

B.Sc.
INFORMATION TECHNOLOGY

SYLLABUS

**THOSE WHO JOINED FROM THE ACADEMIC
YEAR**

2024 - 2025

**MANONMANIAM SUNDARANAR UNIVERSITY
THIRUNELVELI – 627 012**

MANONMANIAMSUNDARANARUNIVERSITY, TIRUNELVELI
UGC COURSES – AFFILIATED COLLEGES
B.Sc INFORMATION TECHNOLOGY
(Choice Based Credit System)
(with effect from the academic year 2024-2025)

PREAMBLE

The Learning Outcome-based Curriculum Framework (LOCF) approach has been adopted in B.Sc Information Technology Program to create and disseminate knowledge to the students on the latest technologies by imparting the technical skills to meet industrial needs and inculcate the skills for employability at the point of graduation.

Vision

Empowering students with computing knowledge to stay in forefront of state-of-art technologies for rendering the need based services to the society.

Mission

- To impart quality based education by inculcating technical, entrepreneurship and leadership skills to meet global challenges.
- To enable the students acquire the skill of employability and entrepreneurship.

Programme Educational Objectives (PEOs):

PEO 1: To equip students with the fundamental concepts of Information Technology.

PEO 2: To help students in getting employment by mastering their skills.

PEO 3: To nurture creative thinking and make the students capable of undertaking innovative practices.

PEO 4: To develop environmental awareness, empowerment of humanity and civic consciousness.

PEO 5: To build the ability to cope with the changing environment

PEO 6: To mould them as responsible citizens by imparting value based education.

Program Outcomes (POs):

On successful completion of the B.Sc. Information Technology program, the graduates will be:

PO1: Knowledge: Gain in-depth knowledge of software and hardware techniques

PO2:Problemsolving:Abilitytocriticallyanalyzeandprovidesoftwareresolutionsforproblems

PO3:Environmentandsustainability:Understandtheimpactofsoftwareresolutionsin environmental and societal context and strive for sustainable development.

PO4:TeamWork:Workinteamstoaccomplishtheobjective.

PO5:CommunicationSkills:Abletocommunicateeffectively.

ProgrammeSpecificOutcomes(PSOs):

PSO 1: UnderstandandanalyzethefundamentalknowledgeintheInformationTechnology domain.

PSO2:Enhancethelogicalandanalyticalthinkingtounderstandthecomputationalsystems.

PSO3:Abilitytocomprehendthedevelopmentmethodologiesofsoftwaresystemsandto design the software solutions.

PSO4:ExplorededevelopingareasintheInformationTechnologysectorandtoenrich themselves to be skillful to meet the diverse expectations of the industry.

PSO5:Equippedtobecompetentinprovidingoptimalandethicalsolutionstothe technological challenges laid by the professional societies.

	PO 1	PO2	PO3	PO4	PO5
PSO 1	S	S	L	S	S
PSO 2	S	S	S	S	S
PSO3	M	S	M	S	M
PSO 4	S	S	S	S	S
PSO 5	L	S	S	S	S

S – Strong, M- Medium, L- Low

REGULATIONS/PROGRAMMESPECIFICREQUIREMENTS

DurationoftheCourse:

B.Sc. Information Technology is a 3 years full time programme spread over sixsemesters.

EligibilityforAdmissiontotheProgramme

Candidates who have studied Mathematics as one of the subject in HSC are eligible for this programme (as specified in the admission guidelines given by the Directorate of Collegiate Education 2024-'2025 www.tndce.tn.gov.in)

SEMESTERWISECOURSELIST FIRST YEAR

Semester-I

Part	Specification	Courses	Credit	Hours per week (L/T/P)
Part-I		Language – Tamil	3	6
Part-II		English	3	6
Part-III	Core-I	Programming in C	5	5
	Core-II [LAB]	C Programming Practical	4	5
	Elective-I	Numerical Methods/Discrete Mathematics	4	4
Part-IV	Skill Enhancement Course – I [LAB]	Office Automation - Practical	2	2
	Foundation Course	Fundamentals of Computers	2	2
			23	30

Semester-II

Part	Specification	Courses	Credit	Hours per week (L/T/P)
Part-I		Language – Tamil	3	6
Part-II		English	3	4
Part-III	Core-III	Java Programming	5	5
	Core-IV [LAB]	Java Programming Practical	4	5
	Elective-II	Optimization Techniques / Data Structures	4	4
Part-IV	Skill Enhancement Course – II [LAB]	PHP Scripting Practical	1	2
	Skill Enhancement Course – III	Introduction to Internet	1	2
		Naan Mudhalvan(Soft Skill)	2	2
			23	30

SECOND YEAR Semester-III

Part	Specification	Courses	Credit	Hours per week (L/T/P)
Part-I		Language – Tamil	3	6
Part-II		English	3	6
Part-III	Core-V	Python Programming	4	4
	Core-VI [LAB]	Python Programming - Practical	4	4
	Elective-III	Digital Logic Fundamentals / Computer Architecture	4	4
Part-IV	Skill Enhancement Course – IV [LAB]	HTML & Web Designing - Practical	2	2
		Naan Mudhalvan	2	2
		Environmental Studies	2	2
			24	30

Semester-IV

Part	Specification	Courses	Credit	Hours per week (L/T/P)
Part-I		Language – Tamil	3	6
Part-II		English	3	6
Part-III	Core-VII	Operating System	4	4
	Core-VIII [LAB]	Mobile Application Development - Practical	4	4
	Elective-IV	Internet of Things and its Applications/ Human Computer Interaction	4	4
Part-IV	Skill Enhancement Course – V [LAB]	Multimedia using React - Practical	2	2
		Naan Mudhalvan	2	2
		Value Education	2	2
			24	30

THIRD YEAR Semester-V

Part	Specification	Courses	Credit	Hours per week (L/T/P)
Part-III	Core-IX	Database Systems	4	5
	Core-X	Machine Learning	4	5
	Core-XI [LAB]	Database Systems - Practical	4	5
	Core-XII [LAB]	Machine Learning - Practical	4	5
	Elective-V	Computer Networks/ Data Mining	3	4
	Elective-VI	Cryptography & Network Security/ Artificial Intelligence	3	4
Part-IV		Naan Mudhalvan	2	2
		Internship/Industrial Visit/Field Visit/Knowledge updation activity	1	-
			25	30

Semester-VI

Part	Specification	Courses	Credit	Hours per week (L/T/P)
Part-III	Core-XIII	Software Engineering	4	5
	Core-XIV	Digital Image Processing	4	5
	Core-XV [LAB]	Image Processing using Scilab - Practical	3	5
	Core-XVI [PRJ]	Project with Viva voce	3	5
	Elective-VII	Trends in Computing /Big Data Analytics	2	4
	Elective-VIII	Natural Language Processing / Cyber	2	4

		Security		
Part IV		Naan Mudhalvan	2	2
Part-V		Extension Activity (Outside college hours)	1	-
			21	30

Total Credits: 140

Part I – Tamil / Other Languages

Part II - English

Part III – Core Papers, Electives and Project

Part IV – Environmental Studies, Value Based Education, Naan Mudhalvan, Skill Enhancement Courses, Foundation Course and Internship

Part V – Extension Activity

Internship/Industrial visit/Field visit/Knowledge Updation Activity:

- A report should be submitted at the end of V semester and evaluated by external examiners.
- Internal – 50 Marks, External – 50 Marks (Total : 100 Marks)
- Internship students should submit certificate of attendance from the industry along with report.

Extension Activity :

- NSS/NCC/YRC/RRC/Sports and Games/Youth Welfare Activity/Outreach Programmes/ Migration Awareness in the Tamil Nadu Education System
- External examination will be conducted at the end of VI semester.
- Internal – 50 Marks, External – 50 Marks (Total : 100 Marks)

Naan Mudhalvan : If a student is unable to appear for Naan Mudhalvan course in a particular semester or who have failed the same should clear the respective self-study courses specified here (External Exam : 100 Marks [no internals])

II Semester	:	Soft skills for Employability
III Semester	:	Digital skills for Employability
IV Semester	:	Introduction to Industry 4.0
V Semester	:	Social Network
VI Semester	:	Software Testing

Project : Group (maximum 3 members) OR individual Project. The project report should be submitted at the end of VI semester for external evaluation. Internal – 50 Marks, External – 50 Marks (Total : 100 Marks)

Scheme of Evaluation (THEORY): Core/Elective/ Skill Enhancement Courses
Total Marks: 100 (Internal: 25 Marks, External: 75 Marks)

There is no Passing Minimum for the CIA component. But overall (CIA+ External), the student should get 40% or more to get a pass	
CIA-Internal Marks	External Marks
i. Average of best two tests from three: 20 Marks	End Semester Examination
ii. Assignment: 05 Marks	
Total: 25 Marks	Total: 75 Marks
Minimum Passing 40% i.e. 30 marks	

Scheme of Evaluation (PRACTICAL): Core / Skill Enhancement Course
Total Marks: 100 (Internal: 50 Marks, External: 50 Marks)

There is no Passing Minimum for the CIA component. But overall (CIA+ External), the student should get 40% or more to get a pass	
CIA-Internal Marks	External Marks
i. Completion of Practical in time : 20 Marks	End Semester Practical Examination
ii. Model Practical Test : 20 Marks	
iii. Completion of Record work: 10 Marks	
Total: 50 Marks	Total: 50 Marks
Minimum Passing 40% i.e. 30 marks	

Scheme of Evaluation (PROJECT)
Total Marks: 100 (Internal: 50 Marks, External: 50 Marks)

There is no Passing Minimum for the CIA component. But overall (CIA+ External), the student should get 40% or more to get a pass	
CIA-Internal Marks	External Marks
i. Completion of Project in time : 20 Marks	End Semester Practical Examination
ii. Model Test with Viva-voce: 20 Marks	
iii. Completion of Report work: 10 Marks	
Total: 50 Marks	Total: 50 Marks
Minimum Passing 40% i.e. 30 marks	

External(EndSemester)ExaminationQuestionPattern

Time:3hours

Max.Marks:75

Part–A (10x1=10)

Answerallthequestions

Ten Questions, twoobjectivetypequestionsfromeachunit.

Part–B(5x5=25)

Answerallthequestions

Five Questions, two short answer type questions from each unit with internal choice (Either ... Or ...type)

Part–C (5x8=40)

Answerallthequestions

Five Questions, two descriptive/Analytical type questions from each unit with internal choice (Either... Or ...type)

CORECOURSE–I:PROGRAMMINGINC

Subject Code	L	T	P	Semester	Credits	Inst. Hours	Marks		
							CIA	External	Total
	5	0	0	I	5	5	25	75	100
Learning Objectives									
LO1	Tofamiliarizethestudentwiththeunderstandingofcodeorganization								
LO2	Toimprovetheprogramming skills								
LO3	Learningthebasicprogramming 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 I, Fourth Edition, Addison Wesley (Unit I: Chapter – 1)	
➤	E. Balaguruswamy, (2010), —Programming in ANSI C I, Fifth Edition, Tata McGraw Hill Publications	
Reference Books		

1.	AshokKamthane,(2009),—ProgrammingwithANSI&TurboCl,Pearson Education
2.	ByronGottfried,(2010),—ProgrammingwithCl,SchaumsOutlineSeries, Tata McGrawHillPublications
NOTE:LatestEditionof TextbooksMaybeUsed	
WebResources	
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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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 ofcoursecontributedtoeachPSO	15	14	11	15	10	10

CORE COURSEII: CPROGRAMMING PRACTICAL

Subject Code	L	T	P	Semester	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	5	I	4	5	50	50	100
Learning Objectives									
LO1	TheCourseaimsto provideexposureto problem-solvingthrough Cprogramming								
LO2	Itaimstotrainthestudenttothebasicconceptsof theC -Programminglanguage								
LO3	Applydifferent conceptsofClanguagetosolve theproblem								
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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

ELECTIVE COURSE-I A : NUMERICAL METHODS

Subject Code	L	T	P	Semester	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	I	4	4	25	75	100
Learning Objectives									
LO1	To introduce the concept of solving equations using different methods								
LO2	To understand the use of Assignment and Transportation problems								
Prerequisites: Mathematics Fundamentals									
Unit	Contents								No. of Hours

