

B III - 01  
2020-21

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

<b>Programme Outcome</b>	
<b>PO1</b>	To enable students to acquire knowledge in fundamentals of mathematical computing to solve real world problems.
<b>PO2</b>	To understand the basic concept of computer architectures and hardware maintenance.
<b>PO3</b>	Ability to acquire skills on identifying optimized solution using appropriate algorithms.
<b>PO4</b>	Provides a variety of programming languages and open source tools to develop procedures to solve problems.
<b>PO5</b>	To possess knowledge on career planning and effective communication skills that meets the need of the industry.
<b>PO6</b>	Provides information on activities and various roles and responsibilities of managers that enable the students to work in teams and develop managerial and leadership skills.
<b>PO7</b>	Equip the students to work in teams to build software systems in the service of mankind.
<b>PO8</b>	Apply the technologies in various fields of Computer Science, including Mobile applications, Web site development and management, databases, and computer networks.
<b>PO9</b>	Ability to select appropriate techniques to tackle and solve problems in the discipline of information security management.
<b>PO 10</b>	To acquire knowledge on creating practical, cost-effective solutions to computing and information processing problems, preferentially by applying scientific knowledge.

*G. Radhakrishnan*

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<b>Programme Specific Outcome</b>	
<b>PSO1</b>	Ability to design and develop computer applications, evaluate and recognize technical risks and provide novel solutions.
<b>PSO2</b>	Ability to understand the principles and working of the hardware and software aspects of computer systems.
<b>PSO3</b>	Ability to apply new technologies in Computer Science to serve the needs of industry, and society.
<b>PSO4</b>	Ability to install, configure and maintain computer networks as a Network Administrator.
<b>PSO5</b>	Students will be able to analyze the trends in the market and make decisions as a Data Scientist.

*G. R. Damodaran*

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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	20107A	CORE: DIGITAL LOGIC AND COMPUTER ARCHITECTURE	4	25	75	100	6	3	THEORY
I	III	20107B	ALLIED: NUMERICAL AND STATISTICAL METHODS	5	25	75	100	5	3	THEORY
I	III	20107P	CORE: WEB DESIGNING 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							

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Sem.	Part	Course Code	Course Name	Credits	MARKS			Hrs. / Week	Exam. Duration (Hrs.)	Category
					CA	TEE	TOTAL			
II	II	20200E	ENGLISH II	3	25	75	100	5	3	THEORY
II	III	20207K	Online Course: SWAYAM/NPTEL Course	4				4		
II	III	20207A	CORE: DATA STRUCTURES	3	25	75	100	4	3	THEORY
II	III	20207B	ALLIED: DISCRETE MATHEMATICS	5	25	75	100	4	3	THEORY
II	III	20207P	SKILL BASED SUBJECT: C PROGRAMMING AND DATA STRUCTURES LAB	2	40	60	100	6	3	PRACTICAL
II	IV	20200G	ENVIRONMENTAL STUDIES: ENVIRONMENTAL AWARENESS	2	25	75	100	2	3	THEORY
III	I	20300T	TAMIL III							
III	I	20300H	HINDI III							
III	I	20300F	FRENCH III							
III	I	20300M	MALAYALAM III	3	25	75	100	5	3	THEORY
III	II	20300E	ENGLISH III	3	25	75	100	5	3	THEORY

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Sem.	Part	Subject Code	Subject Name	Credits	MARKS			Hrs. / Week	Exam. Duration (Hrs.)	Category
					CA	TEE	TOTAL			
III	IV	20300A	BASIC TAMIL I	2	100	NA	100			
III	IV	20300B	ADVANCED TAMIL I							
III	IV	20300N	NON MAJOR: PERSONALITY DEVELOPMENT AND SOFT SKILLS	4	40	60	100	2	3	THEORY
III	III	20307A	CORE: MICROPROCESSORS	4	25	75	100	3	3	THEORY
III	III	20307B	CORE: OBJECT ORIENTED PROGRAMMING WITH C++	4	25	75	100	3	3	THEORY
III	III	20307C	ALLIED: OPERATIONS RESEARCH	5	25	75	100	3	3	THEORY
III	III	20307P	CORE: C++ PROGRAMMING LAB	3	40	60	100	5	3	PRACTICAL
III	IV	20300G2	SKILL BASED SUBJECT: PROFESSIONAL COMMUNICATION	2	25	75	100	4	3	THEORY
III	V	20307S	EXTENSION ACTIVITIES:NSS / COMPUTER AWARENESS PROGRAMME	1	Grade			-	3	PRACTICAL
IV	I	20400T	TAMIL IV	3	25	75	100	5	3	THEORY
IV	I	20400H	HINDI IV							
IV	I	20400F	FRENCH IV							
IV	I	20400M	MALAYALAM IV	3	25	75	100	5	3	THEORY
IV	II	20400E	ENGLISH IV							
IV	IV	20400B	BASIC TAMIL II	2	100	NA	100	2	3	THEORY
IV	IV	20400A	ADVANCED TAMIL II							
IV	IV	20400N	NON-MAJOR ELECTIVE: BASICS IN BUSINESS PROCESS OUTSOURCING	2	40	60	100	2	3	THEORY

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*C. R. Srinivasan*

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IV	III	20407K	Online Course : SWAYAM/NPTEL Course	3				4		
IV	III	20407A	CORE: PYTHON PROGRAMMING	3	25	75	100	3	3	THEORY
IV	III	20407B	ALLIED: PRINCIPLES OF MANAGEMENT	5	25	75	100	3	3	THEORY
IV	IV	20400G1	VALUE EDUCATION: INDIAN SOCIETY, PEOPLE AND CULTURE	2	25	75	100	3	3	THEORY
IV	III	20407P	SKILL BASED SUBJECT: PYTHON AND DBMS LAB	2	40	60	100	5	3	PRACTICAL
V	III	20507A	CORE: CYBER SECURITY	4	25	75	100	4	3	THEORY
V	III	20507B	CORE: JAVA PROGRAMMING	4	25	75	100	5	3	THEORY
V	III	20507C	CORE: OPERATING SYSTEMS	4	25	75	100	4	3	THEORY
V	III	20507D	CORE: SOFTWARE ENGINEERING	4	25	75	100	5	3	THEORY
V	III	20507K	Online Course : SWAYAM/NPTEL Course	4				5		
V	III	20507P	CORE: JAVA PROGRAMMING LAB	3	40	60	100	5	3	PRACTICAL
V	IV	20507E	SKILL BASED SUBJECT: APTITUDE*	2	25	75	100	2	3	PRACTICAL
VI	III	20607A	CORE: COMPUTER NETWORKS	4	25	75	100	4	3	THEORY
VI	III	20607B	CORE: WEB TECHNOLOGY	4	25	75	100	4	3	THEORY
VI	III	20607P	CORE: WEB TECHNOLOGY LAB	3	40	60	100	4	3	PRACTICAL
VI	III	20607S	CORE: PROJECT AND VIVA VOCE	7	25	75	100	12		PRACTICAL
VI	III		ELECTIVE – I:	4	25	75	100	4	3	THEORY
VI	IV	20607C	SKILL BASED SUBJECT: SOFT SKILLS *	2	25	75	100	2	3	PRACTICAL
			<b>TOTAL</b>	140			3900	180		

\* a part of the course is Self Study & Both CA and TEE Marks will be evaluated Internally

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Sem.	Part	Subject Code	Subject Name
<b>ELECTIVE I</b>			
VI	III	20607U1	ELECTIVE – I: MOBILE PROGRAMMING
VI	III	20607U2	ELECTIVE –I: DATA SCIENCE
VI	III	20607U3	ELECTIVE - I: INTERNET OF THINGS
VI	III	20607U4	ELECTIVE - I: ARTIFICIAL INTELLIGENCE
VI	III	20607U5	ELECTIVE –I: INTELLECTUAL PROPERTY RIGHTS

