CURRICULUM & SYLLABUS FOR
M.C.A. PROGRAMME

2020-2022

CBCS-SEMESTER SYSTEM

DEPARTMENT OF COMPUTER APPLICATIONS
SCOTT CHRISTIAN COLLEGE (Autonomous)
NAGERCOIL-629 003

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DEPARTMENT OF COMPUTER APPLICATIONS

VISION

Envisions providing state of the art computer education to the community of learners to equip them with skills such that it shall prepare them for higher studies or contribute in the areas of private and public sectors in Computer Applications

MISSION

- To get knowledge and understanding of the basic operations of computer systems and the inter-relationship among hardware, software and data
- To get knowledge and skills in using a range of applications software effectively, ethically and in a discriminatory manner to support information processing and problem solving
- To get an understanding and experience in the ways that information is logically and sensibly organized, processed and manipulated by a computer
- To get knowledge and skills in data communications and network development
- To get an understanding and appraisal of the social and ethical issues pertaining to computer technologies

Eligibility **:** Passed BCA/Bachelor Degree in Computer Science Engineering or equivalent Degree or passed B.Sc./B.Com./B.A with Mathematics at 10+2 Level or at Graduation Level (with additional bridge Courses as per the norms of the concerned University). Obtained atleast 50% Marks (45% Marks in case of Candidates belonging to reserved category) in the qualifying Examination.

Duration of Course **:** 2 Years (4 Semesters)

Min. Duration **: 2** Years

Medium of Instruction: English

FACULTY MEMBERS

1. **Mr. R. Shanthikaran, M.Sc., P.G.D.C.A., B.Ed., M.C.A., M.Phil.**

2. **Mrs. R. Suguna Jasmin, M.Sc., M.Phil.**
   (Head of the Department)

3. **Mrs. S. Gnana Sophia, M.Sc., M.Phil., PGDCA.**

4. **Mrs. P. Ezhil Roja, M.Sc., M.Tech., M.Phil.**

5. **Dr. B. Shamina Ross, M.Sc., M.Phil., Ph.D.**

MEMBERS OF THE BOARD OF STUDIES

1. **Chairperson**

Mrs. R. Suguna Jasmin,
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3. **Subject Expert 1**

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4. **Subject Expert 2**

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5. **Subject Expert (Nominated by the VC)**

   Dr. A. John Christopher,
   Associate Professor,
   Department of Computer Science,
   S. T. Hindu College, Nagercoil.
   Mobile: 9486177755
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6. **Representative**

   Mr. Angelus Sunith M,
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   HCL Technologies Private limited,
   Chennai.
   Mobile: 9629788836
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7. **Postgraduate Meritorious Alumnus**

   Mr. Jerald. J,
   Assistant Manager,
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   Goregaon East, Mumbai.
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OUTCOME-BASED EDUCATION (OBE)
DEPARTMENT OF COMPUTER APPLICATIONS

PO-No.	**Programme Outcomes** *At the time of graduation, students of the Post-Graduate programme would have:*
PO-1	developed a scientific outlook with respect to their disciplines and apply the same in all aspects of life.
PO-2	acquired the skill to observe and analyze a given scientific data systematically and critically, and to arrive at logical conclusions.
PO-3	acquired creative skills to propose novel ideas in explaining facts and figures or to provide new solutions to problems encountered.
PO-4	realized how developments in one discipline helps in the development of the other leading to interdisciplinary approaches that help in evolving new scientific theories and inventions, providing new ideas and better solutions for sustainable developments.
PO-5	perceived the need for and engaging in professional development.
PO-6	acquired the skill to apply mathematical foundations, algorithmic principles and the theory of computer science in the modeling and designing of computer-based systems that compromise disputes in technology.
PO-7	to analyze the impact of computing on individuals, organizations and societies, including ethical, legal, security and global policy issues.
PO-8	realized that pursuit of knowledge is a life-long activity combined with relentless efforts and an optimistic attitude, and other viable qualities, leads towards a successful life.
PO-9	developed various communication skills such as reading, listening, speaking, drawing, etc. which help in expressing ideas and views clearly and effectively.
PO-10	imbibed ethical, moral and social values in personal and social life leading to a highly cultured and civilized personality with a team-spirit.

PROGRAMME SPECIFIC OUTCOME

PSO – No.	**Programme Specific Outcome** *Upon completion of MCA Degree Programme, the graduates will be able to:*	POs Mapped with %
PSO-1	apply knowledge of computing fundamentals, computing specialization and domain knowledge for the abstraction and conceptualization of computing models from defined problems and requirements**.**	1[50],5[20],6[15]
PSO-2	to develop basic programming skills to build utility programs, make use of cutting edge technologies, object oriented programming, knowledge in web development, computer animation**.**	5[20],6[15]
PSO-3	to analyze a given real-world problem and propose feasible computing solutions**.**	1[50],2[20],3[15],4[20], 5[15],6[15],7[25],8[20]
PSO-4	find solutions to problems across a broad range of application domains through analysis and design**.**	3[15],4[20],5[15],6[15], 7[25],8[20],10[30]
PSO-5	to get firm foundation in understanding and applying the principles of mathematics, computing techniques and its applications**.**	2[30],3[15],6[15],8[20]
PSO-6	identify, formulate, research literature and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.	3[15],4[20],5[15],6[15], 7[25],8[20],9[30],10[35]
PSO-7	apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.	2[30],3[20],6[10]
PSO-8	to conduct investigations of complex problems, use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	2[20],3[20],4[20],8[20]
PSO-9	to develop twining competence in commerce and management, computing skill and computational tools through software design, development and testing, e-commerce, e- business, e-banking, e-services, e-governance and in management domain where management is augmented by information communication technology**.**	9[40]
PSO-10	enhance employability by developing leadership, effective communication & time management skills and also by incorporating ethics, integrity, social responsibility & team work ability**.**	4[20],5[15],7[25],9[30], 10[35]

