

Dr G R DAMODARAN COLLEGE OF SCIENCE (AUTONOMOUS)
COIMBATORE - 641014
B. Sc (INFORMATION TECHNOLOGY)
(Under Choice Based Credit System)
EFFECTIVE FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2020-2021

Programme Outcome	
P01	To gain knowledge on Programming Languages, Data Structure concepts, Networking, Framework Technology, Operating Systems and Security.
P02	Be responsible for supporting network databases and systems, updating system hardware and software, troubleshooting for system errors, and assisting team members in supporting all data security and optimization.
P03	Information Technology applies knowledge of computing and mathematics to appropriatedisciplines.
P04	To improve creative and thinking ability and application of knowledge to analyze complex problems and gives IT based solutions.
P05	Information Technology provides programming skill and technical skill to meet the requirements of the IT based industries.
P06	Ability to quickly learn and use modern tools and current techniques of Information Technology.
P07	To inculcate the scientific temperament in the students and outside the scientific community.
P08	Be able to communicate effectively with specialized and non-specialized audiences.
P09	To impart multidisciplinary skills to build team cooperatively, creatively and responsibly.
PO 10	To analyze the impact of computation on individuals, organizations, and society, to locally and globally.

Programme Specific Outcome	
PS01	Able to use current technical concepts and practices in the core information technology.
PS02	Able to identify problems and design the system to provide appropriate solutions.
PS03	Recognize the need for and an ability to engage in continuing professional development.
PS04	Understand professional, ethical, legal, security and social issues.
PS05	Apply the knowledge of management principles to manage projects effectively in diverse environments as a member or a leader in the team.

G. Reddy

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SCHEME OF EXAMINATIONS

Sem.	Part	Course Code	Course Name	Credits	MARKS			Hrs. / Week	Exam. Duration (Hrs.)	Category
					CA	TEE	TOTAL			
I	I	20100T	TAMIL I	3	25	75	100	5	3	THEORY
I	I	20100H	HINDI I							
I	I	20100F	FRENCH I							
I	I	20100M	MALAYALAM I	3	25	75	100	5	3	THEORY
I	II	20100E	ENGLISH I							
I	III	20112A	CORE: PROGRAMMING FUNDAMENTALS	3	25	75	100	5	3	THEORY
I	III	20112P	CORE: PROGRAMMING LAB	3	40	60	100	6	3	PRACTICAL
I	III	20112B	ALLIED: MATHEMATICAL FOUNDATIONS FOR INFORMATION TECHNOLOGY	5	25	75	100	6	3	THEORY
I	IV	20100G	SKILL BASED SUBJECT: GENERAL AWARENESS	2	25	75	100	3	3	THEORY
II	I	20200T	TAMIL II	3	25	75	100	5	3	THEORY
II	I	20200H	HINDI II							
II	I	20200F	FRENCH II							
II	I	20200M	MALAYALAM II	3	25	75	100	5	3	THEORY
II	II	20200E	ENGLISH II							
II	III	20212K	Online Course: SWAYAM/NPTEL Course	3				4		
II	III	20212A	CORE: DIGITAL COMPUTER FUNDAMENTALS	3	25	75	100	5	3	THEORY
II	III	20212B	ALLIED: NUMERICAL METHODS	5	25	75	100	4	3	THEORY
II	III	20212P	SKILL BASED SUBJECT: JAVA PROGRAMMING LAB	2	40	60	100	5	3	PRACTICAL

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G. Prasad

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Sem.	Part	Course Code	Course Name	Credits	MARKS			Hrs. / Week	Exam. Duration (Hrs.)	Category
					CA	TEE	TOTAL			
II	IV	20200G	ENVIRONMENTAL STUDIES: ENVIRONMENTAL AWARENESS	2	25	75	100	2	3	THEORY
III	I	20300T	TAMIL III	3	25	75	100	5	3	THEORY
III	I	20300H	HINDI III							
III	I	20300F	FRENCH III							
III	I	20300M	MALAYALAM III	3	25	75	100	5	3	THEORY
III	II	20300E	ENGLISH III							
III	III	20312A	CORE: DATA STRUCTURES AND ALGORITHMS	3	25	75	100	4	3	THEORY
III	III	20312B	CORE: PYTHON PROGRAMMING	3	25	75	100	3	3	THEORY
III	III	20312P	CORE: PYTHON PROGRAMMING LAB	3	40	60	100	4	3	PRACTICAL
III	III	20312C	ALLIED: COMPUTER BASED OPTIMIZATION TECHNIQUES	5	25	75	100	3	3	THEORY
III	IV	20300A	BASIC TAMIL/ADVANCED TAMIL: ADVANCED TAMIL I	2	100	NA	100	2	3	THEORY
III	IV	20300B	BASIC TAMIL/ADVANCED TAMIL: BASIC TAMIL I							
III	IV	20300N	NON MAJOR ELECTIVE I: PERSONALITY DEVELOPMENT AND SOFT SKILLS	2	40	60	100	4	3	THEORY
III	IV	20300G2	SKILL BASED SUBJECT: PROFESSIONAL COMMUNICATION							
III	V	20312S	EXTENSION ACTIVITIES: NSS / COMPUTER AWARENESS PROGRAMME	1	Grade**				-	PRACTICAL
IV	I	20400T	TAMIL IV	3	25	75	100	5	3	THEORY
IV	I	20400H	HINDI IV							
IV	I	20400F	FRENCH IV							
IV	I	20400M	MALAYALAM IV							

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					CA	TEE	TOTAL			
IV	II	20400E	ENGLISH IV	3	25	75	100	5	3	THEORY
IV	III	20412K	Online Course: SWAYAM/NPTEL Course	3				4		
IV	III	20412A	CORE: FRAMEWORK TECHNOLOGY	3	25	75	100	3	3	THEORY
IV	III	20412B	ALLIED: PRINCIPLES OF MANAGEMENT	5	25	75	100	4	3	THEORY
IV	III	20412P	SKILL BASED SUBJECT: FRAMEWORK TECHNOLOGY AND RDBMS LAB	2	40	60	100	4	3	PRACTICAL
IV	IV	20400A	BASIC TAMIL/ADVANCED TAMIL: ADVANCED TAMIL II		100	NA	100		3	THEORY
IV	IV	20400B	BASIC TAMIL/ADVANCED TAMIL: BASIC TAMIL II	2				2		
IV	IV	20400N	NON MAJOR ELECTIVE II: BASICS IN BUSINESS PROCESS OUTSOURCING		40	60			3	THEORY
IV	IV	20400G1	VALUE EDUCATION: INDIAN SOCIETY, PEOPLE AND CULTURE	2	25	75	100	3	3	THEORY
V	III	20512A	CORE: VIRTUAL REALITY SYSTEMS	4	25	75	100	3	3	THEORY
V	III	20512B	CORE: COMPUTER NETWORKS	4	25	75	100	4	3	THEORY
V	III	20512C	CORE: OPERATING SYSTEMS	4	25	75	100	4	3	THEORY
V	III	20512D	CORE: PRINCIPLES OF SOFTWARE ENGINEERING	4	25	75	100	4	3	THEORY
V	III	20512E	CORE: OPEN SOURCE SOFTWARE	4	25	75	100	4	3	THEORY
V	III	20512K	Online Course: SWAYAM/NPTEL Course	4				4		
V	III	20512P	CORE: OPEN SOURCE SOFTWARE LAB	3	40	60	100	4	3	PRACTICAL
V	IV	20512F	SKILL BASED SUBJECT - APTITUDE *	2	25	75	100	3	3	PRACTICAL
VI	III	20612A	CORE: CYBER SECURITY	4	25	75	100	4	3	THEORY
VI	III	20612B	CORE: MOBILE APPLICATION DEVELOPMENT	3	25	75	100	4	3	THEORY
VI	III		ELECTIVE: ELECTIVE - I	4	25	75	100	4	3	THEORY

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Sem.	Part	Course Code	Course Name	Credits	MARKS			Hrs. / Week	Exam. Duration (Hrs.)	Category
					CA	TEE	TOTAL			
VI	III	20612P	CORE: MOBILE APPLICATION DEVELOPMENT LAB	3	40	60	100	4	3	PRACTICAL
VI	III	20612S	CORE: PROJECT AND VIVA VOCE	7	25	75	100	12	-	PRACTICAL
VI	IV	20612C	SKILL BASED SUBJECT: SOFT SKILLS *	2	25	75	100	2	3	PRACTICAL
			TOTAL	140			4000	180		

Sem.	Part	Subject Code	Subject Name
			ELECTIVE I
VI	III	20612U1	ELECTIVE I: AUGMENTED REALITY
VI	III	20612U2	ELECTIVE I: DATA SCIENCE
VI	III	20612U3	ELECTIVE I: ARTIFICIAL INTELLIGENCE
VI	III	20612U4	ELECTIVE I: EMBEDDED SYSTEM AND ITS APPLICATIONS
VI	III	20612U5	ELECTIVE I: ENTERPRISE RESOURCE PLANNING

* Both CA and TEE marks will be evaluated internally.
Basic Tamil/Advanced Tamil - 100 Marks CA only.
PROJECT AND VIVA VOCE

Marks split up:

I Project Review	10
II Project Review	15
Project Documentation	25
Viva Voce	50
Total	100 Marks

Online course: This can be availed by the students at anytime during that particular year of study. Students are expected to produce certificates from SWAYAM/NPTEL

