

BI-01

**Dr G R DAMODARAN COLLEGE OF SCIENCE (AUTONOMOUS) 2020-21**  
**COIMBATORE - 641014**  
**BACHELOR OF COMPUTER APPLICATIONS**  
**(Under Choice Based Credit System)**

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

<b>Programme Outcome</b>	
<b>P01</b>	Possess the basic knowledge on the mathematical concepts and their application in computing
<b>P02</b>	Ability to study and understand the problem statement, listing down the requirements, define the algorithm to solve the problem
<b>P03</b>	Possess the knowledge on computer networks and communication, security issues in networks
<b>P04</b>	Ability to apply the computing principles and possess knowledge to manage projects in multidisciplinary environments
<b>P05</b>	Possess knowledge on the latest computing technologies and applications
<b>P06</b>	Ability to manage, represent and interpret data effectively through data representation techniques and respective application softwares
<b>P07</b>	Ability to communicate efficiently in the society and industry to deliver their thought process
<b>P08</b>	Ability to document the business process and software development process in a standardized way
<b>P09</b>	Ability to work in a diverse team as a member or leader in projects under multidisciplinary environments
<b>P010</b>	Ability to cross the boundaries and volunteering themselves in solving the national and societal problems

<b>Programme Specific Outcome</b>	
<b>PS01</b>	Explore the technical knowledge in varied computer applications and inculcating the skill set for challenging career opportunities, to self develop as an entrepreneur or to pursue higher studies
<b>PS02</b>	Analyze, Design and develop various types of software solutions like web design and development and desktop applications
<b>PS03</b>	Knowledgeable to manage and handle IT solution of industries in varied domains
<b>PS04</b>	Capable to design and develop mobile applications to fulfill the need of the society
<b>PS05</b>	Knowledge in embedded systems enabling to proceed as an entrepreneur, to provide solutions to key problems in the society through innovative ideas

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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							
I	II	20100E	ENGLISH I	3	25	75	100	5	3	THEORY
I	III	20106A	CORE: C PROGRAMMING	4	25	75	100	5	3	THEORY
I	III	20106B	ALLIED: MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS	5	25	75	100	6	3	THEORY
I	III	20106P	CORE: C PROGRAMMING LAB	2	40	60	100	6	3	PRACTICAL
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							
II	II	20200E	ENGLISH II	3	25	75	100	5	3	THEORY
II	III	20206K	Online Course: SWAYAM/NPTEL Course	4				5		
II	III	20206A	CORE: DATA STRUCTURES	4	25	75	100	5	3	THEORY
II	III	20206B	ALLIED: COMPUTER BASED OPTIMIZATION TECHNIQUES	5	25	75	100	4	3	THEORY
II	III	20206P	SKILL BASED SUBJECT: DATA STRUCTURES LAB	2	40	60	100	4	3	PRACTICAL
II	IV	20200G	ENVIRONMENTAL STUDIES: ENVIRONMENTAL AWARENESS	2	25	75	100	2	3	THEORY

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*G. Prasad*

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Sem.	Part	Course Code	Subject Name	Credits	MARKS			Hrs. / Week	Exam. Duration (Hrs.)	Category
					CA	TEE	TOTAL			
III	IV	20300A	BASIC TAMIL/ADVANCED TAMIL: ADVANCED TAMIL I	2	100	NA	100	3	THEORY	
III	IV	20300B	BASIC TAMIL/ADVANCED TAMIL: BASIC TAMIL I							
III	IV	20300N	NON MAJOR ELECTIVE: PERSONALITY DEVELOPMENT AND SOFTSKILLS		40	60				
III	III	20306A	CORE: COMPUTER NETWORKS	4	25	75	100	3	THEORY	
III	III	20306B	CORE: OPERATING SYSTEMS	4	25	75	100	3	THEORY	
III	III	20306C	CORE: JAVA PROGRAMMING	4	25	75	100	3	THEORY	
III	III	20306D	ALLIED: INTERNET OF THINGS	5	25	75	100	3	THEORY	
III	III	20306P	CORE: JAVA PROGRAMMING LAB	2	40	60	100	3	PRACTICAL	
III	IV	20300G2	SKILL BASED SUBJECT: PROFESSIONAL COMMUNICATION	2	25	75	100	3	THEORY	
III	V	20306S	EXTENSION ACTIVITIES: NSS / COMPUTER AWARENESS PROGRAMME	1	GRADE**			3	THEORY	
IV	IV	20400A	BASIC TAMIL/ADVANCED TAMIL: ADVANCED TAMIL I	2	100	NA	100	3	THEORY	
IV	IV	20400B	BASIC TAMIL/ADVANCED TAMIL: BASIC TAMIL I							
IV	IV	20400N	NON MAJOR ELECTIVE: PERSONALITY DEVELOPMENT AND SOFTSKILLS		40	60				
IV	III	20406K	Online Course: SWAYAM/NPTEL Course	4				3	THEORY	
IV	III	20406A	CORE: OPEN SOURCE SOFTWARE	4	25	75	100	5	THEORY	
IV	III	20406B	CORE: PYTHON PROGRAMMING	4	25	75	100	5	THEORY	
IV	III	20406C	ALLIED: UNDERWATER COMMUNICATIONS	5	25	75	100	5	THEORY	
IV	III	20406P	CORE: OPEN SOURCE SOFTWARE LAB	2	40	60	100	3	PRACTICAL	
IV	IV	20400G1	VALUE EDUCATION: INDIAN SOCIETY, PEOPLE AND CULTURE	2	25	75	100	3	THEORY	

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Sem.	Part	Course Code	Subject Name	Credits	MARKS			Hrs. / Week	Exam. Duration (Hrs.)	Category
					CA	TEE	TOTAL			
V	III	20506A	CORE: OBJECT ORIENTED ANALYSIS AND DESIGN	4	25	75	100	4	3	THEORY
V	III	20506B	CORE: WEB DESIGN AND MARKUP LANGUAGE	4	25	75	100	5	3	THEORY
V	III	20506C	CORE: SOFTWARE ENGINEERING	4	25	75	100	5	3	THEORY
V	III	20506D	CORE: .NET PROGRAMMING	5	25	75	100	5	3	THEORY
V	III	20506P	CORE: WEB DESIGN AND .NET PROGRAMMING LAB	3	40	60	100	4	3	PRACTICAL
V	III	20506K	Online Course: SWAYAM/NPTEL	4				4		
V	IV	20506E	SKILL BASED SUBJECT: APTITUDE*	2	25	75	100	3	3	PRACTICAL
VI	III	20606A	CORE: CYBER SECURITY	4	25	75	100	4	3	THEORY
VI	III	20606B	CORE: MOBILE APPLICATION DEVELOPMENT	5	25	75	100	4	3	THEORY
VI	III	20606P	CORE: MOBILE APPLICATION DEVELOPMENT LAB	2	40	60	100	4	3	PRACTICAL
VI	III		ELECTIVE - I	5	25	75	100	4	3	THEORY
VI	III	20606S	CORE: PROJECT AND VIVA VOCE	7	25	75	100	12	-	PRACTICAL
VI	IV	20606C	SKILL BASED SUBJECT: SOFT SKILLS *	2	25	75	100	2	3	PRACTICAL
				140			3700	180		

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Sem.	Part	Course Code	Subject Name
<b>ELECTIVE I</b>			
VI	III	20606U1	MOBILE COMMUNICATIONS
VI	III	20606U2	ARTIFICIAL INTELLIGENCE
VI	III	20606U3	DATA SCIENCE
VI	III	20606U4	ENTERPRISE RESOURCE PLANNING
VI	III	20606U5	AIR AND SEA NAVIGATION

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

<b>Marks split up:</b>	<b>Marks</b>
I Project Review	10
II Project Review	15
Project Documentation	25
Viva Voce	50
<b>Total</b>	<b>100 Marks</b>

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

**MAPPING OF COURSES WITH PROGRAMME OUTCOME LEVELS**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
20106A	CORE: C PROGRAMMING	1	3		1	1	3		1	1	2
20106B	ALLIED: MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS	3						2			
20106P	CORE: C PROGRAMMING LAB	3	3		2	1	1	1	1	1	1
20100G	SKILL BASED SUBJECT: GENERAL AWARENESS	2	3	3	2	3	2		1	2	1
20206A	CORE: DATASTRUCTURES	3						2			
20206B	ALLIED: COMPUTER BASED OPTIMIZATION TECHNIQUES	3	3	1	3	3	3	3	3	3	2
20206P	SKILL BASED SUBJECT: DATA STRUCTURES LAB		2	2		3				2	
20306A	CORE: COMPUTER NETWORKS		2	3	1	3	2			1	1
20306B	CORE: OPERATING SYSTEMS	1	3	2	3	3	3	2	3	3	3
20306C	CORE: JAVA PROGRAMMING	1	2	2	2	3	3	2	1	1	2
20306D	ALLIED: INTERNET OF THINGS	3	3	1	3	3	3	3	3	3	2
20306P	CORE: JAVA PROGRAMMING LAB	1	1		2	1		1	1	1	2
20406A	CORE: OPEN SOURCE SOFTWARE	1	2	3	3	2	2	2	2	2	1