CURRICULUM TABLE

Year	Semester	Module No.	Courses	No. of Teaching/ Practical Hours per week	Credit
I	I	1.1	Core 1- Computer Organization and Architecture	4	4
		1.2	Core 2- Object Oriented Programming with C++	4	4
		1.3	Core 3- Data Structures Through C	4	4
		1.4	Core 4- Operating System Concepts	4	4
		1.5	Elective I: 1. Mathematical Foundations of Computer Applications 2. Statistics 3. Optimization Techniques 4. Numerical Methods	4	4
		1.6	Core Practical 1 - Object Oriented Programming with C++ Lab	5	3
		1.7	Core Practical 2 - Data Structures Through C Lab	5	3
	II	2.1	Core 5 - Advanced Database Management System	4	4
		2.2	Core 6 - C# & .NET Technology	4	4
		2.3	Core 7 - Advanced JAVA Programming	4	4
		2.4	Core 8 - Artificial Intelligence & Expert System	4	4
		2.5	Elective II: 1. Financial Accounting 2. Management Information Systems 3. Principles of Management 4. E-Commerce & Web Applications	4	4
		2.6	Core Practical 3 - C# & .NET Technology Lab	5	3
		2.7	Core Practical 4 - Advanced JAVA Programming Lab	5	3
II	III	3.1	Core 9 - Research Methodology	4	4
		3.2	Core 10 - Web Programming	4	4
		3.3	Core 11 - Multimedia Systems	4	4
		3.4	Elective III: 1. Cloud Computing 2. Big Data Analytics 3. Data Mining 4. Data Communication & Computer Networks	4	4
		3.5	Elective IV: 1. Software Engineering 2. Software Project Management 3. Object Oriented Analysis and Design 4. Software Testing and Quality Assurance	4	4
		3.6	Core Practical 5 - Web Programming Lab	5	3
		3.7	Core Practical 6 - Multimedia Systems Lab	5	3
	IV	PROJECT		30	12
		Total		**120**	**90**

SEMESTER - I

Course Title: Core 1 – 1.1 Computer Organization & Architecture	Course Type: Theory
Total Hours: 60 Hours/Week: 4 Credits: 4	
Pass-Out Policy : Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]	

Course Creator	Expert 1	Expert 2
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CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand digital circuits needed for the design of digital systems.	1[4], 5[3], 6[3], 7[8]	K2
CO-2	understand the logical operations of standard digital components, register transfer language and create micro-operations in symbolic form.	1[4], 5[3], 6[3], 7[8]	K2, K6
CO-3	analyze the organization and design of basic digital computer.	1[4], 5[3], 6[3], 7[8]	K4
CO-4	understand the techniques used in assembly language programming.	1[4], 5[3], 6[3],7[8]	K2
CO-5	understand CPU and memory organization.	1[4], 5[3], 6[3], 7[8]	K2

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Digital Logic Circuits:** Digital Computers, Logic Gates, Boolean Algebra	1-4	4	1[30]	Lecture	Multiple Choice Questions	1
1.2	Map Simplification, Combinational Circuits, Flip-Flops	5-10	6	1[50]	Lecture	Multiple Choice Questions	1
1.3	Sequential Circuits	11-12	2	1[20]	Lecture	Assignment	1
2.1	**Digital Components:** Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit, Read Only Memory, Types of ROMs	13-17	5	2[30]	Lecture	Assignment	1
2.2	**Register Transfer and Micro- Operations:** Register Transfer Language, Register Transfer, Bus and Memory Transfers	18-21	4	2[40]	Case Study	Assignment	1

2.3	Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit	22-24	3	2[30]	Case Study	Assignment	1
3.1	**Basic Computer Organization and Design:** Instruction Codes, Computer Registers, Computer Instructions, Timing and Control	25-28	4	3[40]	Smart Class	Seminar	1
3.2	Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt	29-31	3	3[30]	Smart Class	Seminar	1
3.3	Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic	32-36	5	3[30]	Smart Class	Seminar	1
4.1	**Programming the Basic Computer:** Machine Language, Assembly language, The Assembler	37-40	4	4[30]	Lecture	Quiz	1
4.2	Program Loops, Programming Arithmetic and Logic Operations	41-43	3	4[40]	Lecture	Quiz	1
4.3	Subroutines, Input-Output Programming.	44-48	5	4[30]	Lecture	Quiz	1
5.1	**Central Processing Unit:** General Register Organization, Stack Organization, Instruction Formats, Addressing Modes	49-51	3	5[25]	Smart Class	Seminar	1
5.2	Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.	52-54	3	5[25]	Smart Class	Report Writing	1
5.3	**Memory Organization:** Memory Hierarchy, Main Memory, Associative Memory	55-58	4	5[25]	Group Discussion	Report Writing	1
5.4	Cache Memory, Virtual Memory, Memory Management Hardware	59-60	2	5[25]	Group Discussion	Report Writing	1

Reference Books

1. M. Morris Mano, "*Computer System Architecture"*, Pearson Prentice Hall, Revised Third Edition, Sixth Impression, 2019.
2. John P. Hayes, "*Computer Architecture and Organization"*, Tata McGraw-Hill, Third Edition, 2012.
3. William Stallings, "*Computer Organization & Architecture Designing Performance"*, Pearson Prentice Hall, Third Edition, Seventh Impression, 2019.

SEMESTER - I

Course Title: Core 2 – 1.2 Object Oriented Programming with C++	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %:50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the principles of oops & control structures.	1[4], 2[3], 5[3], 6[2]	K2
CO-2	create programs using functions, classes & objects, constructors & destructors and operator overloading.	1[4], 2[3], 5[3], 6[2]	K6
CO-3	analyze the differences of arrays & pointers, understand memory models, binding, polymorphisms & virtual functions.	1[4], 2[3], 5[3], 6[2]	K4, K2
CO-4	create programs templates, string and exception handling.	1[4], 2[3], 5[3], 6[2]	K6
CO-5	understand exception handling & create graphics.	1[4], 2[3], 5[3], 6[2]	K2, K6

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Introduction to OOP, Basics of C++**	1-3	3	1[30]	Lecture	Seminar	1
1.2	**Input & Output in C**	4-6	3	1[20]	Lecture	Quiz	1
1.3	**C++ Declarations**	7-9	3	1[20]	Lecture	Seminar	1
1.4	**Decision Statements**	10-11	2	1[20]	Lecture	Seminar	1
1.5	**Control Loop Structures**	12	1	1[10]	Lecture	Programs	
2.1	**Functions in C++**	13-15	3	2[25]	Smart Class	Quiz	1
2.2	**Classes and Objects**	16-18	3	2[25]	Smart Class	Programs	1
2.3	**Constructors and Destructors**	19-21	3	2[25]	Smart Class	Quiz	1
2.4	**Operator Overloading and Type Conversion**	22-24	3	2[25]	Smart Class	Quiz	1
3.1	**Inheritance**	25-27	3	3[30]	Lecture	Seminar	1
3.2	**Arrays**	28-30	3	3[20]	Lecture	Seminar	1

3.3	**Pointers**	31-33	3	3[20]	Lecture	Seminar	1
3.4	**C++ and Memory Models**	34-36	3	3[30]	Lecture	Programs	1
4.1	**Binding, Polymorphisms & Virtual Functions**	37-39	3	4[30]	Group Discussion	Programs	1
4.2	**Applications with Files**	40-42	3	4[20]	Group Discussion	Programs	1
4.3	**Generic Programming with Templates**	43-45	3	4[20]	Case Study	Assignment	1
4.4	**Working with Strings**	46-48	3	4[30]	Case Study	Assignment	1
5.1	**Exception Handling**	49-52	4	5[40]	Lecture	Assignment	1
5.2	**Overview of Standard Template Library**	53-56	4	5[30]	Lecture	Seminar	1
5.3	**C++ Graphics**	57-60	4	5[30]	Case Study	Seminar	1

Reference Books

1. Ashok N. Kamthane, "*Programming in C++"*, Pearson Publications, Second Edition, 2013.
2. E. Balaguruswamy, "*Object Oriented Programming with C++"*, TATA McGraw Hill Publication, Seventh Edition, 2018.
3. Robert Lafore, "*Object Oriented Programming in C++"*, The Waite Groups, Galgotia Publication Schildt, Third Edition , 2000.
4. Sourav Sahay, "*Object Oriented Programming with C++"*, Oxford Higher Education, Second Edition, 2012.