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MAPPING OF COURSES WITH PROGRAMME OUTCOME LEVELS

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
20112A	CORE: PROGRAMMING FUNDAMENTALS	3	1	2	3	3					2
20112P	CORE: PROGRAMMING LAB	3	3	3	3	3	2	2	2	2	3
20112B	ALLIED: MATHEMATICAL FOUNDATIONS FOR INFORMATION TECHNOLOGY			3							2
20212A	CORE: DIGITAL COMPUTER FUNDAMENTALS		2			1					1
20212B	ALLIED: NUMERICAL METHODS			3		1	2	2		2	1
20212P	SKILL BASED SUBJECT: JAVA PROGRAMMING LAB	3	3	3	3	3			2		3
20312A	CORE: DATA STRUCTURES AND ALGORITHMS	3		3	3	1					1
20312B	CORE: PYTHON PROGRAMMING	3	2	2	3	3	2				2
20312P	CORE: PYTHON PROGRAMMING LAB	3	3	3	3	3	2	2	2	2	3
20312C	ALLIED: COMPUTER BASED OPTIMIZATION TECHNIQUES			3		1					1
20412A	CORE: FRAMEWORK TECHNOLOGY	3	2		3	3	3			2	2
20412B	ALLIED: PRINCIPLES OF MANAGEMENT						3		3	3	1
20412P	SKILL BASED SUBJECT: FRAMEWORK TECHNOLOGY AND RDBMS LAB		3		3	3	2	2	2	2	3
20512A	CORE: VIRTUAL REALITY SYSTEMS				3	3					
20512B	CORE: COMPUTER NETWORKS	3	3		3	3	3	3	2	2	2
20512C	CORE: OPERATING SYSTEMS	3									
20512D	CORE: PRINCIPLES OF SOFTWARE ENGINEERING										
20512E	CORE: OPEN SOURCE SOFTWARE	3	2		3	3	2		2	3	1
20512P	CORE: OPEN SOURCE SOFTWARE LAB	3	3		3	3	2	1	2	2	3
20512F	SKILL BASED SUBJECT - APTITUDE *						1		2	2	1
20612A	CORE: CYBER SECURITY	3	3					3			
20612B	CORE: MOBILE APPLICATION DEVELOPMENT	3	2		3	3		3		2	2
	ELECTIVE: ELECTIVE - I										
20612U1	ELECTIVE I: AUGMENTED REALITY	2	1	2	3	3	1	1	2	1	1
20612U2	ELECTIVE I: DATA SCIENCE	1	1	1	2	2	2	2	1	1	

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20612U3	ELECTIVE I: ARTIFICIAL INTELLIGENCE			1	2	1	2	1	1	1
20612U4	ELECTIVE I: EMBEDDED SYSTEM AND ITS APPLICATIONS		3			3	2	2	2	2
20612U5	ELECTIVE I: ENTERPRISE RESOURCE PLANNING	2		2	3			3	3	2
20612P	CORE: MOBILE APPLICATION DEVELOPMENT LAB	3	3		3	3	2	3	2	3
20612S	CORE: PROJECT AND VIVA VOCE	3	2	2	3	3	1	1	2	2
20612C	SKILL BASED SUBJECT: SOFT SKILLS *						3	3	3	3

Indicators: 1. Reasonable 2. Significant 3. Strong

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20112A	CORE: PROGRAMMING FUNDAMENTALS	3	Theory	-	100

Objective of the subject: This subject provides the knowledge on the concepts of the programming in general with respect to any language and their programming environments. The fundamental concepts in both the structured programming and the Object Oriented programming are discussed.

UNIT I:Programming Fundamentals

(Teaching hours: 8)

Programming Concept Fundamentals: Concepts of programming languages – Programming Domains – Language Evaluation Criteria - Influences of Language Design – Language Categories – Language Design Trade-offs – Implementation Methods – Programming Environments.

UNIT II:Structured Programming

(Teaching hours: 10)

Structured Programming: C Fundamentals: The C Character Set – Identifiers and Keywords – Data Types – Constants – Variables and Arrays – Declarations – Expressions –Statements – Symbolic Constants – Operators.

Data Input and Output: Getchar and Puchar Function – scanf function- printf function- Gets and Puts Functions.

Control Statements: The If-else, The While, Do-while, For, Nested control structures, Switch, break, The Continue statement- The Comma Operator-The Goto Statement - Storage Classes

UNIT III:Function and Arrays

(Teaching hours: 10)

Functions: A Brief Overview - Defining a Function– Accessing a Function – Function Prototype- Passing Arguments to a Function – Recursion. Arrays: Defining an Array – Processing an Array- Passing Arrays to Functions – Multidimensional Arrays – Strings: Defining a string-Reading and writing a string- String Handling Functions. Pointers– Pointer Declarations – Passing Pointers to Function – Pointers and One-Dimensional Arrays – Operations on Pointers – Pointers and Multidimensional Arrays. Structures: Defining a Structure – Processing a Structure.

UNIT IV:Object Oriented Programming with C++

(Teaching hours: 11)

Object Oriented Programming with C++: Objects and Classes - A Simple class – C++ Objects as Physical Objects – C++ Objects as Data types – Constructors – Objects as Function arguments – The default Copy constructor – Returning objects from functions – Static class Data – const and classes.

Operator Overloading: Overloading unary operators – Overloading binary operators.

Inheritance: Derived class and Base class – Derived class constructors – Overriding member functions – Scope resolution with overridden functions – Class Hierarchies – Types of Inheritance.

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UNIT V:Virtual Functions

(Teaching hours: 11)

Virtual Functions: Virtual Functions – Normal member functions accessed with pointers – Virtual member functions accessed with pointers – Late binding – Abstract classes and Pure virtual functions – Virtual destructors – Virtual base class-Friend Functions.

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Acquire basic knowledge to write and execute C program	K2
CO2	Ability to use C control structures, preprocessor directives and arrays	K2 & K3
CO3	Explore the concept of functions, storage classes and strings	K2 & K3
CO4	Knowledge on Object Oriented Programming, Objects and Classes in C++	K2 & K3
CO5	Application of Virtual Functions in C++	K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3		1	1	3					
CO2	3		2	3	3					
CO3	2		2	2	3					
CO4	2		1		2					
CO5	2		2	3	3					

Indicators: 1. Reasonable 2. Significant 3.Strong

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Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1.	Concepts of Programming Languages	Robert W. Sebesta	Pearson Publication	2016, Eleventh Edition.
2.	Programming with C	Byron S. Gottfried	Tata McGraw Hill	2012, Third Edition.
3.	Let Us C	Yashawant Kanetkar	BPB Publications	2016, Fourth Edition.
4.	Object Oriented Programming in C++,	Robert Lafore	Sams Publishing, Pearson Education	2011, Fourth Edition, Sixth Impression.
5.	Professional C++	Marc Gregoire, Nicholas A. Solter, Scott J. Kleper	Wrox	2011, Second Edition.

Pedagogy: Lecture, PowerPoint Presentation, Discussion, Assignment, Demo, Quiz



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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20112P	CORE: PROGRAMMING LAB	3	Practical	-	-

Objective of the subject: The purpose of this subject is to introduce structured and object oriented programming where the students will be able to enhance their analyzing and problem solving skills.

Structured Programming (C)

1. Operators and expressions
2. Control statements
3. Functions
4. Arrays
5. Strings
6. Pointers
7. Structures

Object Oriented Programming (C++)

8. Class and Objects
9. Functions (Friend, Inline, Recursive, Virtual)
10. Overloading concepts (Function, Operator)
11. Inheritance
12. Exceptions

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Acquire basic knowledge develop and execute C programming	K5

Note: K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

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Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3		3	3	3					

Indicators: 1. Reasonable 2. Significant 3.Strong

Pedagogy:Demo, Experiment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20112B	ALLIED: MATHEMATICAL FOUNDATIONS FOR INFORMATION TECHNOLOGY	5	Theory	95%	5%

Objective of the subject: The objective of the course the students are able to understand the concepts and principles of logical connective, relation and functions, formal languages and automata theory, lattice and Boolean algebra, graph theory.

UNIT I: Mathematical Logic

(Teaching hours: 10)

Mathematical Logic: Connective, well-formed formula, tautology equivalence of formulas, tautological implications, duality law, normal forms, predicates, variables, quantifiers, free and bound variables. Theory and inference for statement calculus only.

UNIT II: Relation And Functions

(Teaching hours: 10)

Relation and functions: Composition of relations, equivalence of relations – Functions – composition of functions, inverse functions, one-to-one, on-to, one to, one-on-to functions.

UNIT III: Formal Languages And Automata

(Teaching hours: 10)

Formal Languages and Automata: Grammars, phrase-structure grammar, context-sensitive grammar, context-free grammar, regular grammar and finite state automata – conversion of non-deterministic finite automata to finite state automata.

UNIT IV: Lattice and Boolean Algebra

(Teaching hours: 10)

Lattice and Boolean Algebra: Partial ordering, poset, lattices, distributive lattices – complementary distributive lattices – Boolean algebra – Minimization of Boolean function using K-map.

UNIT V: Graph Theory and Trees

(Teaching hours: 10)

(Theorem proved exempted for both Graph and Trees)

Graph Theory: Directed and undirected graphs, connected graphs, path, reachability, circuits, Hamiltonian paths, Euler paths – Matrix representation of Graph: Incidence matrix - Adjacency matrix. Tree: Introduction – Binary tree - In-order, post-order, pre-order Traversals of Binary Tree.

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Course Outcome mapping with Knowledge level

Course outcome	CO Statement	Knowledge level
CO1	To Keep in mind about the fundamental ideas and notations of discrete mathematics such as Tautology, contradiction and normal forms.	K1, K2
CO2	To understand the concepts of sets, relation, function.	K1, K2, K3
CO3	Analyze the formal languages and automata.	K2, K4, K5
CO4	Understand algebra concepts, posets, lattices, Boolean algebra and their applications in the field of computer science.	K2, K3, K5
CO5	Basic definitions of Tree, Graph theory and knowledge about types of graphs including Eulerian and Hamiltonian graphs.	K1, K2, K3, K4

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome:

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			3					1	1	
CO2			3					1	1	
CO3			3					1	1	
CO4			3					1	1	
CO5			3					1	1	

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Discrete Mathematical Structures with Applications to Computer Science.	J.P Tremblay, R. P. Manohar	McGraw Hill	2010, 38 th Reprint

Pedagogy: Lecture, Assignment.

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20212A	CORE: DIGITAL COMPUTER FUNDAMENTALS	3	Theory	10	90

Objective of the subject: To provide the basic knowledge on computer arithmetic, machine language instruction set, counters, input/output and system bus design and memory systems. The objective is to provide the students an insight into the fundamental building blocks of a computer.

UNIT I : Number Systems and Codes

(Teaching hours: 10)

Number Systems and Codes: Decimal, Binary, Octal, Hexadecimal - Conversion from one to another - Binary Addition, Subtraction, Multiplication and Division - Negative Numbers- Use of Complements to Represent Negative Numbers - Binary Number Complements - Complements in other Number Systems. Codes: BCD Weighted - Excess Three - Gray- Error Detection Codes.

UNIT II: Logic Gates and Boolean Algebra

(Teaching hours: 10)

Logic gates and Boolean Algebra: Basic Logic Gates - AND, OR, NOT, NAND, NOR, EX-OR and their Truth Tables – NAND and NOR Implementation – Basic theorems and properties of Boolean Algebra – Canonical and Standard forms - Simplification of Boolean functions using Karnaugh Maps (Including Don't care conditions).