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Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
20406B	CORE: PYTHON PROGRAMMING	1	2	2	3	3	2	1		1	2
20406C	ALLIED: UNDERWATER COMMUNICATIONS	3	3	1	3	3	3	3	3	3	2
20406P	CORE: OPEN SOURCE SOFTWARE LAB	3	3	2	3	2	2		2	2	2
20506A	CORE: OBJECT ORIENTED ANALYSIS AND DESIGN				3	3		2			
20506B	CORE: WEB DESIGN AND MARKUP LANGUAGE	2	2	3	2	1	2	1	1	2	1
20506C	CORE: SOFTWARE ENGINEERING	1	2	2	3	2	3	2		3	
20506D	CORE: .NET PROGRAMMING	3	3	1	3	3	3	3	3	3	2
20506P	CORE: WEB DESIGN AND .NET PROGRAMMING LAB	1	3		1	1	3		1	1	2
20506E	SKILL BASED SUBJECT: APTITUDE*	3	3		2		1				2
20606A	CORE: CYBER SECURITY	2	3	2	3	2	2	1	2	1	1
20606B	CORE: MOBILE APPLICATION DEVELOPMENT	2	3	3	3	2	2	1	2		
20606P	CORE: MOBILE APPLICATION DEVELOPMENT LAB	3	3	1	3	3	3	3	3	3	2
20606U1	ELECTIVE I: MOBILE COMMUNICATIONS					3	3				
20606U2	ELECTIVE I: ARTIFICIAL INTELLIGENCE	1	2	3	1	2		1			2
20606U3	ELECTIVE I: DATA SCIENCE		2		3	3		1		1	2



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Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
20606U4	ELECTIVE I: ENTERPRISE RESOURCE PLANNING				2	2	1	1	1	1	
20606U5	ELECTIVE I: AIR AND SEA NAVIGATION	2		2	2	1	2		1	1	2
20606S	CORE: PROJECT AND VIVA VOCE	3	3	1	3	3	3	3	3	3	2
20606C	SKILL BASED SUBJECT: SOFT SKILLS *		2		2	1		3	1	3	3

**Indicators: 1. Reasonable      2. Significant      3. Strong**



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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20106A	CORE: C PROGRAMMING	4	Theory	-	100

**Objective of the subject:** This paper provides a brief introduction to C language. It gives detailed description about syntax and semantics of C Languages along with concepts like pointers, files and pre processor directives.

**UNIT I: C Basics**

**(Teaching Hours: 9)**

Introduction to C Programming Language-Data types – Identifiers – Variables - Scope of variables - Type Qualifiers - Storage class specifiers - Variable Initialization - Constants. Operators – Assignment – Arithmetic - Increment/Decrement – Relational - logical-Bit wise-Ternary-Address and pointer operator - SizeOf – Comma – Dot - Arrow operator -The [] and () operators – Expressions.

**UNIT II: Control Statements**

**(Teaching Hours: 10)**

Selection statements - Iteration Statements - Jump Statements - Expression Statements -Block Statements - Functions - General form of Functions - Function prototypes - Function Arguments - Arguments to main function - Return Statement – Recursion -Declaring variable length parameter list.

**UNIT III: Arrays & Structures**

**(Teaching Hours: 11)**

Arrays - Single dimension - Passing Single dimension arrays to functions – Strings - Two dimensional arrays - Arrays of strings - Multidimensional Arrays - Array Initialization - Variable length arrays - Structures-Array of Structures - Passing structures to functions - Arrays and structures within structures – Unions - Bit fields – Enumerations –Typedef.

**UNIT IV: Pointers**

**(Teaching Hours: 10)**

Pointers - Pointer Expressions - Pointers and arrays - Multiple indirection - Initializing pointers - Pointers to Functions - Dynamic memory allocation - Generating a pointer to an array - Indexing Pointers - Structure pointers.

**UNIT V: Files & Preprocessors**

**(Teaching Hours: 10)**

Files - File system basics - fseek() and random access I/O - fscanf() and fprintf() - Preprocessor-#define, #error, #include - comments.

*G. R. Damodaran*

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To understand Building blocks of C programming	K1,K2
CO2	Overview of Selection, Iteration statements and Functions	K1,K2,K3
CO3	Discussion on Arrays ,Structures, Unions	K1,K3,K5
CO4	Illustrate about pointers and Dynamic memory allocation	K3,K4
CO5	Understanding the concept of files and preprocessor	K2,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		2			1			1		
CO2		1				1		1		
CO3		2		1		2			1	2
CO4	1					2				
CO5		1								

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	C The Complete Reference	Herbert Schildt	Tata McGraw-Hill	2008 Fourth Edition
2	Programming in ANSI C	E.Balagurusamy	Tata McGraw Hill	2012 Sixth Edition
3	C Programming	Ashok Kamthane	Pearson Education	2011 Second Edition
4	Programming with C - Schaum's Outlines Series	Byron Gottfried	Tata McGraw Hill	2011 Third Edition

**Pedagogy:** Lecture, PPT Presentation, Group Discussion

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20106B	ALLIED: MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS	5	Theory	95%	5%

**Objective of the course:** Provides an introduction to the conceptual and mathematical foundations of computer science and its applications in functional programming as well as reasoning techniques based on propositional logic and mathematical induction.

**UNIT I: NUMERICAL METHODS**

**(Teaching hours: 12)**

Numerical Methods: Solving simultaneous linear algebraic equations: Gauss Elimination – Gauss Siedel methods. Interpolation: Newton's forward and backward interpolation formula - Lagrange's interpolation. Numerical Integration: Trapezoidal rule and Simpson's  $1/3^{\text{rd}}$  rule.

**UNIT II: PROBABILITY & STATISTICS**

**(Teaching hours: 8)**

Probability & Statistics: Sample space and events, axioms of probability. Baye's theorem. Correlation – Karl Pearson's co-efficient of correlation. Regression – Regression equations and its coefficient – Curve fitting by the method of least squares (fitting straight lines only).

**UNIT III: MATHEMATICAL LOGIC**

**(Teaching hours: 10)**

Mathematical Logic: Connectives – Truth Tables, Well-formed formula, Tautology, Equivalence of formulas, duality law, Normal forms, Inference theory for statement calculus (direct and indirect method).

**UNIT IV: RELATION and FUNCTIONS**

**(Teaching hours: 10)**

Relations And Functions: Binary relations, Composition of relations, Equivalence of Relations, Composition of Functions, Inverse functions, One-to-one, Onto, One to one-on-to functions.

**UNIT V: 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: Deterministic finite automata- non-deterministic finite-state automata – conversion of non-deterministic finite automata to deterministic finite state automata.

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**Course Outcome mapping with Knowledge level**

Course outcome	CO Statement	Knowledge level
CO1	Derive numerical methods for approximating the solution of the problems of algebraic and transcendental equations such as Gauss elimination, Seidel methods, trapezoidal, Simpson's rule, and Newton's forward and backward interpolations.	K1, K3, K4
CO2	To find out appropriate probability and statistical methods such as Mean, median, mode and apply them in various data analysis problems.	K1, K3, K5
CO3	To Keep in mind about the fundamental ideas and notations of discrete mathematics such as Tautology, contradiction and normal forms.	K1, K2
CO4	To understand the concepts of sets, relation, function.	K1, K2, K3
CO5	Analyze the formal languages and automata.	K2, 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									
CO2	3									
CO3	3									
CO4	3						2			
CO5	3						2			

**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, 5 <sup>th</sup> Edition
2	Statistical Methods	S.P.Gupta	Sultan Chand and sons	2009, 36 <sup>th</sup> Revised Edition
3	Discrete Mathematical Structures with Applications to Computer Science	J P Tremblay and R P Manohar	McGraw Hill	2006, 27 <sup>th</sup> Reprint

**Pedagogy:** Lecture, Assignment.

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Semester/ Year	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20106P	CORE: C PROGRAMMING LAB	2	Practical	-	-

**Objective of the course:** The programming paper gives an experience on working with arrays, functions, structures, pointers, files, preprocessor directives using C Language.

Simple Input / Output, Variables & Expression Statements

1. Selection statements
2. Iteration Statements
3. Single & Multi dimensional Array
4. Functions & Recursive Functions
5. Structures
6. Pointers
7. Files
8. Preprocessor directives
9. Command Line Arguments

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Provides hands on real time experience in handling applications and techniques in arrays, structures, pointers, functions and also working experience on files, preprocessor and Command line arguments.	K2,K3,K5

**Note:**

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

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

**Pedagogy:** Demo, Hands-on.

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20206A	CORE: DATA STRUCTURES	4	Theory	5%	95%

**Objective of the course:** To provide the students with the basic understanding of data structures for more efficient program writing. This paper focuses on various data storage and manipulation structures like arrays, records, stacks, queues, recursion, trees and sorting techniques

**UNIT I: Introduction, Arrays**

**(Teaching Hours: 12)**

Introduction and Overview: Basic terminology – Data structures – Data structure operations.

Arrays, Records: Linear arrays – Representation of linear arrays – Traversing linear array – Inserting and deleting – Linear search – Multidimensional arrays – Records.

