design of Experiments - Randomisation, Replication and Local control - C.R.D., R.B.D. and L.S.D.

BOOKS FOR REFERENCE:

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor – Sultan Chand
3. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
4. Elements of Statistics - Mode . E.B. – Prentice Hall

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	3	3	2
CO3	3	3	2	2	2
CO4	3	3	3	3	2
CO5	2	2	3	2	3

1-LOW 2- MODERATE 3-HIGH

SEMESTER: IV PART: III ELECTIVE IV THEORY	23UPHYE45 - PHYSICS – II	CREDIT: 3 HOURS: 3
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COURSE OBJECTIVES

To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.

UNITS COURSE DETAILS

UNIT-I

OPTICS: interference – interference in thin films – colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster’s law – optical activity – application in sugar industries

UNIT-II

ATOMIC PHYSICS: atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli’s exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect – Zeeman effect (elementary ideas only) – photo electric effect – Einstein’s photoelectric equation – applications of photoelectric effect: solar cells, solar panels, optoelectric devices

UNIT-III

NUCLEAR PHYSICS: nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses – controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor – importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods – introduction to DAE, IAEA – nuclear fusion – thermonuclear reactions – differences between fission and fusion.

UNIT-IV

INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES: frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence – introduction on gravitational waves, LIGO, ICTS opportunities at International Centre for Theoretical Sciences

UNIT-V

SEMICONDUCTOR PHYSICS: p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger – introduction to e-vehicles and EV charging stations

TEXT BOOKS

1. R.Murugesan (2005), AlliedPhysics,S. Chand&Co, NewDelhi.
2. K.ThangarajandD. Jayaraman(2004), Allied Physics, Popular Book Depot, Chennai.
3. BrijlalandN.Subramanyam(2002), Textbook of Optics, S.Chand&Co, NewDelhi.
4. R.Murugesan (2005), Modern Physics, S.Chand&Co, NewDelhi.
5. A.SubramaniamAppliedElectronics, 2ndEdn.,National PublishingCo.,Chennai.

REFERENCE BOOKS

1. ResnickHallidayandWalker (2018), Fundamentals of Physics, 11thEdn., JohnWiley and Sons, Asia Pvt.Ltd.,Singapore.
2. D.R.KhannaandH.R. Gulati (1979).Optics, S.Chand&Co.Ltd.,New Delhi.
3. A.Beiser (1997), Concepts of Modern Physics, Tata McGraw Hill Publication, New Delhi.
4. Thomas L. Floyd (2017), Digital Fundamentals, 11thEdn., Universal Book Stall, New Delhi.
5. V.K.Metha(2004), Principlesofelectronics, 6 th Edn. ,S.Chandand Company, New Delhi.

WEBLINKS

1. <https://www.berkshire.com/learning-center/delta-pfacemask/><https://www.youtube.com/watch?v=QrhxU47gtj4>https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo
2. <https://www.youtube.com/watch?v=JrRrp5F-Qu4>
3. <https://www.validyne.com/blog/leak-test-using-pressuretransducers/>
4. <https://www.atoptics.co.uk/atoptics/blsky.htm> -
5. <https://www.metoffice.gov.uk/weather/learnabout/weather/optical-effects>

METHOD OF EVALUATION:

Continuous Internal Assessment End Semester Examination Total Grade
25 75 100

COURSE OUTCOMES:

CO1

Explain the concepts of inter ferenace diffraction using principles of Super position of waves and rephrase the concept of polarization based on wave patterns

CO2

Outline the basic foundation of different atom models and Various experiments establishing quantum concepts. Relate the importance of interpreting improving the oreticalmodels based on observation. Appreciate inter disciplinary nature of science and in solar energy related applications.

CO3

Summarize the properties of nuclei, Nuclear forces structure of atomic nucleus and nuclear models. Solve problems on delay rate half-life and mean-life. Interpret nuclear processes like fission and fusion. Understand the importance of nuclear energy, safety measures carried and get our Govt. agencies like DAE guiding the country in the nuclear field.

CO4

To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa. Relate this with current research in this field and get an overview of research projects of National and International importance, like LIGO, ICTS, and opportunities available.

CO5

Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices we daily use like USB chargers and EV charging stations.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	3	3	2
CO3	3	3	2	2	2
CO4	3	3	3	3	2
CO5	2	2	3	2	3

1-LOW 2- MODERATE 3-HIGH

SEMESTER: IV PART: III ELECTIVE – IV PRACTICAL	23USTAEP4 - STATISTICS-II LAB	CREDIT: 2 HOURS: 2
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LIST OF EXPERIMENTS

1. Curve fitting by the methods of least square $y = ax+b$
2. Curve fitting by the methods of least square $y=ax^2+bx+c$
3. Curve fitting by the methods of least square $y=ax^b, y=ae^{bx}$
4. Fitting of Binomial distributions
5. Fitting of Poisson distributions
6. Fitting of Normal distributions
7. Test of significance small sample tests based on mean, S.D. correlation and proportion - confidence interval.
8. Test of significance large sample tests based on mean, S.D. correlation and proportion - confidence interval.
9. Analysis of Variance: one way classification, Two-way classification
10. Design of Experiments - C.R.D, R.B.D & L.S.D

BOOKS FOR REFERENCE:

3. Statistical Methods by S.P. Gupta, Sultan chand & Sons
4. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor

Note:

Use of Scientific Calculator shall be permitted for Practical Examination. Statistical Table may be provided to the students at the Examination Hall.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	3	3	2
CO3	3	3	2	2	2
CO4	3	3	3	3	2
CO5	2	2	3	2	3

1-LOW 2- MODERATE 3-HIGH

SEMESTER: IV PART: III ELECTIVE IV PRACTICAL	23UPHYEP4 - PHYSICS – II LAB	CREDIT: 2 HOURS: 2
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COURSE OBJECTIVES

Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

Any Eight

1. Radius of curvature of lens by forming Newton's rings
2. Thickness of a wire using air wedge
3. Wavelength of mercury lines using spectrometer and grating
4. Refractive index of material of the lens by minimum deviation
5. Refractive index of liquid using liquid prism
6. Determination of AC frequency using sonometer
7. Specific resistance of a wire using PO box
8. Thermal conductivity of poor conductor using Lee's disc
9. Determination of figure of merit table galvanometer
10. Determination of Earth's magnetic field using field along the axis of a coil
11. Characterisation of Zener diode
12. Construction of Zener/IC regulated power supply
13. Construction of AND, OR, NOT gates using diodes and transistor
14. NOR gate as a universal building block

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	3	3	2
CO3	3	3	2	2	2
CO4	3	3	3	3	2
CO5	2	2	3	2	3

1-LOW 2- MODERATE 3-HIGH

SEC-6: Internet of Things

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTS46	2	0	0	1	2	2	25	75	100

Course title : Internet of Things

Course Type : Theory

General Objectives :

To understand the basic perspective of IoT, architecture of IoT, design consideration methodology, the applications of IoT and the security features of IoT.

Course Objective : The main objective of this Course are:

- Describe what IoT is and how it works today
- Design and program IoT devices
- Use real IoT protocols for communication
- Define the infrastructure for supporting IoT deployments.