I	Curve Fitting: Introduction, Method of Least squares, Curve Fitting, Fitting a Straight Line	12
II	Solution of Algebraic and Transcendental Equations: Bisection method, Regula Falsi method, Newton Raphson Method	12
III	Solution of Simultaneous Linear Equations: Gauss Elimination method, Gauss-Jordan method, Gauss Seidel Method, Jacobi's method	12
IV	Numerical Differentiation & Integration: Newton's Forward Difference, Newton's Backward Difference, Newton's Divided Difference (First Order Differentiation only) Integration: Using Trapezoidal rule, Simpson's 1/3 & Simpson's 3/8 rules	12
V	Solution of Ordinary Differential Equations: Runge-Kutta 2nd Order and 4th Order methods, Predictor-Corrector Methods: Milne and Adam's methods	12
TOTAL		60
CO	Course Outcomes	
CO1	Obtain numerical solutions of algebraic and transcendental equations	
CO2	Solve system of linear equations numerically using direct and iterative methods	
CO3	Solve ordinary differential equations	
CO4	Compute integration using Simpson's & Trapezoidal Rule	
CO5	Apply numerical methods in real life problems	
Textbooks		
➤	B.S.Grewal, "Numerical Methods in Engineering & Science", Khanna Publishers, Fifth Edition, April 1999	
➤	M.K.Venkataraman, "Numerical Methods in Science & Engineering", National Publishing Co., 2005'	

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

ELECTIVE COURSE-I B :DISCRETE MATHEMATICS

Subject Code	L	T	P	Semester	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	I	4	4	25	75	100
Learning Objectives									
LO1	To get the knowledge about the relations								
LO2	To understand the functions and their classifications								
LO3	To understand the propositions and normal forms								
LO4	To understand the usage of matrix								
LO5	To acquire knowledge about the graphs								
Prerequisites: Mathematics Fundamentals									
Unit	Contents								No. of Hours
I	Introduction to Relations – Binary relation – Classification of Relations – Composition of Relations – Inverse of Relation – Closure operation on Relations – Matrix representation of Relation - digraphs								12
II	Introduction to Functions – Addition and Multiplication of Functions - Classifications of Functions – Composition of Function – Inverse Function								12
III	Introduction – Statement (Propositions) – Laws of Formal Logic – Basic Set of Logical operators/operations-Propositions and Truth Tables – Algebra Propositions- Tautologies and Contradictions – Logical Equivalence – Logical Implication – Normal Forms.								12
IV	Introduction – Definition of a Matrix - Types of Matrices – Operations on Matrices – Related Matrices – Transpose of a Matrix – Symmetric and Skew-symmetric Matrices – Complex Matrix – Conjugate of a Matrix – Determinant of a Matrix – Typical Square Matrices – Adjoint and Inverse of a Matrix – Singular and Non-singular Matrices – Adjoint of a Square Matrix – Properties of Adjoint of a Matrix – Properties of Inverse of a Matrix.								12
V	Introduction – Graph and Basic Terminologies – Types of Graphs – Sub Graph and Isomorphic Graph – Operations on Graphs – Representation of Graph								12
TOTAL								60	
CO	Course Outcomes								
CO1	To recall basic concepts for clear understanding of mathematical principles								
CO2	To explain practical problems								
CO3	To construct matrices using discrete mathematics								
CO4	To analyze techniques to draw graph using mathematics								

CO5	Todesigngraphsusingthe representations
Textbooks	
➤	DISCRETEMATHEMATICS,SwapanKumarChakrabortyandBikashKantiSarkar, OXFORD University Press
Reference books	
➤	DISCRETEMATHEMATICS,ThirdEdition,SeymourLipschutzandMarcLars Lipson, Tata McGraw Hill Education Private Limited
➤	DiscreteMathematicalStructureswithApplicationstoComputerScienceby J.P.Tremblay, R.Manohar TMH edition
Web Reference	
➤	https://www.tutorialspoint.com/discrete_mathematics

MappingwithProgrammeOutcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	3
CO2	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
Weightageofcourse contributed to each PSO	15	15	14	15	14	14

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

SKILL ENHANCEMENT COURSE I : OFFICE AUTOMATION PRACTICAL

Subject Code	L	T	P	Semester	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	2	I	2	2	50	50	100
Course Objective									
C1	Understandthebasicsofcomputersystemsanditscomponents.								
C2	Understandandapplythe basicconceptsof a wordprocessingpackage.								
C3	Understandand applythebasicconceptsofelectronicspreadsheetsoftware.								
C4	Understandandapplythebasicconceptsofdatabasemanagement system.								
C5	UnderstandandcreateapresentationusingPowerPointtool.								

Exercises	
	<p>MS-Word</p> <ol style="list-style-type: none"> 1. Prepare a word document for spell checking and Thesaurus. 2. Apply Cut, Copy and Paste operations in a document. 3. Find a word and Replace with another in a document. 4. Insert Header with College Name, Footer with Page No., and Footnote in a document. 5. Insert mathematical symbols using Microsoft equation 3.0. 6. Preparing Newspaper format (Apply Alignment, Font, Property, Line spacing, Picture Format). 7. Prepare a Bio-Data and insert the contents of qualification within the table. 8. Mail Merge 9. Macro. <p>MS-Excel</p> <ol style="list-style-type: none"> 1. Apply formulas and functions 2. Prepare a chart for population growth. 3. Create a Pivot table. 4. Apply ascending and descending order 5. Apply auto format <p>MS-PowerPoint</p> <ol style="list-style-type: none"> 1. Create a power point presentation with 3 slides. 2. Create a design template with 3 slides. 3. Create a presentation with animation. 4. Create a power point presentation with 4 slides. Set slide transition time of 3 seconds and Display your presentation. 5. Create a presentation with auto content wizard. <p>MS-Access</p> <ol style="list-style-type: none"> 1. Create an employee database. 2. Create a student database. Set primary key. 3. Prepare salary list. 4. Create a report. 5. Create Mailing labels
WebResources	
1.	https://www.udemy.com/course/office-automation-certificate-course/
2.	https://www.javatpoint.com/automation-tools

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO 1	M	S	M			M		L
CO 2	S	M	S			M		
CO 3		S	S		M		L	

CO 4			S	L	M		M	
CO 5				M		S	M	S

S-Strong M-Medium L-Low

FOUNDATION COURSE: FUNDAMENTALS OF COMPUTERS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	2	0	0	I	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 - Pseudocode								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, construct 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 I, 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 I, Prentice Hall International Series in Computer Science.
2.	C.S.V. Murthy, (2009), —Fundamentals of Computers I, 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/basicitut/
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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

CORE COURSE III: JAVA PROGRAMMING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	5	0	0	II	5	5	25	75	100
Learning Objectives									
LO 1	To provide knowledge on fundamentals of object-oriented programming								
LO 2	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								
CO 1	Outline the basic terminologies of OOP, programming language techniques, JDBC and Internet programming concepts								
CO 2	Solve problems using basic constructs, mechanisms, techniques and technologies of Java								

CO 3	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
CO 4	Assess various problem-solving strategies involved in Java to develop a high-level application.
CO 5	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	
	P. Naughton and H. Schildt (1999), "Java 2 The Complete Reference", TMH, 3rd Edition
	Jaison Hunder & William Crawford (2002), "Java Servlet Programming", O'Reilly
	Jim Keogh (2002), "J2EE: The Complete Reference", Tata McGraw Hill Edition.
NOTE: Latest Edition of Textbooks Maybe Used	
Web Resources	
	http://javabeginnerstutorial.com/core-java/
	http://www.tutorialspoint.com/java/
	http://beginnersbook.com/java-tutorial-for-beginners-with-examples/
	http://www.homeandlearn.co.uk/java/java.html
	http://www.journaldev.com/1877/servlet-tutorial-java (Unit V: Servlet API)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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 COURSE IV : JAVA PROGRAMMING PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	5	II	4	5	50	50	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. Working with Database using JDBC 12. 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 application that Utilize OOP and data structure concepts								

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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
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ELECTIVE COURSE-II A : OPTIMIZATION TECHNIQUES

Subject Code	L	T	P	Semester	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	II	4	4	25	75	100
Learning Objectives									
LO1	To apply various optimization techniques for decision making.								
LO2	To introduce the use of variables for formulating complex mathematical models in management, science and industrial applications								
Prerequisites: Mathematics Fundamentals									
Unit	Contents								No. of Hours
I	INTRODUCTION-LINEAR PROGRAMMING PROBLEM The Nature and Meaning of OR – Management – Applications of OR – Modeling in OR – General methods for solving OR models – Scope of OR. Linear Programming Problem: Formulation of LP problems – Graphical solution of LP problems – General formulation of LPP – Slack and Surplus variables – Standard form of LPP – Some important forms of LPP – Simplex Method I.								12
II	ASSIGNMENT PROBLEMS Assignment Problem: Mathematical formulation – Hungarian method – Unbalanced assignment problem – Various types								12
III	TRANSPORTATION PROBLEMS Transportation Model: Mathematical formulation – Matrix form – Methods for finding Initial Basic Feasible solution and Optimal solution – Degeneracy in Transportation Problems – Unbalanced Transportation Problem.								12
IV	SEQUENCING PROBLEMS AND QUEUING MODELS Sequencing Problems: Assumptions – Solutions to Sequencing Problems: Processing n jobs through 2 machines – Processing n jobs through 3 machines – Processing n jobs on m machines Queuing Models: Queuing System – Transient and Steady States – Kendall's Notation for representing Queuing Models – Various Models in Queuing System – Birth and Death Model								12
V	PERT AND CPM TECHNIQUES PERT and CPM Techniques: Basic Steps – Network Diagram representation – Rules for drawing Network Diagram – Labeling Fulkerson's I-J Rule – Time Estimates and Critical Path in								12

	NetworkAnalysis – Examples on optimum duration and minimum duration cost – PERT	
TOTAL		60
CO	Course Outcomes	
CO1	Formulate and solve Linear Programming Problem	
CO2	Analyze the usage of Sequencing Problems	
CO3	Apply PERT and CPM techniques to find the optimal solution	
CO4	Evaluate Queueing Models	
Textbooks		
➤	S.D.Sharma, “Operations Research”, Tenth Edition, Pearson, 2017	
Reference books		
➤	Hamdy A Taha, “Operations Research”, Ninth Edition, 2016	
➤	V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, “Resource Management Techniques”, Ninth Edition, A.R.Publications, 2015	

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO 1	3	3	3	3	3	3
CO2	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-2L-Low-1

ELECTIVE COURSE II B : DATA STRUCTURES

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	II	4	4	25	75	100
Learning Objectives									
LO1	To become familiar with the various data structures and their applications								

LO2	to increase the understanding of basic concepts of the design and use of algorithms	
Prerequisites:		
Unit	Contents	No. of Hours
I	Introduction and Overview: Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures. Arrays: 1 D Array – Memory allocation of an Array – Operation on Arrays – Application of Arrays – Multidimensional Arrays – 2 D Array – Sparse Matrices – 3 D and n – dimensional arrays	12
II	Linked Lists: Definition – Single Linked List – Representation of a Linked List in memory – Operations on a Single Linked List – Circular Linked List – Operations on a Double Linked List – Operations on Circular Double Linked List – Applications of Linked List – Sparse Matrix Manipulation – Polynomial Representation – Dynamic Storage Management – Memory Representation – Fixed Block Variable Block Storage.	12
III	Stacks : Definitions – Representation– Array Representation of Stacks – Linked List Representation of Stacks – Operations on Stacks – Application of Stacks – Evaluation of Arithmetic Expressions – Implementation of Recursion – Factorial Calculation Queue : Definition – Representation of Queues – Representation of Queues using an Array – Representation of a Queue using a Linked List – Various Queue Structures – Circular Queue – Dequeue – Priority Queue.	12
IV	Tables : Hash Tables – Hashing Techniques – Collision Resolution Techniques – Closed Hashing – Open Hashing. Trees: Definition-Representation of Binary Tree – Linear Representation of Binary Tree-Linked Representation of Binary Tree – Operation on a Binary Tree – Insertion – Deletion – Traversals Inorder – Preorder- Postorder – Merging together Two Binary Trees – Types of Binary Trees – Expression Tree – Binary Search Tree – Heap Tree – Threaded Binary Tree.	12
V	Sort: Sorting Techniques – Straight Insertion Sort – Straight Selection Sort –Bubble Sort –Quick Sort – Merge Sort. Searching – Linear Search Techniques – Linear Search with Array – Linear Search with Linked List – Binary Search. Graphs: Graph types – Representation of graphs – Operations of graphs –operations on linked list representations of graphs - operations on matrix representations of graphs.	12
TOTAL		60
THEORY 100%		
CO	Course Outcomes	
CO1	Outline the different fundamental concepts of data structures	
CO2	Make use of different memory representation for data storage and apply various operations	
CO3	Construct an algorithm for different data structure operations.	