**UNIT II: Sorting, Linked List**

**(Teaching Hours: 10)**

Sorting: Sorting - Bubble sort – Quick sort – Insertion sort – Selection Sort.

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, Queue**

**(Teaching Hours: 10)**

Stacks, Queues and Recursion: Stacks – Array representation of stacks – Linked representation of stack – Arithmetic expressions – Recursion – Tower of Hanoi – Queue – Linked representation of Queues.

**UNIT IV: Trees**

**(Teaching Hours: 8)**

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

**UNIT V: Graph**

**(Teaching Hours: 10)**

Graphs and Applications: Graph theory terminology – Sequential representation of graph – Adjacency matrix – Linked Representation of Graph - Operations on graph – Traversing a graph.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understand the basic concepts, terminologies in data structure. A detailed study on arrays and records.	K1,K2,K3
CO2	Understand various sorting techniques. Introducing linked list, its types and the operation on linked list.	K2,K3,K4
CO3	A detailed study on stacks and queues, representation in memory and its operations. Application of stack such as recursion, infix to postfix, Tower of Hanoi.	K2,K3,K5
CO4	To give an insight on trees, their representation and the operations on trees. Apply different tree traversal techniques and operations on binary search tree.	K2,K3,K4,K5
CO5	To understand the concept of non-linear data structure graph, its terminologies, representation and traversal.	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	3				3		1		
CO2		3		2		3		1		
CO3	2	3		3	1	3		1		
CO4	3	3	2	1		2				
CO5	3	3	1	1		2				

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Data Structures Schaum's Outlines	Seymour Lipschutz, G.A Vijayalakshmi Pai	Tata McGraw-Hill Companies	2006, Indian Adapted Edition
2	Fundamentals of Data Structures	Ellis Horowitz and Sartaj Sahni	Galgotia Publication Pvt. Ltd	2012, First Edition

**Pedagogy:** Lecture, PPT presentation, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20206B	ALLIED: COMPUTER BASED OPTIMIZATION TECHNIQUES	5	Theory	95%	5%

**Objective of the course:** This subject highlights on the various optimization techniques and the methodologies that includes Linear Programming, Transportation & Assignment Problem, Games & Strategies, Replacement Problem, Queuing Theory, CPM/PERT Method.

**UNIT I: LINEAR PROGRAMMING PROBLEM**

**(Teaching hours: 12)**

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

**UNIT II: TRANSPORTATION and ASSIGNMENT PROBLEM**

**(Teaching hours: 10)**

Transportation Problem: Introduction – Finding an Initial basic feasible solution (North – West Corner Method, Least-Cost Method & Vogel's Approximation Method) – Test for Optimality. Assignment Problem: Introduction - Hungarian Method.

**UNIT III: GAMES and REPLACEMENT PROBLEM**

**(Teaching hours: 10)**

Games and Strategies: Introduction – Two-Person Zero-Sum games – Some basic terms – The Maximin-Minimax Principle – Games without saddle point-Mixed Strategies – Graphic Solution of  $2 \times n$  and  $m \times 2$  games.

Replacement Problem: Introduction – Replacement of equipment/asset that deteriorates gradually: Replacement policy when value of money does not changes with time - Replacement policy when value of money changes with time

**UNIT IV: QUEUEING THEORY**

**(Teaching hours: 8)**

Queuing Theory: Introduction – Queuing system – Elements of a queuing system – Operating characteristics of a queuing system- Poisson queuing systems- $\{(M/M/1):(\infty)/FIFO\}$  and  $\{(M/M/1): (N/ FIFO)\}$ .

**UNIT V: NETWORK SCHEDULING BY CPM/PERT**

**(Teaching hours: 10)**

Network Scheduling by PERT/CPM: Network: Basic Components – Rules of network construction – Numbering the events – Critical path analysis: Forward & Backward Pass Calculations. Probability considerations in PERT: Probability of meeting the schedule time – PERT Calculation.

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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			
CO2	3						1			
CO3	3						1			
CO4	3						1			
CO5	3						1			

**Indicators: 1. Reasonable 2. Significant 3.Strong**

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

**Pedagogy:** Lecture, Assignment.

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Semester/ Year	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20206P	SKILL BASED SUBJECT: DATA STRUCTURES LAB	2	Practical	-	-

**Objective of the course:** The programming paper gives an experience on working with stacks, queues, and linked lists; searching and sorting techniques.

Stack Operations

1. Queue Operations
2. Singly linked list
3. Linear Search
4. Binary Search
5. Infix to Postfix Notation
6. Bubble Sort
7. Selection Sort
8. Quick Sort
9. Insertion Sort

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Provides hands on real time experience in handling Stack, Queue Operations, Singly linked list, Linear and Binary Search, Infix to Postfix Notation, Bubble, Selection, Quick Sort and Insertion Sort	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	3	3	1	3	3	3	3	3	3	2

**Indicators:** 1. Reasonable 2. Significant 3.Strong

**Pedagogy:** Demo, Hands-on.

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20306A	CORE: COMPUTER NETWORKS	4	Theory	-	100

**Objective of the course:** This subject helps in understanding the concepts and mechanisms of Telecommunication and Computer Network Engineering which includes details about Signaling, Encoding, Modulating, Error Detection and Data transfer.

**UNIT I: Introduction to Networks and Switches** **(Teaching Hours: 8)**

Introduction: Data communications - Networks- Protocols and standards. Network Models: Layered tasks - The OSI model - Layers in the OSI model.

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: TCP/IP, Signals and media** **(Teaching Hours: 10)**

TCP/IP protocol suite - Addressing. Data and signals: Analog and digital -Transmission impairment- Performance – Multiplexing. Transmission media: Guided media – Unguided media - Virtual circuit networks.

**UNIT III: Error detection and correction, Congestion control** **(Teaching Hours: 12)**

Error Detection and Correction: Introduction – Block coding – Checksum. Network layer: Delivery – forwarding – Unicast routing protocols - Multicast routing protocols. Congestion Control and Quality of service: Data traffic –Congestion –Congestion control.

**UNIT IV: Transport layer, Protocols** **(Teaching Hours: 10)**

Transport layer: Process to Process Delivery: Client/Server Paradigm - Multiplexing and Demultiplexing – Connectionless Versus Connection Oriented Service – Reliable versus Unreliable Protocols - TCP.

**UNIT V: Application layer** **(Teaching Hours: 10)**

Application Layer: Domain Name system: Name space- Domain name space - Distribution of name space-Resolution - Electronic mail.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Provide an overview of the concepts and fundamentals of computer networks and network switches	K1 & K2
CO2	Understand various signals and transmission medias	K2
CO3	Describe Error detection, correction and congestion control	K3
CO4	Compare Multiplexing and Demultiplexing, Connectionless Versus Connection Oriented Service and Reliable versus Unreliable	K4
CO5	Illustrate email services, cryptography and software defined networks.	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
CO2		2	3	1		1				1
CO3			3	1	3	2				1
CO4			3	1		1			2	1
CO5			3	1	3	1				1

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Data Communication and Networking	Behrouz A Forouzan	Tata McGraw Hill	2013, Fifth edition
2	Computer Networks	Andrew S. Tanenbaum & David J. Wetherall	Pearson Education	2012, 5 <sup>th</sup> Edition
3	SDN: Software Defined Networks: An Authoritative Review of Network Programmability Technologies	Thomas D. Nadeau & Ken Gray	O'Reilly	2013, First Edition

**Pedagogy:** Lecture, PPT presentation, Assignment.

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20306B	CORE: OPERATING SYSTEMS	4	Theory	-	100

**Objective of the course:** The objective is to emphasize the need and the functionality of the operating system, to discuss the components and responsibilities of the operating systems like CPU scheduler, memory management system, secondary memory management, handling concurrent processes.

**UNIT I: Operating Systems**

**(Teaching hours: 8)**

Introduction to Operating Systems: Definition of OS - Early History - Process Concepts: Definition of process – Process states – Process Management- Interrupt – Interprocess communication- Mutual exclusion – Semaphores – Deadlock and indefinite postponement.

**UNIT II: Real Memory Organization and Management**

**(Teaching hours: 12)**

Real Memory Organization and Management: Memory Organization- Memory Management - Memory Hierarchy - Memory Management Strategies - Contiguous Vs Non-contiguous storage allocation – Single user contiguous storage allocation – Fixed partition multiprogramming – Variable partition multiprogramming – Multiprogramming with storage swapping.

**UNIT III: Virtual Memory Management**

**(Teaching hours: 10)**

Virtual Memory Management: Basic Concepts - Paging – Demand Paging- Anticipatory Paging - Page replacement strategies – Working set Model, Page size – Segmentation. Processor Scheduling: Scheduling Levels - Preemptive Vs non-preemptive scheduling – Priorities – Scheduling Algorithms– Deadline Scheduling- FIFO – RR – SPF – SJF – SRT – HRRN.

**UNIT IV: Disk Performance Optimization**

**(Teaching hours: 10)**

Disk Performance Optimization: Characteristics of moving head disk storage – Need for disk scheduling – Disk Scheduling Strategies – FCFS – SSTF – SCAN – C-SCAN.