UNIT III: Combinational Logic

(Teaching hours: 9)

Combinational Logic Circuit: Half Adder - Full Adder - Parallel Binary Adder - Binary Coded Decimal Adder –Half Subtractor – Full Subtractor – Shift Micro Operation - Logic Micro Operation – Arithmetic Micro Operation - Multiplexers –Demultiplexers – Decoders - Encoders.

UNIT IV: Sequential Logic

(Teaching hours: 11)

Sequential Logic: Flip-flops – RS, JK, Master Slave, D Flip-flop- Register - Shift Register- Counters- Ripple Counters- Synchronous Counters.

UNIT V: Memory and I/O Devices

(Teaching hours: 10)

Memory and I/O Devices: Random Access Memories - Static and Dynamic Random Access Memories - Read Only Memories - Magnetic Disk Memories. Input/Output Devices- Punched Tape-Tape Readers - Punched Cards- CD – DVD - Blueray - USB - LCD – LED - Character Recognition – Keyboards - Printers - 3D Printers.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Ability to understand and manipulate number systems and error codes	K1, K2 & K3
CO2	Basics of logic gates and methods to design a logic circuit	K1, K2, K3, K4 & K5
CO3	Knowledge on Combinational logic circuits and design	K1, K2, K3, K4 & K5
CO4	Gain familiarity on sequential logic and circuits	K1, K2, K3, K4 & K5
CO5	Acquire knowledge on the various memories and input – output devices	K1 & K2

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			1		1	1			1	
CO2			1	2	2	1			1	
CO3			2	3	3	1			1	
CO4			2	3	3	1			1	
CO5			2					2	1	1

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1.	Digital Logic and Computer Design	M.Morris Mano	Prentice Hall	2012, 14th Impression
2.	Digital Computer Fundamentals	Thomas C.Bartee	Tata McGrawHill	2011, Sixth Edition, 23rd Reprint

Pedagogy:Lecture, PowerPoint Presentation, Discussion, Assignment, Demo, Quiz

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20212B	ALLIED: NUMERICAL METHODS	5	Theory	100%	-

Objective of the subject: This course enables the students to gain knowledge on various numerical and statistical methods like solving algebraic equations, interpolation, statistical measures and testing of hypothesis.

UNIT I: Algebraic Equations and Numerical Integration (Teaching hours: 10)

Numerical Methods: Systems of simultaneous Linear equations – Gauss elimination Gauss Jordan, Gauss Jacobi Methods. Numerical integration: Trapezoidal rule, Simpson's 1/3 & 3/8 rule.

UNIT II: Interpolation and Differential Equations (Teaching hours:10)

Numerical Interpolation: Newton's Forward & Backward method – Lagrange's interpolation. Solution of ordinary differential equations: Taylor's series, Runge – Kutta method of second and fourth order.

UNIT III: Numerical Solutions (Teaching hours:10)

Numerical Solutions of Algebraical and Transcendental Equations: Bolzano's Bisection Method- Iterative method -Method of False Position - Newton Raphson method for finding real roots.

UNIT IV: Statistical Measures and Graphs (Teaching hours:10)

Introduction- collection of data- classification of data-tabulation of data- uses of statistics. Measures of Central Tendency and dispersion: mean- median- mode- Range-Standard deviation- variance. Graphical Representation of data: Histogram-frequency curve-frequency polygon-cumulative frequency curves.

UNIT V: Test of Hypothesis (Teaching hours:10)

Tests of hypothesis and significance: Introduction -tests of significance- procedure for testing of hypothesis. Student's t-test: test based on t-distribution for single mean and difference of two means-Chi-Square Test: Introduction-Procedure of chi square test-Goodness of fit only.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	To gain knowledge on the basic concepts of Algebra and apply them in solving the problems.	K1, K3, K4
CO2	To analyze the difference equations and solve them	K2, K4,K5
CO3	To Implement the numerical methods for a variety of multidisciplinary applications	K3, K4,K5
CO4	Understanding the different numerical methods for interpolation, differentiation and integration.	K1,K2, K3, K4,K5
CO5	Solving set simultaneous linear algebraic equations and ordinary differential equations	K1, K4, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome:

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			3	1						
CO2			3	1						
CO3			3	1						
CO4			3	1						3
CO5			3	1						3

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Numerical Methods in Science and Engineering	M.K.Venkatraman	The National Publishing Company	2007, Fifth Edition
2	Numerical Methods	P.Kandasamy, K.Thilagavathy, K.Gunavathy	Sultan chand and sons	2007, Fifth Edition
3	Statistical Methods.	S.P. Gupta	Sultan Chand & Company Limited	2014, Revised Edition.

Pedagogy: Lecture, Assignment.

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20212P	Skill Based Subject: JAVA PROGRAMMING LAB	2	Practical	-	-

Objective of the subject: To provide a hands-on experience in developing applets, packages, multi-threading, exceptions, interface and inheritance.

1. Inheritance.
2. Interface.
3. Packages.
4. Exceptions.
5. Multi-threaded programming.
6. String Operations.
7. Arithmetic operations using applets.
8. Applet Graphics Drawing.
9. Applet AWT Controls.
10. AWT Event handling.
11. GUI for user registration using applets.
12. Create a webpage.

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Develop Java application programs using OOP principles and proper program structuring. To build software development skills using java programming for real world applications.	K1, K2, K3, K4, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	3	3	2	1	1	1	1

Indicators: 1. Reasonable 2. Significant 3.Strong

Pedagogy:Demo, Experiment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20312A	CORE: DATA STRUCTURES AND ALGORITHMS	3	Theory	-	100

Objective of the subject: This subject highlights on Introduction to Data Structures, Stack and Queue algorithms, algorithms for Searching, Sorting, Trees and Manipulation of data structures.

UNIT I: Basic data structure concepts

(Teaching hours: 8)

Basic Concepts: Algorithm Specification – Performance analysis. Arrays, Records and Pointers: Linear arrays – Representation of linear arrays – Traversing linear array – Inserting and deleting – Multidimensional arrays – Pointers – Records –Matrices.

UNIT II: Linked lists and its types

(Teaching hours: 9)

Linked list: Linked lists – Representation in memory – Traversing linked list – Garbage collection – Insertion and deletion in linked list – Header linked lists – Two-way lists.

UNIT III: Stack, Queues, Recursion

(Teaching hours: 11)

Stacks, Queues and Recursion: Stacks – Array representation of stacks – Linked representation of stack – Arithmetic expressions – Recursion – Tower of Hanoi – Implementation of recursive procedure by stacks – Queue – Linked representation of Queues – Deques – Priority Queues.

UNIT IV: Trees

(Teaching hours: 12)

Trees: Introduction – Binary trees – Representing binary trees in memory – Traversing binary trees – Traversing algorithm using stack – Threads - Binary search trees – Searching, Inserting and Deleting in a binary search tree.

UNIT V: Searching and Sorting

(Teaching hours: 10)

Searching: Sequential – Binary – Fibonacci Search. Sorting - Bubble sort – Quick sort – Insertion sort – Selection sort – Merging – Merge sort – Radix sort – Heap sort.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Acquire knowledge on algorithms, its performance, data structure operations	K1, K2, K3 & K4
CO2	Acquire knowledge on working with linked list types	K2 & K3
CO3	Posses knowledge on working of stack, queues and recursive procedures	K2, K3, K4
CO4	Perform operations on trees and their types	K2, K3, K4& K5
CO5	Skill to apply few searching and sorting algorithms	K2, K3, K4 & K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	1	2	2	2			1		2
CO2	3		2		1					
CO3	3		1		2					
CO4	3		3	2	2					
CO5	3		3	2	2					1

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1.	Fundamental of Data Structures in C	Ellis Horowitz and SartajSahni, Anderson- Freed	Galgotia Publications	2008, Second Edition
2.	Data Structures Schaum's Outlines	Seymour Lipschutz, G.A VijayalakshmiPai	Tata McGraw-Hill Companies	2006,Indian Adapted Edition

Pedagogy:Lecture, PowerPoint Presentation, Discussion, Assignment, Demo, Quiz

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20312B	CORE: PYTHON PROGRAMMING	3	Theory	-	100

Objective of the subject: The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, installing and running the Python interpreter, Tuples, Class and Objects, Files using the Python programming language.

UNIT I:Introduction to Python

(Teaching hours: 8)

Introduction to Python: Python - Features – Execution - Viewing the Byte Code - Flavors of Python - Python Virtual Machine (PVM) - Frozen Binaries - Memory Management in Python - Garbage Collection in Python - Comparisons between C and Python - Comparisons between Java and Python. Python IDEs and Code Editors. Writing Our First Python Program: Installing Python for Windows - Setting the Path to Python - Executing a Python Program.

UNIT II:Data types and Operator

(Teaching hours: 8)

Data types in Python: Comments in Python – Docstrings – Variables – Data types – Built-in datatypes - boolDatatype - Sequences in Python – Sets - Literals in Python – Characters – User defined Data types - Constants - Identifiers and Reserved words - Naming Conventions. Operators in Python: Arithmetic - Assignment - Unary Minus - Relational - Logical - Boolean - Bitwise - Membership - Identity - Precedence and Associativity. Input and Output: Output statements - Input Statements - Command Line Argument.

UNIT III:Control Statements

(Teaching hours: 12)

Control Statements: The if Statement - A Word on Indentation - The if ... else Statement - The if ... elif ... else Statement - The while Loop - The for Loop - Infinite Loops - Nested Loops - The else Suite - The break Statement - The continue Statement - The pass Statement - The assert Statement - The return Statement.

Arrays in Python: Advantages - Creating - Importing the Array Module - Indexing and Slicing - Processing the Arrays - Types of Arrays - Working with Arrays using numpy - Creating Arrays: array() - linspace - logspace - arrange() – Function - Creating Arrays using zeros() and ones() Functions - Mathematical Operations on Arrays - Comparing - Aliasing - Viewing and Copying - Slicing and Indexing - Dimensions of Arrays - Attributes of an Array - Working with Multi-dimensional Arrays - Indexing - Slicing.

UNIT IV:Strings and Functions

(Teaching hours: 12)

Strings and Characters: Creating Strings – String Functions - String Testing Methods - Formatting the Strings - Working with Characters.