SEMESTER - I

Course Title: Core 3 – 1.3 Data Structures Through C	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

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CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the basic concepts of data structures & analyze how to represent arrays.	1[3], 2[1], 5[2]	K2, K4
CO-2	apply stack, queues & linked lists structures to data & analyze the representations.	1[3], 2[1], 5[2]	K3, K4
CO-3	apply binary tree structure to data, evaluate the time & space complexity.	1[3], 2[1], 5[2]	K3, K5
CO-4	apply & analyze the graph structures.	1[3], 2[1], 5[2]	K3, K4
CO-5	apply and create sorting techniques.	1[3], 2[1], 5[2]	K3, K6

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Basic Concepts:** System Life Cycle, Pointers and Dynamic Memory Allocation, Algorithm Specification, Data Abstraction, Performance Analysis, Performance Measurement	1-2	2	1[20]	Lecture	Assignment	1
1.2	**Arrays and Structures:** Arrays, Dynamically Allocated arrays, Structures and Unions, Polynomials	3-7	5	1[40]	Lecture	Seminar	1
1.3	Sparse Matrices, Representation of Multidimensional Arrays, Strings	8-12	5	1[40]	Lecture	Seminar	1
2.1	**Stack and Queues**: Stacks, Stacks using dynamic arrays	13-15	3	2[25]	Smart Class	Quiz	1
2.2	Queues, Circular Queues Using dynamic Arrays, A Mazing Problem, Evaluation of Expressions, Multiple Stacks and Queues	16-18	3	2[25]	Smart Class	Quiz	1
2.3	**Linked Lists :** Singly linked list and chains, Representing chains in C, Linked Stack and Queues, Polynomials	19-21	3	2[25]	Smart Class	Quiz	1
2.4	Additional list operations, Equivalence Classes, Sparse Matrices, Doubly Linked lists	22-24	3	2[25]	Smart Class	Quiz	1
3.1	**Trees:** Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations	25-28	4	3[40]	Lecture	Multiple Choice Questions	1
3.2	Threaded binary trees, Heaps, Binary Search Trees, Selection Trees	29-32	4	3[30]	Lecture	Seminar	1
3.3	Forests, Representation of Disjoint sets, Counting Binary Trees	33-36	4	3[30]	Lecture	Seminar	1
4.1	**Graphs**: The Graph abstract data type, Elementary Graph Operations	37-42	6	4[50]	Lecture	Assignment	1
4.2	Minimum Cost Spanning Trees, Shortest Path and Transitive Closure, Activity Networks	43-48	6	4[50]	Lecture	Assignment	1
5.1	**Sorting:** Insertion Sort, Quick Sort, How Fast Can We Sort, Merge Sort, Heap Sort	49-54	6	5[50]	Lecture	Problem.	1
5.2	Sorting on Several Keys, List and Table Sorts, Summary of Internal sorting, External Sorting	55-60	6	5[50]	Lecture	Problem	1

Reference Books

1. Ellis Horowitz, Sahni, Anderson, "*Fundamentals of Data Structures in C"*, Universal Press, Second Edition, 2018.
2. Gilberge Forouzan, "*Data Structures A Pseudocode Approach with C"*, Tata McGraw Hill, Fifth Edition, 2004.

SEMESTER - I

Course Title: Core 4 - 1.4 Operating System Concepts	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

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CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the basics of operating system and system structure.	1[1], 9[4]	K2
CO-2	understand and apply process concept and multithread programming.	1[1], 9[4]	K2,K3
CO-3	evaluate synchronization and deadlocks.	1[1], 9[4]	K5
CO-4	apply memory management and analyze file system & implementation.	1[1], 9[4]	K3,K4
CO-5	analyze system security & protection.	1[1], 9[4]	K4

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Operating System Basics:** Operating System Definition, Operation System Structure, Operation System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Kernel Data Structures, Computing Environments, Open Source Operating Systems.	1-6	6	1[50]	Lecture	Seminar	1
1.2	**System Structure**: Operating System Services, User and Operating System Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, Operating System Structure, Operating System Debugging, Operating System Generation.	7-12	6	1[50]	Lecture	Seminar	1
2.1	**Process Concept**: Process Concept, Process scheduling, operations on Processes, Inter Process Communication, Communication in Client Server System.	13-16	4	2[35]	Lecture	Seminar	1

2.2	**Multithread Programming:** Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues, Operating System Examples.	17-20	4	2[35]	Lecture	Seminar	1
2.3	**Process Scheduling:** Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiprocessor Scheduling, Real Time CPU Scheduling.	21-24	4	2[30]	Lecture	Seminar	1
3.1	**Synchronization:** The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problem of Synchronization, Synchronization Examples.	25-30	6	3[50]	Lecture	Quiz	1
3.2	**Deadlocks:** System Model, Deadlock Characterization, Methods of Handling Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlocks.	31-36	6	3[50]	Lecture	Quiz	1
4.1	**Memory Management Strategies:** Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.	37-40	4	4[40]	Lecture	Multiple Choice Questions	1
4.2	**Virtual-Memory Management:** Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory.	41-44	4	4[30]	Smart Class	Multiple Choice Questions	1
4.3	**Implementing File-Systems:** File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery	45-48	4	4[30]	Smart Class	Multiple Choice Questions	1
5.1	**System Protection:** Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation, Access Control, Revocation of Access Rights, Capability – Based Systems, Language – Based Protection.	49-54	6	5[50]	Group Discussion	Assignment	1
5.2	**System Security:** The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Implementing security Defenses, Computer Security Classifications**.**	55-60	6	5[50]	Group Discussion	Assignment	1

Reference Books

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne**, "***Operating Systems Concepts"* **,**Wiley India Pvt. Ltd, Ninth Edition, Reprint 2016.
2. A.S. Tanenbaum, "*Modern Operating Systems"*, Pearson Education, Third Edition, 2007.
3. G. Nutt, "*Operating Systems: A Modern Perspective"*, Pearson Education, Second Edition, 1997.