CO4	Analysethedatastructures applications.
CO5	Discoversuitabletechniques to providesolutionforsolvingthe problems.
Textbooks	
➤	“Classic Data Structures” Debasis Samanta, PHI Learning Limited, New Delhi, 2009 Second Edition
ReferenceBooks	
1.	Seymour Lipschutz (1986),—TheoryandProblemsof DataStructuresl,TataMcGraw-HillEdition
2.	E.Horowitz,S.Sahni,S.Rajasekaran(1998),—ComputerAlgorithmsl,Galgotia Publications.
3.	RobertKruse,C.L.Tondo,Bruce Leung,—DataStructuresandProgramDesigninCl, SecondEdition,PrienticeHallPublications
NOTE:LatestEditionof TextbooksMaybeUsed	
WebResources	
1.	http://www.cs.sunysb.edu/~skiena/214/lectures/
2.	http://datastructures.itgo.com/graphs/dfsdfs.htm
3.	http://oopweb.com/Algorithms/Documents/PLDS210/VolumeFrames.html
4.	http://discuss.codechef.com/questions/48877/data-structures-and-algorithms
5.	http://code.tutsplus.com/tutorials/algorithms-and-data-structures--cms-20437
6.	https://www.tutorialspoint.com/data_structures_algorithms/insertion_sort_algorithm.htm (UnitIV:InsertionSorting)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	3	2	3	3	3
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	2
Weightage ofcoursecontributedtoeachPSO	15	14	11	15	15	13

S-Strong M-Medium L-Low

SKILL ENHANCEMENT COURSE II:PHPSCRIPTING PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	2	II	1	2	50	50	100

Learning Objectives		
LO1	To enable the student to understand, analyze and build dynamic web pages using PHP with MySQL database	
Prerequisites:		
	Contents	No. of Hours
	Exercises: 1. Control Structures 2. Working with Forms.	5
	3. String Manipulations 4. Arrays 5. Functions 6. Sorting	10
	7. Classes and Objects 8. Cookies and Sessions 9. Graphics	10
	10. Working with single table 11. Working with multiple tables	5
	TOTAL	30
CO	Course Outcomes	
CO1	Demonstrates simple programs using PHP and jQuery	
CO2	Apply the interface setup, styles & themes for the given application	
CO3	Analyze the problem and add necessary user interface components, multimedia components and web data source into the application	
CO4	Evaluate the results by implementing the correct techniques on the web form	
CO5	Construct web applications with the facilitated components in PHP and jQuery	
	Textbooks	
➤	Kevin Tatroe, Peter MacIntyre, Rasmus Lerdorf, "Programming PHP", O'Reilly Publications, Third Edition	
➤	Joel Murach, Ray Harris (2010), "PHP and MySQL", Shroff Publishers & Distributors	
	Reference Books	
1.	W. Jason Gilmore (2010), "Beginning PHP & MySQL", Apress	
2.	Larry Ullman (2008), "PHP 6 and MySQL 5", Pearson Education	

3.	JohnCoggeshall(2006),“PHP5”,PearsonEducation
4.	MichaleC.Glass(2004),“BeginningPHP,Apache, MySQLWebDevelopment”,Wiley DreamTechPress
5.	RobinNixon(2013),“LearningPHP,MySQL,JavaScript&CSS”,O,,Reilly,2 nd Edition

NOTE:LatestEditionof TextbooksMaybeUsed

WebResources

1.	http://www.w3schools.com/jquery/
2.	http://www.ccc.commnet.edu/faculty/sfreeman/cst%20250/jqueryNotes.pdf
3.	http://www.w3schools.com/php/
4.	http://www.tutorialspoint.com/php/
5.	http://www.tutorialspoint.com/mysql/

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	2
CO2	3	3	2	2	2	3
CO3	3	2	3	2	2	3
CO4	3	2	2	2	2	3
CO5	3	2	2	3	2	2
Weightage ofcoursecontributedtoeachPSO	15	11	11	12	11	13

SKILL ENHANCEMENT COURSE III:INTRODUCTION TO INTERNET

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

Learning Objectives

LO1	To acquire the knowledge of internet and its applications
LO2	To understand the format of the tags
LO3	To understand the tags and html document creation
LO4	To understand the table creation
LO5	To get the knowledge about the forms

Prerequisites:None		
UNIT NO	Contents	No. of Hours
I	Introduction to the Internet – Networking – Internet – Email – Resource sharing – Gopher– World Wide Web	6
II	Internet Technologies – Browsers - Introduction to HTML – History of HTML – HTMLdocuments	6
III	Headand BodySections – Designing thebodysection-Ordered and UnorderedLists	6
IV	TableHandling–DHTMLandStylesheets	6
V	Frames– AWebpage designproject–Forms	6
TOTAL		30
CO	Course Outcomes	
CO1	ExplainthebasicfunctionsofHTMLtags	
CO2	Createsimplewebpagesusing HTML	
CO3	Describetheconceptsoftables,framesandforms	
CO4	Createwebpagesusings,framesandforms	
CO5	Updateknowledge,learnanyfutureadvancedversionoflanguage	
Textbooks		
➤	C. Xavier, “World Wide Web Design with HTML”, Tata McGraw Hill publication,First Edition , 2000.	

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	2
CO2	3	3	2	2	2	3
CO3	3	2	3	2	2	3
CO4	3	2	2	2	2	3
CO5	3	2	2	3	2	2
Weightage of course contributed to each PSO	15	11	11	12	11	13

CORE COURSE V : PYTHON PROGRAMMING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	III	4	4	25	75	100
Learning Objectives									
LO 1	To provide knowledge on fundamentals of Python programming								
L O2	To have the ability to know the functions and modules								
L O3	To know the basics of file handling								
L O4	To understand object oriented concepts								
L O5	To know about exception and overloading concepts								
Prerequisites: Basic knowledge about programming concepts									
Unit	Contents								No. of Hours
I	<p>Basics of Python Programming: Features of Python – History of Python – The future of Python – Writing and Executing first Python Program – Literal Constants – Variables and Identifiers – Data types of Identifiers – Input Operation – Comments – Reserved Words – Indentation – Operators and Expressions – Expressions in Python – Operations on Strings – Other Data Types – Type Conversion.</p> <p>Decision Control Statements: Introduction – Selection/ Conditional Branching Statements – Basic Loop Structures – Nested Loops – The break statement – The continue statement – pass statement – The else statement used with loops.</p>								12
II	<p>Functions and Modules: Introduction – Function Definition – Function Call – Variable Scope and Lifetime – The return statement – Fruitful functions – Lambda functions or Anonymous functions – Function composition in Python – Documentation strings – Good Programming Practices – Recursive functions – Modules – Packages in Python – Standard Library Modules – Globals(), Locals() and Reload() – Function Redefinition.</p> <p>Python Strings: Introduction – Concatenating, Appending and Multiplying Strings – Strings are Immutable – String formatting operator – Built-in String methods and functions – Slice operation – ord() and chr() functions – in and not in operators – Comparing strings – Iterating string – Regular Expressions.</p>								12
III	<p>File Handling: Introduction – File Path – Types of Files – Opening and Closing Files – Reading and Writing files – File positions – Renaming and Deleting files – Directory methods.</p> <p>Data Structures: Sequence – Lists – Functional Programming – Tuple –</p>								12

	Sets – Dictionaries	
IV	<p>Classes and Objects: Introduction – Classes and Objects – Class method and self argument – The <code>__init__()</code> Method (The class constructor) – Class variables and object variables – The <code>__del__()</code> method – Other special methods – Public and Private data members – Private methods – Calling a class method from another class method – Built-in functions to check, get, set and delete class attributes – Built-in class attributes – Garbage collection – Class methods – Static methods.</p> <p>Inheritance: Introduction – Inheriting classes in Python – Types of Inheritance – Composition or Containership or Complex Objects – Abstract classes and Interfaces – Metaclass</p>	12
V	<p>Operator Overloading: Introduction – Implementing operator overloading – Reverse adding – Overriding <code>__getitem__()</code> and <code>__setitem__()</code> methods – Overriding the in Operator – Overloading the Miscellaneous functions – Overriding the <code>__call__()</code> method.</p> <p>Error and Exception Handling: Introduction to Errors and Exceptions – Handling Exceptions – Multiple Except Blocks – Multiple Exceptions in a Single Block – Except Block without Exception – The else Clause – Raising Exceptions – Instantiating Exceptions – Handling Exceptions in Invoked functions – Built-in and User-defined Exceptions – The finally Block – Pre-defined clean-up action – Re-raising Exception – Assertions in Python</p>	12
TOTAL		60
CO	Course Outcomes	
CO 1	Describe Object Oriented Programming Paradigm through Python Programming	
CO 2	Describe as systematic approach to design, organize, write and debug programs	
CO 3	Analyze the various data structures available in Python programming language and apply them in solving computational problems	
C O4	Develop proficiency in creating applications using the Python Programming Language	
C O5	Update knowledge to learn any future advanced version of language	
Textbooks		
	Reema Thareja, “Python Programming Using Problem Solving Approach”, Second Edition, Oxford University Press	
	Martin C. Brown, —PYTHON: The Complete Reference, McGraw-Hill, 2001	
Reference Books		
	Mark Summerfield. —Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009	
	Wesley J Chun, —Core Python Applications Programming, Prentice Hall, 2012	

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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 COURSE VI : PYTHON PROGRAMMING PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	4	III	4	4	50	50	100
Learning Objectives									
LO1	To get the knowledge to write the programs in Python								
LO2	To understand arrays, list and tuples								
LO3	To understand different functions used in Python								
LO4	To understand about package and module								
LO5	To understand the exception handling								
Prerequisites:									
Contents									
1. Simple Programs 2. Programs using Control Structures 3. Programs using Sequences 4. Programs using Strings 5. Programs using Lists 6. Programs using Tuples 7. Programs using Files 8. Programs for Exception Handling 9. Programs using Functions 10. Programs to demonstrate Scope of Variables 11. Programs using Recursion 12. Programs using Classes 13. Programs using Inheritance									
CO	Course Outcomes								

CO1	Describe the basics and syntax of Python language
CO2	Write programs for simple problems using Python language
CO3	Developing programming skill in handling advanced concepts in Python
CO4	Update knowledge to learn any future advanced version of language
CO5	Develop programming skill in handling advanced concepts in Python

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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 COURSE III A :DIGITAL LOGIC FUNDAMENTALS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	III	4	4	25	75	100
Learning Objectives									
LO 1	To provide knowledge on fundamentals of number system								
LO 2	To have the ability to know the logic gates								
LO 3	To know the basics of combinational logic analysis								
LO 4	To understand latches and flip-flops								
LO 5	To know about memory and storage								
Prerequisites: None									
Unit	Contents								No. of Hours
I	NUMBER SYSTEM AND CODES: Decimal Numbers, Binary Numbers, Decimal to Binary Conversions, Binary Arithmetic, 1's and 2's complements of Binary Numbers, Signed Numbers, Arithmetic Operations with Signed numbers, Hexadecimal Numbers, Octal Numbers, Digital Codes, Error Detection Codes								12
II	LOGIC GATES: The Inverter, The AND gate, The OR gate, The NAND gate, NOR gate, The Exclusive-OR gate and Exclusive-								12

	NOR gate; Boolean Algebra and Logic Simplification – Boolean Operations and Expressions, Laws and Rules, DeMorgan's Theorems, Boolean Expressions and Truth Tables, The Karnaugh Map, SOP minimizations	
III	COMBINATIONAL LOGIC ANALYSIS: Basic combinational Logic Circuits, Implementing Combinational Logic, The Universal Property of NAND and NOR Gates. Functions of Combinational Logic - Basic Adder, Parallel Binary Adders, Comparators, Decoders, Encoders, Code Converters, Multiplexers, Parity Generator/Checkers	12
IV	LATCHES AND FLIP-FLOPS: Latches, Edge Triggered Flip-Flops, Flip-Flop Operating characteristics, Flip-Flop Applications, Registers, Counters	12
V	MEMORY AND STORAGE: Memory Basics, The RAM, The ROM, Programmable ROMs, The Flash Memory, Memory Expansion, Special Types of Memories, Magnetic and Optical Storage	12
TOTAL		60
CO	Course Outcomes	
	The student will be able to:	
CO 1	Identify the logic gates and their functionality	
CO 2	Perform number conversions from one system to another system	
CO 3	Design basic electronic circuits (combinational circuits)	
CO 4	Perform a comparative analysis of the components of different memory units	
CO 5	Perform number conversions	
Textbooks		
	Floyd, Thomas L, "Digital Computer Fundamentals", 10 th Edition, University Book Stall, 1997	
Reference Books		
	Malvino, Paul Albert and Leach, Donald P, "Digital Principles and Applications", 4 th Edition, TMH, 2000	
	Malvino, Paul Albert and Leach, Donald P, "Digital Computer Fundamentals", 3 rd Edition, TMH, 1995	
	Bartee, Thomas C, "Digital Computer Fundamentals", 6 th Edition, TMH, 1995	