PROJECT AND VIVA VOCE

**Marks split up:** **Marks**

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
20107A	CORE: DIGITAL LOGIC AND COMPUTER ARCHITECTURE	2	2					1	2		1
20107B	ALLIED: NUMERICAL AND STATISTICAL METHODS	3		1							
20107P	CORE: WEB DESIGNING LAB				3			3	2		1
20207A	CORE: DATA STRUCTURES	2		3					3	1	3
20207B	ALLIED: DISCRETE MATHEMATICS	3		1							
20207P	SKILL BASED SUBJECT: C PROGRAMMING AND DATA STRUCTURES LAB	2		3	3					2	2
20307A	CORE: MICROPROCESSORS	1	2	2	1	2	2	1	1	1	1
20307B	CORE: OBJECT ORIENTED PROGRAMMING WITH C++	1		2	2	2		3	2	1	2
20307C	ALLIED: OPERATIONS RESEARCH	3		1	1	1		2	2	1	2
20307P	CORE: C++ PROGRAMMING LAB	1		2	2			2	2	2	2
20407A	CORE: PYTHON PROGRAMMING	2		1	2			2	2	2	2
20407B	ALLIED: PRINCIPLES OF MANAGEMENT					3	3	3	2		
20407P	SKILL BASED SUBJECT: PYTHON AND DBMS LAB	2		1	2			2	2	2	2
20507A	CORE: CYBER SECURITY	2	1	2	1	1	2	2	1	3	2
20507B	CORE: JAVA PROGRAMMING	2		1	2			2	2	2	2
20507C	CORE: OPERATING SYSTEMS	1	1	2	1				1	2	2
20507D	CORE: SOFTWARE ENGINEERING				3	2	2	3	2	1	1
20507P	CORE: JAVA PROGRAMMING LAB	2		1	2			2	2	2	2
20507E	SKILL BASED SUBJECT: APTITUDE*	3		3	3				1	1	1
20607A	CORE: COMPUTER NETWORKS	1	3	2		1	1		1	1	1
20607B	CORE: WEB TECHNOLOGY	2		1	2			2	3	2	2
20607P	CORE: WEB TECHNOLOGY LAB	2		1	2			2	3	2	2
20607S	CORE: PROJECT AND VIVA VOCE	2	2	2	3	2	2	3	3	2	3

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Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
20607U1	ELECTIVE – II: MOBILE PROGRAMMING			3	3				3	1	2
20607U2	ELECTIVE – II: DATA SCIENCE	1	1	2	2				2	2	2
20607U3	ELECTIVE - II: INTERNET OF THINGS				3	3			3		3
20607U4	ELECTIVE - II: ARTIFICIAL INTELLIGENCE				1	3	3	3		1	2
20607U5	ELECTIVE – II: INTELLECTUAL PROPERTY RIGHTS	1		1	3	2	2	3	1	3	2
20607C	SKILL BASED SUBJECT: SOFT SKILLS *					3	3	2			

Indicators: 1. Reasonable 2. Significant 3. Strong

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20107A	Core: Digital Logic and Computer Architecture	4	Theory	20	80

**Objective of the subject:** The objective is to provide the students an insight into the fundamental building blocks of a computer. To provide the basic knowledge on computer arithmetic, machine language Instruction Set, Counters, I/O and System Bus Design and Memory Systems.

**UNIT I: Number Systems**

**(Teaching hours: 10)**

Number Systems: Decimal, Binary, Octal and Hexadecimal – Conversion from one to another – Binary Addition, Subtraction, Multiplication and Division – Complements in binary and other number systems – ASCII codes – BCD weighted – Excess three – Gray codes.

**UNIT II: Logic Gates**

**(Teaching hours: 10)**

Logic gates : AND, OR, NOT, XOR, NAND, NOR and XNOR gates – Truth tables – NAND and NOR as Universal Building Block – Laws of Boolean Algebra – DeMorgan's Theorem – Simplification of Boolean expressions – Karnaugh Maps – Two and Three variable maps – Four Variable Map – Product of Sums and Sum of products simplification – Don't care conditions.

**UNIT III: Combination Logic**

**(Teaching hours: 10)**

Combination Logic : Introduction – Adders – Binary Half adder – Full adder – Parallel Binary adder – Serial Binary adder – BCD Adder – Subtractors – Half subtractor – Full Subtractor – Decoders – Encoders – Multiplexers – Demultiplexers.

**UNIT IV: Input-Output Organization**

**(Teaching hours: 10)**

Input-Output organization: Input-output Interface - I/O Bus and Interface Modules- Asynchronous data transfer (strobe control and handshaking) - Modes of transfer: Programmed I/O - Interrupt Initiated I/O - Software Considerations. Input-output processor: CPU-IOP Communication.

**UNIT V: Memory Organization**

**(Teaching hours: 10)**

Memory organization: Memory hierarchy. Main memory: RAM and ROM Chips - Cache memory: Associative Mapping- Direct Mapping. Virtual memory: Address Space & Memory Space- Address Mapping Using Pages-Associative memory Page Table-Page Replacement.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Explain on number systems and various representations of codes in digital computer.	K1,K2,K3,K5
CO2	Illustrate concept of logic gates, laws of Boolean algebra, Karnaughmaps and theorems.	K1,K2,K3,K5
CO3	Exposure to Combination Logic with adders, subtractors, encoders and so on.	K1,K2
CO4	Summarize the execution sequence of an instruction through the processor	K1,K2
CO5	Explain the memory organization and its mapping techniques.	K1,K2,K3

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

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

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Digital Logic and Computer Design	M. Morris Mano	Prentice Hall	14 <sup>th</sup> Impression 2012.
2	Digital Computer Fundamentals	Thomas C.Bartee	Tata McGrawHill	2011, Sixth Edition, 23 <sup>rd</sup> Reprint.
3	Computer System Architecture	M. Morris Mano	Prentice Hall of India Publications	2011, 3 <sup>rd</sup> Edition, 8 <sup>th</sup> Impression.

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20107B	ALLIED: NUMERICAL AND STATISTICAL METHODS	5	Theory	100%	-

**Objective of the Subject:** The course objective is to teach efficient algorithms for numerical computations, interpolation and extrapolation methods. This paper covers the concepts of Matrices, Numerical methods and Statistics.

**UNIT I: MATRICES**

**(Teaching hours: 10)**

Matrices: Types – Determinant & its properties – Inverse of a matrix – Eigen Values and Eigen vectors – Cay ley’s Hamilton theorem.

**UNIT II: NUMERICAL METHODS**

**(Teaching hours: 10)**

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

**UNIT III: NUMERICAL INTERPOLATION**

**(Teaching hours: 10)**

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

**UNIT IV: MEASURES OF CENTRAL VALUE and DISPERSION**

**(Teaching hours: 10)**

Measures of central value: Mean, Median, Mode. Measures of Dispersions: Range, Standard Deviation and Variance.

**UNIT V: CORRELATION and REGRESSION**

**(Teaching hours: 10)**

Correlation: Karl Pearson’s Coefficient of Correlation – Rank correlation. Regression – Regression equations. Curve fitting – method of least squares (Fitting straight lines only).