SEMESTER - I

Course Title: Elective I – 1.5 Mathematical Foundations of Computer Applications	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Dr.B.Shamina Ross	Mrs.R.Suguna Jasmin	Mrs.S.Gnana Sophia
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CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand and evaluate logic and combinatorics.	3[2], 4[3], 5[2], 6[2], 7[8]	K2, K5
CO-2	understand and evaluate basic concepts in number theory.	3[2], 4[3], 5[2], 6[2], 7[8]	K2, K5
CO-3	evaluate the roots of equations.	3[2], 4[3], 5[2], 6[2], 7[8]	K5
CO-4	evaluate system of linear equations.	3[2], 4[3], 5[2], 6[2], 7[8]	K5
CO-5	evaluate numerical differentiation and integration.	3[2], 4[3], 5[2], 6[2], 7[8]	K5

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Logic and Combinatorics:** Connectives, Equivalence Formula	1-3	3	1[25]	Lecture	Problem	1
1.2	Tautological Implication, Inference Theory, Predicate Calculus, Inference Theory for Predicate Calculus	4-6	3	1[20]	Lecture	Problem	1
1.3	Counting Principle, Factorial Notation, Binomial Co-efficients, -Binomial Theorem-Pascal's Triangle	7-9	3	1[20]	Lecture	Problem	1
1.4	Multinomial Co-efficients, Permutations and Combinations	10-12	3	1[35]	Lecture	Problem	1
2.1	**Basic Concepts in Number Theory:** Order Inequalities, Mathematical Induction- -Problems related to Peano's Postulates Division	13-15	3	2[30]	Lecture	Assignment	1
2.2	The Euclidean Algorithm-Problems related to Euclidean Algorithm	16-18	3	2[20]	Lecture	Assignment	1

2.3	Chinese Remainder Theorem	19-21	3	2[25]	Lecture	Assignment	1
2.4	Sun-Tsu's Puzzle	22-24	3	2[25]	Lecture	Assignment	1
3.1	**Roots of Equations:** Roots of Algebraic Transcendental Equations, Important properties of equations	25-27	3	3[25]	Smart Class	Problem	1
3.2	Bisection Method-Problems related to Bisection Method	28-30	3	3[25]	Smart Class	Problem	1
3.3	Newton's Method (or) Newton Raphson Method- Problems related to Newton Raphson Method	31-33	3	3[30]	Lecture	Problem	1
3.4	The Method of False Position or Regula Falsi Method- Problems related to Regula Falsi Method	34-36	3	3[20]	Lecture	Problem	1
4.1	**System of Linear Equations:** Direct Methods: Gauss Elimination Method	37-39	3	4[25]	Lecture	Problem	1
4.2	Direct Methods: Gauss Jordan Method	40-42	3	4[35]	Lecture	Problem	1
4.3	Iterative Methods: Jacobi's (or Gauss Jacobi's) iteration method	43-45	3	4[20]	Lecture	Problem	1
4.4	Iterative Methods: Gauss Seidel Iterative Method	46-48	3	4[20]	Lecture	Problem	1
5.1	**Numerical Differentiation and Integration:** Finite Differences, Interpolation, Newton's Forward Interpolation Formula to compute derivatives	49-52	4	5[30]	Lecture	Seminar	1
5.2	Backward Differences, Newton's Backward Interpolation Formula, Problems related to Forward Difference Formula & Backward Difference Formula	53-55	3	5[30]	Lecture	Seminar	1
5.3	**Numerical Integration:** Trapezoidal Rule, Romberg's Method	56-58	3	5[20]	Lecture	Seminar	1
5.4	Simpson's Rule	59	1	5[10]	Lecture	Seminar	1
5.5	Truncation Error in Simpon's Formula	60	1	5[10]	Lecture	Seminar	1

Reference Books

1. V. Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan, "*Mathematical Foundations of Computer Science"*, Meenakshi Publications, First Edition, 2000.
2. M. K. Jain , S. R. K. Iyengar and R. K. Jain, " *Numerical Methods for Scientific and Engineering Computation"*, New Age International (P) Ltd, Third Edition, 1999.
3. Dr. M. K. Venkataraman, "*Numerical Methods in Science and Engineering"*, The National Publishing Company, Fifth Edition, 1999.

SEMESTER - I

Course Title: Elective I – 1.5 Statistics	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Dr.B.Shamina Ross	Mrs.R.Suguna Jasmin	Mrs.S.Gnana Sophia
Assistant Professor	Assistant Professor	Assistant Professor
Mobile: 9443137232	Mobile: 9486941443	Mobile: 9944281506
shaminas@hotmail.com	suguna.jasmin@gmail.com	gnanasophias@gmail.com

CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand statistical survey and evaluate collection of data.	3[2], 4[3], 5[2], 6[2], 7[8]	K2, K5
CO-2	understand sampling, create and apply sample designs and classification and tabulation of data.	3[2], 4[3], 5[2], 6[2], 7[8]	K2, K6, K3
CO-3	understand and create diagrammatic and graphic presentation.	3[2], 4[3], 5[2], 6[2], 7[8]	K2, K6
CO-4	understand and apply measures of central value.	3[2], 4[3], 5[2], 6[2], 7[8]	K2, K3
CO-5	understand and evaluate measures of dispersion and create and apply vital statistics.	3[2], 4[3], 5[2], 6[2], 7[8]	K2, K5, K6, K3

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Organizing A Statistical Survey:** Planning the Survey, Executing the Survey	1-3	3	1[25]	Lecture	Problem	1
1.2	**Collection of Data**: Primary and Secondary Data, Methods of Collecting Primary Data	4-6	3	1[20]	Lecture	Problem	1
1.3	Drafting the Questionnaire, Pre-testing the Questionnaire (or Pilot Survey), Specimen Questionnaires	7-9	3	1[20]	Lecture	Problem	1
1.4	Sources of Secondary Data, Editing Primary and Secondary Data, Precautions in the use of Secondary Data	10-12	3	1[35]	Lecture	Problem	1
2.1	**Sampling and Sample Designs:** Census and Sample methods, Theoretical Basis of sampling, Methods of Sampling, Non-probability Sampling Methods	13-15	3	2[20]	Lecture	Assignment	1