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

ELECTIVE COURSE III B : COMPUTER ARCHITECTURE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	III	4	4	25	75	100
Learning Objectives									
LO 1	To impart basic concepts of computer architecture and organization								
L O2	To explain key skills of constructing cost-effective computer systems								
L O3	To familiarize the basic CPU organization								
L O4	To help students in understanding various memory devices								
L O5	To facilitate students in learning IO communication								
Prerequisites: None									
Unit	Contents								No. of Hours
I	STRUCTURE OF COMPUTERS: Computer types, Functional units, Basic operational concepts, Von- Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes								12
II	BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC								12
III	REGISTER TRANSFER AND MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit. MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit								12
IV	MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID								12
V	INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Interprocessor Communication and Synchronization, Cache Coherence								12

TOTAL		60
CO	Course Outcomes	
	The student will be able to:	
CO 1	Identify various components of computer and their interconnection	
CO 2	Identify basic components and design of the CPU: the ALU and control unit	
CO 3	Compare and select various Memory devices as per requirement	
C O4	Compare various types of IO mapping techniques	
C O5	Critique the performance issues of cache memory and virtual memory	
Textbooks		
	M.Moris Mano(2006), Computer System Architecture, 3rd edition, Pearson/PHI, India	
Reference Books		
	Carl Hamacher, Zvonks Vranesic, Safea Zaky(2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India	
	William Stallings(2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersey	
	Anrew S. Tanenbaum(2006), Structured Computer Organization, 5th edition, Pearson Education Inc	
	John P. Hayes(1998), Computer Architecture and Organization, 3rd edition, Tata McGraw Hill	

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

SKILL ENHANCEMENT COURSE IV :HTML & WEB DESIGNING PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	2	III	2	2	50	50	100
Learning Objectives									
LO1	To get the knowledge about HTML tags								
LO2	To understand the usage of ordered and unordered list								

LO3	To understand the usage of links
LO4	To understand the usage of tables
LO5	To understand the usage of frames
Prerequisites: None	
Contents	
<p>1. Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.</p> <p>2. Create a page to show different character formatting (B, I, U, SUB, SUP) tags.</p> <p>3. Apply various colors to suitably distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.</p> <p>4. Write a HTML code to create a web page with pink color background and display moving message in red color.</p> <p>5. Create a web page, showing an ordered list of all second semester courses</p> <p>6. Create a web page, showing an unordered list of names of all the Diploma Programmes (Branches) in your institution.</p> <p>7. Write a program using html to design a Bio-Data.</p> <p>8. Create a web page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page.</p> <p>9. Use tables to provide layout to your HTML page describing your college infrastructure.</p> <p>10. Create a web page which divides the page in two equal frames and place the audio and video clips in frame-1 and frame-2 respectively</p>	
CO	Course Outcomes
CO1	Describe the basics of HTML and web design
CO2	The students able to understand the usage of list
CO3	The students able to understand the usage of links
CO4	The students able to understand the usage of tables
CO5	The students able to understand the usage of frames

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

CORE COURSE VII : OPERATING SYSTEM

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	IV	4	4	25	75	100
Learning Objectives									
LO 1	To impart basic concepts of Operating system								
LO 2	To explain about process concept, scheduling and synchronization								
LO 3	To understand the deadlock and memory management								
LO 4	To help students to understand the file system								
LO 5	To understand the UNIX operating system operations								
Prerequisites: None									
Unit	Contents								No. of Hours
I	Introduction: Operating system - Computer System Organization-Operating System Structure – Operations – Process Management – Memory Management – Storage Management – Protection and Security System structures: Operating system services – user operating system interface – system calls – types of system calls – System programs - operating system structure.								12
II	Process Concept: Process Scheduling – Operations on Processes – Inter Process Communication Process Scheduling: Basic concepts - Scheduling Criteria – Scheduling Algorithms Synchronization: Background – Critical Section Problem – Mutex locks - Semaphores – Classic problems of synchronization								12
III	Deadlocks: System Model – Deadlock Characterization - Methods of Handling Deadlocks – Deadlock prevention – Deadlock Avoidance Memory Management Strategies: Background – Swapping - Contiguous Memory allocation – Segmentation – Paging Virtual Memory Management: Background – Demand Paging – Page replacement								12
IV	File System: File Concept – Access Methods – Directory and Disk Structure– Protection. Implementing File System: File System Structure – File system Implementation – Directory Implementation – Allocation Methods Mass storage structure: Overview of mass storage structure – Disk structure – disk scheduling								12
V	UNIX : The filesystem: the file-The HOME variable-pwd-cd-mkdir-rmdir-absolute and relative pathnames-ls-The Unix filesystem. Handling ordinary files: cat-cp-rm-mv-more-lp-file-wc-od-cmp-comm-diff-gzip-gunzip-tar-zip-unzip. Basic File attributes : ls options-File ownership-file permission-chmod-directory permission-changing file ownership. Essential Shell programming: Shell								12

	scripts-read-using command line arguments-exit-The logical operators-if conditional-test-case-expr-\$0 calling a script by different names – while-for-set and shift- the here document- trap – set-x – sample validations and data entryscripts	
TOTAL		60
CO	Course Outcomes	
	The student will be able to:	
CO 1	Describe the basic concepts of operating system	
CO 2	Illustrate how UNIX implements File System	
CO 3	Analyze the CPU Scheduling Algorithms	
CO 4	Compare the Memory Management Strategies	
CO 5	Explore several tools to solve process Synchronization problems	
Textbooks		
	Abraham Silber Schatz, Peter Baer Galvin, Greg Gagne, "Operating System Concepts", John Willy & Sons (Asia), NINTH Edition, 2014	
	Sumitabha Das. "Unix Concepts and Applications", Tata McGraw Hill Publications, Third Edition., 2017	
Reference Books		
	Gary J. Nutt, "Operating Systems", Pearson Education Asia, 2 nd Edition., 2012	
	H.M. Deital, "Operating Systems", Addison-Wesley Publishing Company, Second Edition	

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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 COURSE VIII :MOBILE APPLICATION DEVELOPMENT PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	4	IV	4	4	50	50	100
Learning Objectives									
LO1	To get the knowledge to write the programs using android programming								
LO2	To understand mobile applications								

LO3	To understand the basic concepts of android studio
LO4	To understand the application development methods
LO5	To understand the deployment methods
Prerequisites: None	
Contents	
1. LayoutwithFlexbox 2. BreakingdownaUIintoComponents 3. Dealingwiththe Keyboard 4. ListingDatawiththe FlatList 5. PersistentStorage 6. DealingwithRemoteImagesonSlow Networks 7. PlayingwithAnimations 8. ComplexNavigationStructure 9. BuildaSwiperComponent 10. MakingaDeclarativeAPIforanImperativeAPI	
CO	Course Outcomes
CO1	Applythebasicelements
CO2	Implementingthecomponents
CO3	UsingthePersistent storage
CO4	PlayingwithAimations
CO5	DisplayingRemoteImages and BuildingAppwithAPI

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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 IV A :INTERNET OF THINGS AND ITS APPLICATIONS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	IV	4	4	25	75	100

Course Objective		
C1	Use of Devices, Gateways and Data Management in IoT.	
C2	Design IoT applications in different domain and be able to analyze their performance	
C3	Implement basic IoT applications on embedded platform	
C4	To gain knowledge on Industry Internet of Things	
C5	To Learn about the privacy and Security issues in IoT	
UNIT	Details	No. of Hours
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.	12
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.	12
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	12
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 GasIndustry, Opinions on IoT Application and Value for Industry, Home Management	12
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from	12

	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	
	Total	60
Course Outcomes		PO
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
4	Perform analytics on data streams.	PO4, PO5, PO6
5	Learn NoSQL databases and management.	PO3, PO8
Text Book		
1	Vijay Madisetti and Arshdeep Bahga, "Internet of Things: (A Hands-on Approach)", Universities Press (INDIA) Private Limited 2014, 1st Edition.	
Reference Books		
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,.	
3.	WaltenegusDargie, ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice" 4..CunoPfister, "Getting Started with the Internet of Things", O'Reilly Media 2011	
Web Resources		
1.	https://www.simplilearn.com	
2.	https://www.javatpoint.com	
3.	https://www.w3schools.com	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						

CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong M-Medium L-Low

ELECTIVE IV B : HUMAN COMPUTER INTERACTION

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	IV	4	4	25	75	100
Course Objective									
C1	To learn about the foundations of Human Computer Interaction.								
C2	To learn the design and software process technologies.								
C3	To learn HCI models and theories.								
C4	To learn Mobile Ecosystem.								
C5	To learn the various types of Web Interface Design.								
UNIT	Details								No. of Hours
I	FOUNDATIONS OF HCI : <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 								12
II	DESIGN & SOFTWARE PROCESS: <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 								12
III	MODELS AND THEORIES: <ul style="list-style-type: none"> • HCI Models : Cognitive models:- Socio-Organizational issues and stakeholder requirements Communication and collaboration models-Hypertext, Multimedia and WWW. 								12

IV	Mobile HCI: <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 	12
V	WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies	12
Total		60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the fundamentals of HCI.	PO1
2	Understand the design and software process technologies.	PO1, PO2
3	Understand HCI models and theories.	PO4, PO6
4	Understand Mobile Ecosystem, types of Mobile Applications, mobile Architecture and design.	PO4, PO5, PO6
5	Understand the various types of Web Interface Design.	PO3, PO8
Text Book		
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 Interfacesl, 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		
1.	https://www.interaction-design.org/literature/topics/human-computer-interaction	
2.	https://link.springer.com/10.1007/978-0-387-39940-9_192	
3.	https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	S	S						
CO 3				S		S		

CO 4				S	S	S		
CO 5			S					S

S-Strong M-Medium L-Low

SKILL ENHANCEMENT COURSE V :MULTIMEDIA USING REACT PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	2	IV	2	2	50	50	100

Learning Objectives

LO1	Toget the knowledge to write the programs using React
LO2	To understand the usage of functions
LO3	To understand the usage of mapping
LO4	To understand the application of various components
LO5	To understand the usage of audio and video players

Prerequisites: None

Contents

1. Create an image gallery component that displays a list of images.
2. Create a video player component that can play, pause, and control the volume of a video.
3. Create an audio player component with play, pause, and volume controls.
4. Create a component that allows users to upload an image and preview it before submission.
5. Create a component that visualizes audio frequencies using the Web Audio API.
6. Create an image slider that automatically transitions between images.
7. Create a Picture-in-Picture (PiP) video player that allows users to watch a video in a small overlay window while continuing to browse the page.
8. Create a component that allows users to draw annotations on an image.
9. Create an interactive map component using a mapping library like Leaflet.
10. Create a 3D model viewer using Three.js and React.

CO	Course Outcomes
CO1	Applythebasicelements
CO2	Implementingthecomponents
CO3	Usingtheaudio and video players
CO4	PlayingwithAnimations
CO5	Displayingvarious applications with React

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

CORE COURSE IX: DATABASE SYSTEMS

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

Learning Objectives

LO1	To understand the basic DBMS models and architecture
LO2	To learn how to query and normalize the database.
LO3	To study the data base design, transaction Processing and Management and Security Issues.