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Functions: Function Versus Method - Defining a Function - Calling a Function - Returning Results from a Function - Returning Multiple Values - Functions are First Class Objects - Pass by Object Reference - Formal and Actual Arguments - Positional Arguments - Keyword Arguments - Default Arguments - Variable Length Arguments - Local and Global Variables - The Global Keyword - Passing a Group of Elements to a Function - Recursive Functions - Anonymous Functions or Lambdas.

UNIT V: Lists and Files

(Teaching hours: 10)

Lists and Tuples: List - Creating Lists using range() Function - Updating the Elements of a List - Concatenation - Repetition of Lists - Membership in Lists - Aliasing and Cloning Lists - Methods to Process Lists - Nested Lists. Tuples: Creating Tuples - Accessing the Tuple Elements - Basic Operations on Tuples - Functions to Process Tuples - Nested Tuples.

Files: Persistence - Opening files - Text files and lines - Reading files - Searching through a file - Using try, except and open - Writing files.

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Introduction to Python programming	K1, K2, K3, K4
CO2	Syntax and Description about data types in python	K1, K2, K3, K4
CO3	Study on control statements	K1, K2, K3, K4, K5
CO4	To impart the usage of Strings and Functions	K1, K2, K3, K4
CO5	To study the Description about files and lists	K1, K2, K3, K4

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	3		1	1	1	
CO2	3	2	2		1	2		1	1	
CO3	3	2		3		1			1	
CO4	3	2	3	2	2	1	1	2	1	
CO5	3	2	3	2		1		1	1	1

Indicators: 1. Reasonable 2. Significant 3.Strong

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Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Core Python Programming	Dr. R. NageswaraRao	Dreamtech Press	October 2016, Second Edition
2	Python for Everybody, Exploring Data Using Python	Charles Severance	Kindle Publication	2016, Paper Back.
Web References				
1	https://opensource.com			
2	https://realpython.com			

Pedagogy: Teaching / Lecture, PPT presentation, e-content seminar, Assignment, Quiz, Group Discussion



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EFFECTIVE FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2020-2021

Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20312P	CORE: PYTHON PROGRAMMING LAB	3	Practical	-	-

Objective of the Subject: The course provides hands-on experience to develop simple applications Python Programming.

1. Expressions
2. Operators
3. Looping
4. Branching
5. Arrays
6. String functions
7. Functions
8. Lists
9. Tuples
10. File Handling

Note:

Develop a project / case study using the above applicable concepts.

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Description about Unit 1	K1, K2, K3, K4, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	1	2	3	3	1	2	3

Indicators: 1. Reasonable 2. Significant 3.Strong

Pedagogy: Teaching / Lecture, PPT presentation

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20312C	ALLIED: COMPUTER BASED OPTIMIZATION TECHNIQUES	5	Theory	95%	5%

Objective of the subject: This paper gives optimization techniques like linear programming, transportation problem, game theory, replacement models, waiting line theory, PERT & CPM methods.

UNIT I: Linear Programming

(Teaching hours: 12)

Linear Programming - Mathematical Formulation of the Linear Programming Problem – Graphical Solution Method - Simplex Method, Big - M Method, Dual Simplex Method.

UNIT II: Transportation and Assignment Problems

(Teaching hours: 10)

The Transportation problem: Initial basic feasible solution- North-West Corner Rule, Least Cost Method & VAM – Moving towards optimality. Assignment Problem: Hungarian method.

UNIT III: Game Theory

(Teaching hours: 10)

Game Theory: Concept of Pure and mixed strategies – solving 2 x 2 matrixes with and without saddle point – Graphic solution of 2 x n and m x 2 games.

Replacement models: Replacement of Equipment that deteriorates gradually: Replacement policy when value of money does not change with time – Replacement policy when value of money changes with time. Replacement of Equipment that fails suddenly.

UNIT IV: Queueing Theory

(Teaching hours: 8)

Queueing Theory: Queueing system – Elements of a Queueing system – Queueing models: (M/M/1): (∞ /FIFO) and (M/M/1): (N/FIFO) Only.

UNIT V: PERT & CPM

(Teaching hours: 10)

PERT & CPM: Network – Basic components – Rules of Network construction. Critical Path Analysis : Forward pass & Backward pass calculations – Critical Path. PERT calculations.

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Course Outcome mapping with Knowledge level

Course outcome	CO Statement	Knowledge level
CO1	To remember the Linear Programming Problem concepts such as Mathematical formulations, Graphical Method, simplex methods.	K1, K3, K4
CO2	Understand the difference between Transportation and assignment Problems.	K1, K3, K5
CO3	To implement the concept of Game theory and Replacement Problems.	K2, K3, K5
CO4	To implement the concept of Queueing systems.	K2, K4
CO5	Evaluate CPM and PERT methods.	K1,K3,K4,K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome:

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			3	1	1					
CO2			3	1	1					
CO3			3	1	1					
CO4			3	1	1					
CO5			3	1	1					

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Operations Research	KantiSwarup, P K Gupta, Manmohan	Sultan Chand and Sons	2012, 16 th Edition
2	Problems in Operations Research	P K Gupta, Dr.D.S.Hira	Sultan chand and sons	2010
3	Operations Research	A.C.S.Kumar	Yesdee	2015, Revised Edition.

Pedagogy: Lecture, Assignment.

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20412A	CORE: FRAMEWORK TECHNOLOGY	3	Theory	-	100

Objective of the subject: This paper concentrates on controls used in web server, database programming, binding of data and templates used in framework.

UNIT I: Introduction to .NET Framework

(Teaching hours: 12)

The .NET Framework: Web Development – The .NET Framework - .NET Languages – TheCommon Language Runtime - .NET Class Library. Developing ASP.NET Applications: CreatingWebsites – Designing a web page –The anatomy of a web form – Writing Code – Debugging.

UNIT II: Web Server Controls

(Teaching hours: 9)

Web Server Controls: Basic Web Server Controls : Label – Textbox - Button Control – Link Button – Check Box – Radio Button – Hyperlink – Image Control. Data list Web Server Controls: CheckBoxList - RadioButtonList – DropDownList – List Box.

UNIT III:Rich Web Server Controls

(Teaching hours: 9)

Rich Web Controls: Other Web Server Controls - Calendar – AdRotator – Validation Controls. IE Web Controls :Treeview – Tool Bar – Tabstrip – Multipage Control.

UNIT IV:Database Connectivity

(Teaching hours: 10)

Working With Data: System.Data&System.Data.OLEDB Namespaces: OLEDB Connection Class – OLEDB Command Class – OLEDB Transaction Class - OLEDB Data Adapter Class – OLEDB Data Set Class – Simple Application. System.Data- SQLClient Namespace : Connecting to a SQL Server Database – Manipulating data in SQL Server Database – Retrieving data from the SQL Server Database.

UNIT V:Working with Data Grid and Templates

(Teaching hours: 10)

Working with data grids: Using a data grid example - Using the columns property - Paging data grid-Sorting data grid. Using Templates: Templates: Repeater control - Data list control - Data grid control. Creating Templates: Combining templates with the repeater control - Combining templates with data list control - Combining templates with the Data grid control.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	To provide basic knowledge on .NET framework concepts such as .NET languages, .NET class library etc., And also to learn about art of programming in .NET framework	K1, K2
CO2	To learn about basic web server controls and Data list web server controls such as Label, Textbox, Button etc.,	K2, K3
CO3	To understand the concept of Rich Web Controls including Calendar, AdRotator, Treeview etc., Also to work with various validation Controls.	K2, K3
CO4	To learn and work with Data, Connecting .NET framework with various data sources.	K2, K3
CO5	Working with data grids. Creating templates and combining templates with data grids	K2, K3, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1		2	3	1			
CO2	2	1	1	2	2	3				1
CO3	2	1	1	2	2	3				1
CO4	3	1	1	2	3	3				1
CO5	3	1	1	1	3	3				2

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Beginning ASP.NET 4 in VB 2010	Matthew MacDonald	Apress	2010.
2	ASP.NET Bible	MridulaParihar	Wiley Publishing Inc.USA	Reprint 2006.

Pedagogy:Lecture, PPT presentation, Assignment, Quiz, Group Discussion

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20412B	ALLIED: PRINCIPLES OF MANAGEMENT	5	Theory	-	100

Objective of the subject: This paper highlights on introduction to management concepts and its nature. Functional areas of management such as planning, organization, staffing, motivation and controlling are also covered

UNIT I: Management

(Teaching hours: 10)

Management – Meaning – Nature- As art, science and profession - Difference between Administration and Management – Levels of Management. Planning: Nature – Importance -Advantages and limitation of planning - Process of planning.

UNIT II: Organization

(Teaching hours: 10)

Organization – Meaning – Types of Organization - Delegation of Authority – Types –Functions. Departmentation: Meaning – Bases of Departmentation - Decentralization.

UNIT III: Personnel Planning

(Teaching hours: 10)

Personnel Planning – Recruitment: Meaning - Internal Source - External Sources -Evaluation of external source. Selection - Training and Development.

UNIT IV: Motivation

(Teaching hours: 10)

Motivation: Meaning – Process - Nature – Importance - Theories. Leadership: Significance – Meaning - Nature-Leadership Vs Headship - Different Approaches.

UNIT V: Controlling

(Teaching hours: 10)

Controlling: Meaning - Factors – Working - Characteristics. Control Devices: Traditional device - Budgetary, cost, production, inventory, profit and loss controls – BEP - Modern devices.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Understand the concepts of management, administration and planning.	K1,K2,K3
CO2	Analyse the different organizational structures and the staffing process.	K1,K2,K3,K4
CO3	Comprehend the Personnel planning, recruitment, selection, training and development	K1,K2,K3,K4
CO4	Analyse the various motivational and leadership theories with its different approaches.	K1,K2,K3
CO5	Illustrate the concept of controlling and control devices.	K1,K2,K3,K4

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1									3	3
CO2									3	3
CO3									3	2
CO4									2	3
CO5			2			3			2	3

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Principles of Management	DinkarPagare	Sultan Chand & Sons	2013, Reprint, Fifth Edition.

Pedagogy:Lecture, PPT presentation, Assignment, Group Discussion

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20412P	Skill Based Subject: Framework Technology and RDBMS Lab	2	Practical	-	-

Objective of the Course:

This paper provides an experience on creating webpages, manipulation of web controls, implementing the validation controls and Emphasis is also given on database connectivity and manipulation of data through this connectivity.