S. NO	COURSE OUTCOME
CO-1	Understand the Key components, basics of Devices, Gateways and Data Management in IoT.
CO-2	Acquire knowledge on IoT applications in different domains and analyze their performance
CO-3	Understand methodology and building blocks of Internet of Things and characteristics.
CO-4	Compare the various models and Architecture of Internet of Things
CO-5	Apply the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis

UNIT I:

IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

UNIT II:

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT III:

IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference

Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views

UNIT IV:

IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

UNIT V:

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

PRESCRIBED TEXT :

1. Vijay Madiseti and ArshdeepBahga, “Internet of Things: (A Hands-on Approach)”, Universities Press (INDIA) Private Limited 2015, 1st Edition.
2. WalteneusDargie, ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice" 4..CunoPfister, “Getting Started with the Internet of Things”, O“Reilly Media 2011
3. Samuel Greengard, The Internet of Things, The MIT press Essential Knowledge series, 2015.

BOOKS FOR REFERENCE :

1. Michael Miller, “The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World”, kindle version.
2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, Apress Publications 2013, 1st Edition,.

WEB REFERENCE:

- <https://www.javatpoint.com/iot-internet-of-things>
- <https://data-flair.training/blogs/iot-tutorial/>
- <https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/>

Mapping with Programme Outcomes:

S-Strong M-Medium L-Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	L	S	M	S	M	S
CO 2	S	L	S	L	S	L
CO 3	M	S	L	M	S	M
CO 4	L	S	S	L	S	M
CO 5	S	M	M	S	L	S

SEC-7: Cloud Computing

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTS47	2	0	0	1	2	2	25	75	100

Course Title: Cloud Computing

Course Type: Theory

General Objective:

To enable the student to understand the fundamental concepts of Cloud Computing and have a basic knowledge of the service implementations provided by the Amazon, Microsoft and Google Cloud Computing platforms.

Course Objectives:

- To impart fundamental concepts of Cloud Computing.
- To impart a working knowledge of the various cloud service types and their uses and pitfalls.
- To enable the students to know the common features and differences in the service offerings of the three major Cloud Computing service providers, namely Amazon, Microsoft and Google.
- To provide know-how of the various aspects of application design, benchmarking and security on the Cloud.

CO NO.	COURSE OUTCOME
CO-1	To understand the fundamental concepts, various models and services involved in Cloud Computing. and have knowledge on Virtualization.
CO-2	To understand the concepts of various cloud services and their implementation in the Amazon, Microsoft and Google cloud computing platforms.
CO-3	To gain knowledge about designing cloud applications, deployment and data storage services in the cloud.
CO-4	To understand the concepts involved in benchmarking and security on the Cloud.
CO-5	To understand the use case in which the cloud is used in multidisciplinary domains.

UNIT I

Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications.

Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – MapReduce – Identity and Access Management – Service Level Agreements – Billing.

UNIT II

Cloud Services

Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines

Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage

Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service

Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services

Content Delivery Services: Amazon CloudFront - Windows Azure Content Delivery Network

Analytics Services: Amazon Elastic MapReduce - Google MapReduce Service - Google Big Query - Windows Azure HDInsight

Deployment and Management Services: Amazon Elastic Bean stack - Amazon Cloud Formation

Identity and Access Management Services: Amazon Identity and Access Management - Windows Azure Active Directory

Open Source Private Cloud Software: Cloud Stack – Eucalyptus - OpenStack

UNIT III

Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).

UNIT IV

Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping.

Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data at rest, securing data in motion – Key Management – Auditing.

UNIT V

Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.

PRESCRIBED TEXT:

1. Arshdeep Bahga, Vijay Madiseti, *Cloud Computing – A Hands On Approach*, Universities Press (India) Pvt. Ltd., 2018.
2. Anthony T Velte, Toby J Velte, Robert Elsenpeter, *Cloud Computing: A Practical Approach*, Tata McGraw-Hill, 2013.
3. Barrie Sosinsky, *Cloud Computing Bible*, Wiley India Pvt. Ltd., 2013.

BOOKS FOR REFERENCE:

1. David Crookes, *Cloud Computing in Easy Steps*, Tata McGraw Hill, 2012.
2. Dr. Kumar Saurabh, *Cloud Computing*, Wiley India, Second Edition 2012.

WEB RESOURCES:

1. www.eduonix.com/courses/Software-Development/Learn-Cloud-Computing-from-Scratch-for-Beginners
2. www.udemy.com/course/introduction-to-cloud-computing
3. explore.skillbuilder.aws/learn/public/learning_plan/view/82/cloud-foundations-learning-plan

	PO1	PO2	PO3	PO4	PO5	PO6
CO-1	L	M	L	L	L	M
CO-2	S	S	L	M	L	M
CO-3	L	M	S	S	M	L
CO-4	S	M	M	S	S	M
CO-5	S	L	S	M	M	S

S-Strong M-Medium L-Low

SEMESTER - V

CORE – IX: Computer Networks

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTC51	5	0	0	1	4	5	25	75	100

Course Title: Computer Networks

Course Type: Theory

General Objective:

- To understand the concept of Data communication and Computer network and to gain knowledge on Routing algorithms, inter networking devices and Security over Network communication.

Course Objective:

CO. NO	COURSE OUTCOME
CO-1	To Understand the fundamentals of Computer Network architecture, OSI and TCP/IP reference models and familiarize with the various networks and physical level communication.
CO-2	To gain knowledge on Transmission, Telephone systems and Satellite communications. To learn the components to build, detect and correct the Data layer.
CO-3	To impart the functions and protocols of Elementary data link layer protocols.
CO-4	To analyze the characteristics of Network layer and the various Routing and Congestion control algorithms and internet protocols.
CO-5	To understand network security and define various protocols and their services such as FTP, HTTP, Telnet, DNS

UNIT I

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media

UNIT II

Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.

UNIT III

Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.

UNIT IV

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.

UNIT – V

Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography.

PRESCRIBED TEXT:

1. A. S. Tanenbaum, “Computer Networks”, 4th Edition, Prentice-Hall of India, 2008.
2. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition, 2017.
3. F. Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education, 2008.

REFERENCE BOOK:

1. D. Bertsekas and R. Gallager, “Data Networks”, 2nd Edition, PHI, 2008.
2. Lamarca, “Communication Networks”, Tata McGraw- Hill, 2002

Web References:

1. <https://www.javatpoint.com/computer-network-tutorial>
2. https://onlinecourses.nptel.ac.in/noc20_cs23/preview

	PO1	PO2	PO3	PO4	PO5	PO6
CO-1	L	M	L	L	L	M
CO-2	L	S	L	M	L	M
CO-3	S	L	M	M	S	S
CO-4	M	L	S	L	S	M
CO-5	M	L	M	S	S	M

S-Strong M-Medium L-Low

CORE – X: Database Management System

Subject Code		L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23UINTC52		5	0	0	I	4	5	25	75	100

Course title: Database Management System

Course type: Theory

GENERAL OBJECTIVES:

- To enable the students to learn the basics of data base systems, relational model of data and normal forms, design simple Database models, write queries using SQL, and simple programs in PL/SQL.