2.2	Probability Sampling Methods, Size of Sample, Merits and Limitations of Sampling, Sampling and Non-sampling Errors	16-17	2	2[20]	Lecture	Assignment	1
2.3	**Classification and Tabulation of Data:** Meaning and Objectives of Classification, Types of Classification, Formation of Discrete Frequency Distribution, Formation of Continuous Frequency Distribution	18-21	4	2[40]	Lecture	Assignment	1
2.4	Tabulation of Data, Parts of A Table, General Rules of Tabulation, Types of Tables, Miscellaneous Illustrations, Machine Tabulation	22-24	3	2[20]	Lecture	Assignment	1
3.1	**Diagrammatic and Graphic Presentation:** Significance of Diagrams and Graphs, General Rules for Constructing Diagrams	25-27	3	3[25]	Smart Class	Problem	1
3.2	Types of Diagrams	28-30	3	3[25]	Smart Class	Problem	1
3.3	Graphs	31-34	4	3[30]	Lecture	Problem	1
3.4	Graphs of Frequency Distributions	35-36	2	3[20]	Lecture	Problem	1
4.1	**Measures of Central Value:** Objectives of Averaging, Requisites of a God Average, Types of Averages	37-38	2	4[25]	Lecture	Problem	1
4.2	Geometric Mean	39-42	4	4[35]	Lecture	Problem	1
4.3	Harmonic Mean	43-45	3	4[20]	Lecture	Problem	1
4.4	Relationship among the Averages, Miscellaneous illustrations, Which average to Use? General Limitations of Average	46-48	3	4[20]	Lecture	Problem	1
5.1	**Measures of Dispersion:** significance of Measuring Variation, Properties of a Good Measure of Variation	49-50	2	5[15]	Lecture	Seminar	1
5.2	Methods of Studying Variation, Which Measure of Dispersion to Use	51-52	2	5[15]	Lecture	Seminar	1
5.3	**Vital Statistics:** Vital Statistics Defined, Uses of Vital statistics, Methods of Obtaining Vital Statistics, Reproduction Rates	53-54	2	5[15]	Lecture	Seminar	1
5.4	Measurement of Mortality	55-58	4	5[25]	Lecture	Seminar	1
5.5	Life Tables, Miscellaneous Illustrations	59-60	2	5[30]	Lecture	Seminar	1

Reference Books

1. S.P. Gupta, "*Statistical Methods*", Sultan Chand & Sons, Forty Fifth Revised Edition, 2019.
2. S.C. Gupta, V.K. Kapoor, "*Fundamentals of Mathematical Statistics*", Sultan Chand & Sons, Eleventh Revised Edition, 2019.

SEMESTER - I

Course Title: Elective I – 1.5 Optimization Techniques	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Dr.B.Shamina Ross	Mrs.R.Suguna Jasmin	Mrs.S.Gnana Sophia
Assistant Professor	Assistant Professor	Assistant Professor
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shaminas@hotmail.com	suguna.jasmin@gmail.com	gnanasophias@gmail.com

CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand operations research in decision making and solve linear programming problems.	3[2], 4[3], 5[2], 6[2], 7[8]	K2,
CO-2	evaluate specialized linear programming problems like transportation problems to minimize transport cost.	3[2], 4[3], 5[2], 6[2], 7[8]	K5
CO-3	apply real world problem as a mathematical programming model.	3[2], 4[3], 5[2], 6[2], 7[8]	K3,
CO-4	apply replacement techniques in real world problem.	3[2], 4[3], 5[2], 6[2], 7[8]	K3
CO-5	create large projects.	3[2], 4[3], 5[2], 6[2], 7[8]	K6

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Operations Research: An Overview**: Origin and Development of OR, Scientific Method in OR, Modeling in OR, General Solution Methods for OR Models, Methodology of OR, Operations Research and Decision Making, Applications of Operations Research, Operations and Shortcomings of OR	1-3	3	1[25]	Lecture	Problem	1
1.2	**Linear Programming Problem-Mathematical Formulation:** Linear Programming Problem, Mathematical Formulation of the Problem, Illustrations on Mathematical Formulation of LPPs-Sample Problems	4-6	3	1[20]	Lecture	Problem	1

1.3	**Linear Programming Problem-Graphical Solution:** Graphical Solution Method-Sample Problems	7-8	2	1[20]	Lecture	Problem	1
1.4	Canonical and Standard Forms of LPP-Sample Problems	9-12	4	1[35]	Lecture	Problem	1
2.1	**Transportation Problem :** LP formulation, existence of solution in T.P.	13-15	3	2[25]	Lecture	Assignment	1
2.2	Duality in T.P, The transportation table, loops in transportation table, solution of a transportation problem	16-18	3	2[25]	Lecture	Assignment	1
2.3	Finding an initial basic feasible solution – North-West Corner method, Finding an initial basic feasible solution – Least-cost method, Finding an initial basic feasible solution – Vogel's approximation method.	19-21	3	2[25]	Lecture	Assignment	1
2.4	Test for optimality, Degeneracy in transportation problem, Transportation algorithm : MODI method	22-24	3	2[25]	Lecture	Assignment	1
3.1	**Games and Strategies:** Two person zero-sum games, some basic terms.	25-27	3	3[25]	Smart Class	Problem	1
3.2	Games without saddle Points, Mixed strategies, Games against Passivity	28-32	5	3[45]	Smart Class	Problem	1
3.3	Dominance property, General solution of m × n rectangular games	32-36	4	3[30]	Smart Class	Problem	1
4.1	**Replacement Problem and System Reliability:** Replacement of equipment/ asset that deteriorates gradually- when value of money does not change with time- Sample Problems, Replacement of equipment/ asset that deteriorates gradually-value of money changes with time,	37-40	4	4[30]	Lecture	Problem	1
4.2	Replacement of equipment/ asset that deteriorates gradually-Selection of the best equipment amongst two- Sample Problems	41-44	4	4[35]	Lecture	Problem	1
4.3	Replacement of equipment that fails suddenly, Individual Replacement Policy, Group Replacement Policy, Mortality tables, Recruitment and promotion problem	45-48	4	4[35]	Lecture	Problem	1
5.1	**Network Scheduling by PERT/CPM:** Network : Basic components	49-51	3	5[25]	Lecture	Problem	1
5.2	Logical sequencing	52-54	3	5[25]	Lecture	Problem	1
5.3	Rules of network construction, Concurrent Activities	55-57	3	5[25]	Lecture	Problem	1
5.4	Critical path analysis, Type of floats Probability Considerations in PERT, Distinction between PERT and CPM	58-60	3	5[25]	Lecture	Problem	1

Reference Books

1. Kantiswarup, P.K.Gupta, Manmohan, "*Operations Research"*, Sultan Chand & Sons Thirteenth Edition, 2007.
2. R.Panneerselvam, "*Operations Research"*, PHI, Second Edition, 2011.
3. Hamdy.A.Taha, "*Operation Research An Introduction"*, Pearson Publication, Ninenth Edition, 2016.