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Course Outcome mapping with Knowledge level**

Course outcome	CO Statement	Knowledge level
CO1	Basic definition of matrix, determinants and perform various operations on it.	K1, K2
CO2	Derive numerical methods for approximating the solution of the problems of algebraic and transcendental equations such as Gauss elimination, Jordan, Jacobi methods, trapezoidal, Simpson's rule.	K1, K2, K3
CO3	Derive numerical interpolation and integration methods for approximating the solution of Newton's forward and backward, Lagrange's interpolations and RungeKutta method.	K2, K4, K5
CO4	To find out appropriate statistical methods such as Mean, median, mode and apply them in various data analysis problems.	K2, K3, K5
CO5	To find out appropriate statistical methods like correlation, regression and apply them in various data analysis problems.	K1, K2, K3, K4

**Note:**

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

**Course Outcome mapping with Programme outcome:**

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

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

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<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Numerical Methods In Science & Engineering	M. K. Venkataraman	National Publishing Company	2007, 5 <sup>th</sup> Edition
2	Statistical Methods	S.P. Gupta	Sultan Chand & Company	2014, Revised edition
3	Discrete Mathematics for Computer Science & Applications	P.Radha, T. Santha	Kalaikathir Publications	2003, Revised Edition

**Pedagogy:** Lecture, Assignment.



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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIRST	20107P	CORE: WEB DESIGNING LAB	2	Practical	-	-

**Objective of the Subject:** This paper provides a hands-on experience on working with HTML pages, designing of CSS and embedding CSS with HTML version 5.

**With reference to HTML5**

Create HTML Page using the following concepts.

1. Formatting tags
2. Hyperlinks
3. Tables
4. Frames
5. Linking to a segment of a Page. (Fragments)
6. Images and text wrapping around images
7. Lists
8. Templates
9. Forms using basic controls
10. Forms using List controls
11. Drag and Drop operations
12. Write a HTML5 program to include multimedia files Create a CSS to format the following.
13. Links
14. Integration of CSS with HTML

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

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Design applications using HTML pages, CSS and embedding CSS with HTML version 5	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		3

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

**Pedagogy: Lecture, PPT presentation**

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20207A	CORE: DATA STRUCTURES	3	Theory	20	80

**Objective of the subject:** 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: Overview of Data Structures**

**(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 Techniques and Linked List**

**(Teaching Hours: 10)**

Sorting: Sorting - Bubble sort – Quick sort – Insertion 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 and 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 – Sorting Techniques.

**UNIT V: Graphs**

**(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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**B.Sc (COMPUTER SCIENCE)**  
**(Under Choice Based Credit System)**  
**EFFECTIVE FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2020-2021**

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understand the basic concepts, terminologies in data structure. Illustrate the performance of basic linear data structures.	K1,K2,K3
CO2	Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort and quick sort. Describe the abstract data type list as a linked list using node and reference pattern	K1,K2,K3,K4
CO3	To Understand basic concepts about stacks and queues. Recognize the problems where stacks and queues are used in data structures.	K1,K2,K3,K5
CO4	Gain knowledge about Binary trees and apply different tree traversal technique to search, insert and delete data in the tree.	K1,K2,K4,K5
CO5	To understand the concept of non-linear data structure graph and apply the same for real-time problems.	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	1
CO2	2		3					3	2	3
CO3	2		3					2	1	2
CO4	3		2					2	1	1
CO5	3		2					3	1	3

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Data Structures Schaum's Outlines	Seymour Lipschutz, G.A VijayalakshmiPai	Tata McGraw-Hill Companies	2006, Indian Adapted Edition

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20207B	ALLIED: DISCRETE MATHEMATICS	5	Theory	95%	5%

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

**UNIT I: MATHEMATICAL LOGIC**

**(Teaching hours: 10)**

Mathematical Logic: Connective, well-formed formula, tautology equivalence of formulas, tautological implications, duality law. Normal Forms. Theory of inference for statement calculus.

**UNIT II:RELATION AND FUNCTIONS**

**(Teaching hours: 10)**

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

**UNIT III:FORMAL LANGUAGES AND AUTOMATA**

**(Teaching hours: 10)**

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

**UNIT IV:LATTICE AND BOOLEAN ALGEBRA**

**(Teaching hours: 10)**

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

**UNIT V: GRAPH THEORY AND TREES**

**(Teaching hours: 10)**

**(Proving the theorems are exempted for Graphs and Tree)**

Graph Theory: Directed and undirected graphs, connected graphs, path, reachability, circuits, Hamiltonian paths, Euler graphs – Matrix representation of directed and undirected graphs, incidence matrix, and adjacency matrix. Trees - binary tree, expression trees. Traversals of binary trees. Theorems – statements only for both graphs and trees.

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## Course Outcome mapping with Knowledge level

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

**Note:**

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

## Course Outcome mapping with Programme outcome:

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3		1							
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	Discrete Mathematical Structures with Applications to Computer Science.	J.P Tremblay, R. P. Manohar	McGraw Hill	2010, 38 <sup>th</sup> reprint

**Pedagogy:** Lecture, Assignment.

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SECOND	20207P	SKILLED BASED SUBJECT: C PROGRAMMING AND DATA STRUCTURES LAB	2	Practical	-	-

**Objective of the subject:** The main objective is to develop C programming in an Open Source Platform and to provide an introduction of the C programming language emphasizing Data Structure exercises. The course will mainly cover the following topics like General structure and organization of a C program , Basic Components, Arrays and Pointers, Functions, Strings, structures, command line arguments etc.

**C Exercises**

- Operators and expressions
- Ternary operator.
- Control statements
- Functions.
- Arrays.
- Strings
- Pointers.
- Structures.
- Files.
- Command line parameters.

**Data Structures Exercises (Implement the concepts in C)**

- Stack
- Queues
- Linked List
- Sorting (any two techniques)
- Searching

**Note :**

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

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understand the fundamental programming concepts and implementing the concepts like arrays, strings, pointers, functions and files. The concept of data structures like stack, queue, linked list, searching and sorting techniques are also implemented in C	K2,K3,K5



B<sub>III</sub> - 21  
2020 - 21

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**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	3					2	2

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

**Pedagogy:** PPT presentation, Demonstration



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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20307A	Core: MICROPROCESSORS	4	Theory	-	100

**Objective of the Course:** The overall objectives is to provide a basic understanding with the basic components of 8086 & 8088 instruction set architecture, inspect and modify 8086 processor registers and memory, write and run basic assembly programs along with 80286 processors.

**UNIT I: Introduction To Microprocessors**

**(Teaching hours: 10)**

Microprocessors – General Architecture of a Microcomputer system – Reprogrammable and Embedded Microprocessors - Micro architecture of the 8088/8086 Microprocessor – Software model of the 8088/8086 Microprocessor - Memory Address space and Data Organization – Data types – Segment registers and Memory Segmentation – Instruction Pointer – Data registers – Pointer and Index registers – Status Register - MOV Instruction-Addressing modes.

**UNIT II: Integer Instructions And Computations**

**(Teaching hours: 10)**

Data transfer Instruction: MOV,XCHG instructions – Arithmetic Instructions: Addition of Binary Numbers, ADD,ADC,INC,AAA and DAA- Subtraction of Binary numbers, SUB, SBB, DEC,AAS,DAS and NEG- Multiplication and Division instructions: MUL,DIV, IMUL,IDIV, AAM,AAD,CBW&CWD- Logic instructions : AND,OR,XOR and NOT – Shift instruction: SHL,SHR,SAL&SAR – Rotate Instructions: ROL,ROR,RCL&RCR.

**UNIT III: Control Flow Instructions**

**(Teaching hours: 10)**

Flag control & compare instructions – unconditional and conditional jump – Branch instruction: IF-THEN-ELSE – REPEAT-UNTIL& WHILE-DO – CALL & RETURN – PUSH&POP instructions. 8088&8086 microprocessors: Minimum-mode & Maximum-mode systems – 82C55A PPI – 82C54 programmable Interval timer: Block diagram & Architecture.

**UNIT IV: Interrupt Interface Of 8088**

**(Teaching hours: 10)**

82C37A Programmable DMA controller: Microprocessor interface of the 82C37A, DMA interface of the 82C37A, Internal Architecture of 82C37A - Programmable communication interface controller: 8251AUSART-KeyBoard and display interface. Interrupt mechanism – types& priority – interrupt Vector table – interrupt instructions –enabling/disabling of interrupts – External hardware – interrupt interface signals.