Prerequisites: base knowledge about data and information

Unit	Contents	No. of Hours
I	Introduction to Databases: Introduction – Characteristics of the Database Approach – Actors on the Scene – Workers behind the scene – Advantages of using DBMS Approach. Overview of database and Architectures: Data Models, Schemas, and Instances – Three-schema Architecture and Data Independence – Database languages & Interfaces – Database System Environment– Centralized & Client Server Architecture for DBMS - Classification of DBMS.	15
II	Basic Relational Model: Relational Model Concepts – Relational Model Constraints and Relational Database Schemas – Update Operations, Tractions, Dealing with Constraint Violations – Formal Relational Languages: Unary Relational Operations: SELECT and PROJECT – Relational Algebra Operations from Set Theory – Binary Relational Operations: JOIN and DIVISION – Examples of Queries in Relational Algebra.	15

III	Conceptual Data Modeling using the ER Model: Using High-Level Conceptual Data Models for Database Design – An example DB application – Entity Types, Entity Sets, Attributes, and Keys – Relationship Types, Relationship sets, Roles, and Structural Constraints – Weak entity types – Example- Mapping a Conceptual Design into Logical Design: Relational Database Design using ER-Relational Mapping – Mapping EER Model Constructs to Relations	15
IV	Functional Dependencies and Normalization for Relational Database: Functional Dependencies – Definition of Functional Dependency – Normal Forms based on Primary Keys – Normalization of Relations – First Normal Form – Second Normal Form – Third Normal Form – BCNF- Fourth Normal Form- Fifth Normal Form.	15
V	SQL: The Relational Database Standard: Data definition, Constraints, and schema changes in SQL – Basic Queries in SQL – More complex SQL Queries – Insert, delete and update statements in SQL – Views in SQL. PL/SQL: Introduction to PL/SQL – More on PL/SQL – Error Handling in PL/SQL – Oracle’s Named Exception Handlers – Stored Procedures and Functions – Execution of Procedures and Functions – Advantages – Procedures Vs. Functions – Syntax for Creating Procedures and Functions – Deleting a Stored Procedure or Function – Oracle Packages – Database Triggers – Types Of Triggers – Deleting a Trigger – Raise-Application Error Procedure	15
TOTAL		75
THEORY 100%		
CO	Course Outcomes	
CO1	Outline the fundamental RDBMS concepts and PL/SQL	
CO2	Apply database operations, mapping, normalization, SQL and PL/SQL	
CO3	Analyze the requirements to implement relational database concepts	
CO4	Evaluate the database based on various models and normalization.	
CO5	Design and construct normalized tables and manipulate it effectively using SQL and PL/SQL database objects	
Textbooks		
➤	Ramez Elmasri, Shamkant B. Navathe (2014), —Database Systems, Sixth edition, Pearson Education, New Delhi.	

➤	Ivan Bayross (2003 Reprint), SQL, PL/SQL-The Programming Language of Oracle, Second Revised Edition, BPB Publications, New Delhi.
Reference Books	
1.	Abraham Silberschatz, Henry F.Korth, S.Sudarshan, Database System Concepts, Tata McGraw Hill Publication, 4 th Edition.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://srikanthtechnologies.com/books/orabook/ch1.pdf
2.	Http://www.tmv.edu.in/pdf/Distance_education/BCA%20Books/BCA%20IV%20SEM/BCA-428%20Oracle.pdf
3.	http://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
4.	http://ecomputernotes.com/database-system/rdbms
5.	http://www.mithunashok.com/2011/04/basics-of-rdbms.html

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	3
CO2	3	3	2	3	3	3
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	2
Weightage of course contributed to each PSO	15	14	11	15	15	13

CORE COURSE X :MACHINE LEARNING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	5	0	0	V	4	5	25	75	100
Learning Objectives									
LO1	To comprehend the raw data and to design the same with the appropriate machine learning algorithms for a meaningful representation of data..								

Unit	Contents	No. of Hours
I	Introduction: Machine Learning – Examples of Machine Learning Applications. Supervised Learning: Learning a Class from Examples – Vapnik-Chervonenkis (VC) Dimension – Probably Approximately Correct (PAC) Learning – Noise – Learning Multiple Classes – Regression – Model Selection and Generalization – Dimensions of a Supervised Machine Learning Algorithm. Bayesian Decision Theory: Introduction – Classification – Losses and Risks – Discriminant Functions – Association Rules.	15
II	Parametric Methods: Maximum Likelihood Estimation – Evaluating an Estimator: Bias and Variance – The Bayes’ Estimator – Parametric Classification – Regression – Tuning Model Complexity: Bias/Variance Dilemma – Model Selection Procedures. Nonparametric Methods: Nonparametric Density Estimation – Generalization to Multivariate Data – Nonparametric Classification – Condensed Nearest Neighbor – Distance-Based Classification – Outlier Detection – Nonparametric Regression: Smoothing Models	15
III	Linear Discrimination – Generalizing the Linear Model – Geometry of the Linear Discriminant – Pairwise Separation – Gradient Descent – Logistic Discrimination – Discrimination by Regression – Learning to Rank. Multilayer Perceptrons: The Perceptron – Training a Perceptron – Learning Boolean Functions – Multilayer Perceptrons – MLP as a Universal Approximator – Backpropagation Algorithm	15
IV	Combining Multiple Learners: Generating Diverse Learners – Model Combination Schemes – Voting – Bagging – Boosting – Stacked Generalization – Fine-Tuning an Ensemble – Cascading Reinforcement Learning: Elements of Reinforcement Learning – Model-Based Learning – Temporal Difference Learning – Generalization – Partially Observable States	15
V	Machine Learning with Python: Data Pre-processing, Analysis & Visualization - Training Data and Test Data – Techniques – Algorithms: List of Common Machine Learning Algorithms- Decision Tree Algorithm- Naïve Bayes Algorithm - K-Means-Random Forest- Dimensionality Reduction Algorithm- Boosting Algorithms – Applications: Social Media-Refinement of Search Engine Results- Product Recommendations-Detection of Online frauds.	15
TOTAL		75
CO	Course Outcomes	
CO1	Outline the importance of machine learning in terms of designing intelligent machines	
CO2	Identify suitable machine learning techniques for the real time applications	
CO3	Analyze the theoretical concepts and how they relate to the practical aspects of machine learning.	

CO4	Assess the significance of principles, algorithms and applications of machine learning through a hands-on approach
CO5	Compare the machine learning techniques with respective functionality
Textbooks	
➤	Ethem Alpaydın, "Introduction to Machine Learning" Third Edition, MIT, 2014. (Unit I – Unit IV) https://www.tutorialspoint.com/machine_learning_with_python/machine_learning_with_python_tutorial.pdf (Unit V: Machine learning with python tutorial)
Reference Books	
1	Bertt Lantz, "Machine Learning with R," Packt Publishing, 2013
2	Jason Bell, "Machine Learning: Hands-On for Developers and Technical Professionals," Wiley Publication, 2015.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
	1. https://www.expertsystem.com/machine-learning-definition/
	2. https://searchenterpriseai.techtarget.com/definition/machine-learning-ML

MAPPING TABLE						
CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	3	3	3	3	2
CO3	2	2	3	3	3	3
CO4	3	2	2	3	2	3
CO5	3	3	3	2	3	3
WeightageofcoursecontributedtoeachPSO	13	12	13	13	13	13

CORE COURSE XI :DATABASE SYSTEMS PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	5	V	4	5	50	50	100

Learning Objectives	
LO1	The primary Objective of this paper is to learn and implement SQL& PL/SQL.
Prerequisites:	
Contents	

SQL:

1. DDL Commands
2. DML Commands
3. DCL Commands
4. SQL Built-in functions
5. Using Sub Queries

PL/SQL:

6. Simple programs using PL/SQL
7. Procedures
8. User-defined functions
9. Exception Handling
10. Triggers

CO	Course Outcomes
CO1	Choose appropriate SQL queries and PL/SQL blocks for the database.
CO2	Implement SQL and PL/SQL blocks for the given problem effectively.
CO3	Analyse the problem and Exceptions using queries and PL/SQL blocks.
CO4	Validate the database for normalization using SQL and PL/SQL blocks.
CO5	Design Database tables, create Procedures, user-defined functions and Triggers.

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	2	3	3	2
CO2	3	3	2	3	2	3
CO3	2	3	3	3	2	3
CO4	2	3	2	3	3	3
CO5	2	2	2	3	3	2
Weightage of course contributed to each PSO	11	13	11	15	13	13

CORE COURSE XII :MACHINE LEARNING PRACTICAL

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	5	V	4	5	50	50	100
Learning Objectives									
LO1	Toget the knowledge to write the programs for machine learning								
LO2	To understand the usage of functions								

LO3	To understand the usage of plotting methods
LO4	To understand the application of various components and data set
LO5	To understand the usage of classification and segmentation
Prerequisites: None	
Contents	
<ol style="list-style-type: none"> 1. Write a Python program to load data from a given csv file into a dataframe and print the shape of the data, type of the data and first 3 rows. 2. Write a Python program to get the number of observations, missing values and nan values from a dataset. 3. Write a Python program to view basic statistical details like percentile, mean, std etc. of a given dataset. 4. Write a Python program to split a dataset into its attributes (X) and labels (y). 5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets. 6. Write a program to implement k-Nearest Neighbour algorithm to classify a data set. Print both correct and wrong predictions. 7. Implement linear regression with one variable on any dataset. 8. Represent a scatter plot using any two variables on a dataset. 9. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample. 10. Apply K-Means clustering on a dataset. 	
CO	Course Outcomes
CO1	Apply the basics of machine learning
CO2	Implementing the components with dataset
CO3	Using different classifiers
CO4	Applying different segmentation methods
CO5	Displaying various applications with Python

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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 V A :COMPUTER NETWORKS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	V	3	4	25	75	100
Learning Objectives									
LO1	This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks								
LO2	To familiarize the student with the basic taxonomy and terminology of the computer.								
Prerequisites:									
Unit	Contents								No. of Hours
I	Introduction: Data Communication-Networks: Distributed Processing-Network Criteria Physical Structures –Network Models-Categories of Network-Internetwork - The Internet Protocols and Standards – Network Models: Layers in the OSI Model - TCP/IP Protocol Suite.								12
II	Data and Signals: Analog and Digital Data - Analog and Digital Signals – Performance - Digital Transmission: Transmission Modes – Multiplexing: FDM – WDM - Synchronous TDM -Statistical TDM - Transmission Media: Guided media - Unguided Media.								12
III	Switching: Circuit Switched Networks - Datagram Networks-Virtual Circuit Network - Error Detection and Correction: Introduction - Block Coding - Linear Block Codes - Cyclic Codes: Cyclic Redundancy Check - Checksum. Data Link Control: Framing - Flow Control and Error Control - Noiseless Channel: Stop-and-wait Protocol.								12
IV	Wired LANs: Standard Ethernet-GIGABIT Ethernet-Wireless LAN: Bluetooth Connecting LANs: Connecting Devices: Passive Hubs-Repeaters-Active Hubs-Bridges-Two Layer Switches-Routers-Three layer Switches-Gateway-Network Layer: Internet Protocol: IPv4 –Ipv6-Transition from IPv4 to IPv6.								12
V	Network Layer: Delivery, Forwarding and Routing- Unicast Routing Protocols: Distance Vector Routing-Link state routing- Future & Current Trends in Computer Networks: 5G Network: Salient Features-Technology-Applications-Advanced Features-Advantages & Disadvantages-Internet of Things: key Features - Advantages & Disadvantages-IOT Hardware- IOT Technology and Protocols-IOT Common Uses-Applications-WiFi-WiMax Lifi- Lifi vs Wifi.								12
TOTAL									60
THEORY 20% & PROBLEM 80%									

CO	Course Outcomes
CO1	Understand the fundamental concepts of computer networks and its application areas
CO2	Identify and use various networking techniques and components to establish networking connection and transmission
CO3	Analyze the services performed by different network layers and recent advancements in networking
CO4	Compare various networking models, layers, protocols and technologies.
CO5	Select the appropriate networking mechanisms to build a reliable network
Textbooks	
➤	Behrouz and Forouzan,(2006), Data Communication and Networkingl, 4th Edition, TMH.
➤	Ajit Pal,(2014), Data Communication and Computer Networks, PHI.
Reference Books	
1.	Jean Walrand (1998), —Communication Networks,Second Editionl, TataMcGraw Hill.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://www.tutorialspoint.com/data_communication_computer_network/
2.	http://www.slideshare.net/zafar_ayub/data-communication-and-network-11903853
3.	http://www.freotechbooks.com/data-communication-and-networks-f31.html

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	2	3	3	2
CO2	3	3	2	3	3	2
CO3	3	3	3	3	3	2
CO4	3	3	2	3	3	2
CO5	3	3	2	3	3	2
Weightage ofcoursecontributedtoeachPSO	15	14	11	15	15	10

ELECTIVE V B: DATA MINING

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

Learning Objectives

LO1	To identify the underlying concepts and the fundamental data mining methodologies with the ability to formulate and solve problems	
Prerequisites: None		
Unit	Contents	No. of Hours
I	Introduction: Data Mining – Kinds of Data and Patterns to be Mined – Technologies used –Kinds of Applications are Targeted - Major Issues –Data objects and Attribute types – Basic statistical Descriptions of Data- Data Preprocessing : Data Cleaning – Data Integration - Data Reduction - Data Transformation.	12
II	Association Rules Mining: Introduction – Frequent Itemset Mining Methods: Apriori Algorithm-Generating Association Rules from Frequent Itemsets-Improving the efficiency of Apriori-A Pattern –Growth Approach for mining Frequent Itemsets-Pattern Evaluation Methods.	12
III	Classification: Introduction –Basic concepts – Logistic regression - Decision tree induction–Bayesian classification, Rule–based classification-Model Evaluation and selection.	12
IV	Cluster Analysis: Introduction-Requirements for Cluster Analysis - Partitioning Methods: The K-Means method - Hierarchical Method: Agglomerative method - Density based methods: DBSCAN- Evaluation of Clustering: Determining the Number of Clusters – Measuring Clustering Quality.	12
V	Outlier Detection: Outliers and Outlier Analysis – Outlier Detection Methods - Data Visualization: Pixel-oriented visualization – Geometric Projectionvisualization technique- Icon-based-Hierarchical visualization-Visualizing complex data and relations.	12
TOTAL		60
CO	Course Outcomes	
CO1	Outline the fundamentals and the principles of Data Mining	
CO2	Apply suitable different preprocessing for data mining	
CO3	Classify data-mining techniques based on the different applications	
CO4	Analyze the various data mining algorithms with respect to functionality	
CO5	Recommend appropriate data models for data mining techniques to solve real world problems	
Textbooks		
➤	Jiawei Han, Micheline Kamber, Jian Pei, “Data Mining concepts and techniques”, 3 rd Edition, Elsevier publication, 2012.	