SEMESTER - I

Course Title: Elective-I – 1.5 Numerical Methods	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Dr.B.Shamina Ross	Mrs.S.Gnana Sophia	Mrs.P.Ezhil Roja
Assistant Professor	Assistant Professor	Assistant Professor
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shaminas@hotmail.com	gnanasophias@gmail.com	roja_z@yahoo.com

CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	evaluate numerical algebraic and transcendental equations.	3[2], 4[3], 5[2], 6[2], 7[8]	K5
CO-2	evaluate simultaneous linear algebraic equations.	3[2], 4[3], 5[2], 6[2], 7[8]	K5
CO-3	evaluate finite differences.	3[2], 4[3], 5[2], 6[2], 7[8]	K5
CO-4	evaluate numerical differentiation and integration.	3[2], 4[3], 5[2], 6[2], 7[8]	K5
CO-5	evaluate numerical solution of ordinary differential equation.	3[2], 4[3], 5[2], 6[2], 7[8]	K5

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Solution of Numerical Algebraic and Transcendental Equations :** Bisection Method	1-3	3	1[25]	Lecture	Problem	1
1.2	Iteration Method	4-5	2	1[20]	Lecture	Problem	1
1.3	Regula Falsi Method	6-8	3	1[20]	Lecture	Problem	1
1.4	Newton Raphson Method	9-12	4	1[35]	Lecture	Problem	1
2.1	**Simultaneous Linear Algebraic Equation:** Gauss Elimination Method	13-15	3	2[20]	Lecture	Assignment	1
2.2	Gauss Jordan Method	16-18	3	2[20]	Lecture	Assignment	1

2.3	**Iterative Methods :** Gauss Jacobi Method	19-20	2	2[20]	Lecture	Assignment	1
2.4	Gauss Seidel Method	21-22	2	2[20]	Lecture	Assignment	1
2.5	Comparison of Gauss Elimination and Gauss Seidal Iteration methods	23-24	2	2[20]	Lecture	Assignment	1
3.1	**Finite Differences:** First differences, Higher differences, Difference Tables Backward Differences	25-27	3	3[25]	Smart Class	Problem	1
3.2	Central Difference Notation, Properties of Operator Δ	28-30	3	3[25]	Smart Class	Problem	1
3.3	**Interpolation:** Linear Interpolation	31-33	3	3[30]	Lecture	Problem	1
3.4	Gregory Newton Forward Interpolation Formula, Gregory Newton Backward Interpolation Formula	34-36	3	3[20]	Lecture	Problem	1
4.1	**Numerical Differentiation and Integration:** Newton's Forward Formula to compute derivatives, Newton's Backward Formula to compute derivatives	37-39	3	4[25]	Lecture	Problem	1
4.2	Trapezoidal Rule, Romberg's Method	40-43	4	4[35]	Lecture	Problem	1
4.3	Simpson's Rule, Truncation Error in Simpon's Formula	44-46	3	4[20]	Lecture	Problem	1
4.4	Practical Application of Simpson's Rule	47-48	2	4[20]	Lecture	Problem	1
5.1	**Numerical Solution of Ordinary Differential Equation:** Euler's Method	49-50	2	5[15]	Lecture	Seminar	1
5.2	Improved Euler's Method	51-52	2	5[15]	Lecture	Seminar	1
5.3	Modified Euler's Method	53-54	2	5[15]	Lecture	Seminar	1
5.4	Runge-Kutta Methods, Higher Order Runge-Kutta Methods, Distinguishing Properties of Runge-Kutta Methods,	55-58	4	5[25]	Lecture	Seminar	1
5.5	Distinguishing Properties of Runge-Kutta Methods, Predictor Corrector Methods	59-60	2	5[30]	Lecture	Seminar	1

Reference Books

1 **.** M. K. Jain , S. R. K. Iyengar and R. K. Jain, " *Numerical Methods for Scientific and Engineering Computation"* , New Age International (P) Limited , Third Edition, 1999.

2. Dr. V. N. Vedamurthy, Dr. N. Ch. S. N. Iyengar, "*Numerical Methods",* Vikas Publishing House, Pvt.Ltd, First Edition, 2010.
3. Dr. M. K. Venkataraman., "*Numerical Methods in Science and Engineering"*, The National Publishing Company, Fifth Edition, 1999.

SEMESTER - I

Course Title: Core Practical 1- 1.6 Object Oriented Programming with C++ Lab	Course Type: Practical

Total Hours: 75	Hours/Week: 5	Credits: 3

Pass-Out Policy :	Minimum Contact Hours: 45 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.R.Suguna Jasmin	Mrs.S.Gnana Sophia	Mrs.P.Ezhil Roja
Assistant Professor	Assistant Professor	Assistant Professor
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Sl. No	Description
C++ Programs Implementing	
1.	Control Loop Structures
2.	Functions
3.	Classes and Objects
4.	Constructors and Destructors
5.	Operator Overloading
6.	Inheritance
7.	Arrays & Pointers
8.	Virtual Functions and Polymorphism
9.	Console I/O Operations
10.	Application Files
11.	Templates
12.	Strings
13.	Exception Handling
14.	Graphics

Reference Books

1. Ashok N. Kamthane, "*Programming in C++"*, Pearson Publications, Second Edition, 2013.
2. E. Balaguruswamy, "*Object Oriented Programming with C++"*, TATA McGraw Hill Publication, Seventh Edition, 2018.
3. Robert Lafore, "*Object Oriented Programming in C++"*, The Waite Groups, Galgotia Publication Schildt, Third Edition, 2000.
4. Sourav Sahay, "*Object Oriented Programming with C++"*, Oxford Higher Education, Second Edition, 2012.

SEMESTER - I

Course Title: Core Practical 2 - 1.7 Data Structures Through C Lab	Course Type: Practical

Total Hours: 75	Hours/Week: 5	Credits: 3

Pass-Out Policy :	Minimum Contact Hours: 45 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.R.Suguna Jasmin.	Dr.B.Shamina Ross	Mrs.S.Gnana Sophia
Assistant Professor	Assistant Professor	Assistant Professor
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Sl.No.	Description
C Programs Implementing	
1.	Searching Techniques
2.	Sorting Techniques
3.	Singly Linked List Operations
4.	Doubly Linked List Operations
5.	Stack Operations
6.	Queue Operations
7.	Adding Polynomials - Array/Linked List
8.	Sparse Matrix
9.	Evaluation of Expressions – Infix, Prefix, Postfix
10.	Binary tree traversals
11.	Binary tree operations
12.	Depth First search
13.	Breadth First Search
14.	Minimum Cost Spanning Tree: Kruskal's Algorithm, Prim's Algorithm,Sollin's Algorithm
15.	Shortest Path: Bellman and Ford algorithm

Reference Books

1. Ellis Horowitz, Sahni, Anderson, "*Fundamentals of data structures in C",* Universal Press, Second Edition, 2018.
2. Gilberge Forouzan, "*Data Structures A Pseudocode approach with C",* Tata McGraw Hill, Fifth Edition, 2004.