**UNIT V:The 80386,80486 And Pentium Processor Families**

**(Teaching hours: 10)**

80286 microprocessor – Internal architecture – 80386 microprocessor family – internal architecture of 80386DX – 80486 microprocessor family – Internal architecture of 80486 –

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Pentium processor family: Internal architecture – Pentium Pro Processor and Pentium II – Celeron – Pentium III & Pentium IV. Superscalar Organisation - An Overview.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Aware and Understand the general architecture of a microcomputer system, registers and pointers	K1 & K2
CO2	Detail and analyze the integer instructions and computations	K2 & K3
CO3	Enhance the control flow instructions and program structures.	K2 & K3 & K4
CO4	Explore and research the interrupt [interface of the 8088 and 8086 microprocessors.	K4 & K5
CO5	Knowledge on the 80386, 80486, and Pentium processor families software architecture	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	1	1	1	1
CO2	1	2	1							1
CO3	1	2	2		1		1			
CO4		1	3	1	2					1
CO5			2	1	3		1			1

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

Text Book				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications.	Walter A. Triebel, Avtar Singh,	Pearson Education Ltd.,	Fourth Edition, Tenth impression, 2013.
2	Modern Processor Design	John Paul Shen	Waveland Press Inc	First Edition, 2013.
3	Microprocessors and Interfacing	Vaneet Singh	Satyaprakasan Publishers	Twelfth edition, 2016.

**Pedagogy:** Teaching /learning methods

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20307B	CORE: OBJECT ORIENTED PROGRAMMING WITH C++	4	Theory	20	80

**Objective of the subject:** This paper highlights on the basic OOP concept, looping structures, control structures, concept of objects and classes, application of OOPS concepts in programming and functions supported by Object Oriented Programming.

**UNIT I: Overview**

**(Teaching Hours: 8)**

Object Oriented Programming-Procedural Languages – The Object Oriented Approach – Characteristics of Object oriented programming - Objects – Classes – Inheritance – Reusability – Creating new data types – Polymorphism and Encapsulation.

Basic Program Construction – Output using cout – Directives – Comments – Integer variables – Character variables – Input with cin – Floating point types – Type bool – Type conversion - Arithmetic operators – Library functions.

**UNIT II: Objects & Classes**

**(Teaching Hours: 10)**

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

Arrays and Strings: Array Fundamentals – Arrays as Class member data – Arrays of Objects – C Strings - The Standard C++ String class.

**UNIT III: Operator Overloading**

**(Teaching Hours: 10)**

Operator Overloading: Overloading unary operators – Overloading binary operators.

Inheritance: Derived class and Base class – Derived class constructors – Overriding member functions – Scope resolution with overridden functions – Class Hierarchies – Levels of Inheritance – Multiple inheritance – Aggregation.

**UNIT IV: Pointers & Virtual Functions**

**(Teaching Hours: 12)**

Pointers: Pointers and Addresses – The address-of operator & -Pointers and Arrays – Pointers and Functions – Memory management using new and delete operator – Pointers to Objects-Pointers to pointers.

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



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**UNIT V: Stream & Files****(Teaching Hours: 10)**

Streams and Files : Stream Classes – Disk File I/O with Streams – File Pointers – File I/O with Member Functions – Overloading the Extraction and Insertion operators.

Templates and Exceptions: Function Templates – Class Templates – Exceptions – Syntax – A Simple Exception Example.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Overview and Basic Concepts	K1,K2, K3,K4
CO2	Concepts of Classes and Objects and Arrays and Strings	K1,K2, K3,K5
CO3	Concepts of Operator Overloading	K1,K2, K3,K5
CO4	Concepts of Pointers and Virtual Functions	K1,K2, K3,K5
CO5	Concepts of Streams and Files, Templates and Exceptions	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	1	1	3	1	2		3	2	1	3
CO2	1	1	3	1	2		3	2	1	3
CO3	1	1	3	1	2		3	2	1	3
CO4	1	1	3	1	2		3	2	1	3
CO5	1	1	3	1	2		3	2	1	3

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Object Oriented Programming in C++	Robert Lafore	Pearson Education, Sams Publishing	Fourth Edition, Sixth Impression, 2011
2	Professional C++	Marc Gregoire, Nicholas A. Solter, Scott J. Kleper	Wrox	First Edition, 2011

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20307C	ALLIED: OPERATIONS RESEARCH	5	Theory	95%	5%

**Objective of the Subject:** The main objective of this subject is to introduce certain OR techniques such as the methodology of mathematical modeling and its relation to problems in industrial, commercial, and public systems. The emphasis is on the use of linear mathematical programming including the simplex method, transportation problems, inventory models, queuing systems and network scheduling.

**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: 12)**

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: INVENTORY Control** **(Teaching hours: 10)**

Inventory Control: Introduction – Objectives of scientific inventory control - Various costs involved in inventory – Deterministic Inventory Problem with and without shortages – Problem of EOQ with price breaks.

**UNIT IV: QUEUING 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: GAMES and NETWORK SCHEDULING by PERT/CPM** **(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.

Network Scheduling by PERT/CPM: Network: Basic Components – Rules of network construction –Critical path analysis: Forward & Backward Pass Calculations-PERT Calculations.

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**Course Outcome mapping with Knowledge level**

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

**Note:**

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

**Course Outcome mapping with Programme outcome:**

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

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Operations Research	KantiSwarup, 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	2015, 4 <sup>th</sup> Edition
3	Operations Research	A.C.S.Kumar	Yesdee	2015, Revised edition.

**Pedagogy:** Lecture, Assignment.

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
THIRD	20307P	CORE: C++ PROGRAMMING LAB	3	Practical	-	-

**Objective of the subject:** The main objective is to develop C++ programming in an Open Source Platform. The goals of this course are to introduce students the C++ Programming Languages concept including data types, operators, control structures, arrays and parameter passing. It also gives a hands-on experience on implementing the OOPS concepts like overloading, virtual function, inheritance, files, exception handling and template concepts.

Develop programs using the following concepts:

1. Class and Objects
2. Arrays
3. Functions
  - i) Friend
  - ii) Inline
  - iii) Recursive
  - iv) Virtual
4. Constructors, Destructors and the types of Constructors
5. Overloading concepts.
  - i) Function Overloading
  - ii) Operator Overloading
6. Inheritance
7. Dynamic memory management using new, delete operators.
8. Pointers
9. Templates
10. Exception Handling
11. Files



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Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Hands on Experience in C++ Programming Concepts	K1,K2,K3,K4,K5

**Note:**

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

Course Outcome mapping with Programme outcome

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

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

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20407A	CORE: PYTHON PROGRAMMING	3	Theory	-	100

**Objective of the subject:** The focus of the course is to provide students with an introduction to programming, install and run the Python interpreter - I/O – Tuples – Class and Object – Files using the Python programming language.

**UNIT I :Python and its Syntax**

**(Teaching Hours: 10)**

**Introduction to Python:** Overview – History of Python – Python features – **Environment** - Environment setup – Getting Python – Install Python – Setting up Path – Running Python – **Basic Syntax** – Hello World – Interactive mode programming – Script mode Programming – A simple Python example.

**UNIT II :Python Basics and Statements**

**(Teaching Hours: 10)**

**Programming Basics of Python:** Python Keywords –Identifiers – Rules for writing Identifiers – Reserved words – Lines and Indentation – Multiline statements – Python Variable – Variable Assignment – Multiple Assignment - **Standard Data Types:** Numbers: int, float and decimal – **Basic Operators:** Arithmetic Operators – Comparison (Relational) Operators – Assignment Operators – Logical Operators – Bitwise Operators – Membership Operators – Identity Operators – **Loops:** Types of loops – while – for Loops – **Control statements:** if ...else – for loop – break and continue.