Framework Technology

1. Creation of a Simple ASP.NET Web Page.
2. Creating and manipulation with Web Controls.
3. Create and manipulate with Rich Web Controls (AdRotator)
4. Creation and manipulation of Validation controls.
5. Displaying Data in the DataGrid.
6. Manipulation of data using SQL Server Database.
7. Database Connectivity using ADO.NET

RDBMS

8. Table creation using Integrity Constraints and apply DDL and DML commands.
9. Program using Built-in functions.
10. Programs using Cursors.
11. Programs using Exception Handling.
12. Programs using Procedures and Functions.
13. Programs using Triggers.



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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	To design GUI based web pages using basic web controls and rich web controls, and accessing data from various data sources. This course also provides knowledge on working with basic RDBMS concepts like creating table, working with DDL, DML commands and advanced RDBMS concepts like Cursor, Trigger, Exception Handling etc.,	K1, K2, K3, K4, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	3	2	3	1	1	1	2

Indicators: 1. Reasonable 2. Significant 3.Strong

Pedagogy:Demo, Experiment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20512A	CORE: VIRTUAL REALITY SYSTEMS	4	Theory	-	100

Objective of the course: This course enables the candidates to understand the elements, architecture, input and output devices of virtual reality systems. The candidates will be able to develop and evaluate 3D interactive applications involving stereoscopic output, virtual reality hardware and 3D user interfaces.

UNIT I:Basics of Virtual Reality

(Teaching hours: 10)

Virtual Reality and Virtual Environment: Introduction - Computer Graphics - Real Time Computer Graphics - Flight Simulation - Virtual Environment - Requirement - Benefits of Virtual Reality - Historical Development of VR: Scientific Landmark

UNIT II:3D Virtual Reality

(Teaching hours: 10)

3D Computer Graphics: Introduction - The Virtual World Space - Positioning the Virtual Observer - The Perspective Projection - Human Vision - Stereo Perspective Projection - 3D Clipping - Colour Theory - Simple 3d Modelling - Illumination Models - Reflection Models - Shading Algorithms - Radiosity - Hidden Surface Removal - Realism-Stereographic Image.

UNIT III: 2D to 3D Tranformations

(Teaching hours: 10)

GeometricModelling:From2Dto3D - 3d Space Curves - 3DBoundaryRepresentation Geometrical Transformations: Introduction - Frames of Reference - Modelling Transformations - Instances - Picking - Flying - Scaling the VE - Collision Detection.

UNIT IV: Animation

(Teaching hours: 10)

Animating the Virtual Environment: The dynamics of Numbers - Linear and Non-Linear Interpolation - The Animation of objects - Linear and Non-linear translation - Shape & Object inbetweening - Free Form Deformation - Particle System.

UNIT V: Virtual Reality Applications

(Teaching hours: 10)

VRApplications: Introduction - Engineering - Entertainment - Science - Training. The Future: Virtual environment - Modes of Interaction

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Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understand the Basic concept of Virtual Reality	K1&K2
CO2	Learn about 3D concept of Virtual Reality	K2&K3
CO3	Learn about 2D to 3D Transformations	K2&K3
CO4	Understand the concept of Animation	K3&K4
CO5	Learn about Virtual Reality Applications	K2, K3, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			1				1	2	1	2
CO2			1	2	1	2			2	1
CO3			2	2	1	2		1	1	1
CO4			1	2	2	2	1	1	2	2
CO5			2	2	2	1	2	2	2	1

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books ✓				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Virtual Reality Systems	John Vince	Pearson Education Asia	2007.
2	Virtual Reality Technology	Grigore C. Burdea, Philippe Coiffet	Wiley InterScience.	2006, Second Edition.

Pedagogy: Lecture, PPT presentation, Assignment, Quiz, Group Discussion

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20512B	CORE: COMPUTER NETWORKS	4	Theory	-	100

Objective of the subject: This paper focuses on the network reference models, issues of different layers of the OSI reference model layers and underwater networking concepts. This subject helps in understanding the concepts of Computer Network Engineering and Underwater Networks.

UNIT I: Introduction to Computer Networks (Teaching hours: 10)

Introduction: Use of computer networks – Network Hardware – PAN, LAN, MAN WAN, Internetworks – Network software - Protocol hierarchies – Design issues for the layers – Connection-Oriented versus Connectionless Service – Service Primitives – Reference models - the OSI reference model – the TCP/IP reference model. Types of networks: Wireless and mobile networks.

Switching systems: Circuit switching – message switching – Packet switching. Network Ports: Connectors – Switch – Jack. Network Boosters. Critical areas of the Network: Security – Traffic Management – Real-Time monitoring – Scalability

UNIT II: Physical Layer and Data Link Layer (Teaching hours: 10)

The Physical Layer: Transmission Media – Wireless transmission – Communication satellites. Data link layer: Data link layer design issues – Error detection and correction – Elementary data link protocols – Sliding window protocols.

UNIT III: Network Layer and Application Layer (Teaching hours: 10)

Network Layer: Network layer design issues - Routing algorithms – The optimality principle – Shortest path routing – Flooding – Distance vector routing. Transport layer: The transport service – Elements of transport protocol. Application Layer: Domain Name System – The DNS Name space – Domain resource records – Name servers - The world wide web.

UNIT IV: Introduction to Underwater Networking (Teaching hours: 10)

Introduction: Underwater Networking – Underwater Networking Architecture - Types of Cables - Modems - Protocols - Operating System - Monitoring systems. Network monitoring: deployment – relocation – recovery

UNIT V: Applications of Underwater Networking (Teaching hours: 10)

Applications of Underwater Networking: Autonomous underwater vehicles (AUVs) – Sea level temperature - Storm identification – Heading - storm's intensity, hail probabilities – Hail Size - causes of a Tsunami – timing and intensity – centre of the Tsunami - direction.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Understand the concepts of networks, types and architectures. Understand terminologies and concepts of OSI and TCP reference model.	K1, K2, K3
CO2	Identify the networks technologies for error free transmission of data.	K1, K2, K3, K4
CO3	Interpret the data flow in network and application layer and services of these layers. Apply various routing protocols in data communication to select optimal path.	K1, K2, K3, K4
CO4	Provide an overview of the concepts and components of Underwater Networking Architecture.	K1, K2
CO5	Acquire knowledge about various application of underwater networking in real time environment.	K1, K2

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2		1	1			1		1
CO2	3	2	2	1	2	1		1		2
CO3	3	1	3	2	2	1	1		1	1
CO4	2	2	1	1	1	1		1		1
CO5	2	1		2	1	1		1		2

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Computer Networks	Andrew S. Tanenbaum & David J. Wetherall	Pearson Education	2012, Fifth Edition.
2	Data and Computer Communications	William Stallings	Prentice Hall of India	2007, Eighth Edition.

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3	Principles of Underwater Sound	Robert J. Urick	Peninsula Publication	2013, Third Edition.
4	Handbook of Marine Surveying	Thomas Ask	Sheridan House	2007, Illustrated Edition.

Pedagogy:Lecture, PPT presentation, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20512C	CORE: OPERATING SYSTEMS	4	Theory	-	100

Objective of the Course: The objective is to emphasize the need and the functionality of the operating system. The aim is to discuss the components and responsibilities of the operating systems like CPU scheduler, memory management system, I/O systems, handling concurrent processes.

UNIT I: Evolution of Operating system and Storage Hierarchy (Teaching hours: 10)

Operating Systems Introduction – Main frame systems – Desktop systems – Multi processor systems – Distributed System – Clustered System – Real Time Systems- Handheld Systems – Feature Migration – Computing Environments.

Computer System Structures – Computer, System operation, I/O Structure, Storage Structure, Storage Hierarchy, Hardware Protection and Network Structure.

UNIT II: Operating System Structures and Process Management (Teaching hours: 10)

Operating System Structures: System Components, Operating System Services, System Calls, System Programs. Process Management: Process Concept, Process scheduling, Operations on Processes, Cooperating Processes, and Inter process Communication in Client Server Systems.

UNIT III: CPU Scheduling (Teaching hours: 10)

CPU Scheduling: Scheduling Concepts, Scheduling Algorithms. Deadlock: Deadlock Problem, Characterization, Prevention, Avoidance, Detection, Recovery

UNIT IV: Memory Management (Teaching hours: 10)

Memory Management: Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging Virtual Memory – Demand Paging, Page Replacement

UNIT V: File Interface (Teaching hours: 10)

File System Interface: File Concept, Access Methods, Directory Structure, File System Mounting, and File System Protection. Mass: Storage Structure – Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure, Disk Attachment, Stable – Storage Implementation, Tertiary, Storage Structure

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Describes the evolution of the operating system and about the various kinds of computing systems	K1
CO2	Provides the operating system concepts of dealing with hardware and software interrupts with process management concepts	K1, K2
CO3	Process Scheduling along with the Deadlock handling and avoidance are given here	K3
CO4	Explain the principles of paging and describe the components (both hardware and software) that are necessary to implement paging and other memory management techniques	K4
CO5	Describe the phases required of hardware and software components for persistent storage and retrieval of persistent data	K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	1							3
CO2	3	3			1				2	
CO3	3	3	3							
CO4	2	3	4		1				1	2
CO5	3	2	2			1			1	1

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Operating Systems Concepts	Silberschatz, Galvin, Gagne	John Wiley & Sons, Inc	2012, Reprint, 9 th Edition.

Pedagogy: Lecture, PPT presentation, e-content seminar, Assignment, Quiz, Group Discussion

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20512D	CORE: PRINCIPLES OF SOFTWARE ENGINEERING	4	Theory	-	100

Objective of the subject: This subject mainly concentrates on software engineering concepts along with some of the methodologies of Testing. This paper highlights on the characteristics of software, software evolution, software models, the various phases in software design and the different types of software testing techniques.

UNIT I: Software Engineering and Process Models

(Teaching hours: 9)

The evolving role of software – Software characteristics – Software Engineering: A layered technology. Process Models: The Waterfall model - Incremental process model - Evolutionary process model - Specialized process models.

UNIT II: Requirement Engineering

(Teaching hours:

9)Requirements Engineering: Tasks, initiating - Analysis Model: Requirement analysis, Scenario based, Flow oriented, Class based modeling.

UNIT III: Design Engineering and Architectural Design

(Teaching hours:

10)Design Engineering: Design within the context of software, Design process and design quality – concepts - Model.

Architectural Design: Software architecture, Mapping data flow into software architecture.