Reference Books	
1.	Ian H. Witten and Eibe Frank, (2005), “Data Mining: Practical Machine Learning Tools and Techniques (Second Edition)”, Morgan Kaufmann.
2.	Arun K Pujari, “Data Mining Techniques”, 10 impression, University Press, 2008.
3.	Daniel T. Larose , Chantal D. Larose, "Data mining and Predictive analytics," Second Ed., Wiley Publication, 2015.
4.	G.K. Gupta, “Introduction to Data mining with case studies”, 2 nd Edition, PHI Private limited, New Delhi, 2011.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://csed.sggs.ac.in/csed/sites/default/files/WEKA%20Explorer%20Tutorial.pdf
2.	https://www.cs.auckland.ac.nz/courses/compsci367s1c/tutorials/IntroductionToWeka.pdf

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	2	2	3	3
CO2	3	3	2	3	3	2
CO3	2	3	3	2	3	3
CO4	3	3	2	2	3	3
CO5	3	3	2	2	3	3
Weightage of course contributed to each PSO	13	14	11	11	15	14

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TIVE VIA :CRYPTOGRAPHY & NETWORK SECURITY

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	V	3	4	25	75	100
Learning Objectives									
LO1	To understand the fundamentals of Cryptography								
LO2	To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.								
LO3	To understand the various key distribution and management schemes.								
LO4	To understand how to deploy encryption techniques to secure data in transit across data networks								
LO5	To design security applications in the field of Information technology								
UNIT	Contents								No. Of. Hours

I	Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.	12
II	Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Monoalphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography	12
III	Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES – RSA: The RSA algorithm.	12
IV	Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. Web Security: SecureSocket Layer and Transport Layer Security – Secure Electronic Transaction.	12
V	Intruders – Malicious software – Firewalls.	12
TOTAL HOURS		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Apply the different cryptographic operations of public key cryptography	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Apply the various Authentication schemes to simulate different applications.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand various Security practices and System security standards	PO1, PO2, PO3, PO4, PO5, PO6
Textbooks		
1	William Stallings , “Cryptography and Network Security Principles and Practices”.	
Reference Books		
1.	Behrouz A. Foruzan , “Cryptography and Network Security”, Tata McGraw-Hill, 2007.	
2	AtulKahate , “ <i>Cryptography and Network Security</i> ”, Second Edition, 2003, TMH.	
3	M.V. Arun Kumar , “ <i>NetworkSecurity</i> ”, 2011, First Edition, USP.	
Web Resources		
1	https://www.tutorialspoint.com/cryptography/	
2	https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	2	3	2
CO 2	3	2	3	2	3	3
CO 3	3	3	3	2	3	3
CO 4	2	3	3	3	2	3
CO 5	3	2	3	3	3	3
Weightage of course contributed to each PSO	14	13	15	12	14	14

ELECTIVE VI B :ARTIFICIAL INTELLIGENCE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	V	3	4	25	75	100
Course Objective									
C1	To learn various concepts of AI Techniques.								
C2	To learn various Search Algorithm in AI.								
C3	To learn probabilistic reasoning and models in AI.								
C4	To learn about Markov Decision Process.								
C5	To learn various type of Reinforcement learning.								
UNIT	Details								No. of Hours
I	Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree								12
II	Search Algorithms : Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search								12
III	Probabilistic Reasoning : Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.								12
IV	Markov Decision process : MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable								12

	MDPs.	
V	Reinforcement Learning : Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning	12
Total		60
Course Outcomes		Programme Outcome
CO	On completion of this course, students will	
1	Understand the various concepts of AI Techniques.	PO1
2	Understand various Search Algorithm in AI.	PO1, PO2
3	Understand probabilistic reasoning and models in AI.	PO4, PO6
4	Understand Markov Decision Process.	PO4, PO5, PO6
5	Understand various type of Reinforcement learning Techniques.	PO3, PO8
Text Book		
1	Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 3rd Edition, Prentice Hall.	
	Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill	
Reference Books		
1.	Trivedi, M.C., "A Classical Approach to Artificial Intelligence", Khanna Publishing House, Delhi.	
2.	Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011	
3.	David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010	
Web Resources		
1.	NPTEL&MOOCcoursestitledArtificialIntelligenceandExpertSystems	
2.	https://nptel.ac.in/courses/106106140/	
3.	https://nptel.ac.in/courses/106106126/	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	S	S						
CO 3				S		S		
CO 4				S	S	S		
CO 5			S					S

S-Strong M-Medium L-Low

CORE COURSE XIII :SOFTWARE ENGINEERING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	5	0	0	VI	4	5	25	75	100
Learning Objectives									
LO1	This paper familiarizes the students about the processes, forms, tasks, techniques and tools involved in Software Engineering								
LO2	To use the necessary for software engineering practice.								
Prerequisites:									
Unit	Contents								No. of Hours
I	Introduction to Software Engineering: Definition - The changing nature of software - Software Myths - Terminologies - Role of Management in Software Development - Software Life Cycle Models: The Waterfall Model - Increment Process Model - Evolutionary Process Model - The Unified Process.								15
II	Software Requirements Analysis and Specifications: Requirements Engineering - Type of Requirements - Feasibility Studies - Requirements Elicitation - Requirements Analysis - Requirements Documentation - Requirements Validation.								15
III	Software Project Planning: Size Estimation - Cost Estimation - The Constructive Cost Model (COCOMO) - COCOMO II - The Putnam Resource Allocation Model - Software Risk Management - Software Design: Definition - Modularity - Strategy of Design - Function Oriented Design.								15
IV	Software Testing: A Strategic Approach to Software Testing - Terminologies - Functional Testing - Structural Testing - Levels of Testing - Validation Testing - Testing Tools.								15
V	Software Reliability: Basic Concepts - Software Quality - McCall Software Quality Model - Boehm Software Quality Model - Capability Maturity Model - Software Maintenance: Definition - Process - Models - Configuration Management -Documentation.								15
TOTAL								75	
THEORY & PROBLEM									
CO	Course Outcomes								

CO1	Define the basic terminologies involved in the entire software developmental life cycle
CO2	Identify suitable models, techniques and tools for the development of a software product
CO3	Apply software engineering perspective through requirements analysis, software design and construction, verification, and validation to develop solutions to modern problems
CO4	Compare and contrast different process, cost, quality models and testing techniques
CO5	Estimate the project cost using suitable cost estimation models, rate the software risks and evaluate management strategies for effective software development
Textbooks	
➤	K.K Agarwal, Yogesh Singh (2009), —Software Engineering, 3 rd Edition, New Age International Publishers
Reference Books	
1.	Roger S. Pressman, —Software Engineering – A Practitioners Approach, 5 th Edition, Tata Mc Graw Hill Publication.
2.	Panaj Jalote (2005), —An Integrated Approach to Software Engineering, 3 rd Edition, Narosa Publication.
3.	Thomas T. Baker, —Writing Software Documentation – A task oriented approach, Second Edition, Pearson Education, 2004.
4.	Rajib Mall, —Fundamentals of Software Engineering, Second Edition, Prentice Hall.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	http://www/tutorialspoint.com/software_engineering
2.	http://www.nada.kth.se/lectures/
3.	http://www2.latech.edu/

MAPPING TABLE						
CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	2	2
CO2	2	3	3	3	3	2
CO3	2	2	3	3	3	3
CO4	3	2	2	3	3	3
CO5	3	3	3	3	3	3
Weightageofcoursecont ributedtoeachPSO	13	12	14	14	14	13

CORE COURSE XIV :DIGITAL IMAGE PROCESSING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	5	0	0	VI	4	5	25	75	100
Learning Objectives									
LO1	To acquire the fundamental knowledge of introduction to Digital Image Processing								
LO2	To understand the features present in Digital Image Processing								
Prerequisites: None									
Unit	Contents								No. of Hours
I	Introduction & Fundamentals: Definition of Image and Digital Image Processing - Examples of Digital Image Processing - Fundamental Steps in Digital Image Processing - Components of an Image Processing System - Visual Perception - Image Acquisition - A Simple Image Model - Zooming and Shrinking of Digital Image								15
II	Image Enhancement in Spatial Domain : Introduction - Mathematical Analysis of Enhancement in Spatial Domain - Basic Gray Level Transformation - Histogram Processing - Histogram Equalization - Histogram Matching - Image Enhancement using Arithmetic and Logical Operation - Basic Transformations - Basics of Spatial Filtering Image Enhancement in Frequency Domain: One Dimensional Fourier Transform and its Inverse - Two Dimensional Fourier Transform and its Inverse - Basics of Filtering in Frequency Domain - Basic Frequency Domain Filters - Homomorphic Filtering								15
III	Color Image Processing : Introduction - Advantages of Color Image Processing - Categories of Color Image Processing - Color Fundamentals - Primary Colors - Secondary Color - Primary and Secondary Colors for Pigments - Characteristics that are Used for Differentiating Different Colors - Color Models - Conversions between Color Models - Pseudo Color Image Processing - Color Transformation - Color Image Smoothing and Sharpening - Color Segmentation								15
IV	Image Compression : Introduction - Mathematical Analysis - Types of Data Redundancies - Image Compression Model - Compression Strategies. Morphological Image Processing : Introduction - Basic Concept of Set Theory - Logic Operations Involving Binary Images - Dilation and Erosion - Opening and Closing								15
V	Features and Image Segmentation - Introduction - Classification of Features - Features of an Image - Attributes of Features - Process of Feature Extraction - Image Segmentation -								15

	Thresholding - Region Based Segmentation.	
TOTAL		75
THEORY & PROBLEM		
CO	Course Outcomes	
CO1	Get the knowledge about the image fundamentals	
CO2	Understand the image enhancement in Spatial Domain & Frequency Domain	
CO3	Understand the color image processing operations	
CO4	Understanding the image compression techniques	
CO5	Understanding the image segmentation operations	
Textbooks		
➤	DigitalImageProcessing-AbhishakYadavandPoonamYadav-UniversitySciencePress	
Reference Books		
1.	DigitalImageProcessing,SJayaraman,SEsakkirajan,TVeerakumar,McGraw-HillEducationPvt.Ltd., 2e, 2020	
2.	DigitalImageProcessing,4e,RafaelCGonzalez,RichardEWoods,Pearson,2018	
3.	DigitalImageProcessing–SridharS–2e–OxfordUniversityPress,2016.	