**UNIT III: Functions and Advanced Python datatypes**

**(Teaching Hours: 10)**

**Programming with Python: Functions:** Introduction – Using a Function - Communicating with Functions – Example of creating a simple calculator using functions – **Lists:** Accessing values in Lists – Updating Lists – Delete List elements – Built-in Lists functions & Methods – **Tuples:** Creating Tuples – Accessing Tuples –Updating Tuples – Deleting Tuples – Basic Tuple operations - Built-in Tuple functions – **Dictionary:** Access, Update and Delete dictionary elements– Built-in Dictionary Functions & Methods.

**UNIT IV:OOPS and Exception Handling**

**(Teaching Hours: 10)**

**Object Oriented Programming: Classes and Objects:** Creating a Class – Using a Class – Constructor, class attributes and destructors - Inheritance - A simple Inheritance – Multiple Inheritance, overlapping and overloading operators **Exception Handling:** Try, Except and Finally.

**UNIT V: Advanced Concepts**

**(Teaching Hours: 10)**

**Advanced Concepts: Files I/O:** Opening a file – Seek and Find a file – Other I/O functions - **Database and SQL:** Database – SQLDB – Database connection Parameters – Insert, Update, Delete – **Sending Mail:** SMTP protocol – Syntax – Sending Email using Python.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Know about Python, installation and working with Python	K1, K2&K3
CO2	Able to develop simple programming with Python	K2 & K3
CO3	Knowledge on working with advanced Python datatypes	K2, K3 & K5
CO4	Ability to undergo object oriented programming using classes and object and to handle exceptions	K2, K3, K4 & K5
CO5	Capable to handle files, databases and mail system from Python	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	3	1				1	
CO2			2	2	1			2	1	1
CO3			3	3	1			3	1	2
CO4			3	3	1			3	1	2
CO5			3	3	1			3	1	2

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1.	Python for Everybody, Exploring Data Using Python	Charles Severance		Kindle Edition, 2016
2.	Python: Programming For Beginners: Learn The Fundamentals of Python in 7 Days	Michael Knapp	Independently published	Kindle Edition, 2017
<b>Websites</b>				
1.	<a href="http://www.udemy.com">www.udemy.com</a>			

**Pedagogy:** Lecture, Powerpoint Presentation, Discussion, Assignment, Demo, Quiz

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**B.Sc (COMPUTER SCIENCE)**  
**(Under Choice Based Credit System)**  
**EFFECTIVE FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2020-2021**

Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20407B	ALLIED: PRINCIPLES OF MANAGEMENT	5	Theory	-	100

**Objective of the Course:**

This course will give an overview of the various functions of an Organization. It will give an insight into the activities of and various roles and responsibilities of various functional level managers

**UNIT I: Introduction to Management**

**(Teaching hours: 10)**

Definition of Management - Science or Art - Management and Administration - Development of Management Thought - Types of Business Organization.

**UNIT II: Planning**

**(Teaching hours: 10)**

Purpose of Planning - Steps in Planning - Setting Objectives - Managing by Objectives - Forecasting - Strategies - Policies - Decision-making.

**UNIT III: Organizing**

**(Teaching hours: 10)**

Organizing - Nature and Purpose - Structure - Formal and informal - Line and Staff authority - Centralization Vs Decentralization - Authority Vs Responsibility - Staffing - Selection - Managerial Effectiveness.

**UNIT IV: Directing and Communication**

**(Teaching hours: 10)**

Directing - Scope - Objectives. Leadership - Types of Leadership. Motivation - Hierarchy of needs - Motivation theories - Motivational Techniques - Job Enrichment - Communication - Process of Communication - Barriers and Breakdown - Effective Communication - Electronic media in Communication

**UNIT V: Controlling**

**(Teaching hours: 10)**

System and process of Controlling - Requirements for effective control - The Budget as Control Technique - Information Technology in Controlling - Use of computers in handling the

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information - Productivity - Problems and Management - Control of Overall Performance - Direct and Preventive Control - Reporting.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To know the history, functions of management and types of organization	K1, K2,K3
CO2	To understand importance of planning	K1, K2,K3, K4
CO3	To know the significance of organizing and its process	K1,K2,K3,K4,K5
CO4	To learn scope of directing motivation and leadership theories and communication process	K1, K2,K3,K4,K5
CO5	To learn control techniques and reporting	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	1	1	1
CO2					3	3	1	1	1	1
CO3					3	3	1	1	1	1
CO4					3	3	1	1	1	1
CO5					3	3	1	1	1	1

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

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Essentials of Management	Harold Kooritz & Heinz Weihrich	Tata McGraw-Hill	8 <sup>th</sup> Edition, 2011.
2	Essentials of Management	Joseph L Massie	Prentice Hall of India (Pearson)	Fourth Edition, 2010.
3	Principles of Management	Tripathy PC And Reddy PN,	Tata McGraw-Hill	5 <sup>th</sup> reprint 2012.
4	Personnel and Human Reasons Management	Decenzo David, Robbin Stephen A	Prentice Hall of India	Subsequent Edition, 1996

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FOURTH	20407P	SKILL BASED SUBJECT: PYTHON AND DBMS LAB	2	Practical	-	-

**Objective of the Subject:** The course provides hands-on experience to develop simple applications Python Programming. It also provides experience for manipulation of data at back end such as creating tables, exceptions, triggers, procedures and cursors in an open source platform.

#### Python Exercises

1. Install and execute python interpreter
2. String functions
3. Binary functions
4. Looping and Control Statements
5. Functions
6. Lists
7. Tuples
8. Dictionaries
9. File Handling

#### MySQL Exercises

1. Table Creation and Inserting Values.
2. Queries using DDL and DML Commands.
3. Aggregate functions
4. Join
5. Trigger
6. Views
7. Procedures

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

#### Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Posses skills to develop python programs and to work with MySQL databases	K1, K2, K3, K4 & K5

**Note:**

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

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**Course Outcome mapping with Programme outcome**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			3	3	2		2	3	2	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 %
FIFTH	20507A	CORE: CYBER SECURITY	4	Theory	-	100

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

**UNIT I: Cyber Threats**

**(Teaching Hours: 10)**

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- Implications of Cyber Threats on high targeted Industries- **Cyber Crime:** Overview-Origin and evolution of Cyber Crime-Criminalization-Cyber Crime Classifications- Conducting Cyber Investigations-Economical crisis - Challenges faced in Cyber Crimes-Cyber Crime Legislations.

**UNIT II: Cyber Threat Intelligence**

**(Teaching Hours:8)**

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**

**(Teaching Hours: 11)**

Cyber Risk- Analyzing and Managing Cyber Risks- Consequences of Cyber Crimes - 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**

**(Teaching Hours:11)**

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

**UNIT V: Cyber Defense Mechanisms**

**(Teaching Hours: 10)**

Cyber 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	To understand Cyber threats and Cyber Crime	K2
CO2	To learn Cyber Threat Intelligence	K2&K3
CO3	Discussion on Cyber Management & Risk Management	K4
CO4	Illustrate Cyber Security Challenges & Cyber Security Architecture	K2 & K4
CO5	Understanding the concept of Cyber Defense Mechanisms	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	2	2	3
CO2							2	1	2	1
CO3						2		1	3	1
CO4						1	2	2	3	3
CO5	1	1					2	2	2	1

**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 Bhubaneswar	Kalaikathir Publications	2017, First Edition.

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20507B	CORE: JAVA PROGRAMMING	4	Theory	-	100

**Objective of the subject:** This paper aims 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. OOPS, branching statements, classes, constructor, and inheritance, static classes, abstract classes, packages, string handling, multithreading and applets.

**UNIT I: Basic Concept of java programming** **(Teaching hours: 9)**

Java Programming Techniques – Lexical issues – Variables – Types – Arrays – Operators. Branching: If-else, break, switch, return statements – Looping: while, do-while, for, comma statements, continue.