Course Objectives

1. Compare the manual file system with data base systems Design efficient database structures
2. Draft SQL queries for data access and manipulation
3. Recognize suitable storage structures
4. Evaluate query performances
5. Explain the transaction processing steps and procedures
6. Understand the concurrency and recovery protocols
7. Demonstrate different server architectures and their functionalities
8. Recall the concepts and apply in the given case study

Course Outcomes:

CO-NO.	COURSE OUTCOMES
CO-1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.
CO-2	Define and understand the integrity constraints, Relational Data Model, Entity-Relationship Model.
CO-3	Design database schema using normalization and Structured Query Language.
CO-4	Classify the different functions and join operations and handling multiple tables.
CO-5	Develop simple programs in PL/SQL using various constructs, Cursors and Exceptions.

UNIT I: Database Concepts:

Database Systems - Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction.

UNIT II: Design Concepts:

Relational database model - logical view of data-keys -Integrity rules - relational set operators - data dictionary and the system catalog - relationships -data redundancy revisited - indexes - codd's rules. Entity relationship model - ER diagram.

UNIT III: Normalization of Database Tables:

Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form.

Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.

UNIT IV: Advanced SQL:

- Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.SQL
Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join.
- Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM.
- SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function

UNIT V: PL/SQL:

- A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation – Arithmetic operators.
- Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements.
- PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT

OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions

PRESCRIBED TEXT BOOKS:

1. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2. Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016
3. Abraham Silberschatz, Henry F.Korth and S.Sudarshan,“Database System Concepts”,
McGraw Hill International Publication ,VI Edition.

BOOKS FOR REFERENCE:

1. Shio Kumar Singh , “Database Systems “,Pearson publications ,II Edition
2. Albert Lulushi, “Developing ORACLE FORMS Applications”, Prentice Hall ,1997

WEB REFERENCE:

www.sqltutorials.com
<https://www.mysql.com/>
<https://www.w3schools.in/dbms/>

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S

CORE – XI: Database Management System Lab

Subject Code		L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23UINTP53		0	0	5	I	4	5	25	75	100

Learning Objectives: (for teachers: what they have to do in the class/lab/field)

Students can learn various SQL and PL/SQL commands, cursor and various application programs.

Course Outcomes: (for students: To know what they are going to learn)

CO1: Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.

CO2: Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.

CO3: Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML).

CO4: Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.

CO5: Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions

Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)

	List of Exercises:	Required Hours
	<p>I. SQL</p> <ol style="list-style-type: none"> 1. DDL COMMANDS 2. DML COMMANDS 3. TCL COMMANDS <p>II. PL/SQL</p> <ol style="list-style-type: none"> 4. FIBONACCI SERIES 5. FACTORIAL 6. STRING REVERSE 7. SUM OF SERIES 8. TRIGGER <p>III. CURSOR</p> <ol style="list-style-type: none"> 9. STUDENT MARK ANALYSIS USING CURSOR <p>IV. APPLICATION</p> <ol style="list-style-type: none"> 10. LIBRARY MANAGEMENT SYSTEM 11. STUDENT MARK ANALYSIS 	

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
<p>Learning Resources:</p> <ul style="list-style-type: none"> • Recommended Texts <ol style="list-style-type: none"> 1. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition 2. Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016 • Reference Books <ol style="list-style-type: none"> 1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", McGraw Hill International Publication ,VI Edition. 2. Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition 3. Albert Lulushi, "Developing ORACLE FORMS Applications", Prentice Hall ,1997 <p>Web resources: Web resources from NDL Library, E-content from open-source libraries</p>		

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S

CORE-XII: Project with Viva-Voce

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTD54	0	0	6	I	4	6	25	75	100

Project with Viva-Voce

<p>Course Outcomes: (for students: To know what they are going to learn) CO1: To know the problem statement to do the project CO2: Understand the requirements for the problem CO3: Analysis of the Problem CO4: Design work to be done CO5: Implement and deploy</p>					
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>					
Units	Contents				Required Hours
	Each student will take a specific problem for the Project and solve it using any one of latest tool and submit a report. Further each student will participate in regular project review with group project guide / Faculty.				48
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)				
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill				
<p>Learning Resources:</p> <ul style="list-style-type: none"> • Recommended Texts • Reference Books • Web resources 					
PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE					
CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	2	3	2
CO3	3	3	2	2	2
CO4	3	2	3	3	2
CO5	2	2	3	2	2
1-LOW 2- MODERATE 3-HIGH					

(Refer to the Regulations for additional information)

SEMESTER V: ELECTIVE SUBJECTS

SEC-5: Information Security

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE55-1	4	0	0	I	3	4	25	75	100

Course Title : Information Security

Course Type : Theory

General Objective :

- To know the objectives of information security
- Understand the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms
- Understand the basic categories of threats to computers and network

Course Objective :

CO. NO	COURSE OUTCOME
CO-1	Understand network security threats, security services, and countermeasures
CO-2	Understand vulnerability analysis of network security
CO-3	Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.
CO-4	Gain hands-on experience with programming and simulation techniques for security protocols.
CO-5	Apply methods for authentication, access control, intrusion detection and prevention.

UNIT I

Introduction to Information Security : Security mindset, Computer Security Concepts (CIA), Attacks, Vulnerabilities and protections, Security Goals, Security Services, Threats, Attacks, Assets, malware, program analysis and mechanisms.

UNIT II

The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense. Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption

UNIT III

Symmetric and Asymmetric Cryptographic Techniques : DES, AES, RSA algorithms .Authentication and Digital Signatures : Use of Cryptography for authentication, Secure Hash function, Key management – Kerberos.

UNIT IV

Program Security : Nonmalicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels. File protection Mechanisms, User Authentication Designing Trusted O.S: Security polices, models of security, trusted O.S design, Assurance in trusted O.S. Implementation examples.

UNIT V

Security in Networks : Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security. Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.

PRESCRIBED TEXT :

- 1.Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education
2. Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson,
3. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.

BOOKS FOR REFERENCE :

1. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2"d Edition
2. Information Security, Principles and Practice: Mark Stamp, Wiley India.
3. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH

WEB REFERENCE:

<https://www.geeksforgeeks.org/what-is-information-security/>

<https://www.imperva.com/learn/data-security/information-security-infosec/>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	L	S	M	S	M	S
CO 2	S	L	S	L	S	L
CO 3	M	S	L	M	S	M
CO 4	L	S	S	L	S	M
CO 5	S	M	M	S	L	S

S-Strong M-Medium L-Low

SEC-5: Enterprise Resource Planning

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE55-2	4	0	0	I	3	4	25	75	100

Learning Objectives: (for teachers: what they have to do in the class/lab/field)

- Understand the concept of ERP and the ERP model; define key terms; identify the levels of ERP maturity.
- To integrate business processes; define and analyze a process; create a process map and improve and/or simplify the process; apply the result to an ERP implementation.
- To know the elements of a value chain, and explain how core processes relate; identify how the organizational infrastructure supports core business processes; explain the effect of a new product launch on the three core business processes

Course Outcomes: (for students: To know what they are going to learn)

CO1: Understand the basic concepts of ERP.