**UNIT V: File and Database Systems**

**(Teaching hours: 10)**

File and Database Systems: Data Hierarchy – Files - File system – File Organization – File Allocation – Free space Management – Access Control Matrix.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Study on Operating Systems, Process Concepts and Management, Mutual exclusion, Semaphores and Deadlock	K2
CO2	Understanding Memory Organization, Contiguous and Non-contiguous storage allocation, partition	K2, K4
CO3	Study on Virtual Memory Management, and Page replacement strategies and Processor Scheduling.	K2 ,K3, K4
CO4	Study on Disk Performance Optimization and Disk Scheduling Strategies	K2, K3 ,K4
CO5	Understanding File, Database Systems and File Organization	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					2					
CO2					1					
CO3					2					
CO4					1	1				
CO5					2	2				

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Operating System	Harvey M. Deital, Paul J. Deitel, David R. Choffnes	Pearson Education	2007 3 <sup>rd</sup> Edition

**Pedagogy: Teaching /learning methods**

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20306C	CORE: JAVA PROGRAMMING	4	Theory	-	100

**Objective of the Course:** The objective is to learn the Java programming language along with its syntax, idioms, patterns, and styles. To understand object oriented programming and to learn the essentials of the Java class library and event driven Graphical User Interface (GUI) programming.

**UNIT I: Basics of Java**

**(Teaching hours: 10)**

Introduction to Java - Importance of Java – Bytecode – Buzzwords. Overview of Java: Object oriented programming-Simple program-Lexical issues. Data types, Variables and Arrays-Operators.

**UNIT II: Branching and Methods**

**(Teaching hours: 10)**

Control statements-Introduction to Classes: Class Fundamentals – Declaring Objects – Constructors - this keyword - Garbage Collection - finalize() method - Overloading Methods - Recursion-Access control - static – final - Nested and Inner class – Inheritance: Member Access and Inheritance - types of inheritance - super – Method Overriding – Dynamic Method Dispatch – Abstract Class

**UNIT III: Package, Interface, Threads in java**

**(Teaching hours: 10)**

Packages and Interfaces: Definition - Importing Packages - Interfaces. Exception Handling - try and catch - nested try statements. Multithreading Programming: Creating a thread and multiple thread – priorities – synchronization - interthread communication.

**UNIT IV: String handling and applets in java**

**(Teaching hours: 10)**

String Handling: constructors – operations – comparison – extraction – searching - string buffer. Applet Class: basics – architecture – skeleton – repainting - APPLET tag - passing parameters - getDocumentBase() - getCodeBase() - AppletContext and showDocument() - AudioClip and AppletStub Interface - outputting.

**UNIT V: AWT controls and classes**

**(Teaching hours: 10)**

AWT classes: Windows fundamentals - frame window - working with graphics – colour - fonts - Managing text output using Font metrics. AWT controls: labels – buttons - check boxes – lists - - text field.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To understand the basics of Java Programming	K1, K2 K3
CO2	To learn branching statements and method in Java	K1, K2 K3
CO3	To gain knowledge on packages, interfaces and threads in Java	K1, K2 K3
CO4	To develop understanding on string handling and applets in Java	K1, K2 K3
CO5	To learn creation of GUI using AWT in java	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	1	3	2	3	3	3	2	3	3	3
CO2	1	3	2	3	3	3	2	3	3	3
CO3	1	3	2	3	3	3	3	3	3	3
CO4	1	3	2	3	3	3	3	3	3	3
CO5	1	3	2	3	3	3	3	3	3	3

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Java The Complete Reference	Herbert Schildt	Tata McGraw-Hill	2011 Eighth edition
Websites				
1	www.spoken-tutorial.org/			

**Pedagogy:** Teaching/Lecture/ Powerpoint Presentation/ Assignment/quiz/group works

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20306D	ALLIED: INTERNET OF THINGS	5	Theory	-	100

**Objective:** The objective of this paper is to provide an insight on basic electronic components, physical design, logic design, enabling technologies of IOT, IOT system management and design methodology, IOT physical devices and cloud offerings.

**UNIT I: Basic Electronics and Embedded Systems**

**(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 . Microprocessors Vs. Microcontrollers - Advanced Microcontroller Chips: ATmega, Atmel - Arduino IDE. Sensors: Fundamentals - functional characteristics – types.

**UNIT II: Introduction to Internet of Things**

**(Teaching hours: 10)**

Introduction to internet of things: Introduction - Physical design of IOT - Logical design of IOT - IOT Enabling Technologies - IOT Levels and Deployment templates.

IOT and M2M: Introduction - M2M - Difference between IOT and M2M - SDN and NFV for IOT.

**UNIT III: IOT System Management**

**(Teaching hours: 10)**

IOT system Management with NETCONF-YANG: Need for IOT System Management - Simple Network Management Protocol - Network Operator Requirements - NETCONF-YANG - IOT system Management with NETCONF – YANG. IOT Design Methodology - case study on IOT system for weather monitoring - Motivation for using Python.

**UNIT IV: IOT and Physical devices**

**(Teaching hours: 10)**

IOT Physical devices and end points: Basic building blocks of an IOT device - Exemplary device Raspberry Pi - About the board - Linux on Raspberry Pi - Raspberry Pi interfaces - Programming Raspberry Pi with Python - Other IOT devices.

**UNIT V: IOT and Cloud**

**(Teaching hours: 10)**

IOT physical devices and cloud offerings: Introduction to cloud storage models and cloud APIs- WAMP - Autobahn for IOT - Xively cloud for IOT - Python web application framework - Designing a RESTful web API - Amazon web services for IOT.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understand the various electronic components and its functions.	K1,K2
CO2	Describes about fundamentals of Internet of Things	K1,K2,K3
CO3	Understand about IOT system Management and network protocols	K1,K2,K3,K4
CO4	Describes about the Basic building blocks of an IOT device	K1,K2,K3,K4
CO5	Describes IOT physical devices and cloud offerings and cloud storage models	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	1			1			2		1	1
CO2	2	3	2	2		1	1		2	
CO3	3	2			1	2				
CO4	2		2	3	2			1	1	
CO5	3		3	2			1	2		

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Basic Electronics	V.K.Mehta	S.Chand & Company Ltd	2008, 11 <sup>th</sup> Edition
2	Internet of Things - A hands on Approach	Arshdeep Bahga, Vijay Madiseti	Orient Blackswan Private Limited	2014, First Edition

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20306P	CORE: JAVA PROGRAMMING LAB	2	Practical	-	-

**Objective of the Course:**

This paper gives a hands-on experience on implementing the OOPS concepts like overloading, inheritance, applets, packages, interfaces and exception handling using Java.

Write Programs using the following concepts.

1. Classes & Objects.
2. Method overloading.
3. Inheritance.
4. Interfaces.
5. User defined Packages.
6. Exception Handling.
7. Thread Manipulation
8. String Handling Functions
9. Simple Java Applet.
10. AWT Controls.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To gain hands on experience in Java Programming	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	3	1	3	3	3	3	3	3	2

**Indicators: 1. Reasonable 2. Significant 3.Strong**

**Pedagogy: Demo, Hands-on.**

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20406A	CORE: OPEN SOURCE SOFTWARE	4	Theory	-	100

**Objective of the Course:**

The course is designed to provide an insight on the open source licensing and policies, Open source softwares Linux, MySQL and PHP .

**UNIT I: Introduction to Open Source Software**

**(Teaching hours: 8)**

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

Introduction to Linux : Linux Distributions – Operating Systems and Linux – History of Linux and Unix – Linux Overview – Open Source Software – Online Linux Information Resources. Linux Shell and File Structure : The Command Line – Jobs: Background, Kills and Interruptions – Ending Processes: ps and kill – Linux Files – The File Structure – Listing, Displaying and Printing Files – Managing Directories – File and Directory Operations.

**UNIT II: MySQL**

**(Teaching hours: 8)**

MySql Data types – Working with Database and Tables: Creating Databases, Selecting Database for use – 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: PHP Fundamentals**

**(Teaching hours: 12)**

PHP : Writing PHP Programs: Simple PHP program – Web communications – Using variables in PHP – Operators and Expressions. HTML Primer – Accessing PHP and HTML Data – Links – Query Strings – HTML (Web) forms. Decision, Loops and Arrays: Conditional or Branching statements - Loops and Arrays.

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**UNIT IV: PHP Functions and File Handling**

**(Teaching hours: 10)**

Writing User defined functions in PHP : The structure of functions – Switching functions - Scope of variables – Global and Local variables – Creating static function variables – Nesting - Recursion – The Include and Require statements. File and directory Handling: Working with files – Reading and writing characters in Files – Reading Entire files – Random Access to file data - Working with directories – Uploading Files.