**UNIT II : Concept of Classes** **(Teaching hours: 9)**

Classes: Object references – Instance Variables – New operator- Dot operator – Method declaration – Method calling – this operator – Constructors – Method overloading –Inheritance – Super class – Method overriding – Dynamic method dispatch – final, finalize, static, Abstract classes.

**UNIT III : Packages, interfaces and String handling** **(Teaching hours:10)**

Packages and Interfaces: Packages: The package statement – Compiling classes in packages - The import statement – Access protection. Interface: The interface statement – The implements statement – Variables in interfaces. String handling: Constructors – String creation – String Concatenation – Character Extraction, Comparison.

**UNIT IV : Exception handling fundamentals** **(Teaching hours:12)**

Exception handling fundamentals: Exception type – Uncaught Exceptions – Nested try statements – The Java thread model – Thread Priorities, Synchronization, Messaging – Thread – Runnable – Inter Thread communication – Thread API Summary. File Handling – - java.io package - I/O Stream classes.

**UNIT V: Applets** **(Teaching hours:10)**

Applets: HTML applet tags – Order of Applet initialization – Sizing graphics –Simple graphics – Color methods – Fonts – Multi-line Text Alignment – Abstract Window Toolkit: Components – Layout – Menu Components – Event.



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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Understand the basic concept of java programming	K2&K3
CO2	Learn the classes concept	K2&K3
CO3	Know the packages, interfaces and string operations	K3&K4&K5
CO4	Understand the exception handling	K2&K3
CO5	Learn about Applets and AWT Controls	K3&K4&K5

**Note:**

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

**Course Outcome mapping with Programme outcome**

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

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	The Java Handbook	Patrick Naughton	Tata McGraw Hill	2008
2	Java 9 for Programmers	Paul J.Deitel, Harvey Deitel	Prentice Hall	2017 4 <sup>th</sup> Edition

**Pedagogy:** Teaching /learning methods

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20507C	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 storage management, process management and device management. The implementation of these concepts in DOS operating system are also discussed.

**UNIT I: Process Concepts**

**(Teaching hours: 10)**

Introduction and process concepts: Definition of OS - Definition of process – Process states, lifecycle of process – process management

Asynchronous Concurrent Execution: Mutual Exclusion – Implementing Mutual Exclusion Primitives – software solution to the Mutual Exclusion Problem- Semaphores

**UNIT II: Deadlock**

**(Teaching hours: 10)**

Deadlock and Indefinite Postponement: Introduction – Examples – Related Problem – Resource concepts – Four Necessary conditions for Deadlock – Deadlock solutions – deadlock prevention – deadlock avoidance – detection – recovery – deadlock strategy in current and future systems.

**UNIT III: Processor Scheduling**

**(Teaching hours: 10)**

Processor Scheduling: Preemptive Vs Nonpreemptive scheduling – priorities - Scheduling objectives – scheduling criteria - Scheduling algorithms – deadline scheduling

**UNIT IV: Memory management**

**(Teaching hours: 10)**

Real Memory Organization and Management: Introduction – Memory Organization – Memory Management – Hierarchy – Memory Management Strategies – Contiguous Vs Non contiguous memory allocation – Single user contiguous memory allocation – Fixed partition multiprogramming – variable partition multiprogramming – Paging

**UNIT V: Virtual memory and Disk optimization**

**(Teaching hours: 10)**

Virtual Memory Management: Demand Paging – anticipatory paging - Page Replacement – page replacement strategies – page fault – page size

Disk performance Optimization – Necessity of Disk Scheduling – Disk Scheduling Strategies – A Case study on a Mobile Operating System.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To gain knowledge on process concepts	K1, K2, K3
CO2	To understand deadlock situations and methods to overcome deadlock	K1, K2, K3
CO3	To learn the working of various processor scheduling algorithms	K1, K2, K3
CO4	To learn the memory management techniques	K1, K2, K3
CO5	To understand virtual memory management and disk optimization techniques	K1, K2, K3, K4, K5

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

**Course Outcome mapping with Programme outcome**

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

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Operating System	DeitalDeitalChoffnes	Pearson Education	First Edition, 2009
2	An Introduction to Operating System	H.M.Deital	Addison Wesley	Second Edition, reprint 2006
3	Modern Operating Systems Global Edition	Andrew S Tanenbaum, Herbert Bos	Pearson Publishers	4 <sup>th</sup> Edition, 2015

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20507D	CORE:SOFTWARE ENGINEERING	4	Theory	-	100

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

**UNIT I : Software process model**

**(Teaching Hrs: 9)**

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

**UNIT II: Requirements engineering**

**(Teaching Hrs: 9)**

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

**UNIT III : Design Engineering and Architectural design**

**(Teaching Hrs: 10)**

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

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

**UNIT IV: Component and Pattern level design**

**(Teaching Hrs: 12)**

**Component level Design:** Components – Designing class based components. User Interface Design: The Golden rules – User Interface analysis – Interface design steps.

**Pattern based Design:** Design patterns – Architectural patterns – Component level design patterns-User Interface design patterns.

**UNIT V: System testing**

**(Teaching hrs: 10)**

**Testing conventional Applications:** Software Testing Fundamentals-Internal and external views of testing – White-Box Testing – Basis Path Testing – Control-Structure Testing – Black-Box Testing – Model Based Testing.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Various Software process models	K1&K2
CO2	Requirements gathering and engineering	K3
CO3	Software architecture and various diagrams related to mapping software	K3&K4
CO4	Component level diagrams and patterns	K5
CO5	Various system testing.	K4&K5

**Note:**

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

**Course Outcome mapping with Programme outcome**

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

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

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Software Engineering - A Practitioner's Approach	Roger S Pressman	McGraw Hill, Publication	6th Edition, Fifth Reprint, 2012.
2	Software Engineering Concepts	Richard Fairley	Tata McGraw Hill	30 <sup>th</sup> Reprint, 2008

**Pedagogy:** Lecture, PPT presentation

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
FIFTH	20507P	CORE: JAVA PROGRAMMING LAB	3	Practical	-	-

**Objective of the Subject:**The main objective is to develop Java programming in an Open Source Platform. This paper provides a hands-on experience in developing websites, basic OOPS concepts, applets, packages, multi-threading, exceptions, interface.

Develop a Java Program for the following concepts:

1. Classes and objects.
2. Arrays.
3. Thread.
4. Exception handling.
5. Inheritance.
6. Interfaces.
7. User defined Packages.
8. String Operations.
9. Applets.
10. File Handling – I/O Stream Classes.
11. AWT Controls & Event handling.

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

**Course Outcome mapping with Knowledge level**

	CO Statement	Knowledge level
CO	Understand the concept of classes, Thread, Exception handling, inheritance, packages, applets and awt controls	K1&K2&K3&K4&K5

**Note:**

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

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**Course Outcome mapping with Programme outcome**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO			3	3	2		2	3	2	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 %
FIFTH	20507E	SKILL BASED SUBJECT: APTITUDE	2	Practical	-	-

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

**UNIT I: Numbers, Ratio&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: Problems on Ages, Profit & Loss, Time, Distance**

**(Teaching Hours: 6)**

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

**UNIT III: Statistical Description of Data & Probability**

**(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: Problem solving techniques using 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: Fundamentals of Java Programming 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 mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Learning the Basics of Numbers, Ratio & Proportion	K1, k2
CO2	Working with Problems on Ages, Time and Distance, Profit & Loss	K3
CO3	To implement the statistical description of data and probability	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	2									
CO2	2		2							
CO3			3	1						
CO4				1						
CO5				3				2	2	1

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Quantitative Aptitude	R.S.Aggarwal	S. Chand	20th edition, 2013
2	Quick Arithmetic	AshishAggarwal	S. Chand & Company Ltd	Revised Edition, 2014
3	C Programs with Solutions	S.Anadhamurugan	University Science Press	First Edition, 2011
4	Let us C++	Kanetkar, Yashavant P	BPB Publications	3 <sup>rd</sup> Revised Edition, 2019
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, PPT Presentation, Assignment, Quiz