CO2: Identify different technologies used in ERP

CO3: Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules

CO4: Discuss the benefits of ERP

CO5: Apply different tools used in ERP

Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)

Units	Contents	Required Hours
I	ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, the Evolution of ERP, the Structure of ERP, Components and needs of ERP, ERP Vendors; Benefits & Limitations of ERP Packages.	17
II	Need to focus on Enterprise Integration/ERP; Information mapping; Role of common shared Enterprise database; System Integration, Logical vs. Physical System Integration, Benefits & limitations of System Integration, ERP's Role in Logical and Physical Integration. Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing (OLAP), Product Life Cycle Man-	17

	agement (PLM), LAP, Supply chain Management.	
III	ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, the Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications. Cloud and Open Source, Quality Management, Material Management, Financial Module, CRM and Case Study.	17
IV	ERP Implementation Basics, , ERP implementation Strategy, ERP Implementation Life Cycle ,Pre- Implementation task,Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.	17
V	ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into or-ganizational culture. Using ERP tool: either SAP or ORACLE format to case study.	17
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	

Learning Resources:

- **Recommended Texts**

1. Enterprise Resource Planning – Alexis Leon, Tata McGraw Hill.

- **Reference Books**

1. Enterprise Resource Planning – Diversified by Alexis Leon, TMH.

2. Enterprise Resource Planning – Ravi Shankar & S. Jaiswal, Galgotia

- **Web resources**

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	L	S	M	S	M	S
CO 2	S	L	S	L	S	L
CO 3	M	S	L	M	S	M
CO 4	L	S	S	L	S	M
CO 5	S	M	M	S	L	S

S-Strong M-Medium L-Low

SEC-5: Multimedia Systems

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE55-3	4	0	0	I	3	4	25	75	100

<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> To understand the standards available for different audio, video and text applications To learn various multimedia authoring systems in multimedia production team 		
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1:</p> <p>CO2:</p> <p>CO3:</p> <p>CO4:</p> <p>CO5:</p>		
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>		
Units	Contents	Required Hours
I	Multimedia Definition - Use Of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.	17
II	Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. Sound: The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.	17
III	Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.	17
IV	Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - An Authoring Systems Needs- Multimedia Production Team.	17

V	Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent.	17
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
Learning Resources: <ul style="list-style-type: none"> • Recommended Texts <ol style="list-style-type: none"> 1. Tay Vaughan, "Multimedia: Making It Work", 8th Edition, Osborne/McGraw- Hill, 2001. • Reference Books <ol style="list-style-type: none"> 1. Ralf Steinmetz & Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, 2012 • Web resources 		

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	L	S	M	S	M	S
CO 2	S	L	S	L	S	L
CO 3	M	S	L	M	S	M
CO 4	L	S	S	L	S	M
CO 5	S	M	M	S	L	S

S-Strong M-Medium L-Low

SEC-6: Web Application Development

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE56-1	4	0	0	I	3	4	25	75	100

Course Title: Web Application Development

Course type: Theory

GENERAL OBJECTIVES:

- To learn the basic web concepts and to create rich internet applications that use the most recent client-side programming technologies.
- To learn the basics of HTML, DHTML, XML, CSS, JavaScript AJAX.

Course Objectives

1. Understand how to develop and publish web pages using HTML.
2. Learn Cascading Style Sheets (CSS) to develop interactive web pages.
3. Learn scripting language to validate web page forms
4. Learn and understand client-server architecture to develop web pages.
5. Learn XML data format and use XML in web page development.

Course Outcomes:

CO-NO.	COURSE OUTCOMES
CO-1	Develop and publish Web pages using Hypertext Markup Language(HTML).
CO-2	Optimize page styles and layout with Cascading Style Sheets(CSS).
CO-3	Analyze and apply the role of languages to create a capstone
CO-4	Develop websites using client-side web programming's languages like HTML, DHTML, CSS, XML, JavaScript, and AJAX.
CO-5	Create web applications using forms and validation of form fields

UNIT I: HTML:

HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line breaks. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment- links-tables-frames

UNIT II: Forms & Images Using Html:

Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with HTML forms textbox, password, list box, combo box, text area, tools for building web page front page

UNIT III: XML & DHTML:

Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your web pages- Grouping styles-extensible markup language (XML). Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding.

UNIT IV: JavaScript:

Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition, Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations

UNIT V: Ajax: Introduction, advantages &disadvantages, Purpose of it, ajax based web application, alternatives of ajax

Java Script & AJAX: Introduction to array operators, making statements-date & time-mathematics- strings-Event handling-form properties. AJAX. Introduction to jQuery and AngularJS.

PRESCRIBED TEXTBOOKS:

1. Pankaj Sharma, “Web Technology”, Sk Kataria & Sons Bangalore 2011.(UNIT I, II, III &IV).
2. Achyut S Godbole & Atul Kahate, “Web Technologies”, 2002, 2nd Edition. (UNIT V:AJAX)

BOOKS FOR REFERENCE:

1. Laura Lemay, Rafe Colburn , Jennifer Kyrnin, “Mastering HTML, CSS & Javascript Web Publishing”,2016.
2. DT Editorial Services (Author), “HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)”, Paperback 2016, 2ndEdition.
3. Purewal, Semmy. Learning Web App Development: Build Quickly with Proven JavaScript Techniques. " O'Reilly Media, Inc.", 2014.

WEB REFERENCE:

<https://www.w3schools.com/whatis/default.asp>

<https://www.edureka.co/blog/web-development-tutorial/>

https://www.tutorialspoint.com/website_development/index.htm

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium, and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	S	L	S	L	S	M
CO 2	S	M	S	M	S	L
CO 3	M	S	L	S	M	L
CO 4	M	S	S	S	M	L
CO 5	S	S	S	M	M	L

SEC-6: Mobile Ad-hoc Network

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE56-2	4	0	0	I	3	4	25	75	100

Learning Objectives: (for teachers: what they have to do in the class/lab/field)

- To develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- To introduce students to artificial neural networks and fuzzy theory from a theoretical perspective

Course Outcomes: (for students: To know what they are going to learn)

CO1: Understand the basic concepts ad-hoc networks and ad-hoc mobility models.

CO2: Acquire knowledge about Medium access protocols and standards like IEEE 802.11a and HIPERLAN.

CO3: Identify the significance of Routing protocols and analyze about routing Algorithm.

CO4: Understand about the applications of end-end delivery and security issues in ad-hoc networks

CO5: Analyze and understand the concept of cross-layer design and parameter optimization techniques.

Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)

Units	Contents	Required Hours
I	Introduction: Introduction to ad-hoc networks – definition, characteristics features, applications. Characteristics of wireless channel, ad-hoc mobility models indoor and out-door models.	10
II	Medium Access Protocol: <ul style="list-style-type: none"> • MAC Protocols: Design issues, goals and classification. • Contention based protocols – with reservation, scheduling algorithms, protocols using directional antennas. • IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN. 	10
III	Network Protocols : : Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, QoS aware routing.	10
IV	End – end delivery and security: Transport Layer: Issues in designing – Transport layer classification, ad-hoc transport protocols. Security issues in ad-hoc networks: issues and	10

	challenges, network security attacks, secure routing protocols.	
V	CROSS -LAYER DESIGN: Need for cross layer design, cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of ad-hoc with Mobile IP networks.	10
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	

Learning Resources:

- **Recommended Texts**

1. C. Siva Ram Murthy and B. S. Manoj, Ad hoc Wireless Networks Architecture and Protocols II edition, Pearson Edition, 2007.
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000.