MAPPING TABLE						
CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	2	2	2
CO2	2	3	3	3	3	2
CO3	2	2	3	3	3	3
CO4	3	2	2	3	3	3
CO5	3	3	3	3	3	3
Weightageofcoursecont ributedtoeachPSO	13	12	14	14	14	13

CORE COURSE XV :IMAGE PROCESSING USING SCILAB PRACTICAL

Subje ct Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	0	0	5	VI	3	5	50	50	100

Learning Objectives	
LO1	To get knowledge about the basic programs on Digital Image Processing
Prerequisites:	
Contents	
1) Perform 2D Linear Convolution, Circular Convolution between two 2D matrices. 2) Perform Discrete Fourier Transform (DFT), Discrete Cosine Transform (DCT) of 4x4 grayscale image. 3) Perform Brightness enhancement, Contrast Manipulation, Image negative of an image. 4) Perform threshold operation on an image. 5) Perform Edge detection using different edge detectors. 6) Perform Dilation and Erosion operation. 7) Apply low pass filter and high pass filter using 3x3 mask 8) Read a colour image and separate the image into red, blue and green planes.	
CO	Course Outcomes
CO1	Get the practical knowledge of 2D transformations
CO2	Get the practical knowledge of DCT and DFT
CO3	Apply the image enhancement techniques using Scilab
CO4	Understanding the application of different segmentation techniques
CO5	Get the knowledge to do different operations in images

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	2	2	2	3	3	2
CO2	3	3	2	3	2	3
CO3	2	3	3	3	2	3
CO4	2	3	2	3	3	3
CO5	2	2	2	3	3	2
Weightage of course contributed to each PSO	11	13	11	15	13	13

ELECTIVE VII A :TRENDS IN COMPUTING

Subje						Inst	Marks
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ct Code	L	T	P	S	Credits	Hours	CIA	External	Total
	4	0	0	VI	2	4	25	75	100
Course Objective									
C1	Learning current trends in various computer science and information technology fields.								
C2	Learning various fields of Cloud computing, Green computing ,the Edge and Fog computing technology.								
C3	To learn about Architecture and Application design of Cloud, Edge & fog computing.								
C4	To know computingandtoimprove security services of computing technologies.								
C5	To learn the various Case Studies in Cloud, Edge & fog Computing.								
UNIT	Details								No. of Hours
I	Era of Cloud Computing: Introduction – Components of Cloud Computing – Cloud Types: Private, Public and Hybrid clouds – Limitations of the Cloud - Virtualization: Structure and Mechanisms.								12
II	Cloud computing Services: Software as a Service(SaaS) – Platform as a Service(PaaS)- Infrastructure as a Service(IaaS)-Database as a Service(DBaaS)- Recent Trends in cloud computing and Standards- Data Security in Cloud – Risks and Challenges with Cloud Data-Security as a Service.								12
III	Edge Computing: Edge Computing and Its Essentials: Introduction-Edge Computing Architecture- Advantages and Limitations of Edge Computing Systems- Edge Computing Interfaces and Devices - Edge Analytics: Edge Data Analytics – Potential of Edge Analytics – Architecture of Edge Analytics – Case study								12
IV	Edge Data storage Security: Edge-Based Attack Detection and Prevention-Edge Computing Use Cases and Case Studies: Edge Computing High- Potential Use Cases. Introduction to green computing –Calculating carbon footprint- Choosing Green PC path: A green make over – Buying green computer- Choosing Earth Friendly peripherals								12
V	Fog Computing: Introduction to Fog computing – Architecture - Characteristics - Fog Computing Services – Fog Resource Estimation and Its Challenges-Fog computing on 5G networks – Fog computing								12

	Use cases and Case studies.	
	Total	60
	Course Outcomes	Programme Outcome
CO	On completion of this course, students will	
1	Outline the concepts, applications, benefits and limitations of various computing paradigms.	PO1
2	Classify the computing technologies based on its architecture and infrastructure and identify its strategies.	PO1, PO2
3	Examine various cloud services, Security threat exposure within a cloud computing infrastructure.	PO4, PO6
4	Asses the problems and solutions involved in various stages of different computing environments.	PO4, PO5, PO6
5	Discuss the importance of cloud, edge and Fog technology and implement innovative ideas and practices for regulating green IT.	PO3, PO8
	Text Book	
1	Kailas Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Devan Shah “ Cloud Computing –Black Book” Edition :2020 (UNIT I & II : CHAPTER 1,2,3,9,11)	
2	K. Anitha Kumari G. Sudha Sadasivam D. Dharani M. Niranjanamurthy, “EDGE COMPUTING Fundamentals, Advances and Applications”, First Edition 2022, CRC Press. (UNIT III & IV : CHAPTER 1, 2 , 3, 4,5,6)	
3	Woody Leonhard and Katherine Murray (2009) ,Green Home Computing for Dummies, Willey Publishing Inc. (UNIT IV : CHAPTER 2 ,5,6,7)	
4	Evangelos Markakis, George Mastorakis, Constandinos X.Mavromoutakis and Evangelos pallis “Cloud and Fog computing in 5G mobile Networks” ,First edition 2017. (UNIT V: CHAPTER 2)	
	Reference Books	
1.	RajKumarBuyya, Christian Vecchiola, S. Thamarai Selvi, (2013), Mastering Cloud Computing, McGraw Hill Education.	
2.	Michael Miller, (2009), Cloud Computing, Pearson Education.	
3.	Shijun Liu Bedir Tekinerdogan Mikio Aoyama Liang-Jie Zhang” Edge Computing – EDGE “ 2018.	
4.	Flavio Bonomi, Rodolfo Milito, Jiang Zhu, Sateesh Addepalli, —Fog Computing and Its Role in the Internet of Things, MCC’12, August 17, 2012, Helsinki, Finland.	

	Copyright 2012.
5	Amir M. Rahmani · Pasi Liljeberg Jürgo-Sören Preden “Fog Computing in the Internet of Things”Springer,2018. (UNIT V: PART/CHAPTER (1.4,2.5)
Web Resources	
1.	https://static.googleusercontent.com/media/www.google.com/en//green/pdfs/google-green-computing.pdf (CaseStudy)
2.	http://whatiscloud.com/basic_concepts_and_terminology/cloud
3.	http://www.computerweekly.com/guides/Using-green-computing-for-improving-energy-efficiency

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	S	S						
CO 3				S		S		
CO 4				S	S	S		
CO 5			S					S

S-Strong M-Medium L-Low

ELECTIVE VII B :BIG DATA ANALYTICS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	VI	2	4	25	75	100
Course Objective									
C1	Understand the Big Data Platform and its Use cases, Map Reduce Jobs								
C2	To identify and understand the basics of cluster and decision tree								
C3	To study about the Association Rules,Recommendation System								
C4	To learn about the concept of stream								
C5	Understand the concepts of NoSQL Databases								
UNIT	Details								No. of Hours
I	Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data								12

	— 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	
II	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.	12
III	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.	12
IV	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	12
V	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.	12
Total		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	Work with big data tools and its analysis techniques.	PO1
2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
4	Perform analytics on data streams.	PO4, PO5, PO6
5	Learn NoSQL databases and management.	PO3, PO8

Text Book	
1	AnandRajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
Reference Books	
1.	David Loshin, “Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph”, Morgan Kaufmann/Elsevier Publishers, 2013
2.	EMC Education Services, “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley publishers, 2015.
Web Resources	
1.	https://www.simplilearn.com
2.	https://www.sas.com/en_us/insights/analytics/big-data-analytics.html

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong M-Medium L-Low

ELECTIVE VIII A :NATURAL LANGUAGE PROCESSING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	VI	2	4	25	75	100
Learning Objectives									
LO1	To understand approaches to syntax and semantics in NLP.								
LO2	To learn natural language processing and to learn how to apply basic algorithms in this field.								
LO3	To understand approaches to discourse, generation, dialogue and summarization within NLP.								
LO4	To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics etc.								

LO5	To understand current methods for statistical approaches to machine translation.	
UNIT	Contents	No. Of. Hours
I	Introduction : Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics –Information theory – Collocations -N-gram Language Models – Estimating parameters and smoothing – Evaluating language models.	12
II	Word level and Syntactic Analysis: Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging.Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.	12
III	Semantic analysis and Discourse Processing: Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution- Discourse Coherence and Structure.	12
IV	Natural Language Generation: Architecture of NLG Systems- Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.	12
V	Information retrieval and lexical resources: Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: WorldNet-Frame NetStemmers- POS Tagger- Research Corpora SSAS.	12
Course Outcomes		
CO	On completion of this course, students will	
CO1	Describe the fundamental concepts and techniques of natural language processing. Explain the advantages and disadvantages of different NLP technologies and their applicability in different business situations.	
CO2	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each Use NLP technologies to explore and gain a broad understanding of text data.	
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions. Use NLP methods to analyse sentiment of a text document.	
CO4	Analyze large volume text data generated from a range of real-world applications. Use NLP methods to perform topic modelling.	
CO5	Develop robotic process automation to manage business processes and to increase and monitor their efficiency and effectiveness. Determine the framework in which artificial intelligence and the Internet of things may function, including interactions with people, enterprise functions, and environments.	
Textbooks		
1	Daniel Jurafsky, James H. Martin, “Speech & language processing”, Pearson publications.	

2	Allen, James. Natural language understanding. Pearson, 1995.
Reference Books	
1.	Pierre M. Nugues, “An Introduction to Language Processing with Perl and Prolog”, Springer
Web Resources	
1.	https://en.wikipedia.org/wiki/Natural_language_processing
2.	https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP

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	2	3	3	3	2	3
CO 3	3	3	3	3	3	3
CO 4	3	2	3	3	2	3
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	14	14	15	15	13	15

ELECTIVE VIII B : CYBER SECURITY

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	4	0	0	VI	2	4	25	75	100
Course Objective									
C1	Understand the cyber security threat landscape								
C2	Develop a deeper understanding and familiarity with various types of cyberattacks, cyber crimes, vulnerabilities and remedies thereto								
C3	Analyse and evaluate existing legal framework and laws on cyber security								
C4	Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds								
C5	Analyse and evaluate the importance of personal data its privacy and security								
UNIT	Details								No. of Hours
I	Introduction to Cyber security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet								12

	infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.	
II	Cyber crime and Cyber law: Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.	12
III	Social Media Overview and Security: Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.	12
IV	E - C o m m e r c e and Digital Payments: Definition of E-Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007	12
V	Digital Devices S e c u r i t y , Tools and Technologies for Cyber Security: End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.	12
Total		60
Course Outcomes		Programme Outcomes
CO	On completion of this course, students will	
1	understand the concept of Cyber security and issues and challenges associated with it	PO1
2	understand the cyber crimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.	PO1, PO2
3	appreciate various privacy and security concerns on online Social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.	PO4, PO6
4	understand the basic concepts related to E-Commerce and digital payments.	PO4, PO5,

	They will become familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.	PO6
5	understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices.	PO3, PO8
Reference Books		
1.	Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.	
2.	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)	
3	Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)	
4	Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd	
5	Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers	
6	Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd	
7	Fundamentals of Network Security by E. Maiwald, McGraw Hill.	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong M-Medium L-Low

SOFT SKILLS FOR EMPLOYABILITY

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	-	-	-	II	2	-	0	100	100
Learning Objectives									
LO1	The course aims to acquaint the students with some very relevant and necessary soft skills								

	and also to help them to develop their personality as well as to be self-motivated.
LO2	To get the knowledge about the meditation techniques and mental conditioning
LO3	To get the knowledge about the social skills and etiquette
LO4	To get the knowledge about the communication and negotiation skills
LO5	To get the knowledge about the preparation of resumes, appearing for interviews and handling both after campus issues that people normally face while setting foot on the professional sphere
Prerequisites: None	
Unit	Contents
I	Minding the Mind: This Unit will focus on meditation techniques and mental conditioning 1.1 Understanding YOU, which denotes 'Your Own Universe', wherein a person will be encouraged to self-introspect and critically analyse oneself. 1.2 Self-Analysis 1.3 Ice Breaker 1.4 Warming Up
II	The Charming Skills: This Unit will focus on training the student to develop and enhance their social skills, etiquette and basic personal grooming. 2.1 Introduction 2.2 Social Skill 2.3 Etiquette (This will be broad-based delving on various etiquettes necessary for varied areas such as general conversation, table party, official meets and social media)
III	The Communication Mechanism: This Unit will focus on developing skills in both verbal and non-verbal communications (body language, framing emails, and social media communications). Moreover, input on importance of graphology will be taught. 3.1 Introduction to Communication 3.2 Types of Communication 3.3 Public Speaking 3.4 Group Conversation 3.5 Letter writing and email
IV	The Negotiator: This unit will focus on inculcating good negotiations and conflict management skills. 3.6 Introduction to Negotiation 3.6.1 The Negotiation Clock Face 3.6.2 Assertiveness Matters 3.6.3 Traits of Negotiations 3.6.4 Factors that Make a Difference 3.6.5 Tactics and Values
V	Campus to Corporate: This Unit will focus on training about preparation of resumes, appearing for interviews and handling both after campus issues that people normally face while setting foot on the professional sphere. 4.1 The Doorstep 4.2 Resume Preparation/Portfolio Management 4.3 Interviews: The Different Types and How to face the same