UNIT IV: Implementation Issues

(Teaching hours:

11)Implementation issues: Introduction - Structured coding techniques: Single Entry Single Exit constructs, Efficiency considerations, Violations of Single Entry Single Exit, Data Encapsulation, Goto Statement, Recursion – Coding style – Standards and Guidelines – Walk through and inspections - Documentation guidelines.

UNIT V: Software Testing Fundamentals

(Teaching hours:

11)Software Testing Fundamentals: Introduction- Software Testing Perspective- Effective Software Testing – Types of Testing – Principles of Software Testing - Testing and Debugging. Black Box Testing: Introduction- Black Box Techniques – Equivalence Partitioning – Boundary Value Analysis. White Box Testing: Introduction- White Box Techniques – White Box Modeling- Basis Path Testing- Control Structure Testing

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Characteristics of software engineering, evolution and various process models.	K1, K2
CO2	Requirements engineering, various analysis models.	K1, K2
CO3	Design engineering, concepts and Architectural design	K3
CO4	Implementation issues, Data encapsulation, documentation guidelines.	K3
CO5	Software testing fundamentals, types of testing, testing and debugging.	K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2			1	1	2	2		
CO2	3	2	2	3	1	1			2	
CO3	2			3		2		1		1
CO4		3	1	2		1	1			
CO5	1	2	3	2	2			3	3	

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Software Engineering – A Practitioner’s Approach	Roger S Pressman	McGraw Hill	2012, Sixth Edition, Fifth Reprint
2	Software Engineering Concepts	Richard Fairley	Tata McGraw Hill	2008, 30 th Reprint
3	Software Testing Concepts and Practices	K.Mustafa and R.A. Khan	Narosa Publishing House Pvt. Ltd	Reprint 2009.

Pedagogy: Lecture, PPT presentation

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20512E	CORE: OPEN SOURCE SOFTWARE	4	Theory	-	100

Objective of the subject: This paper focuses on open source systems. It also orients developing application with an open source scripting application like PHP in the front end and an open source backend like MySQL.

UNIT I: Overview of Open source

(Teaching hours: 8)

Open Source – Definition of Terms – Open Source Operating systems – Contents – Linux distribution – Open Source Desktop applications – Introduction – Graphical Desktops – Web browsers – The Open Office Suite.

UNIT II: Mysql

(Teachinghours: 8)

MySql Data types – Working with Database and Tables: Creating, Selecting – Deleting Databases – Creating Tables – Copying Tables – Modifying Tables – Deleting Tables. Working with Data: Inserting, updating and deleting records – Retrieving records – Copying, Importing and Exporting records – Subqueries.

UNIT III: Introduction to PHP

(Teachinghours: 12)

PHP- Overview- Writing PHP Programs: Example program - Viewing a web page -Serverside scripting – caching – variables. Getting Data from the Client: Web forms -Decision making: Conditional or Branching statements - Form Validation - Loops and Arrays.

UNIT IV: Code Organization in PHP

(Teachinghours: 10)

Organising codes: Code reuse – Functions - Scope of functions – Nesting - Include files. Objects: File and directory Handling: Working with files – Working with directories - uploading files.

UNIT V: Data Manipulation

(Teaching hours: 12)

Retrieving data from MySQL using PHP: Retrieving data using PHP - SQL statements for Retrieving data. Manipulating Data in MySQL using PHP: Update - delete records - Date and Time Type fields - Getting information on database tables. PHP Database Connectivity: PHP MySQL Connectivity

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Focusing Open source OS and its Applications	K1&K2
CO2	Illustrate Database and tables	K3&k4
CO3	To give explanation about PHP branching and Looping	K2&k3
CO4	To enlight PHP functions, Files and Directories	K3&K5
CO5	Discussion on Retrieving and Manipulating data in MYSQL using PHP	K3&K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	1								1
CO2	2			3	3		2			1
CO3	3			2	3	1				1
CO4	1			2	1	2	2			1
CO5	1			2		2	2			2

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Open Source Software	Paul Kavanagh	Elsevier Digital Press	2004, First Edition.
2	MySQL: The Complete Reference	VikramVaswani	Tata McGraw Hill	2004, First Edition.
3	Beginning PHP4	Wankyu Choi, Allan Kent,ChrisLea, Ganesh Prasad, Chris Ullman with Jon Blank, Sean Cazzell	Shroff Publishers and Distributors Pvt. Ltd	2000, Fourth Edition.

Pedagogy:Lecture, PPT Presentation

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20512P	CORE:OPEN SOURCE SOFTWARE LAB	3	Practical	-	-

Objective of the subject:

This course brings in the knowledge of open source software and to work with various functions of PHP and MySQL.

LINUX

1. LINUX Basic commands.

Write programs using the following concepts.

PHP

2. Looping.
3. Branching.
4. Arrays.
5. Functions.
6. Working with Files.

PHP and MySQL

7. Manipulating Data in MySQL using PHP.
8. Create a Dynamic Web page with PHP.

Note: Develop a project / case study using the above applicable concepts

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	To learn web development using Open Source Softwares PHP and MySQL	K1, K2, K3, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	1	1	3	3	3	1	2	2	2

Indicators: 1. Reasonable 2. Significant 3.Strong

Pedagogy:Demo, Experiment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20512F	SKILL BASED SUBJECT: APTITUDE	2	Practical	-	-

Objective of the subject: This subject highlights on improving the aptitude ability of the student and to understand technical and logical work outs like ratio and proportion, Profit and Loss, Probability, C Programming and OOPS concepts.

UNIT I: Number theory and Algebraic Concepts

(Teaching hours: 6)

Operation on numbers: Introduction -Face value -Place value - BODMAS rule. Ratio and Proportion: Ratio –Proportion- Indices – Logarithms – Average - Simple Problems.

UNIT II: Quantitative Aptitude

(Teaching hours: 6)

Problems on Ages: Problems on Ages – Clocks and Calendars – Mixtures and Alligations – Time and Work – Time and Distance. Profit and loss: Introduction – Cost price – Selling price – Profit and loss – Simple Problems.

UNIT III: Statistical Interpretation

(Teaching hours: 6)

Statistical description of data: Textual - Tabular and Diagrammatic representation of data – Data Sufficiency – Probability: Concept of percentage – Probability - Simple Problems.

UNIT IV: Fundamentals of C and C++

(Teaching hours: 6)

Problem Solving techniques in C - Data types – Type casting – Bitwise Operators – Arithmetic expressions, Relational Operators - Logical Expressions - Functions and Parameter Passing by Value - Passing Arrays to Functions, Call by value - Call by Reference – Recursion -Structures and Pointers.

Object Oriented C++ - Classes – Objects – Object oriented Paradigms: Data Abstraction - Encapsulation – Inheritance – Polymorphism – Abstract Classes – Virtual classes

UNIT V: Programming Concepts

(Teaching hours:6)

Java: Language Fundamentals, Operators and Assignments, Exceptions, Inner Classes, Garbage Collections, Java Packages, Inheritance, Interfaces, Java.util class, Java.io class, Threads.

Python: variables, expressions, math function, Function calls, Type conversion functions, Parameters and arguments, Debugging, Conditionals and recursion, Lists, Dictionaries, Strings, Tuples, files, Classes and Objects

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Learning the Basics of Numbers, Ratio & Proportion	K1, K2, K3
CO2	Working with Problems on Ages, Time and Distance, Profit & Loss	K2, K3
CO3	To implement the statistical description of data and probability	K2, K4, K5
CO4	To understand the basics of C programming and OOPS Concepts	K2
CO5	To learn the fundamentals of java and python programming	K2, K3

Note: K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			3	3						3
CO2			3	3						3
CO3			3	3						3
CO4				3	2					3
CO5	2			3	2					3

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Quantitative Aptitude	R.S.Aggarwal	S. Chand	2013, 20th Edition.
2	Quick Arithmetic	Ashish Aggarwal	S. Chand & Company Ltd	2007, Fifth Edition.
3	C Programs with Solutions	S.Anadhamurugan	University Science Press	2011, First Edition.
4	Let us C++	Kanetkar, Yashavant P	BPB Publications	2010, Third Edition.
5	The Java Complete Reference	Herbert Schildt	Tata McGrawHill, Publishers	2007, Seventh Edition.
6	Think Python	Allen Downey	Green Tea Press, Massachusetts	2012, Second Edition.

Pedagogy: Lecture, e-content, PPT presentation, Assignment, Quiz, Group Discussion

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612A	CORE: CYBER SECURITY	4	Theory	-	100

Objective of the subject: This paper helps the students to understand the different types of Threats, Cyber Crimes, Cyber Risks and also discusses on the necessity of Threat Intelligence for a better Cyber Management and supportive Architecture.

UNIT I: Cyber Threats and Cyber Crime

(Teaching hours: 10)

Cyber Threats: Cyber Security and its importance- Cyber Threats - Organized Crime - Proliferation of Weapons of Mass Destruction- Background, Sources and Types of Cyber Threats- Potential Risk factors of Cyber Threats- **Cyber Crime:** Overview-Origin and evolution of Cyber Crime- Criminalization- Cyber Crime Classifications- Conducting Cyber Investigations- Economical crisis - Challenges faced in Cyber Crimes.

UNIT II: Cyber Threat Intelligence

(Teaching hours: 8)

Cyber Threat Intelligence- An Overview of Threat Intelligence- Key Characteristics- Need for Threat Intelligence- Impact of Threat Intelligence- Applicability of Threat Intelligence. Threat Detection Rules - Risk Reduction through Threat Intelligence – Understanding and Implementing Threat Intelligence.

UNIT III: Cyber Risk Management

(Teaching hours: 11)

Cyber Management - Cyber Risk- Analyzing and Managing Cyber Risks- Risk Management Principles: Principles of Risk Management- Risk Management Process- Dealing with Risks- Risk Analysis - Evaluating cyber risks: Assessing the IT security- Quantifying the Risks- Evaluation of the existing Insurance Policies- Improve security and overall Risk Strategy- Prepare your organization- Coverage Review- Benefits of Risk Management- Cyber Risk Management Frameworks- Governance of Cyber Security Risks.

UNIT IV: Cyber Security Architecture and Challenges

(Teaching hours: 11)

Cyber Security Challenges – Fundamentals – Evolution - Strategic Cyber Security- Preventing Cyber Attacks - Methods of Securing Next Generation Internet Services. Cyber Security Architecture - Planning, Design and Implementation Issues of Security Architecture - Implementation Issues of the Security Architecture - Global Architectural Approach - Multifaceted Cyber Security.