SEMESTER - II

Course Title: Core 5 – 2.1 Advanced Database Management System	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.P.Ezhil Roja	Dr.B.Shamina Ross	Mrs.S.Gnana Sophia
Assistant Professor	Assistant Professor	Assistant Professor
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roja_z@yahoo.com	shaminas@hotmail.com	gnanasophias@gmail.com

CO-No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the basic concepts of database management system.	3[2], 4[3], 6[2], 8[4], 10[2]	K2
CO-2	understand advanced sql functions.	3[2], 4[3], 6[2], 8[4], 10[2]	K2
CO-3	create normalized database, store, and retrieve and manipulate the stored data.	3[2], 4[3], 6[2], 8[4], 10[2]	K6
CO-4	understand storage, indexing and hashing functions.	3[2], 4[3], 6[2], 8[4], 10[2]	K2
CO-5	apply suitable concurrency control mechanism.	3[2], 4[3], 6[2], 8[4], 10[2]	K3

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Introduction:** Database-System Applications, Purpose of Database System, View of Data, Database Language, Relational Database, Database Design	1-3	3	1[20]	Lecture	Assignment	1
1.2	Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Database, Database Users and Administrators	4-6	3	1[20]	Lecture	Assignment	1
1.3	**Introduction to the Relational Databases**: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations	7-8	2	1[20]	Lecture	Seminar	1
1.4	**Introduction to SQL:** Overview of The SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries	9-10	2	1[20]	Lecture	Assignment	1

1.5	Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database	11-12	2	1[20]	Lecture	Seminar	1
2.1	**Intermediate SQL:** Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization	13-15	3	2[25]	Lecture	Assignment	1
2.2	**Advanced SQL:** Accessing SQL From a Programming Language, Functions and Procedure	16-18	3	2[25]	Lecture	Seminar	1
2.3	Triggers, Recursive Queries**, Advanced Aggregation Features**, OLAP**	19-21	3	2[25]	Lecture	Assignment	1
2.4	**Formal Relational Query Languages:** The Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus	22-24	3	2[25]	Smart Class	Assignment	1
3.1	**Database Design and The E-R Model:** Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets	25-27	3	3[25]	Lecture	Assignment	1
3.2	Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for Modeling Data	28-30	3	3[25]	Lecture	Seminar	1
3.3	**Relational Database Design:** Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies	31-33	3	3[25]	Smart Class	Assignment	1
3.4	Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms, Database Design Process, Modeling Temporal Data	34-36	3	3[25]	Lecture	Multiple Choice Questions	1
4.1	**Storage and File Structure:** Overview of Physical Storage Media, Magnetic Disk and Flash Storage, RAID	37-39	3	4[25]	Group Discussion	Seminar	1
4.2	Tertiary Storage, File Organization, Organization of Records in File, Data-Dictionary Storage, Database Buffer	40-42	3	4[25]	Lecture	Seminar	1
4.3	**Indexing and Hashing:** Basic Concepts Ordered Indices, B+- Tree Index Files, B+- Tree Extensions, Multiple- Key Access	43- 45	3	4[25]	Lecture	Assignment	1
4.4	Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices, Index Definition in SQL	46-48	3	4[25]	Lecture	Multiple Choice Questions	1

5.1	**Transactions:** Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability	49-51	3	5[25]	Smart Class	Seminar	1
5.2	Transaction Isolation and Atomicity, Transaction Isolation Level, Implementation of Isolation Level, Transactions of SQL Statements	52-54	3	5[25]	Lecture	Multiple Choice Questions	1
5.3	**Recovery System:** Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management	55-57	3	5[25]	Group Discussion	Seminar	1
5.4	Failure With Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations, ARIES, Remote Backup	58-60	3	5[25]	Lecture	Seminar	1

Reference Books

1. Abraham Silberschatz, Henry F. Korth, S.Sudharshan, "*Database System Concept"s*, McGraw Hill Education, Sixth Edition, 2013.
2. C.J. Date, A. Kannan, S.Swamynathan, "*Introduction to Database Systems"*, Pearson Education, Eighth Edition, 2006.
3. Ramez Elmasri, "*Fundamentals of Database Systems"*, Pearson Education, Sixth Edition, 2008.

SEMESTER - II

Course Title: Core 6- 2.2 C# & .NET Technology	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.P.Ezhil Roja	Mrs. R.Suguna Jasmin	Mrs.S.Gnana Sophia
Assistant Professor	Assistant Professor	Assistant Professor
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roja_z@yahoo.com	suguna.jasmin@gmail.com	gnanasophias@gmail.com

CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	analyze the implementation of the components of a programming language.	1[3],2[4],5[4],6[1],10[2]	K4
CO-2	create applications using ADO.NET.	1[3],2[4],5[4],6[1],10[2]	K6
CO-3	create applications using C#.	1[3],2[4],5[4],6[1],10[2]	K6
CO-4	apply and create controls in ASP.NET.	1[3],2[4],5[4],6[1],10[2]	K3,K6
CO-5	apply and create ADO.NET in ASP.NET.	1[3],2[4],5[4],6[1],10[2]	K3,K6

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Introducing .NET Framework 4.5 and Visual Studio 2012:** Exploring the Benefits of .NET Framework, Exploring the Versions of .NET Framework	1-2	2	1[15]	Lecture	Assignment	1
1.2	Exploring New Features of .NET Framework 4.5, Exploring Visual Studio 2012 IDE, Introducing the Key Enhancements in Visual Studio 2012 IDE, Developing Applications in Visual Studio 2012	3-6	4	1[35]	Lecture	Multiple Choice Questions	1
1.3	**Getting Started with C# 2012:** Exploring New Features of C# 2012	7-8	2	1[15]	Lecture	Seminar	1
1.4	**Dynamic Programming:** Explaining Dynamic Language Runtime, Working With the Dynamic Type, Creating Objects of the Dynamic Object and Expand Object Classes	9-12	4	1[35]	Smart Class	Seminar	1
2.1	**Working with ADO.NET:** Introducing SQL, Introducing ADO.NET, Accessing Data in ADO.NET	13-20	8	2[65]	Lecture	Multiple Choice Questions	1
2.2	**Implementing Data Binding:** Data Binding in Windows Forms, Data Binding in WPF	21-24	4	2[35]	Smart Class	Seminar	1
3.1	**LINQ in C# 2012:** Creating a Simple LINQ Query,Working with Standard Query Operators	25-28	4	3[35]	Lecture	Assignment	1
3.2	Implementing LINQ to ADO.NET, Using Anonymous Types in Queries	29-30	2	3[15]	Lecture	Assignment	1
3.3	Using Lambda Expressions in Queries, Exploring PLINQ	31-32	2	3[15]	Lecture	Assignment	1
3.4	**Errors and Exceptions Handling:** Exploring Types of Errors, Handling Exceptions, Using the User-Defined Exception Class	33-36	4	3[35]	Smart Class	Multiple Choice Questions	1
4.1	**Introduction to ASP.NET 4.5:** Exploring ASP.NET 4.5 Web Application, Implementing Code Sharing, Compiling an ASP.NET 4.5 Web Application, Understanding Dynamic Compilation in ASP.NET 4.5	37-40	4	4[35]	Lecture	Multiple Choice Questions	1
4.2	**Standard Controls:** Label, TextBox, Image Button, List Box, Radio Button, Check Box, Table, Wizard, Calendar, AdRotator	41-44	4	4[35]	Lecture	Seminar	1
4.3	**Navigation Controls:** Working with the SiteMapPath Control, Working with the Menu Control, Working with the Tree View Control	45-48	4	4[30]	Smart Class	Multiple Choice Questions	1