CO	Course Outcomes					
CO1	The students will be able to appreciate the significance of soft skills.					
CO2	The students will be able to get the personality augmentation with reference to their personal life.					
CO3	The students will be able to get the personality augmentation with reference to their professional life.					
CO4	The students will get the professional efficiency.					
CO5	The course module will enhance the employability quotient of the students					
Textbooks						
1.	<i>Bezborah, P.</i> , Soft Skills and Personality Development. Banalata, Dibrugarh.					
2.	<i>Hartely C.B.</i> , The Gentlemen's Book of Etiquette and Manual of Politeness. Julia Miller.					
3.	<i>Rai, U.</i> , English Language Communication Skills, Himalaya Publishing House					
Reference Books						
1.	<i>Amen, K.K. and Ruiz, M.S.</i> , Hand Writing Analysis – The Complete Basic Book. New Page Books, New Jersey.					
2.	<i>Gates, S.</i> , The Negotiation Book. TJI International Limited, Cornwall.					
3.	<i>Wainright. G.R.</i> , Understand Body Language. Hodder Education, London.					
CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

DIGITAL SKILLS FOR EMPLOYABILITY

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	-	-	-	III	2	-	0	100	100
Learning Objectives									
LO1	The course aims to acquaint the students with the fundamentals of Microsoft officer								

LO2	To get the knowledge about the word processing
LO3	To get the knowledge about the spread sheets
LO4	To get the knowledge about the power point
LO5	To get the knowledge about the database and Microsoft access
Prerequisites: None	
Unit	Contents
I	Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing–Preview
II	Spreadsheets : Excel–opening, entering text and data, formatting, navigating; Formulas–entering, handling and copying; Charts–creating, formatting and printing
III	Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition– Animation effects, audio inclusion, timers
IV	Database Concepts: The concept of data base management system; Data field, records, and files- Sorting and indexing data; Searching records. Designing queries, and reports; Linking of datafiles; Understanding Programming environment in DBMS; Developing menu driven applications in query language (MS–Access)
V	Microsoft Access – Creating Tables — Creating database - Creating a Table – Working on Tables – Saving the Table – Defining primary Key – Closing the Table – Closing the Database window
CO	Course Outcomes
CO1	The students will be able to understand the basics of Microsoft office.
CO2	The students will be able to get the idea about word processing
CO3	The students will be able to get the knowledge about spread sheets
CO4	The students will get the knowledge on power point
CO5	The students will understand the database and Microsoft access
Textbooks	
1.	Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGrawHill
2.	VIKAS GUPTA, “Comdex Computer Course Kit (XP Edition)”, Dreametech press, New Delhi
ReferenceBooks	
1.	Stephen L. Nelson, “The Complete Reference office 2000” Tata McGraw – Hill Publishing Company limited, New Delhi
2.	N.Krishnan, “Window and MS Office 2000 with Database Concepts” Scitech publications (India) Pvt Ltd., Chennai
Website references	
1.	https://www.udemy.com/course/office-automation-certificate-course/

2.	https://www.javatpoint.com/automation-tools
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Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

INTRODUCTION TO INDUSTRY 4.0

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	-	-	-	IV	2	-	0	100	100
Learning Objectives									
LO1	The course aims to acquaint the students with the fundamentals of industry 4.0.								
LO2	To get the knowledge about the cyber physical system								
LO3	To get the knowledge about the smart energy sources								
LO4	To get the knowledge about the smart grid								
LO5	To get the knowledge about the smart applications								
Prerequisites: None									
Unit	Contents								
I	INTRODUCTION TO INDUSTRY 4.0 Introduction, Historical Context, General framework, Application areas, Dissemination of Industry 4.0 and the disciplines that contribute to its development, Artificial intelligence, The Internet of Things and Industrial Internet of Things, Additive manufacturing, Robotization and automation, Current situation of Industry 4.0. Introduction to Industry 4.0 to Industry 5.0 Advances								
II	INDUSTRY 4.0 AND CYBER PHYSICAL SYSTEM Introduction to Cyber Physical Systems (CPS), Architecture of CPS- Components, Data science and technology for CPS, Emerging applications in CPS in different fields. Case study: Application of CPS in health care domain								

III	SMART ENERGY SOURCES Energy Storage for Mitigating the Variability of Renewable Electricity Sources-Types of electric energy storage, Potential of Sodium-Sulfur Battery Energy Storage to Enable Integration of Wind-Case study. Electric Vehicles as Energy Storage: V2G Capacity Estimation
IV	SMART GRID Smart grid definition and development Smart Grid, Understanding the Smart Grid, Smart grid solutions, Design challenges of smart grid and Industry 4.0
V	SMART APPLICATIONS Understanding Smart Appliances -Smart Operation-Smart Monitoring-Smart Energy Savings-Smart Maintenance, Case study-Smart Cars, Self-Driving Cars, Introducing Google's Self-Driving Car, Intellectual Property Rights
CO	Course Outcomes
CO1	The students will be able to understand the basics of industry 4.0.
CO2	The students will be able to get the idea about cyber physical system
CO3	The students will be able to get the knowledge about the smart energy sources
CO4	The students will get the knowledge on smart grid
CO5	The students will understand the smart applications
Textbooks	
1.	Jean-Claude André, —Industry 4.0 , Wiley- ISTE, July 2019, ISBN: 781786304827,2019.
2.	Diego Galar Pascual, Pasquale Daponte, Uday Kumar, —Handbook of Industry 4.0 and SMART Systems Taylor and Francis,2020
ReferenceBooks	
1.	Miller M, —The internet of things: How smart TVs, smart cars, smart homes, and smart cities are changing the world , Pearson Education, 2015, ISBN: 9780134021300
2.	Pengwei Du and Ning Lu, —Energy storage for smart grids: planning and operation for renewable and variable energy resources VERS , Academic Press, 2018, Reprint edition , ISBN-13:978-0128100714
3.	Hossam A. Gabbar, —Smart Energy Grid Engineering , Academic Press, 2017, ISBN 978- 0-12-805343-0
4.	Mini S. Thomas, John Douglas McDonald, —Power System SCADA and Smart Grids , CRC Press, 2017

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

SOCIAL NETWORKS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	-	-	-	V	2	-	0	100	100
Learning Objectives									
LO1	The course aims to acquaint the students with the fundamentals of social networks								
LO2	To get the knowledge about the wordpress powered website								
LO3	To get the knowledge about the social networking and microblogging								
LO4	To get the knowledge about the widgets and badges								
LO5	To get the knowledge about the website optimization								
Prerequisites: None									
Unit	Contents								
I	INTRODUCTION Introduction: Social Media Strategy-Important First Decisions -Websites, Blogs - RSS Feeds Mapping -Preparation - Multimedia Items Gathering Content for Blog Posts RSS Feeds & Blogs RSS Feeds-The Feed Reader-The Feed-Options for Creating an RSS Feed-Planning Feed-Blogs Options for Starting. Blog and RSS Feed-Feed or Blog Content-Search Engine Optimization (SEO)-Feed Burner-RSS Feed and Blog Directories-An Optimization Plan for Blog or RSS Feed								
II	BUILDING A WORDPRESS POWERED WEBSITE Building a Word Press Powered Website: Word Press as A CMS - Diversity of Word Press Sites The Anatomy of a Word Press Site -a Brief Look at the Word Press Dashboard Planning - Site Themes Plug-ins setting up Sidebars Building Pages- Posting Blog Entries. Podcasting, Vidcasting, & Webcasting- Publishing Options for Podcast- Creating and Uploading Podcast Episodes-Publishing Podcast Optimizing Podcast- Webcasting								
III	SOCIAL NETWORKING AND MICROBLOGGING Social Networking & Micro-Blogging: Facebook-The Facebook Profile -Myspace LinkedIn Twitter-Niche Social networking Sites-Creating Own Social Network- Promoting Social Networking Presence- Social Bookmarking & Crowd-Sourcing -								

	Social Bookmarking-A Social Bookmarking Strategy- Crowd-Sourced News Sites-Preparation And Tracking Progress Media 51 Communities-Image Sharing Sites-Image Sharing Strategy-Video Sharing Sites-Video Sharing Strategy-Searching And Search Engine Placement-Connecting With Others
IV	WIDGETS AND BADGES Widgets & Badges: Highlighting Social Web Presence-Sharing and Syndicating Content Making Site More Interactive-Promoting Products and Making Money-Using Widgets In Word Press-Widget Communities And Directories- Working Widgets Into Strategy Social Media Newsrooms-Building Social Media Newsroom - Populating The Newsroom-Social Media News Releases-Social Media Newsroom Examples. More Social Tools-Social Calendars-Social Pages Wikis-Social Search Portals-Virtual Worlds
V	WEBSITE OPTIMIZATION Website optimization: A Website Optimization Plan-Streamlining Web Presence-An Integration Plan- Looking to the Future-Life streaming: The Future of Blogging-Distributed Social Networking-Social Ranking, Relevancy, and —Defriending-Web 3.0 or The Semantic Web Mobile Technology- Measuring Your Success-A Qualitative Framework-A Quantitative Framework-Tools to Help You Measure-Come to Your Own Conclusions

CO	Course Outcomes
CO1	The students will be able to understand the basics of social networks.
CO2	The students will be able to get the idea about wordpress powered website
CO3	The students will be able to get the knowledge about social networking and microblogging
CO4	The students will get the knowledge on widgets and badges
CO5	The students will understand the website optimization
Textbooks	
1.	Deltina hay —A Survival Guide to Social Media and Web 2.0 Optimization, Dalton Publishing, 2009
ReferenceBooks	
1.	Miriam Salpeter —Social Networking for Career Success, Learning Express, 2011
2.	Miles, Peggy, —Internet world guide to webcasting, Wiley, 2008 Professionals”, Wiley Publication, 2015
Website references	
1.	https://www.tutorialspoint.com/internet_technologies/social_networking.htm
2.	https://onlinecourses.nptel.ac.in/noc23_cs106/preview

3.	https://www.thatcompany.com/6-social-media-platforms
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Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

SOFTWARE TESTING

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
	-	-	-	VI	2	-	0	100	100
Course Objective									
C1	To study fundamental concepts in software testing								
C2	To discuss various software testing issues and solutions in software unit test, integration and system testing.								
C3	To study the basic concept of Data flow testing and Domain testing.								
C4	To Acquire knowledge on path products and path expressions.								
C5	To learn about Logic based testing and decision tables								
UNIT	Details							No. of Hours	Course Objective
I	Introduction: Purpose–Productivity and Quality in Software–TestingVsDebugging–Model for Testing–Bugs–Types of Bugs – Testing and Design Style.							6	C1
II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction FlowTesting Techniques.							6	C2
III	Data Flow Testing Strategies - Domain Testing:Domains and Paths – Domains and Interface Testing.							6	C3
IV	Linguistic –Metrics – Structural Metric – Path Products and Path Expressions.SyntaxTesting–Formats–Test Cases							6	C4
V	Logic Based Testing–Decision Tables–Transition Testing–States, State Graph, StateTesting.							6	C5
	Total							30	
Course Outcomes								Program Outcomes	
CO	On completion of this course, students will								

1	Students learn to apply software testing knowledge and engineering methods	PO1
2	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.	PO1, PO2
3	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.	PO4, PO6
4	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems	PO4, PO5, PO6
5	Have an ability to use software testing methods and modern software testing tools for their testing projects.	PO3, PO8
Text Book		
1	B.Beizer, "Software Testing Techniques", II Edn., Dream Tech India, New Delhi, 2003.	
2	K. V. K. Prasad, "Software Testing Tools", Dream Tech. India, New Delhi, 2005	
Reference Books		
1.	I. Burnstein, 2003, "Practical Software Testing", Springer International Edn.	
2.	E. Kit, 1995, "Software Testing in the Real World: Improving the Process", Pearson Education, Delhi.	
3.	R. Rajani, and P. P. Oak, 2004, "Software Testing", Tata Mcgraw Hill, New Delhi.	
Web Resources		
1.	https://www.javatpoint.com/software-testing-tutorial	
2.	https://www.guru99.com/software-testing.html	

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong M-Medium L-Low