**UNIT V: Retrieving MySQL data using PHP**

**(Teaching hours: 12)**

Connecting to MySQL from PHP – PHP MySQL Connectivity - Retrieving data from MySQL using PHP: Retrieving data using PHP- SQL statements for Retrieving data. Using PHP to manipulating MySQL: Inserting Records using PHP – Updating and deleting records in Tables – Working with Date and Time Type fields - Getting information on database tables.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To learn the concept of Open Source definitions, category of open source softwares and the basics of Linux operating system.	K1, K2
CO2	To understand the database manipulation with MySQL database.	K2, K3
CO3	To learn the fundamentals of the PHP for server side scripting.	K3, K4
CO4	To understand the PHP User defined functions & File and directory handling	K3, K4, K5
CO5	Retrieving data from 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		2	2					
CO2		2			1					
CO3		3		3	2				1	
CO4				2	3		1			
CO5		2		2	3		1			1

**Indicators: 1. Reasonable 2. Significant 3.Strong**



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<b>Text Books</b>				
<b>S.No.</b>	<b>Title</b>	<b>Author</b>	<b>Publishers</b>	<b>Publication Year &amp; Edition</b>
1	Open Source Software	Paul Kavanagh	Elsevier Digital Press	2004, 1 <sup>st</sup> Edition
2	Linux : The Complete Reference	Richard Peterson	Tata McGraw Hill	2017, 6 <sup>th</sup> Edition.
3	MySQL: The Complete Reference	Vikram Vaswani	Tata McGraw Hill	2017, First Edition.
4	Beginning PHP5	Dave Mercer et al.	Wrox Press	2004, First Edition.
<b>Web References</b>				
1	<a href="http://www.spoken-tutorial.org/">www.spoken-tutorial.org/</a>			

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



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BACHELOR OF COMPUTER APPLICATIONS

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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 %
FOURTH	20406B	CORE: PYTHON PROGRAMMING	4	Theory	-	100

**Objective of the Course:**

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, , Install and run the Python interpreter - I/O – Tuples – Files using the Python programming language.

**UNIT I: Preliminaries of Python Programming**

**(Teaching hours: 10)**

**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.

**Writing Our First Python Program:** Installing Python for Windows - Setting the Path to Python - Executing a Python Program.

**UNIT II: Datatypes and Operators**

**(Teaching hours: 10)**

**Datatypes in Python:** Comments – Docstrings – Variables - Datatypes – Built-in datatypes - bool Datatype - Sequences – Sets - Literals – Characters – User defined Datatypes - Constants - Identifiers and Reserved words - Naming Conventions.

**Operators in Python:** Operator - Arithmetic - Assignment - Unary Minus - Relational - Logical - Boolean - Bitwise - Membership - Identity - Operator Precedence and Associativity. **Input and**

**Output:** Output statements - Input Statements - Command Line Argument

**UNIT III: Control Structures and Arrays**

**(Teaching hours: 10)**

**Control Statements:** if - A Word on Indentation - if ... else - if ... elif ... else - while - for - Infinite - Nested - else - break - continue - pass - assert - return.

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

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**UNIT IV: Strings and Functions**

(Teaching hours: 10)

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

**Functions:** Difference between a Function and a Method - Defining and Calling a Function - Returning from a Function - 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 - Function Decorators.

**UNIT V: List, Tuples, Dictionaries and Files**

(Teaching hours: 10)

**Lists and Tuples:** List - Creating Lists using range() Function - Updating the Elements of a List - Concatenation of Two Lists - Repetition of Lists - Membership in Lists - Aliasing and Cloning Lists - Methods to Process Lists - Nested Lists - Nested Lists as Matrices. **Tuples:** Creating Tuples - Accessing the Tuple Elements - Basic Operations on Tuples - Functions to Process Tuples - Nested Tuples. **Dictionary:** Access, Update and Delete dictionary elements– Built-in Dictionary Functions & Methods **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	Provides an introduction to python and the related programming environment	K1
CO2	Discusses on the various data types and the operators used for programming	K1,K2
CO3	Illustrates about the control structures and its usage in programs, The concepts related to arrays are studied	K2, K3
CO4	Provides insight on string handling and the usage of functions	K4
CO5	Study the usage of List, tuples and File handling	K4

**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		2		1	3		1			
CO2	1	2			1	2				
CO3		2	2	3	2		2	1	1	
CO4	1		3	2		3	1	2		
CO5	1	2	3	2			2	1		

**Indicators: 1. Reasonable 2. Significant 3.Strong**

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Core Python Programming	Dr. R. Nageswara Rao	Dreamtech Press	2018, First Edition
2	Python for Everybody, Exploring Data Using Python	Charles Severance	Amazon Digital Services	2016, First Edition

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



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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20406C	ALLIED: UNDERWATER COMMUNICATIONS	5	Theory	-	100

**Objective of the Course:**

This paper covers the basic concepts of Under Water Communication technology, underwater acoustic communications and Software oriented Case studies.

**UNIT I: Underwater Acoustics and Applications**

**(Teaching hours: 10)**

Underwater Acoustics: The Development – Exploring the Underwater Environment - Historical Highlights – The pioneers – Civilian developments – The Basic Oceanography – Depth variations. Outline of Underwater Applications: Military applications – Civilian applications.

**UNIT II: Underwater Networking and Signals**

**(Teaching hours: 10)**

Underwater Networking Basics: Underwater Acoustic Infrastructure – Offshore Terrestrial Station - Radar Networks –Data Handling of an Underwater Network – Data Tabulation. Types of Signals – Acoustic Modem – Boosters – Antennas – Receivers – Surface Buoy – Gliders – Yatch/Sailing Boats - Networking of submarines. Underwater electro acoustic transducers – Transducer modeling and design – installation.

**UNIT III: USN and AUV**

**(Teaching hours: 10)**

Underwater Sensor Networks: Ocean Sampling Networks, Pollution Monitoring, Environmental Monitoring and Tactical surveillance systems, Major challenges in design of Underwater Sensor Networks - Factors that affect the UWSN-Sensor Node Architecture-GIBS, VRAP, DABSRAPT. Underwater Communication Protocols: Routing Protocols – GPS. Autonomous Underwater Vehicles – Topologies – Servers and Databases - Network Coding – Security issues

**UNIT IV: Water Column Applications and Marine Animal Acoustics**

**(Teaching hours: 10)**

Water Column Applications: Navigation – Military applications – Fishery Acoustics – Physical Oceanography – Tsunami Applications - Underwater Intervention. Marine Animal Acoustics: Marine mammal bioacoustics Fish bioacoustics – Acoustic Pollution of the Ocean. Autonomous Underwater Vehicles.

**UNIT V: Open Source Case Study**

**(Teaching hours: 10)**

Case Study: Under Water Acoustic Software: AcTUP V2.2 L – Underwater Sound Recorder – SailTool Software – Sail Imaging Software.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Explore and watch the basic oceanography and ocean based application domains.	K1 & K2
CO2	Traverse the Underwater Networking Technologies and various types of signals	K2 & K3
CO3	Enhance and knowledgeable about Underwater Sensor Networks and Autonomous Underwater Vehicles.	K2 & K3 & K4
CO4	Apply and envisage on Water Column applications and Marine animal acoustics	K5
CO5	Choose and Deploy an Open Source based simulators to experiment.	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			1			2
CO2		1	1	2	2					
CO3		1	1	2	2	2			1	2
CO4		1	1	3	1					2
CO5	1		2	3	3	3			1	

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Book				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Introduction to Underwater Acoustics: Principles and Applications	Lurton and Xavier	Springer Publications	2010, 2 <sup>nd</sup> Edition
2	Underwater Acoustic Sensor Networks	Yang Xiao	Taylor and Francis Publications	2016, First Edition
Web References				
1	Curtin University : <a href="http://cmst.curtin.edu.au/products/underwater/">http://cmst.curtin.edu.au/products/underwater/</a>			

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20406P	OPEN SOURCE SOFTWARE LAB	2	Practical	-	-

**Objective of the course:**

This course brings in the knowledge of open source software and to implement various functions of PHP, MySQL and Python practically.

**LINUX**

1. LINUX Basic commands

**Write programs using the following concepts.**

**PYTHON**

2. Looping
3. Branching
4. Arrays
5. Functions
6. File Handling

**PHP**

7. Looping
8. Branching
9. Arrays
10. User defined functions.

**MySQL**

11. Simple Queries of DDL, DML and DCL. (MySQL Database).
12. Create a Dynamic Web page with PHP by accessing data from MySQL.

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

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**Course Outcome mapping with Knowledge level**

<b>Course Outcome</b>	<b>CO Statement</b>	<b>Knowledge level</b>
<b>CO1</b>	To provide a practical knowledge about shell commands of Linux operating system and the data base manipulation of MySQL Database. To implement the programming concepts of PHP and PYTHON and the Database connectivity.	K3, K5

**Note:**

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

**Course Outcome mapping with Programme outcome**

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

**Indicators: 1. Reasonable 2. Significant 3.Strong**

**Pedagogy: Demo, Hands-on.**

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20506A	CORE: OBJECT ORIENTED ANALYSIS AND DESIGN	4	Theory	-	100

**Objective of the Course:**

This subject gives guidance on the construction of object oriented systems. It helps in understanding the fundamental concepts and notations of object oriented analysis and design.

**UNIT I: OOPs concept and lifecycle**

**(Teaching hours: 10)**

An Overview Of Object Oriented Systems Development : Object Basics: Object oriented philosophy – objects – classes – attributes - object behavior and methods -encapsulation and information hiding - class hierarchy – polymorphism - object relationships and associations - aggregations and object containment. Case study – object and identity - object persistence. Object oriented systems development life cycle: Software development process - building high quality software - use- case driven approach - reusability.