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20607A	CORE: COMPUTER NETWORKS	4	Theory	—	100

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

**UNIT I: Introduction**

**(Teaching Hours: 10)**

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

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

**UNIT II: Physical Layer**

**(Teaching Hours: 10)**

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

**UNIT III: Network Layer**

**(Teaching Hours: 10)**

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

**UNIT IV: Underwater Networking**

**(Teaching Hours: 10)**

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

**UNIT V: Applications of Underwater Networking**

**(Teaching Hours: 10)**

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

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Study on the basic concepts of computer networks, protocol and various reference models.	K1, K2
CO2	Detail description on physical layer and data link layer with algorithm	K1, K2
CO3	Study on network, transport layer and application layer like routing algorithm, transport layer service and DNS	K1,K2,K3,K4,K5
CO4	Basic idea on underwater network architecture, cable, protocol and its operating system.	K1, K2
CO5	Detail study on application of underwater networking, autonomous underwater vehicle, storm, hail and tsunami	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		3			1			1		
CO2	1	2	2			1		1		
CO3	1		2			1			1	
CO4		2			1					1
CO5					1			1		

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

Text Books				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Computer Networks	Andrew S. Tanenbaum & David J. Wetherall	Pearson Education	2012, 5 <sup>th</sup> Edition
2	Data and Computer Communications	William Stallings	Prentice Hall of India	2007, 8th Edition.
3	Principles of Underwater Sound	Robert J. Urick	Peninsula Publication	Third Edition, 1996

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20607B	CORE: WEB TECHNOLOGY	4	Theory	20	80

**Objective of the subject:** This paper includes basics of .NET Framework, developing & deploying ASP.NET applications, Web controls, Web site navigation and Data binding.

**UNIT I: Overview of .NET framework**

**(Teaching Hours: 10)**

Introducing the .NET Framework: The Evolution of Web Development – The .NET Framework - .NET Languages – The Common Language Runtime - .NET Class Library. Developing ASP.NET Applications – Visual Studio: Creating Websites- Designing a Web page- The anatomy of a Web Form – Writing Code – Visual Studio Debugging.

**UNIT II: Web Form fundamentals and Web controls**

**(Teaching Hours: 10)**

Web Form Fundamentals: The anatomy of an ASP.NET Application – Introducing Server Controls – HTML Control Classes – The Page Class – Application Events – ASP.NET Configuration. Web Controls: Stepping Up to Web Controls – Web Control Classes – List Controls – Table Controls – Web Control Events and AutoPostBack – A Simple Web page.

**UNIT III: Rich Web Controls**

**(Teaching Hours: 10)**

Building Better Web Forms - Validation: Understanding Validation – The Validation Controls. Rich Controls: The Calendar – The AdRotator – Pages with Multiple Views. User Controls and Graphics: User Controls – Dynamic Graphics. Website Navigation: Site Maps – The SiteMapPath Control – The Tree View Control – The Menu Control.

**UNIT IV: Fundamentals of ASP.NET**

**(Teaching Hours: 10)**

ADO.NET Fundamentals: Understanding Databases – Configuring Your Database – SQL Basics – The DataProvider Model – Direct Data Access – Disconnected Data Access. Putting MVC into ASP .NET Context – Creating First MVC Application.

**UNIT V: Data Binding and Data Controls**

**(Teaching Hours: 10)**

Data Binding: Introducing Data Binding – Single-Value Data Binding – Repeated-Value Data Binding – Data Source Controls. The Data Controls : The GridView – Formatting the GridView – Selecting a GridView Row – Editing with the GridView – Sorting and Paging the GridView – Using GridView Templates – The DetailsView and FormView.

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## Course Outcome mapping with Knowledge level

Course Outcome	CO Statement	Knowledge level
CO1	Define the primary concepts of .NET framework and developing ASP.NET applications.	K1,K2
CO2	Understand the fundamentals of web forms and web controls and developing a simple web page.	K1,K2,K3
CO3	Apply validation controls, rich web controls ,user controls in web applications and create web sites.	K2,K3,K5
CO4	Demonstrate the concept of databases and introducing the creation of MVC application.	K2,K3,K4
CO5	To perform binding process in web applications 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										
CO2										
CO3					1					2
CO4					2		3		1	3
CO5				3	3		3	3	3	3

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

TEXT BOOK				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Beginning ASP.NET 4 in VB 2010	Matthew MacDonald	Apress, Berkeley, CA, USA	First Edition, 2010
2	Pro ASP. NET MVC 5	Adam Freeman,	Apress	Fifth Edition, 2013

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20607P	CORE:WEB TECHNOLOGY LAB	3	Practical	-	-

**Objective of the subject:** The lab sessions includes creation of web pages using ASP.NET, manipulation with web controls and multiple format display using ADO.NET.

1. Creation of ASP.NET Web Page.
2. Creating and manipulation with Web Controls.
3. Create and manipulate with Rich Web Controls (Ad rotator).
4. Create and manipulate with Rich Web Controls (Calendar).
5. Create and manipulate with Rich Web Controls (Treeview).
6. Creation and manipulation of User Controls.
7. Connecting to database with GridView control.
8. Database manipulation using GridView control.
9. Displaying the data in GridView control with sorting and paging.
10. An MVC application.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Enhances the practical knowledge on creation of ASP.NET web page by applying various rich web controls and also perform connection to a database using gridview control. It also develops the understanding on creation of MVC application.	K1,K2,K3,K4,K5

**Note:**

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

**Course Outcome mapping with Programme outcome**

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2		1	2			2	3	2	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	20607U1	<b>ELECTIVE I: MOBILE PROGRAMMING</b>	4	Theory	-	100

**Objective of the Subject:** To introduce the mobile application fundamentals and to enable the students for writing android based script for mobile application development.

**UNIT I: Android**

**(Teaching hours: 10)**

All about Android: Versions – Java-XML-Linux-The android system architecture. Creating first app-Starting the Android Studio IDE-Launching and running first application. Examining a Basic Android app- A project's files.

**UNIT II: Application**

**(Teaching hours:10)**

Improving the application: Improving the layout - Localizing application-Responding to check box events – Displaying Images-Sending in the order. Android Activities: All about Activities – Intents – Using a Context- The Activity lifecycle-lifecycle methods.

**UNIT III: Android layouts**

**(Teaching hours:10)**

Android layouts: Linear layout – Relative layout-Table layout-Grid layout-Frame layout-Using a scroll view. Menus: Options Menu-Context menu-Popup menu –Simple notification.

**UNIT IV: User interface**

**(Teaching hours:11)**

Designing user interface with views: Using Basic Views-Text View-Button, Image button, Edit text, Checkbox, Toggle Button, Progress bar View, Auto Complete Text View. Using Picker Views-Using List Views to display long lists.

**UNIT V:Data Persistence**

**(Teaching hours:9)**

Data persistence: Creating and using database – Content providers: Sharing data in android-Using a content provider. Messaging: SMS Messaging-Sending E-mail.

**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Study on Android Versions and Android system architecture	K1, k4
CO2	Understanding Applications	K1, k2
CO3	Study on Android Layouts	K2, k3
CO4	Designing user interface	K2, k3, k4
CO5	Creating and using database	K2, k3, k4, k5

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

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Android Application Development for Dummies,	Barry Burd	Wiley India Pvt. Ltd,	2 <sup>nd</sup> edition, 2015.
2	Beginning Android Application Development,	Wei – Meng Lee	John Wiley,	1 <sup>st</sup> Edition, 2012.