- **Reference Books**

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad-hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of ad-hoc wireless networks, CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies “A Survey of Mobility Models for Ad-hoc Network”
4. Research, “Wireless Commn. and Mobile Comp - Special Issue on Mobile Ad-hoc networking Research, Trends and Applications”, Vol. 2, no. 5, 2002, pp. 483 – 502.
5. A survey of integrating IP mobility protocols and Mobile Ad-hoc networks, Fekri
6. M. bduljalil and Shrikant K. Bodhe, IEEE communication Survey and tutorials, no:12007.

- **Web resources**

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium, and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	S	L	S	L	S	M
CO 2	S	M	S	M	S	L
CO 3	M	S	L	S	M	L
CO 4	M	S	S	S	M	L
CO 5	S	S	S	M	M	L

SEC-6: Software Engineering

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE56-3	3	0	0	I	3	4	25	75	100

Course Title: Software Engineering

Course type: Theory

GENERAL OBJECTIVES:

To understand the software engineering concepts and to create a system model in real-life applications.

Course Objectives

1. Knowledge of basic SW engineering methods and practices, and their appropriate application, describes.
2. A basic understanding of software engineering layered technology and process framework, including waterfall and evolutionary models.
3. Understanding of software requirements and the SRS documents, data models, object models, context models, and behavioral models.
4. Understanding implementation difficulties including modularity, coding standards, static analysis, and reviews.
5. Understanding software evolution, version management, quality control, and software quality.

Course Outcomes

CO-NO.	COURSE OUTCOMES
CO-1	Gain basic knowledge of analysis and design of systems.
CO-2	Ability to apply software engineering principles and techniques.
CO-3	Model a reliable and cost-effective software system.
CO-4	Ability to design an effective model of the system.
CO-5	Perform Testing at various levels and produce an efficient system.

Unit I

Introduction: The software engineering discipline, programs vs. software products, why study software engineering, the emergence of software engineering, Notable changes in software development practices, computer systems engineering.

Software Life Cycle Models: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.

Unit II

Requirements Analysis and Specification: Requirements gathering and analysis, Software requirements specification (SRS)

Software Design: Good software design, cohesion, and coupling, neat arrangement, software design approaches, object-oriented vs function-oriented design

Unit III

Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design.

User-Interface design: Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.

Unit IV

Coding and Testing: Coding; code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing; debugging; program analysis tools; integration testing; system testing; some general issues associated with testing.

Software Reliability and Quality Management: Software reliability; statistical testing; software quality; software quality management system; SEI capability maturity model; personal software process.

Unit V

Computer Aided Software Engineering: CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment. Software Maintenance: Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost;

PRESCRIBED TEXTBOOKS:

1. Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018.
2. Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
3. Ian Sommerville, Software Engineering, Tenth Edition, Pearson.

BOOKS FOR REFERENCE:

1. Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997.
2. James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.
3. R.A. Khan, A. Agrawal, Software Engineering, Narosa

WEB REFERENCE:

[Software Engineering Tutorial \(tutorialspoint.com\)](http://tutorialspoint.com)

[Software Engineering: What It is, Definition, Tutorial - javatpoint](#)

[Software Engineering – Geeks for Geeks Software Engineering – Geeks for Geeks](#)

Mapping with Programme Outcomes:

Map course outcomes for each course with program outcomes (PO) in the 3-point scale of Strong, Medium, and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	S	M	M	M	M	M
CO 2	M	S	S	S	M	M
CO 3	S	M	S	S	M	M
CO 4	S	M	S	M	M	M
CO 5	M	M	M	S	S	M

SEMESTER-V
Summer Internship

Subject Code		L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23UINI58	SUMMER INTERNSHIP	-	-	-	-	2	-	25	75	100

Refer to the Regulations

SEMESTER-VI
CORE – XIII: Machine Learning

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTC61	5	0	0	I	4	6	25	75	100

Course Title : Machine Learning

Course Objective:

- The primary objective of the course is to understand Supervised Learning and Unsupervised Learning. Gain knowledge on Data Representation and Model Evaluation.

Course Outcomes:

On successful completion of this course, the learners will be able to:

CO. NO	COURSE OUTCOME
CO-1	Understand the concept of machine learning and the tools used in python and to explore different supervised learning techniques.
CO-2	Understand Supervised and Unsupervised Algorithms and different kinds of pre-processing and scaling methods.
CO-3	Analyze the data and represent data Engineering features, one hot encoding method, PCA.
CO-4	Perform training, testing and evaluation of the designed ML model.
CO-5	Develop a model for a given application

Unit I:

Introduction: Why Machine Learning? - Why Python? - Scikit-learn - Essential Libraries and Tools. Supervised Learning: Classification and Regression.

Unit II:

Supervised Machine Learning Algorithms: K-Nearest Neighbors – Decision Trees. Unsupervised Learning and Preprocessing: Types of Unsupervised Learning - Preprocessing and Scaling: Different kinds of preprocessing.

Unit III:

Dimensionality Reduction, Feature Extraction and Manifold Learning: Principal Component Analysis – Clustering : K-Means – Agglomerative - DBSCAN. Representing Data and Engineering Features: Categorical Variables: One hot encoding – Numbers can encode categorical.

Unit IV:

Automatic Feature Selection: Univariate statistics – Model based feature selection – Iterative feature selection. Model Evaluation: Cross- Validation: Cross validation in scikit-learn – Stratified k-fold cross validation and other strategies. Grid Search: Simple Grid search.

Unit V:

Evaluation Metrics and Scoring : Metrics for Binary Classification: Confusion Matrices. Algorithm Chains and Pipelines: Parameter Selection with Preprocessing - Building Pipelines - Using Pipelines in Grid Searches.

Text Book:

1. Sarah Guido and Andreas Müller, Introduction to Machine Learning with Python-A Guide for Data Scientists, O'Reilly Media, 2016.
2. Vikram Kamath, [Introduction to Machine Learning Using Python](#), March 2018.
3. Sebastian Raschka, “*Python Machine Learning*”, First Edition, [PACKT], 2015.

Reference Books:

Stephen Marsland, “Machine Learning: An Algorithmic Perspective”, Chapman & Hall/CRC, 2nd Edition, 2014.

Kevin Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012

Tom M Mitchell, “Machine Learning”, McGraw Hill Education, 2013.

Web References:

https://in.pycon.org/2011/static/files/talks/11/Introduction_To_ML_Partial_2.pdf

<https://machinelearningmastery.com/machine-learning-in-python-step-by-step/>

<http://www.r2d3.us/visual-intro-to-machine-learning-part-1/>

<https://nptel.ac.in/courses/106106139>

	PO1	PO2	PO3	PO4	PO5	PO6
CO-1	L	M	L	L	L	M
CO-2	M	S	L	M	L	M
CO-3	L	S	M	M	S	M
CO-4	M	L	S	M	S	L
CO-5	S	M	S	M	M	S

S-Strong M-Medium L-Low

CORE-XIV: Android Programming

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTC61	6	0	0	I	4	6	25	75	100

COURSE TITLE: Android Programming

COURSE TYPE: Theory

GENERAL OBJECTIVES:

- The objective is to help the student understands the working of Android OS practically and to develop Android user interfaces, deploy and maintain the Android Applications.