UNIT V: Cyber Defense Mechanisms

(Teaching hours: 10)

Cyber Defense Mechanisms- Cyber Self Defense- Cyber Attack Techniques and Defense Mechanisms- Cyber Defense Planning Model- Cyber Supply Chain Security- DDOS Attacks and

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Cyber Defense:Securing Industrial Control Systems - Case Studies on Cyber Crime in Indian Perspective.

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Summaries the key vulnerabilities, threats, and attacks with regards to network security and explain approaches to mitigate these issues.	K1, K2, K3, K4
CO2	Provide knowledge about technologies to identify, detect and prevent cyber attacks of various types.	K1, K2, K3, K4
CO3	Able to identify cyber risks and take preventive steps.	K1, K2, K3
CO4	Gain knowledge about cyber security architecture, cyber security challenges and preventing measures.	K1, K2, K3, K4
CO5	Understanding the Cyber Defense planning model and various DDOS attacks.	K1, K2, K3

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	1		2	1	1	1		1	2
CO2	3	2		2	1	2		1	1	1
CO3	2	2		2	2	1		1	1	1
CO4	2	2	1	2	1	1		1	1	1
CO5	3	2	1	1	2	2		1	2	2

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Combating Cyber Threats through Cyber Security Intelligence	Dr.S.Sujatha, Dr.N.SudhaBhuvanewari	Kalaikathir Publications	2017, First Edition.

Pedagogy:Lecture, PPT presentation, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612B	CORE: MOBILE APPLICATION DEVELOPMENT	3	Theory	-	100

Objective: This course highlights the architecture of Android, its requirements, building android application with good user interface, data store and messaging capabilities. It also gives an insight on Android security Architecture and the security concerns to be considered while developing the secured Android Applications and also how to publish an Android application.

UNIT I: Introduction to Android and IOS (Teaching hours10)

Introduction to Android – Required Tools – Creating your first Android Application – Anatomy of Android Application. Activities, Fragments, and Intents: Understanding Activities – Linking Activities using Intents – Fragments.

Introduction to IOS : The New UI- Custom Transitions- New Multitasking modes- LLVM5-Xcode5. Animations: Animations- UIMotionEvent- Tint Colors- Custom Transitions.

UNIT II: Android User Interface (Teaching hours10)

Android User Interface: Understanding the components of a Screen – Adapting to Display Orientation – Managing Changes to Screen Orientation. Designing Your User Interface with Views: Using Basic Views – Using List views to Display Long lists – Using Menus with Views

UNIT III: Data Persistence and Content Providers (Teaching hours 10)

Data Persistence: Saving and Loading User Preferences – Persisting Data to Files – Creating and Using Databases. Content Providers: Sharing Data in Android – Using a Content Provider – Creating a Content Provider – Using the Content Provider.

UNIT IV: Messaging (Teaching hours 10)

Messaging: SMS Messaging – Sending E-mail. Developing Android Service: Creating Services – Establishing Communication between a Service and an Activity – Binding Activity to Services. Publishing Android Applications: Preparing for Publishing – Deploying APK files.

UNIT V: Android Security Architecture and Web Applications (Teaching hours 10)

Android Security Architecture: Understanding Permission Architecture – Checking Permissions – Using Self Defined Permissions – Protection levels. Data Storage and Security: Data storage in Android – Shared Preferences – Combining Data storage with Encryption. Talking to Web Applications: OWASP and Web Attacks – Authentication Techniques – Self-signed Certificates – Man-in-the-Middle Attack – OAuth – Challenge/Response with Cryptography.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Introduction to Android and Introduction to Ios, Activities and animations	K2
CO2	Android user interface, designing user interface with views, lists and menus.	K2
CO3	Data persistence, creating and using databases, content providers.	K3
CO4	Messaging, sending email, establishing communication, publishing apps.	K3
CO5	Android security architecture, data storage, protection levels, authentication techniques..	K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	2	2		3	1	2	2		
CO2	3	2	2	3	1	1	1		2	
CO3	2			3		2		1		1
CO4		2	1	2		1	1			
CO5	1	2	3	2	2			2	3	

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Beginning Android 4 Application Development	Wei-Meng Lee	John Wiley & Sons Inc.,	2012, First Edition.
2	Android Apps Security	Sheran A. Gunasekara	APress	2012, First Edition.
3	iOS7 Programming, Develop Advanced Applications for Apple Iphone ,iPad, and iPod Touch	Rob Napier Mukunth Kumar	Wiley India Pvt Ltd	2014, First Edition.

Pedagogy: Lecture, PPT presentation

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612U1	ELECTIVE I : AUGUMENTED REALITY	4	Theory	-	100

Objective of the Subject: This paper sets the stage by presenting a working definition of augmented reality, providing various application examples of this powerful real world user interface technology.

Unit I: Augmented Reality

(Teaching Hours: 10)

Introduction to Augmented reality – Definition and scope – A brief history of Augmented Reality – Examples- Related fields

Unit II: Displays

(Teaching Hours: 10)

Displays – Multimodal Displays – Visual Perception – Requirements and Characteristics – Method of Augmentation – Ocularity and Stereoscopy - Focus – Occlusion.

Unit III: Tracking

(Teaching Hours: 10)

Tracking, Calibration and Registration – Coordinate Systems – Characteristics of Tracking Technology – Mobile sensors – Optical tracking.

Unit IV: Computer Vision for Augmented Reality

(Teaching Hours: 10)

Computer vision for Augmented Reality: Marker Tracking – Multiple camera Infrared Tracking – Incremental tracking – Simultaneous Localization and Mapping – Outdoor tracking

Unit V: Calibration and Registration

(Teaching Hours: 10)

Calibration and Registration: Camera Calibration – Display Calibration – Registration – Situated Visualization – Challenges – Visualization Registration – Annotations and Labeling – X – Ray Visualization.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Gives the definition and scope of augmented reality	K1
CO2	Describes the requirements, characteristics and methods of augmentation	K1&K2
CO3	Explains the tracking operation and use of sensors in augmented reality	K3
CO4	Analyzing multiple tracking devices for augmented reality	K4&K5
CO5	Understands calibrating camera and visualization challenges	K3

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1		1						1	1
CO2	1		1						2	
CO3	1		1						3	
CO4	1		1						2	
CO5	1		1							2

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Augmented Reality Principles and Practice	Dieter Schmalstieg, Tobias Hollerer	Addison Wesley	2016, First Edition

Pedagogy: Lecture, PPT Presentation, Seminar, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612U2	ELECTIVE I:DATA SCIENCE	4	Theory	-	100

Objective of the course: This course introduces the student to the emerging field of data science through real-world data analysis and to develop applied experience with data science software, programming, applications and processes.

UNIT I: Origin of Data Science

(Teaching Hours: 10)

Introduction: Data Science- Big Data and Data Science hype – Datafication- Current landscape of perspectives- Skill sets needed. Statistical Inference- Populations and samples- Statistical modeling, Exploratory data analysis - The Data Science Process

UNIT II: Machine Learning Algorithms and Usage in Applications

(Teaching Hours: 10)

Linear Regression- k-Nearest Neighbors (k-NN)- k-means - Motivating application: Filtering Spam- Why Linear Regression and k-NN are poor choices for Filtering Spam- Naive Bayes and why it works for Filtering Spam- Data Wrangling: APIs and other tools for scrapping the Web

UNIT III: Extracting Meaning from Data

(Teaching Hours: 10)

Crowdsourcing - The Kaggle model - Feature Selection : User Retention - Filters - Wrappers - Decision Trees - Random Forests - Building a User-Facing Data Product : Algorithmic ingredients of a Recommendation Engine- Dimensionality Reduction - Singular Value Decomposition- Principal Component Analysis

UNIT IV: Predictive Modeling

(Teaching Hours: 10)

Fundamental concepts: Identifying informative attributes; Segmenting data by progressive attribute selection - Models, Induction, and Prediction - Supervised Segmentation - Visualizing Segmentations - Trees as Sets of Rules - Probability Estimation

UNIT V: Visualizing Model Performance

(Teaching Hours: 10)

Fundamental concepts: Visualization of model performance under various kinds of uncertainty; Ranking Instead of Classifying - Profit Curves - ROC Graphs and Curves - The Area Under the ROC Curve (AUC) - Cumulative Response and Lift Curves - Performance Analytics for Churn Modeling.

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Course Outcome Mapping with Knowledge Level

Course Outcome	CO Statement	Knowledge level
CO1	To develop fundamental knowledge of concepts underlying datascience projects	K1,K2,K3,K4,K5
CO2	To develop practical skills needed in modern analytics (data)	K1,K2,K3,K4
CO3	To explain how math and information sciences can contribute to building better algorithms and software	K1,K2,K3
CO4	To give a hands-on experience with real-world data analysis	K1,K2,K3,K4
CO5	To develop practical data analysis skills, which can be applied to practical problems	K1,K2,K3,K4,K5

Note: K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating

Course Outcome Mapping with Programme Outcome

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			1		2			3		
CO2	1					2			3	
CO3	1					3			2	
CO4	1			2		3				
CO5	1			2					2	

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No	Title	Author	Publishers	Publication Year & Edition
1	Doing Data Science	Rachel Schutt and Cathy O'Neil	O'Reilly	October 2013, First Edition
2	Data Science for Business	Foster Provost and Tom Fawcett	O'Reilly	July 2013, First Edition

Pedagogy:Lecture, PPT Presentation, Seminar, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612U3	ELECTIVE I: ARTIFICIAL INTELLIGENCE	4	Theory	-	100

Objective of the subject: This subject helps in understanding the concepts and mechanisms of Artificial Intelligence which includes details about Search process and Knowledge Representation

UNIT I: Introduction to Artificial Intelligence (Teaching hours: 8)
Introduction to AI - The Foundations - History of Artificial Intelligence - The State of the Art.

UNIT II: Intelligent Agents (Teaching hours: 10)
Agents and Environments - Good Behavior: The Concept of Rationality - The Nature of Environments - The Structure of Agents.

UNIT III: Searching and problem solving (Teaching hours: 10)
Problem-Solving: Problem-Solving Agents - Example Problems: Toy Problem- Searching for Solutions - Uninformed Search Strategies: Breadth-first, Depth-first, Depth-limited, Iterative deepening depth-first search - Avoiding Repeated States - Searching with Partial Information

UNIT IV:Heuristics& Algorithms (Teaching hours: 12)
Informed Search and Exploration: Informed (Heuristic) Search Strategies - Heuristic Functions - Local Search Algorithms and Optimization Problems - Local Search in Continuous Spaces – Practical applications of AI (Games, CAD/CAM).