**UNIT II : Methodologies and UML diagrams**

**(Teaching Hours: 12)**

Object Oriented Methodologies: Rumbaugh et al.'s object modeling technique - Booch methodology - Jacobson et al Methodologies – patterns - frameworks - the Unified Approach. Unified modeling language: Static and dynamic models - UML diagrams - UML class diagrams - use-case diagrams - UML dynamic modeling – packages - UML extensibility and UML Meta-Model.

**UNIT III: Analysis and Classification**

**(Teaching Hours: 10)**

Object Oriented Analysis process : Identifying use cases - Business object analysis - use-case driven object oriented analysis - business process modeling - Use-case model - Developing effective documentation . Classification - Classification theory - Noun Phrase approach - common class patterns approach - Use-case driven approach - classes, responsibilities, and collaborators - Naming classes.

**UNIT IV: Objects Relationships and design axioms**

**(Teaching Hours: 8)**

Identifying Object Relationships, Attributes and Methods. Associations - Super-Subclass relationships - A-part of relationships - Class Responsibility - Object responsibility. The Object oriented design process and design axioms: Corollaries - Design patterns.

**UNIT V : Packages and layers**

**(Teaching Hours: 10)**

Designing Classes, UML object constraint languages - Designing classes - Class visibility - Refining attributes - Designing methods and protocols - Packages and managing classes. Access Layer: Designing Access layer classes - View layer: User Interface design as a creative process -

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Designing view layer classes - Macro level process – Micro Level Process – The purpose of a view layer interface.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Object oriented programming concepts, lifecycle, Importance of OOPs , and reusability.	K2
CO2	Object oriented methodologies, various patterns for problem solving and UML diagrams	K3
CO3	Object oriented analysis process, and providing documentation, applying classification for various problems and use case driven approach.	K2 & K3
CO4	Identifying Object Relationships, Attributes And Methods, design process and design axioms.	K4 & K5
CO5	Applying packages and a study of various layers.	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	1	2		3	3	1		2	2	3
CO2	3	2		3	1	2			2	
CO3	2	3		3		2		1		
CO4	3	3	1	2		1				
CO5	1	2	3	2	2			3		

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Object Oriented Systems Development using the Unified Modeling Language	Ali Bahrami	McGraw Hill, Publication	Reprint 2017, First Edition.

**Pedagogy:** Lecture, PPT presentation

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20506B	CORE: WEB DESIGN AND MARKUP LANGUAGE	4	Theory	-	100

**Objective of the course:** The goal of this course is to present an overview of the Internet as a global resource for the people and provides the basic knowledge for designing a web page or websites using HTML and XML. The concept of style sheets is also discussed for formatting the XML documents.

**UNIT I: HTML Basics**

**(Teaching Hours: 8)**

Getting started: Internet-Web Browser-Web Server-Designing the Web site-Creating a web page with HTML basics: Basic elements-lists.

**UNIT II: Formatting Tags**

**(Teaching Hours: 12)**

Creating a web page with HTML Linking - Creating web page with HTML text formatting: text formatting and alignment- character styles-font and sizes-using colors for web-preformatted text-horizontal lines-line break-displaying special characters-Images in HTML-Tables.

**UNIT III: Working with Frames, CSS**

**(Teaching Hours: 10)**

Frames: Creating frames-attributes and linking-complex framesets-inline frames- Image maps-forms and CGI Scripts. DHTML – CSS.

**UNIT IV: XML Basics**

**(Teaching Hours: 10)**

Introduction to XML-XML Basics: tag format-declaration-elements-attributes-comments-character entities-CDATA blocks-example document. Document Type Definition-XML Schema simple types- XML Schema complex types- XML namespaces.

**UNIT V: XSL Transformation**

**(Teaching Hours: 10)**

XSL transformation-XPath language –Cascading Style Sheets-XLink and XPointer: Simple links-extended links-displaying the links-linking by element identity, position and hierarchy.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To understand the basics of Internet and HTML	K1&K2
CO2	To understand the formatting tags	K1&K2&K3
CO3	To design the webpage using frames and CSS	K1&K5
CO4	To understand the XML syntax and XML Schema	K1&K2&K4
CO5	To transform of XML to HTML using XSL	K1&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										
CO2				3	1					
CO3				3	1					
CO4				2	2			2		
CO5				3	3			3		

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Web Publishing	Monica D' Souza, Jude D' Souza	Tata McGraw-Hill	2001, First Edition
2	XML – How to Program	H.M. Deitel, J.M. Deitel, T.R. Nieto, T.M. Lin,P. Sadhu	Pearson Education	2013, First Edition
3	XML in Easy Steps	Mike Mcgrath	McGraw Hill Education	2012, Second Edition

**Pedagogy:** Lecture, PPT Presentation, Seminar, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20506C	CORE: SOFTWARE ENGINEERING	4	Theory	-	100

**Objective of the course:** 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 user interface design, different types of software testing techniques.

**UNIT I: Basics of Software Engineering**

**(Teaching Hours: 10)**

**Introduction to software engineering:** The Evolving Role of software - Software - The changing nature of software - Legacy software. A Generic view of software: Software Engineering - A Layered Technology - A Process Framework - The Capability Maturity Model Integration (CMMI) - Process Partners - Process Assignment - Personal and Team Process Models - Process Technology.

**UNIT II: Process Models**

**(Teaching Hours: 10)**

**Process Models:** Prescriptive Models - The Waterfall Model - Incremental Process Model - Evolutionary Process Models - Specialized Process Models - The Unified Process.

**UNIT III: Agile Process**

**(Teaching Hours: 10)**

**An Agile View of Process:** Agility - Agile Process - Agile Process Models - Software Engineering Practice - Communication Practices - Planning Practices - Modeling Practices.

**UNIT IV: Software Testing**

**(Teaching Hours: 10)**

**Software Testing :** Creating an environment supportive for software testing: Minimizing risks – Writing a policy for software testing – Economics of Testing – Testing an Organizational issue – Management support for software testing – Building a Structures Approach to software testing – Developing a test strategy - Building the software testing process: Software Testing Guidelines – Workbench Concept – Customizing Software testing process.

**UNIT V: Testing and Planning**

**(Teaching Hours: 10)**

**The seven step testing process:** Overview of the software testing process: The cost of computer testing – The Seven step software testing process – Workbench Skills. **Organizing for testing :** Objective – Workbench – Input – Do procedures – Check Procedures – Output. **Developing the test plan:** Objective – Concerns - Workbench – Input – Do procedures – Check Procedures – Output. **Case Study :** Testing a Data warehouse – Testing Web based Systems.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To impart the fundamentals of software engineering	K1, K2, K4
CO2	To impart the importance of various software engineering process models	K1, K2, K4
CO3	To impart the principles of Agile methodology in software engineering	K1, K2, K4
CO4	To impart the developing and testing methodologies in software engineering	K1, K2, K4, K5
CO5	To impart the knowledge of testing plan	K1, K2, 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	3	2				1	1	2	
CO2	3	2	1			2		1		
CO3	1	1	2	3	2	1		1		
CO4	1	1	3			2	1	2	1	
CO5	1	2	3	2	1				1	1

**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	Tata McGraw	2013, Tenth Edition.
2	Software Engineering	Ian Sommerville	Pearson Education	2011, Ninth Edition.
3	Effective Methods for Software Testing	William E Perry	Wiley India	2006, 3rd Edition.

**Pedagogy:** Teaching / 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	20506D	CORE: .NET PROGRAMMING	5	Theory	-	100

**Objective of the Course:** This subject highlights on Introduction to .NET Framework, .NET Languages, Introduction to VB.Net, Controls in VB.Net, Structure of ASP.NET, Web Controls, State Management - Rich Text Controls. It also focuses on Data Source Binding and how to work with Data Grid.

**UNIT I - .NET FRAMEWORK**

**(Teaching Hours: 10)**

Introducing the .NET Framework : The Evolution of Web Development – The .NET Framework - The Common Language Runtime - .NET Class Library - .NET Languages - Variables and Datatypes - Operations - Methods - Basics of Classes - Building a Basic Class - Passing Parameters by Reference and by Value - Understanding Namespaces and Assemblies.

**UNIT II – VB.NET CONTROLS**

**(Teaching Hours: 10)**

Introduction to Visual Basic.Net : The Windows Graphical User Interface - The Object Model - The Three Step Process - The Visual Studio Environment - Writing the First Visual Basic program. Controls : Introducing Controls, Working with Multiple Controls, Designing Applications for User Convenience, Coding for Control - Data: Variables and Constants - Calculations - Formatting Data - Handling Exceptions - Displaying Messages in Message Boxes.

**UNIT III – ASP.NET & Web controls**

**(Teaching Hours: 10)**

Developing ASP.NET Applications : Creating Websites - Anatomy of a Web Form - Visual Studio Debugging - Anatomy of an ASP.NET Applications - Introducing Server Controls - The Page Class - Application Events - ASP.NET Configuration. Web Controls : Stepping Up to Web Controls - The WebControl Base Class - Enumerations - List Controls - Table Controls - Web Control Events and AutoPostBack - Logging Exceptions - Page Tracing.