COURSE OUTCOMES:

CO.NO	COURSE OUTCOME
CO-1	Demonstrate the Understanding of fundamental of Android Programming
CO-2	Understanding the applications, activities and services on their design.
CO-3	Prototyping techniques to design and develop sophisticated mobile user interfaces.
CO-4	Program mobile applications for the Android operating system that use basic and advanced phone features.
CO-5	Explain and use deploy applications to the Android marketplace for distribution.

UNIT- I

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Android Architecture, Android-Application Components, Building you First Android application, Android Resources (Manifest file).

UNIT – II

Android Applications: Android terminologies, Application Context, Android-Activities, Android-Services, Android Broadcast Receivers, Android Intents and types of objects/Filters, Android-Fragment, Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT – III

Android User Interface Design: UI Controls, Designing User Interfaces with Layouts, Android-Event Handling, Drawing and Working with Animation. Android UI Design, UI Patters and UI Testing.

UNIT – IV

Android Advanced Concepts: Android Drag and drop, Location Based Services, Android Sending Email and SMS, Testing Android applications, Publishing Android application. Managing Application resources in a hierarchy, working with different types of resources.

UNIT – V

Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd edition. (2011)
2. Android Mobile Application Development, ISBN-978-81-940577-2-7 June 2019 by Dr. Babasaheb Ambedkar Open University.
3. Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps by Ian G. Clifton

REFERENCE BOOKS:

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Android Application Development All in one for Dummies by Barry Burd, Edition: I

WEB REFERENCE:

<https://www.javatpoint.com/android-tutorial>
<https://www.w3schools.blog/android-tutorial>
<https://www.tutorialspoint.com/android/index.htm>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	M	M	M	M	M
CO 2	M	S	L	M	S	M
CO 3	M	M	L	S	M	M
CO 4	M	S	M	S	S	S
CO 5	S	S	M	M	M	S

S-Strong M-Medium L-Low

CORE-XV: Android Programming Lab

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTC63	0	0	6	I	4	6	25	75	100

COURSE OUTCOMES:

CO.NO	COURSE OUTCOME
CO-1	Demonstrate the Understanding of fundamental of Android Programming
CO-2	Understanding the applications, activities and services on their design.
CO-3	Prototyping techniques to design and develop sophisticated mobile user interfaces.
CO-4	Program mobile applications for the Android operating system that use basic and advanced phone features.
CO-5	Explain and use deploy applications to the Android marketplace for distribution.

Program List:

1. Using Login Screen
2. Browse by Intent
3. Using content provider
4. Simple program using Layouts
5. Displaying progress Dialog
6. Alert Dialog Box
7. Create and send Notifications
8. Sending SMS and Email
9. Playing audio and video
10. SQLite Database

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd edition. (2011)
2. Android Mobile Application Development, ISBN-978-81-940577-2-7 June 2019 by Dr. Babasaheb Ambedkar Open University.
3. Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps by Ian G. Clifton

REFERENCE BOOKS:

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Android Application Development All in one for Dummies by Barry Burd, Edition: I

WEB REFERENCE:

<https://www.javatpoint.com/android-tutorial>

<https://www.w3schools.blog/android-tutorial>

<https://www.tutorialspoint.com/android/index.htm>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	M	M	M	M	M
CO 2	M	S	L	M	S	M
CO 3	M	M	L	S	M	M
CO 4	M	S	M	S	S	S
CO 5	S	S	M	M	M	S

S-Strong M-Medium L-Low

SEMESTER – V ELECTIVE SUBJECTS

ELECTIVE-VIII: PHP Programming

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE64-1	5	0	0	1	3	5	25	75	100

Pre-requisite	Basic Knowledge on Web	
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <p>The objective of this course is to teach the fundamentals of quantum information processing, including quantum computation, quantum cryptography, and quantum information theory.</p>		
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1:Analyze the behavior of basic quantum algorithms</p> <p>CO2: Implement simple quantum algorithms and information channels in the quantum circuit model</p> <p>CO3:Simulate a simple quantum error-correcting code</p> <p>CO4: Prove basic facts about quantum information channels</p> <p>CO5:</p>		
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>		
Units	Contents	Required Hours
I	Introduction to PHP -Basic Knowledge of websites - Introduction of Dynamic Website -Introduction to PHP - Scope of PHP -XAMPP and WAMP Installation- PHP Programming Basics -Syntax of PHP -Embedding PHP in HTML -Embedding HTML in PHP .	15
II	Introduction to PHP Variable -Understanding Data Types - Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement -Switch() Statements -Using the while() Loop -Using the for() Loop	15

III	PHP Functions -PHP Functions -Creating an Array - Modifying Array Elements -Processing Arrays with Loops - Grouping Form Selections with Arrays -Using Array Functions -Using Predefined PHP Functions -Creating User- Defined Functions	15
IV	PHP Advanced Concepts -Reading and Writing Files - Reading Data from a File -Managing Sessions and Using Session Variables -Destroying a Session -Storing Data in Cookies -Setting Cookies	15
V	OOPS Using PHP -OOPS Concept-Class, Object, Abstractions, Encapsulation, Inheritance, Polymorphism - Creating Classes and Object in PHP-Cookies and Session Management-Working with forms and system file - Error Handling- Model View Controller – AJAX.	15
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	

Learning Resources:

- **Recommended Texts**

Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.

- **Reference Books**

The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes

Web resources: Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S

S-Strong M-Medium L-Low

ELECTIVE-VIII: Open Source Software Technologies

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE64-2	5	0	0	I	3	5	25	75	100

Learning Objectives: (for teachers: what they have to do in the class/lab/field)

- To become proficient in software development processes, databases middleware Components
- To be productive in a software development environment that uses OSS components

Course Outcomes: (for students: To know what they are going to learn)

CO1: Acquire and understand the basic concepts in Java, application of OOPS concepts.

CO2: Acquire knowledge about operators and decision-making statements.

CO3: Identify the significance and application of Classes, arrays and interfaces and analyzing java arrays

CO4: Understand about the applications of OOPS concepts and analyze overriding and packages through java programs.

CO5: Create window-based programming using applet and graphics programming.

Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)

Units	Contents	Required Hours
I	Introduction: Open Source – open source vs. commercial software – What is Linux? – Free Software – Where I can use Linux? - Linux kernel – Linux distributions	17
II	LINUX: : Introduction Linux Essential Commands – File System concept – Standard Files – The Linux Security Model - Introduction to Unix – Unix Components – Unix Files – File Attributes and Permission – Standard I/O – Redirection – Pipes and Filters – Grep and Stream Editor – Process and Signal Commands Shell Programming – Shell Variables – Export, Read, Exit Commands – Control Structures – Arithmetic in Shell Programming – Debugging Scripts.	17
III	APACHE: Introduction - Apache Explained – Starting, Stopping and Restarting Apache –Modifying the Default configuration – Securing Apache – Set user and Group – Consider allowing access to local documentation – Don't allow public-html web sites – Apache control without access.	17
IV	MySQL: Introduction to MySQL – The show databases and table – The USE command –Create Database and Tables – Describe	17