UNIT V: Introduction to Datasets and its types (Teaching hours: 10)
Machine learning: Datasets: Introduction-Olive oil dataset (Hierarchical) - Ischemia heart disease classification - Australian crabs- (Hierarchical) – Optdigits - IRIS datasets - Pageblock.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	To provide knowledge on introduction to artificial intelligence, history and applications.	K1, K2
CO2	To impart learning about Agents and Environments	K1, K2
CO3	To Understand the problem solving techniques with various algorithm	K1, K2, K4
CO4	To understand the heuristic search strategies and application of artificial intelligence	K1, K2
CO5	Study on various type of data sets with example	K1, K2, K4

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1								2		
CO2							1	2		1
CO3			1	2	1			2	1	1
CO4				1	1		2	2		1
CO5				1	1		1	2	1	1

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Artificial Intelligence - A Modern Approach	Stuart Russell, Peter Norvig	Pearson Education Ltd	2014, Third Edition.
2	Artificial Intelligence	Elaine Rich, Kevin Knight, Shivashankar B Nair	McGraw Hill	2010, Fourth reprint.
3	Machine Learning with SVM and other Kernel Methods.	K.P.Soman, R.Loganathan, V.Ajay	PHI learning private Limited	2009.

Pedagogy:Lecture, PPT presentation, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612U4	ELECTIVE I : EMBEDDED SYSTEM AND ITS APPLICATIONS	4	Theory	-	100

Objective of the Course:

The objective of the course is to introduce the basic components of embedded systems and robotics. This course also introduces some of the Applications of sensors and Robots.

UNIT I:Basics of Electronic

(Teaching hours: 10)

Basic Electronics: Components and Devices: Capacitors – Resistors – Transistors – Diodes – LEDs - Breadboard – AC Motors – DC Motors - Servo Motors - Measuring Instruments – Circuits – Power Units

UNIT II: Microcontrollers and Embedded Systems

(Teaching hours: 10)

Introduction to Microcontrollers and Embedded Systems: Introduction to PCB – Microprocessors Vs. Microcontrollers – Types of Microcontrollers, Advanced Microcontroller Chips: ATmega, Atmel - Arduino IDE

UNIT III:Sensors

(Teaching hours: 10)

Fundamentals of Sensors – Types - functional characteristics of sensors – IR Sensors – Temperature Sensors – Light Sensors - Actuators – Sensors and actuators for Biosciences – Tactile Sensors. Application: Domain Specific IoTs: Introduction- Home Automation, Cities, Retail, Logistics and Agriculture.

UNIT IV:Introduction to Robots

(Teaching hours: 10)

Introduction to Robots – Types of Robots – Operating Principles and functions – Black Line follower robot – Edge detector robot – Obstacle sensing – Automation of Traffic signals.

UNIT V:Applications of Robotics

(Teaching hours: 10)

Applications: Robotics applications in Agriculture, Biotechnology, Information and Communication Technology, Navigation.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Detailed study on the basics of Electronics, the components and devices used in embedded systems.	K2
CO2	To learn about Microcontrollers and its types.	K1, K2
CO3	Study on various sensors used in Embedded systems and its Applications.	K1, K2
CO4	Explains the concepts of Robots, its types, working principles of robots.	K2
CO5	To discuss about the applications of Robots in various fields including Agriculture, Biotechnology etc.,	K1, K2, K3, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2			1							
CO3			1			2	1			
CO4			3			3				
CO5			3		3	3	2		2	2

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Microcontrollers: Architecture, Programming, Interfacing and System Design	Raj Kamal	Pearson Education	2011 (5 th Impression)
2	An Embedded Software Primer	David E. Simon	Pearson Education	2002, First Edition
3	Internet of Things: A Hands-on Approach	ArshdeepBahga and Vijay Madiseti	Universities press(India) private Limited	2016 Reprint

Pedagogy:Lecture, PPT presentation, e-content seminar, Assignment, Quiz, Group Discussion

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612U5	ELECTIVE I : ENTERPRISE RESOURCE PLANNING	4	Theory	-	100

Objective of the Course:

This paper highlights on the integrated information management with ERP and its benefits. An overview about Business Engineering and Business Modeling is discussed. Learn methods of ERP implementation and Vendors of ERP, case studies.

UNIT I: Integrated Information with ERP

(Teaching hours: 10)

ERP Curtain Riser: Accommodating variety-Integrated Management Information-Seam less Integration- SCM-Resource management-Data model-Scope-Technology-Benefits-Evolution- Revisited-Modern Enterprise. Business Engineering: Overview-Significance-Principles-IT- Concerns.

UNIT II: Business Modeling

(Teaching hours: 10)

Business Modeling: Building the model- Problems. ERP Implementation: Roles- Customization- Precautions-Post implementation- Implementation method. Competitive Advantage.

UNIT III: ERP Products

(Teaching hours: 10)

ERP Domain: MFG/PRO- IFS/Avalon-Bann IV-SAP 82- SDAP R/3 Applications- Indian ERP Package- Arrival of ERP III- problems.

UNIT IV: Marketing of ERP

(Teaching hours: 10)

Marketing Of ERP: Overview-Market Dynamics and Competitive Strategy- Managing strategy process-Relationship marketing- Developing strategies- Planning Programmes-Participants- Sales cycle.

UNIT V: Case Study

(Teaching hours: 10)

Case Study: Benz-Keen Hin Industries-Bull Electronics- Twentieth Century Companies- Ameritech-Essar steel- Jindal Iron-Godrej Soaps-IREDA-Sara Case Study.

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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	To gain knowledge on Integrated information management using ERP	K1, K2 , K3 , K4
CO2	To develop knowledge on creating better business models	K1, K2 , K3 , K4, K5
CO3	To study modules in different vendors ERP products	K1, K2 , K3 , K4
CO4	To build an understanding on marketing ERP products	K1, K2 , K3 , K4
CO5	To study successful cases of ERP implementation	K1, K2 , K3 , K4, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			2			1			3	
CO2	1					2			3	
CO3			1			3				2
CO4	1			2					3	
CO5	2			3					1	

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Enterprise Resource Planning Concepts and Practice	Vinod Kumar Garg and N.K. Venkitakrishnan	PHI Publication	2012, Second Edition, 22 nd Reprint

Pedagogy: Teaching /learning methods

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612P	CORE: MOBILE APPLICATION DEVELOPMENT LAB	3	Practical	-	-

Objective of the subject: To develop user interfaces, activities and views in the Android operating system. It also highlights the location identification, sms and e-mail.

The following programs can be implemented in android operating system.

1. Activities.
2. Intent Filters.
3. User Interface.
4. Image Views.
5. Create a database to store the values.
6. Store the data in SD Card.
7. Content Providers.
8. SMS Messaging.

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO	Activities, User interface, Image views, creating database, store data in SD card, content providers, SMS messaging.	K1, K2, K3, K4, K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO	3	3		3	3	2	3	2	2	3

Indicators: 1. Reasonable 2. Significant 3.Strong

Pedagogy: Demo, Experiment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20612C	Skill Based Subject : Soft Skills	2	Practical	-	-

Objective of the subject: This course content guides and helps students to concentrate on career planning, group discussion, art of listening skill, art of speaking skill, body language, team building and team work, etiquette, manners, cv writing, interview skills, and dress code.

UNIT I: Introduction to Soft Skills

(Teaching hours: 6)

Soft skills: Introduction – Importance of Soft Skills – Attributes Regarded as Soft Skills – Practicing Soft Skills – Know Thyself / Self Discovery: Importance of Knowing Yourself – Process of Knowing Yourself – Developing Positive Attitude.

UNIT II: Values and Career Planning

(Teaching hours: 6)

Forming Values: Meaning – Value - Values Relating to Education – Values Relating to Self and Others- Important of Values – Types of Values: Terminal and Instrumental values, Power of Values – Examples for Values. Career Planning: Guidelines for Choosing a Career – Myths about Choosing a Career – Tips for Successful Career Planning.

UNIT III: Art of Listening, Reading and Effective Communication

(Teaching hours: 6)

Art of Listening: Listening – Benefits of Active Listening – Kinds of Listening – Art of Reading: Benefits of Reading – Different Types of Reading – The SQ3R Technique – Art of Speaking: Defining Communication – Special Features of Communication – Importance of Communication – Tips for Effective Communication.

UNIT IV: Body Language and Team Building(Teaching hours: 6)

Body Language: Forms of Body Language – Parts of Body Language – Types of Body Language - Team Building and Teamwork: Aspects of Team Building – Skills Needed for Teamwork – A Model of Team Building - Team Vs Group - Characteristics of Effective Team – Role of a Team Leader – Role of Team Members - Group Discussion(GD): Meaning of GD – Skills Required in a GD – Essential Elements of GD.

UNIT V: Etiquette, manners and Interview Skills(Teaching hours: 6)

Etiquette and Manners: Introduction – Classification of Etiquette – Manners: Introduction – Good Manners - Preparing CV/Resume: Meaning – Types of Resumes – CV Writing Tips – Interview Skills: Types of Interview – Types of Questions Asked – Dress Code at Interview.

Dr G R DAMODARAN COLLEGE OF SCIENCE (AUTONOMOUS)
COIMBATORE - 641014
B. Sc(INFORMATION TECHNOLOGY)
(Under Choice Based Credit System)
EFFECTIVE FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2020-2021

Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Study of soft skills, to know about thyself/ self discovery and to have a positive attitude.	K1,K2, K3
CO2	Study on values, its types and power. Provides idea on choosing our career and tips for successful career.	K2, K3, K5
CO3	Detail study on active listening, reading, speaking and effective communication	K2,K3
CO4	Detail description on body language, team building and group discussion	K2,K3
CO5	Provides knowledge on etiquette, manners, CV writing, Interview skills, Dress code	K2,K3,K4,K5

Note:

K1- Remembering; K2 – Understanding; K3 – Applying; K4 – Analysing; K5 – Creating & Evaluating.

Course Outcome mapping with Programme outcome

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1								1		1
CO2								1		
CO3				2				3		
CO4	1							1	2	
CO5								1		

Indicators: 1. Reasonable 2. Significant 3.Strong

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Soft Skills Know yourself & Know the world	Dr. K. Alex	S.Chand& Company Ltd.	2014, Second , Revised

Pedagogy:Lecture, PPT presentation, Assignment, Group Discussion, Mock Interview