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20607U2	ELECTIVE I: DATA SCIENCE	4	Theory	-	100

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

**UNIT I: Origin of Data Science**

**(Teaching Hours: 10)**

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

**UNIT II: Machine Learning Algorithms and Usage in Applications**

**(Teaching Hours: 10)**

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

**UNIT III: Extracting Meaning from Data**

**(Teaching Hours: 10)**

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

**UNIT IV: Predictive Modeling**

**(Teaching Hours: 10)**

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

**UNIT V: Visualizing Model Performance**

**(Teaching Hours: 10)**

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

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**EFFECTIVE FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2020-2021**  
**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	3	3	2	2	1	1	1	1	1	1
CO2	3	3	3	3	2	1	1	1	1	1
CO3	3	3	3	2	2	1	1	1	1	1
CO4	3	3	3	2	1	1	1	1	1	1
CO5	3	3	3	2	1	1	1	1	1	1

**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	20607U3	ELECTIVE I –INTERNET OF THINGS	4	Theory	-	100

**Objective of the course:** This course highlights on physical design, logic design, enabling technologies of IoT, IoT system management and design methodology, IoT physical devices and cloud offerings.

**UNIT I: Introduction to IoT**

**(Teaching Hours: 10)**

Introduction to Internet of things: Introduction- Definition and Characteristics - Physical design of IoT-Logical design of IoT

**UNIT II: IoT Technologies and Applications**

**(Teaching Hours: 10)**

IoT Enabling Technologies - IoT Levels and Deployment templates – Domain Specific IoTs – Home Automation – Smart Cities – Agriculture.

**UNIT III: IoT Platform Design Methodology& Case Study**

**(Teaching Hours: 10)**

IoT Platforms Design Methodology – Purpose and Requirements Specification –Process Specification – Domain Model Specification – Information Model Specification –Service Specification – IoT Level Specification- Case Study on IoT System for Weather Monitoring.

**UNIT IV: Raspberry Pi**

**(Teaching Hours: 10)**

IoT physical devices and Endpoints – IoT Device –Exemplary Device: Raspberry Pi – About the Board- Linux on Raspberry Pi - Raspberry Pi Interfaces – Serial – SPI – I2C.

**UNIT V: Case Studies**

**(Teaching Hours: 10)**

Case Studies illustrating IoT Design: Home Automation: Smart lighting- Cities : Smart Parking- Environment: Air pollution monitoring-Productivity application: IoT Printer.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	To understand the basics of Internet of Things and design of IoT.	K1, K2
CO2	To learn the IoT technologies and applications.	K2, K3
CO3	To understand the design methodology and level specification of IoT and case study.	K3, K4
CO4	To learn about the physical devices such as Raspberry Pi.	K3, K4, K5
CO5	To understand the different IoT case studies.	K3, K5

**Note:**

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

**Course Outcome mapping with Programme outcome**

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

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

<b>Text Books</b>				
S.No.	Title	Author	Publishers	Publication Year & Edition
1	Internet of Things-A hands on approach	ArshdeepBahga , Vijay Madiseti	Orient Blackswan Private Limited	2014, 1 <sup>st</sup> Edition

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20607U4	ELECTIVE I : ARTIFICIAL INTELLIGENCE	4	Theory	-	100

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

**UNIT I: Introduction to Artificial Intelligence** (Teaching hours: 8)

Introduction to AI - The Foundations - History of Artificial Intelligence - The State of the Art.

**UNIT II: Intelligent Agents** (Teaching hours: 10)

Agents and Environments - Good Behavior: The Concept of Rationality - The Nature of Environments - The Structure of Agents.

**UNIT III: Searching and problem solving** (Teaching hours: 10)

Problem-Solving: Problem-Solving Agents - Example Problems: Toy Problem- Searching for Solutions - Uninformed Search Strategies: Breadth-first, Depth-first, Depth-limited, Iterative deepening depth-first search - Avoiding Repeated States - Searching with Partial Information

**UNIT IV: Heuristics & Algorithms** (Teaching hours: 12)

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

**UNIT V: Introduction to Datasets and its types** (Teaching hours: 10)

Machine learning: Datasets: Introduction-Olive oil dataset (Hierarchical) - Ischemia heart disease classification - Australian crabs- (Hierarchical) – Optdigits - IRIS datasets - Pageblock.

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Course Outcome mapping with Knowledge level**

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

**Note:**

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

**Course Outcome mapping with Programme outcome**

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

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

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

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

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Semester	Course Code	Course Title	Credits	Theory/ Practical	Problems %	Theory %
SIXTH	20607U5	ELECTIVE I: INTELLECTUAL PROPERTY RIGHTS	4	Theory	-	100

**Objective of the Course:**

This course introduces the fundamentals of Intellectual Property rights, Law of copy rights, patents and trade secrets.

**UNIT I: INTRODUCTION TO INTELLECTUAL PROPERTY** (Teaching hours: 10)

**Introduction to Intellectual property:** Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT II: TRADE MARKS** (Teaching hours: 10)

**Trade Marks:** Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

**UNIT III: LAW OF COPY RIGHTS AND PATENTS** (Teaching hours: 10)

**Law of copy rights:** Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. **Law of patents:** Foundation of patent law, patent searching process, ownership rights and transfer

**UNIT IV: TRADE SECRETS AND UNFAIR COMPETITION** (Teaching hours: 10)

**Trade Secrets:** Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. **Unfair competition:** Misappropriation right of publicity, False advertising.

**UNIT V: PLAGIARISM** (Teaching hours: 10)

Plagiarism – Plagiarism occurrence – positive reasons for not plagiarizing – Plagiarism in Practice – Avoiding Plagiarism.

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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Aware and Remember the Know-How of Intellectual Property Rights.	K1 & K2
CO2	Inquire the registration and usage of Trade marks	K2 & K3
CO3	Enhance the knowledge on Law of Copyrights and Patents	K2 & K3 & K4
CO4	Determine behavior models the Trade Secrets and Unfair Competition	K5
CO5	Figure out the Plagiarism occurrences and practices	K3 & K5

**Note:**

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

**Course Outcome mapping with Programme outcome**

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

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

Text Books				
S.No	Title	Author	Publishers	Publication Year & Edition
1	Intellectual Property Rights	Deborah, E	Bouchoux, Cengage learning Publications	2013, Fourth Edition
2	Intellectual Property Right Unleashing the knowledge economy	PrabuddhaGanguli	Tata McGraw Hill Publishing Company Ltd	2017, First Edition
3	The Little book of Plagiarism	Richard A.Posner	Pantheon Publishers	2007, First Edition

**Pedagogy:**PPT presentation, e-content, Seminar, 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	607C	<b>SKILL BASED SUBJECT: SOFT SKILLS</b>	2	Practical	-	-

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

**UNIT I: Introduction**

**(Teaching hours: 10)**

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**

**(Teaching hours: 10)**

Forming Values: Meaning – 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**

**(Teaching hours: 10)**

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

**UNIT IV: Body Language**

**(Teaching hours: 10)**

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**

**(Teaching hours: 10)**

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

**Dr G R DAMODARAN COLLEGE OF SCIENCE (AUTONOMOUS)**  
**COIMBATORE - 641014**  
**B.Sc (COMPUTER SCIENCE)**  
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**Course Outcome mapping with Knowledge level**

Course Outcome	CO Statement	Knowledge level
CO1	Imparting the ability of soft skills that is needed for placement	K1, K2, K3
CO2	Adopt and practice values relating to education, self and others.	K1, K2, K4
CO3	Should develop and improve their communication skills such as they should be able to communicate their ideas, suggestions, views and opinions clearly and logically.	K1,K2,K3,K4
CO4	Making students Industry-Ready through inculcating team-playing activity.	K1,K2,K3
CO5	Etiquette and its different practices for improving their interview skills	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					2	2				
CO2					3	2	2			
CO3					3	2				
CO4						3	2			
CO5						2				

**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, 3 <sup>rd</sup> Edition
2	The ACE of Soft Skills: Attitude, Communication, and Etiquette for Success	Gopalaswamy Ramesh, Mahadevan Ramesh	Kindle Edition, Pearson Education	2010, 1st Edition

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