	Table – Select, Insert, Update and Delete statement Some administrative detail – Table joins – Loading and Dumping a database.	
V	PHP: Introduction –PHP Form processing – Database Access with PHP – MySQL, MySQL-Functions – Inserting Records – Selecting Records – Deleting Records – Update Records. Perl: Introduction – perl documentation – Perl Syntax rules – Mod perl: Introduction – Turning CGI into mod perl programs – Pure mod perl programs.	17
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
Learning Resources: <ul style="list-style-type: none"> • Recommended Texts <ol style="list-style-type: none"> 1. James Lee and Brent Ware “Open Source Web Development with LAMP using 2. LINUX, Apache, MySQL, Perl and PHP”, Dorling Kindersley (India) Pvt. Ltd, 2008. • Reference Books <ol style="list-style-type: none"> 1. Eric Rosebrock, Eric Filson, “Setting up LAMP: Getting Linux, Apache, MySQL and PHP and working together”, John Wiley and Sons, 2004. 2. Anthony Butcher , “Teach Yourself MySQL in 21 days”, 2nd Edition, Sams Publication. 3. Rich Bower, Daniel Lopez Ridreejo, Alian Liska , “Apache Administrator’s Handbook”, Sams Publication. 4. Tammy Fox, “RedHat Enterprise Linux 5 Administration Unleashed”, Sams Publication. 5. Naramore Eligabette, Gerner Jason, Wrox Press, Wiley Dreamtech Press, “Beginning PHP5, Apache, MySQL Web Development”, 2005. 		

6. Stever Holzner, “PHP: The Complete Reference”.
7. Vikram Vaswami, “The Complete Reference MySQL”, Tata McGraw Hill.
8. 8. M.G. Venkateshmurthy, “Introduction to Unix & Shell Programming”, Pearson Education India, Delhi, 2005.

- **Web resources**

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S

S-Strong M-Medium L-Low

ELECTIVE-VIII: Human – Computer Interaction

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE64-3	5	0	0	I	3	5	25	75	100

<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> • To learn the foundations of Human Computer Interaction. • To become familiar with the design technologies for individuals and persons with disabilities. • To be aware of mobile HCI. • To learn the guidelines for user interface 		
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1: Design effective dialog for HCI</p> <p>CO2: Design effective HCI for individuals and persons with disabilities</p> <p>CO3: designing multimedia/ ecommerce/ e-learning Web sites</p> <p>CO4: Assess the importance of user feedback.</p> <p>CO5:</p>		
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>		
Units	Contents	Required Hours
I	<p>FOUNDATIONS OF HCI :</p> <ul style="list-style-type: none"> • The Human: I/O channels – Memory • Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; • Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. - Case Studies 	17
II	<p>DESIGN & SOFTWARE PROCESS:</p> <ul style="list-style-type: none"> • Interactive Design: • Basics – process – scenarios • Navigation: screen design Iteration and prototyping. • HCI in software process: • Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design. 	17

III	<p>MODELS AND THEORIES:</p> <ul style="list-style-type: none"> • HCI Models : Cognitive models:- Socio-Organizational issues and stakeholder requirements • Communication and collaboration models-Hypertext, Multimedia and WWW. 	17
IV	<p>Mobile HCI:</p> <ul style="list-style-type: none"> • Mobile Ecosystem: Platforms, Application frameworks • Types of Mobile Applications: Widgets, Applications, Games • Mobile Information Architecture, Mobile 2.0, • Mobile Design: Elements of Mobile Design, Tools. - Case Studies 	17
V	<p>WEB INTERFACE DESIGN:</p> <p>Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies</p>	17
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>	
Skills acquired from the course	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>	

Learning Resources:

- **Recommended Texts**

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human -Computer Interaction", III Edition, Pearson Education, 2004 (UNIT I, II & III)
2. . Brian Fling, —"Mobile Design and Development", I Edition, O'Reilly Media Inc., 2009 (UNIT – IV)
3. . Bill Scott and Theresa Neil, —Designing Web Interfaces, First Edition, O'Reilly, 2009. (UNIT-V)

- **Reference Books**

1. Shneiderman, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", V Edition, Pearson Education

- **Web resources**

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S

S-Strong M-Medium L-Low

ELECTIVE-VIII: Fuzzy Logic

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE65-1	5	0	0	I	3	5	25	75	100

Course Title :Fuzzy Logic

Course Type: Theory

General Objectives: The objective of this course is to teach the fundamentals of fuzzy sets, relations and the various fuzzification and defuzzification methods.

Course Objectives

CO. NO	COURSE OUTCOME
CO-1	Develop the skill in basic understanding of Fuzzy sets, operation and Properties.
CO-2	Apply Cartesian product and composition on Fuzzy relations and use the tolerance and Equivalence relations
CO-3	Analyze various fuzzification methods and its association features.
CO-4	Evaluate defuzzification methods for real time applications
CO-5	Design and analyze the application of Fuzzy logic and its Relations

Unit I:

Introduction to Fuzzy Logic- Fuzzy Sets- Fuzzy Set Operations, Properties of Fuzzy Sets, Classical and Fuzzy Relations: Introduction-Cartesian Product of Relation-Classical Relations-Cardinality of Crisp Relation.

Unit II:

Operations on Crisp Relation-Properties of Crisp Relations-Composition Fuzzy Relations, Cardinality of Fuzzy Relations-Operations on Fuzzy Relations-Properties of Fuzzy Relations-Fuzzy Cartesian Product and Composition-Tolerance and Equivalence Relations ,Crisp Relation.

Unit III:

Membership Functions: Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.

Unit IV:

Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods, Fuzzy Rule-Based System: Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules.

Unit V:

Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System-Antilock-Braking System and Vehicle Speed-Estimation Using Fuzzy Logic.

PRESCRIBED TEXT:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa-Introduction to Fuzzy Logic using MATLAB, Springer-Verlag Berlin Heidelberg 2007.
2. Guanrong Chen and Trung Tat Pham- Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems
3. 2. Timothy J Ross , Fuzzy Logic with Engineering Applications

BOOKS FOR REFERENCE:

1. Klir.G, Yuan B.B. Fuzzy sets and Fuzzy Logic Prentice Hall of India private limited, 1997.
2. Gen, M. and Cheng R. Genetic Algorithm and Engineering Design, john wiley 1997.

Web References:

1. https://onlinecourses.nptel.ac.in/noc20_ee03/preview
2. https://odp.inflibnet.ac.in/index.php/module_details?course=noc:fuzzy%20logic%20and%20neural%20networks&source=swayam&subsource=NPTEL

	PO1	PO2	PO3	PO4	PO5	PO6
CO-1	L	M	L	L	L	M
CO-2	M	M	S	M	L	M
CO-3	S	M	L	M	L	S
CO-4	M	S	M	L	M	S
CO-5	S	M	L	S	M	M

S-Strong M-Medium L-Low

ELECTIVE-VIII: Cyber Security

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE65-2	5	0	0	I	3	5	25	75	100

Pre-requisite	Basic skills on internet and its functions	
Learning Objectives: (for teachers: what they have to do in the class/lab/field)		
The students will be able to		
<ul style="list-style-type: none"> • Understand various block cipher and stream cipher models • Describe the principles of public key cryptosystems, hash functions and digital signature • To get a firm knowledge on Cyber Security Essentials 		
Course Outcomes: (for students: To know what they are going to learn)		
CO1: Implement basic security algorithms required by any computing system		
CO2: Analyze the vulnerabilities in any computing system and hence be able to design a security solution		
CO3: Analyze the possible security attacks in complex real time systems and their effective countermeasures		
CO4: Differentiate various governing bodies of cyber laws		
CO5: Impart various privacy policies for an organization		
Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)		
Units	Contents	Required Hours
	Introduction to Security Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm.	
	Public Key Cryptography and Hash Algorithms Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange- Hash functions-Hash Algorithms (MD5, Secure Hash Algorithm	
	Fundamentals of Cyber Security	