**UNIT IV – Advanced Controls**

**(Teaching Hours: 10)**

Validation: The Validation Controls - Server-Side Validation - Client-Side Validation - Validating with Regular Expressions. Rich Controls: The Calendar - The AdRotator - Creating a Simple User Control - User Control Events - Website Navigation : Defining a Site Map - Binding an Ordinary Page & a Master Page to a Site Map - URL Mapping and Routing - Menu Styles - Menu Templates.

**UNIT V – Connecting with Data**

**(Teaching Hours: 10)**

Working with Data : Understanding Databases - Configuring Database - SQL Basics - The Data Provider Model - Direct Data Access. Data Binding: Introducing Data Binding - Single-Value Data Binding - Repeated-Value Data Binding. The Data Controls: The GridView - Formatting the GridView - Sorting and Paging the GridView - Using GridView Templates.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Define the Fundamental concepts of .NET framework.	K1,K2
CO2	Understand the .Net environment, basic controls, variables and constants	K1,K2
CO3	Develop .net applications, web sites using web controls	K2,K3
CO4	Apply validation controls,user controls in web applications and to bind an Ordinary Page & a Master Page to a Site Map	K2,K3,K4
CO5	Demonstrate the concept of databases and display the data in gridview.	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									
CO2		2		3						
CO3					3	2	2			
CO4						3				
CO5				3		3			3	

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Programming in Visual Basic.Net	Julia Case Bradely, Anita C Millspaugh	Tata McGraw-Hill	2008, Fifth Reprint
2	Beginning ASP.NET 4.0 in VB 2010	Matthew MacDonald	Apress, Berkeley, CA, USA	2011, Second Edition.

**Pedagogy:** PPT presentation, e-content seminar, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20506P	CORE: WEB DESIGN AND .NET PROGRAMMING LAB	3	Practical	-	-

**Objective of the Course:** This paper provides an experience on creating web site, Windows application in VB.NET and Web application in ASP.NET. Demonstration of various controls such as Menus, Rich web controls, Validation Controls and interactive report generation are emphasized.

**WEB DESIGN:**

1. Design a web page with images, links and tables.
2. Design a web page using CSS.
3. Create a XML document for a database using DTD.
4. Design a XML Schema for a student database.

**VB.NET:**

5. Create a login form to check the authentication of the user.
6. Design an application using basic controls.
7. Design a form to manipulate the dataset.
8. Generation of a Report from the database.

**ASP.NET:**

9. Create a Web Application for manipulation of Basic Web Controls
10. Create a Web Application for manipulating Rich Web Controls
11. Create a Web Application for the manipulation of Validation controls
12. Develop a Web application for database manipulation using SQL Server Database.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Demonstrate designing web page using HTML, create XML document and xml schema, windows application, web application, manipulating databases using SQL server,	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	3	1	3	3	3	3	3	3	2

**Indicators: 1. Reasonable 2. Significant 3.Strong**

**Pedagogy: Demo, Hands-on.**



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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20506E	SKILL BASED SUBJECT: APTITUDE	2	Practical	-	-

**Objective of the course:** 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 - Numbers, Ratio and Proportion**

**(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 - Age, Profit and Loss**

**(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 – Probability and Statistics**

**(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 – 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 - Java and Python**

**(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	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									1
CO2	3									1
CO3	3					2				1
CO4		3		2						1
CO5		3		2						1

**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	20th edition, 2013
2	Quick Arithmetic	Ashish Aggarwal	S. Chand & Company Ltd	2007
3	C Programs with Solutions	S. Anadhamurugan	University Science Press	First Edition, 2011
4	Let us C++	Kanetkar, Yashavant P	BPB Publications	2010
5	The Java Complete Reference	Herbert Schildt	Tata McGrawHill, Publishers	7 <sup>th</sup> Edition, 2007
6	Think Python	Allen Downey	Green Tea Press, Massachusetts	2 <sup>nd</sup> Edition, 2012

**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	20606A	CORE: CYBER SECURITY	4	Theory	-	100

**Objective of the course:** 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 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 and detection rules**

**(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 management and policies**

**(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 challenges and Architecture**

**(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 and Attacks**

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

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Origin of cyber crime, evolution, risk factors and Investigations	K1
CO2	Cyber threat intelligence, various detection rules, understanding and implementing threat intelligence.	K2
CO3	Principles of risk management, evaluating risks, and cyber risk management	K2
CO4	Preventing cyber attacks, architecture design and implementation.	K1
CO5	Cyber self defense, DDoS attacks, securing industrial control systems. case studies.	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		2			1	1	2			
CO2	3	2	2	3	1	2			2	
CO3	2					2		1		1
CO4		3	1	2		1				
CO5	1	2	3	2	2			3		

**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.Sudha Bhuvaneshwari	Kalaikathir Publications	2017

**Pedagogy:** Lecture, PPT presentation

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20606B	CORE: MOBILE APPLICATION DEVELOPMENT	5	Theory	-	100

**Objective of the course:** This paper deals with the Mobile Application Development in Android Operating System. The students will learn the User Interface design, the basic activities, creating the interfaces and Messaging.

**UNIT I: Introduction about Android**

**(Teaching Hours: 10)**

**Getting Started with Android Programming:** Android: Versions-Features-Architecture-Android devices -- Creating the First Android Application - Anatomy of an Android Application.

**UNIT II: Message passing and navigation**

**(Teaching Hours: 10)**

**Activities, Fragments and Intents:** Understanding Activities - Linking Activities Using Intents: Resolving Intent filter collision-Returning results from intent-Passing data using an Intent object-Calling Built-in Applications Using Intents - Displaying Notifications.

**UNIT III: Screen display and orientation**

**(Teaching Hours: 10)**

**Getting to know the Android User Interface:** Understanding the Components of a Screen: Views and View groups-linear-relative-Absolute-Table-Frame layouts-Scroll view -Adapting to display Orientation: Anchoring views-Resizing and Repositioning- Managing Changes to Screen Orientation.

**UNIT IV: Databases and Views**

**(Teaching Hours: 10)**

**Designing Your User Interface with Views:** Using Basic Views - Using Picker Views - Using List Views to Display Long Lists. **Data Persistence:** Saving and Loading User Preferences - Persisting Data to Files -- Creating and Using Databases. **Content Providers:** Using a Content Provider - Creating Your Own Content Provider - Using the Content Provider.

**UNIT V: Finding location and sending email and SMS**

**(Teaching Hours: 10)**

**Messaging: SMS Messaging:** Sending SMS messages programmatically-Getting feedback after Sending a message-Sending SMS messages using Intent-Receiving SMS messages - Sending E-Mail. **Location-Based Services:** Displaying Maps - Getting Location Data.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Introduction about android	K1
CO2	Navigation between pages and displaying notification	K2
CO3	Resizing a page, orientation and views	K3&K5
CO4	Views and data loading in database	K2 & K3
CO5	Location tracking, sending SMS and email	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	3	2	3		1	1	1		
CO2		3	3		1	2				
CO3		3		1	2	2		1		
CO4	1	2		2			1	2		
CO5		3	3	2			1	1		

**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	Wiley Publications	2015 Edition

**Pedagogy:** Lecture and PPT Presentation

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20606P	CORE: MOBILE APPLICATION DEVELOPMENT LAB	2	Practical	-	-

**Objective of the course:** To develop User Interfaces, Activities and Views in the Android Operating System. It also highlights the location identification, SMS Messaging and e-mail.

**Implementation of the following programs 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 data in SD Card.
7. Content Providers.
8. SMS Messaging.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO	Programs for implementing activities, Intent filters, User interface, image views, storing values in database and SD card, Content providers and SMS messaging.	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
CO	3	3	1	3	3	3	3	3	3	2

**Indicators: 1. Reasonable 2. Significant 3.Strong**

**Pedagogy:** Demo, Exercises

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20606U1	ELECTIVE I – MOBILE COMMUNICATIONS	5	Theory	-	100

**Objective of the course:** This paper orients wireless communication, Tele-communication systems, broadcast systems and Mobile IP.

**UNIT I : Wireless communication**

**(Teaching hours: 10)**

Introduction-history of Wireless communication-Applications-Market for Mobile communications-Characteristics of Wireless Technologies-Cellular System infrastructure-A simplified reference model. Medium access control – Motivation for a specialized MAC-SDMA-FDMA-TDMA-CDMA.

**UNIT II: Telecommunication systems**

**(Teaching hours: 10)**

Telecommunication systems – GSM-Mobile services-System architecture-Radio interface-Protocols-Localization and calling-Handover-Security-new data services-DECT-System architecture-Protocol architecture. Satellite systems – Applications-Basics-GEO-LEO-MEO-Routing-Localization-Handover.

**UNIT III: Broadcast systems**

**(Teaching hours: 10)**

Broadcast systems – Overview-Cyclical repetition of data-Digital audio broadcasting-Digital video broadcasting-Convergence of broadcasting and mobile communications. Wireless LAN-Introduction – Infrastructure and ad-hoc networks – IEEE 802.11- System architecture – Protocol architecture – Physical layer-Medium access control layer (Basic DFWMAC-DCF using CSMA/CA, MAC frames) –Bluetooth- User scenarios – Architecture.