	How Hackers Cover Their Tracks- Fraud Techniques- Threat Infrastructure- Techniques to Gain a Foothold (Shellcode, SQL Injection, Malicious PDF Files)- Misdirection, Reconnaissance, and Disruption Methods.	
	Planning for Cyber Security Privacy Concepts -Privacy Principles and Policies - Authentication and Privacy - Data Mining - Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies.	
	Cyber Security Management Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster – Legal Issues – Protecting programs and Data – Information and the law – Rights of Employees and Employers - Emerging Technologies - The Internet of Things - Cyber Warfare.	
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and	

from the course	Transferrable Skill	
<p>Learning Resources:</p> <ul style="list-style-type: none"> • Recommended Texts <ol style="list-style-type: none"> 1. William Stallings, “Cryptography and Network Security”, Pearson Education, 6th Edition, 2013. 2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015. • Reference Books <ol style="list-style-type: none"> 1. Graham, J. Howard, R., Olson, R., Cyber Security Essentials, CRC Press, 2011. 2. George K.Kostopoulos, Cyber Space and Cyber Security, CRC Press, 2013. <p>Web resources: Web resources from NDL Library, E-content from open-source libraries</p>		

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S

S-Strong M-Medium L-Low

sSELECTIVE-VIII: E-Commerce

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTE65-3	5	0	0	I	3	5	25	75	100

<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> To provide knowledge on Ecommerce technology, Business Models and M-Commerce. To explore the major issues associated with e-commerce-security, privacy, authentication, encryption and e-Payment 		
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1:Understanding the basic electronic business management</p> <p>CO2: Analyze the technologies and marketing trends in Ecommerce</p> <p>CO3:Knowledge gain in E security, Legal and Ethical issues</p> <p>CO4: A clear evaluation of the e payment systems</p> <p>CO5: Improve the expertise in mobile commerce and apply knowledge in development of E- Business portals</p>		
<p>Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)</p>		
Units	Contents	Required Hours
I	<p>History of E-commerce and Indian Business Context: E-Commerce –Emergence of the Internet –Emergence of the WWW – Advantages of E-Commerce – Transition to E-Commerce in India – The Internet and India – E-transition Challenges for Indian Corporate.</p> <p>Business Models for E- commerce: Business Model – E-business Models Based on the Relationship of Transaction Parties - E-business Models Based on the Relationship of Transaction Types.</p>	14
II	<p>Enabling Technologies of the World Wide Web: World Wide Web – Internet Client-Server Applications – Networks and Internets – Software Agents – Internet Standards and Specifications – ISP.</p> <p>e-Marketing :Traditional Marketing – Identifying Web Presence Goals – Online Marketing – E-advertising – E-branding.</p>	14

<p style="text-align: center;">III</p>	<p>E-Security: Information system Security – Security on the Internet – E-business Risk Management Issues – Information Security Environment in India.</p> <p>Legal and Ethical Issues : Cybers talking – Privacy is at Risk in the Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.</p>	<p style="text-align: center;">14</p>
<p style="text-align: center;">IV</p>	<p>e-Payment Systems: Main Concerns in Internet Banking – Digital Payment Requirements – Digital Token-based e-payment Systems – Classification of New Payment Systems – Properties of Electronic Cash – Cheque Payment Systems on the Internet – Risk and e-Payment Systems – Designing e-payment Systems – Digital Signature – Online Financial Services in India - Online Stock Trading.</p>	<p style="text-align: center;">15</p>
<p style="text-align: center;">V</p>	<p>Information systems for Mobile Commerce: What is Mobile Commerce? – Wireless Applications –Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies –Different Generations in Wireless Communication – Security Issues Pertaining to Cellular Technology.</p> <p>Portals for E-Business: Portals – Human Resource Management – Various HRIS Modules.</p>	<p style="text-align: center;">15</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>	

Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
Learning Resources: <ul style="list-style-type: none"> • Recommended Texts <ol style="list-style-type: none"> 1. P.T.Joseph, S.J., “E-Commerce - An Indian Perspective”, PHI 2012, 4th Edition • Reference Books <ol style="list-style-type: none"> 1. David Whiteley , “E-Commerce Strategy, Technologies and Applications”, Tata McGrawHill, 2001. 2. Ravi Kalakota, Andrew B Whinston, “Frontiers of Electronic Commerce”, Pearson 2006,12th Impression. • Web resources 		

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S

S-Strong M-Medium L-Low

Professional Competency skill: 8: Big Data Analytics

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
23UINTF66	2	0	6	1	2	2	25	75	100

Course Title : Big Data Analytics

Course Type : Theory

General Objective : To know the fundamental concepts of big data and analytics.

Course Objectives:

1. Enumerate the types of data analytics models
- 2 describe usage and implementation of various classifiers
3. Learn the varied clustering techniques and sequence analysis
- 4 . calculate analytics result performances and visualization methods
5. Generalize the model processing steps and procedures using NOSsql

Course Outcomes :

CO. NO	COURSE OUTCOME
CO-1	Understand the big data tools and its analysis techniques.
CO-2	Analyze data by utilizing clustering and classification algorithms.
CO-3	Compare the different mining algorithms and recommendation systems for large volumes of data.
CO-4	Perform data analytics on data streams.
CO-5	Explore the NoSQL databases and management.

UNIT I: INTRODUCTION TO BIG DATA

Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value - Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — MapReduce and YARN — Map Reduce Programming Model

UNIT II: CLUSTERING AND CLASSIFICATION

Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions- Classification: Decision Trees — Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes Theorem — Naïve Bayes Classifier.

UNIT III: ASSOCIATION AND RECOMMENDATION SYSTEM

Advanced Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of Candidate Rules — Applications of Association Rules — Finding Association& finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV: STREAM MEMORY

Introduction to Streams Concepts — Stream Data Model and Architecture — Stream Computing,
Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNIT V: NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION

NoSQL Databases : Schema-less Models?: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores — Tabular Stores — Object Data Stores — Graph Databases Hive — Sharding —Hbase — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.

PRESCRIBED TEXT :

1. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
2. David Loshin, “Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph”, Morgan Kaufmann/El sevier Publishers, 2013.
- 3 EMC Education Services, “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley publishers, 2015.

BOOKS FOR REFERENCE :

1. Bart Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Its applications, Wiley India Private Limited
2. Michael Minelli, Michele Chambers, 2013, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s Businesses, Wiley CIO

WEB REFERENCE:

<https://www.w3schools.com/>

<https://www.kaggle.com/>

<https://tableau.com>

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S

S-Strong M-Medium L-Low

EXTENSION ACTIVITY

Subject Code		L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
23UINTX67	EXTENSION ACTIVITY					1		25	75	100

(Refer to the Regulations)