**UNIT IV: Mobile Network Layer**

**(Teaching hours: 9)**

Mobile Network Layer - Mobile IP-Goals, assumptions and requirements-entities and terminology-IP Packet delivery-Agent Discovery-Registration-Tunneling and encapsulation-Optimizations-Reverse tunneling-IPV6-IP micro-Mobility support.

**UNIT V: Mobile Transport Layer**

**(Teaching hours: 11)**

Mobile Transport Layer – Traditional TCP – Congestion control-Slow start-Fast retransmit-Implications of mobility-Classical TCP improvements-Indirect TCP-Snooping TCP-Mobile TCP-Fast retransmit/fast recovery-Transmission/time-out freezing-Selective retransmission-Transaction oriented TCP. Wireless application protocol (Architecture, Wireless datagram protocol, Wireless application environment, Wireless markup language) - imode technology.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	A study on Wireless communication and Cellular System infrastructure	K1, K2
CO2	Over view of Telecommunication systems, GSM architecture and Satellite systems	K1, K2
CO3	Study on Broadcast systems, Infrastructure and ad-hoc networks	K2, K3
CO4	Understanding IP Packet delivery	K2, K4
CO5	Study on Traditional TCP and Classical TCP improvements	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					1					
CO2					2					
CO3					3	2				
CO4					3	3				
CO5					1					

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Mobile Communications	J. Schiller	Addison Wesley	Second Edition, 2011

**Pedagogy:** Lecture, PPT presentation, e-content seminar, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20606U2	ELECTIVE I- ARTIFICIAL INTELLIGENCE	5	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 Intelligenc** **(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**

<b>Text Books</b>				
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, e-content seminar, Assignment, Quiz, Group Discussion etc

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20606U3	ELECTIVE I: DATA SCIENCE	5	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 data science 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

**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		3		2		
CO2	1	1		1		3		2		
CO3	3	3		1		3		2		
CO4	1	3		1		3		2		
CO5	3	2		2		3		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	20606U4	ELECTIVE I: ENTERPRISE RESOURCE PLANNING	5	Theory	-	100

**Objective of the course:** This paper concentrates on basic concepts of ERP, ERP and related technologies, implementing ERP, ERP in action, business modules and the ERP marketplace.

**UNIT I: Introduction to ERP**

**(Teaching Hours: 10)**

Introduction : Enterprise –An Overview – Introduction to ERP – Basic ERP concepts - Justifying ERP investments – Risks of ERP - Benefits of ERP – Examples for Open, proprietary and In-house ERPs.

**UNIT II: ERP and Related Technologies**

**(Teaching Hours: 10)**

ERP and Technology: ERP and related technologies – Business process reengineering – Data warehousing – Data mining – On-line analytical processing – Product life cycle management – customer relationship management – Selection of ERP for an organization.

**UNIT III: ERP Implementation**

**(Teaching Hours: 10)**

ERP Implementation : To be or not to be – Implementation challenges – Implementation life cycle – Implementation methodologies – ERP project teams – Vendors and Consultants – Contracts with Vendors, Consultants and Employees – Training and education – Key success factors of ERP.

**UNIT IV: ERP Package Business Modules**

**(Teaching Hours: 10)**

The Business Modules : Business Modules of an ERP Package – Finance – Manufacturing – Human Resources – Plant Maintenance – Materials Management – Quality Management – Marketing – Sales, Distribution and service.

**UNIT V: Various Vendor ERP**

**(Teaching Hours: 10)**

The ERP Market: ERP market place and marketplace dynamics - SAP AG – Oracle Corporation – PeopleSoft - JD Edwards – QAD Inc – SSA Global – Open ERP.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Study on basic concepts of ERP including investment in ERP Software, merits and drawbacks et.,	K2
CO2	To gain knowledge on ERP and its related technologies	K2, K3
CO3	Detail description of team building for implementing ERP Software	K1, K2, k4,k5
CO4	Gives an idea on various ERP modules of the ERP vendors.	K1,k2, k3
CO5	Describes the various ERP developing companies and their ERP products.	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										
CO2				2	2					
CO3				2	2	1	2	1	2	
CO4										
CO5					1					

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	ERP Demystified	Alexis Leon	Tata McGraw - Hill Publishing Company	Second Edition, Eighth Reprint, 2010.

**Pedagogy:** Lecture, PPT presentation, Assignment

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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 %
SIXTH	20606U5	ELECTIVE I: AIR AND SEA NAVIGATION	5	Theory	-	100

**Objective of the Course:** This course is designed to introduce the computing technologies used for Air and Sea Navigation. The fundamentals, key terms and equipments used for the navigations purposes are discussed.

**UNIT I: Navigation Aids**

**(Teaching Hours:10)**

Air Navigation: Navigation Aids – Distance Measuring Equipments (DME) – LORAN - Doppler RADAR – GPS. Aeronautical lighting and other Airport Visual Aids: Approach Light Systems – Runway Edge Light Systems – Control of Lighting Systems - Air Space: General Dimensions of Airspace Segments – Transient Speed Control-Descent gradient - Wind Direction. Air Traffic Control: Air Route Traffic Control Centers – Control Towers.

**UNIT II: Emergency Procedures**

**(Teaching Hours:10)**

Emergency Procedures: Pilot Responsibility and Authority -Emergency Conditions –Distress Signals – Safety of the Flight: Weather Observing Program – Medical Facts for Pilots: Fitness for flight – Vision in flight –Dynamics of the Helicopter - Helicopter Operations: Helicopter Flight control systems.

**UNIT III: Marine Navigation**

**(Teaching Hours: 10)**

Fundamentals: Introduction to Marine Navigation – Nautical Charts: Chart fundamentals – Piloting: Definition and Purpose - Preparation – Transition to Piloting - Short Range aids to Navigation: Fixed Lights – Light Characteristics – Buoyage Systems – Compasses – Magnetics Compasses - Tides and Tidal Currents: Origins of Tides – Features of Tides

**UNIT IV: Emergency Navigation Techniques**

**(Teaching Hours: 10)**

Emergency Navigations: Basic Techniques -Navigation Regulations: Ship Routing –Avoiding rock collisions - Maritime Safety Systems - Global Maritime Distress and Safety System - Distress Signals. Hydrography: Basics of Hydrographic Surveying. Weather Elements: General Description of the Atmosphere.

**UNIT V: Satellite Navigation**

**(Teaching Hours: 10)**

Satellite Navigation: The Global Position System – LORAN Navigation: Introduction to LORAN – LORAN Description – RADAR Navigation: Principles of RADAR operations. Navigational Astronomy: The Universe – AZIMUTHS and AMPLITUDES.

**Course Outcome mapping with Knowledge level**

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Course Outcome	CO Statement	Knowledge level
CO1	Know about the navigation aids and air traffic control	K2 & K3
CO2	Gives emergency procedures and safety measures for the pilot	K1&K2 & K3
CO3	Understand the knowledge on nautical charts that help in marine navigation	K1&K2&K3&K4
CO4	Describes about navigation regulations and maritime safety techniques	K1&K2&K3
CO5	Discusses about different types of navigation	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	2		1	1	2	3			1	2
CO2			1	1					1	2
CO3	2		1	1	2	3		1	1	2
CO4			1	1					1	2
CO5	2		3	1	3	3			1	2

**Indicators: 1. Reasonable 2. Significant 3.Strong**

Text Books				
S.No	Title	Author	Publishers	Publication Year & Edition
1	The American Practical Navigator : The Epitome of Navigation	Nathaniel Bowditch, LL.D	The National Imagery and Mapping Agency	2002
2	Maritime Navigation	Jim Doherty	Trieste, Italy	2010
3	Air Navigation	Professor Dr. Paul Stephen Dempsey	McGill University, www.iasl.mcgill.ca (online Tutorial)	
4	Official Guide to Basic Flight Information and ATC Procedures	Aeronautical Information Manual, US Department of Transportation, Federal Aviation Administration		2017

**Pedagogy:** Lecture, PPT Presentation, E-content, Seminar, Assignment

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20606C	SKILL BASED SUBJECT: SOFT SKILLS	2	Practical	-	-

**Objective of the course:** 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: Forming Values and Career Planning**

**(Teaching hours: 6)**

Forming Values: Meaning – What is a 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 Speaking**

**(Teaching hours: 6)**

Art of Listening: What is 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, Team Building and Teamwork**

**(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 and Manners, Preparing CV and Resume**

**(Teaching hours: 6)**

Etiquette and Manners: Introduction – Classification of Etiquette – Manners: Introduction – Practicing 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.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understanding all the major aspects of soft skills and Developing 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	Discuss the essentials of listening skills and techniques that are needed to play different job rolls.	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	3	2
CO2		2					2		1	2
CO3					1		2	1	1	1
CO4		1		2			3		3	3
CO5								1	2	3

**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	2009
Reference Books				
1	The ACE of Soft Skills: Attitude, Communication, and Etiquette for Success	Gopaldaswamy Ramesh, Mahadevan Ramesh	Pearson Education	2010, 1st Edition, Kindle Edition

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