5.1	**Validation Controls:** Introducing the Base Validator Class, Required Field Validator, Range Validator, Regular Expression Validator, Compare Validator, Custom Validator, Validation Summary	49-51	3	5[25]	Lecture	Assignment	1
5.2	**Login Controls:** Creating a User Account in ASP.NET 4.5	52-54	3	5[25]	Smart Class	Seminar	1
5.3	Login Control, Login Name Control, Login View Control, Login Status Control, Password Recovery Control, Configuring the web.config File for Password Recovery.	55-57	3	5[25]	Lecture	Seminar	1
5.4	**Database Controls:** Working with ADO.NET, Introducing Data Source Controls, Working with Data-Bound Controls	58-60	3	5[25]	Smart Class	Multiple Choice Questions	1

Reference Books

1. Vikas Gupta, *Comdex.NET 4.5 "Programming Course Kit"*, Dreamtech, First Edition, 2014.
2. Balagurusamy, *"Programming in C# A Primer"*, Tata McGraw Hill, Third Edition, 2011.
3. David S Platt, "*Introducing Microsoft.NET"*, Microsoft Press, Third Edition, 2003.

SEMESTER - II

Course Title: Core 7 – 2.3 Advanced JAVA Programming	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.P.Ezhil Roja	Mrs. R.Suguna Jasmin	Mrs.S.Gnana Sophia
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand and apply AWT applets and handling events.	1[3], 2[20], 10[3]	K2, K3
CO-2	apply and create applications using swing.	1[3], 2[20], 10[3]	K3, K6
CO-3	create applications using java beans.	1[3], 2[20], 10[3]	K6
CO-4	analyze and create JDBC & RMI.	1[3], 2[20], 10[3]	K4,K6
CO-5	analyze and create servlet programming.	1[3], 2[20], 10[3]	K4,K6

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**AWT-Applets, Applications, and Event Handling:** The Abstract Windowing Toolkit	1-2	2	1[15]	Lecture	Programs	1
1.2	Applets, Applications, Handling Events	3-6	4	1[35]	Lecture	Programs	1
1.3	**AWT:** Graphics, Image, Text and Fonts	7-8	2	1[15]	Lecture	Programs	1
1.4	The Keyboard and Mouse	9-12	4	1[35]	Case Study	Programs	1
2.1	**Swing-Applets, Applications, and Pluggable Look and Feel:** The Java Foundation Classes	13-15	3	2[25]	Lecture	Programs	1
2.2	Swing, What's New in javax?, Swing Package	16-18	3	2[25]	Smart Class	Programs	1
2.3	Heavyweight vs Lightweight components, Swing Features	19-21	3	2[25]	Case Study	Programs	1
2.4	Graphics Programming Using Panes, Model View Controller Architecture	22-24	3	2[25]	Lecture	Programs	1
3.1	**Swing:** Text Fields, Buttons, Toggle Buttons	25-28	4	3[35]	Lecture	Programs	1
3.2	Checkboxes, Radio Buttons	29-30	2	3[15]	Lecture	Programs	1
3.3	**Working with Java Beans**: What is Java Bean? Advantage of Java Beans	31-32	2	3[15]	Lecture	Programs	1
3.4	Introspection, Customizers	33-36	4	3[35]	Smart Class	Programs	1
4.1	**Talking to Database:** What does JDBC do?, JDBC vs ODBC and other APIs	37-39	3	4[25]	Case Study	Programs	1
4.2	Two-tier and Three-tier Models, Introducing SQL	40-42	3	4[25]	Lecture	Programs	1
4.3	**Understanding RMI:** Remote Method Invocation (RMI), Client/ Server Architecture	43-45	3	4[25]	Lecture	Programs	1
4.4	Implementing RMl, Limitation of RMI	46-48	3	4[25]	Smart Class	Programs	1
5.1	**Understanding Servlet Programming:** What's New in Servlet 2.4? Overview of Servlets, Servlet API, Servlet and Environment State	49-51	3	5[25]	Lecture	Programs	1
5.2	Servlet Life-Cycle, Servlet Security Features, HTML-Aware Servlets, HTTP- Specific Servlets, Performance Features	52-54	3	5[25]	Case Study	Programs	1

5.3	Three-Tier Applications, Web Publishing System	55-57	3	5[25]	Lecture	Programs	1
5.4	Package javax.servlet Description, Servlet Configuration, How the Application Works	58-60	3	5[25]	Case Study	Programs	1

Reference Books

1. KoGENT Solutions INC, "*Java 6 Programming Black Book"*, Dreamtech Press, New Edition, 2008.
2. KoGENT Solutions INC, "*Java Server Programming Black Book"*, Dreamtech Press, Platinum Edition, 2014.
3. Herbert Schildt, "*The Complete Reference"*, Tata McGraw-Hill, Seventh Edition, 2007.

SEMESTER - II

Course Title: Core 8-2.4 Artificial Intelligence & Expert System	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Dr.B.Shamina Ross	Mrs. R.Suguna Jasmin	Mrs.S.Gnana Sophia
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand Artificial Intelligence and Game Playing.	3[2], 4[4], 8[4], 9[2]	K2
CO-2	understand Planning and Concepts in AI.	3[2], 4[4], 8[4], 9[2]	K2
CO-3	analyze Natural Language Processing and Parallel and Distributed AI.	3[2], 4[4], 8[4], 9[2]	K4
CO-4	apply and analyze Genetic Algorithms and Artificial Immune Systems.	3[2], 4[4], 8[4], 9[2]	K3, K4
CO-5	apply and create Prolog-The Natural Language of Artificial Intelligence.	3[2], 4[4], 8[4], 9[2]	K3, K6

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Artificial Intelligence:** The AI problems, What is an AI Technique?	1-3	3	1[30]	Lecture	Assignment	1
1.2	Level of the Model, Criteria for success	4-5	2	1[20]	Lecture	Assignment	1
1.3	**Game Playing:** The Minimax Search Procedure, Adding Alpha-Beta Cutoffs	6-8	3	1[20]	Lecture	Quiz	1
1.4	Additional Refinements, Iterative Deepening	9-12	4	1[30]	Lecture	Quiz	1

2.1	**Planning:** Blocks World, Components of a Planning System	13-14	2	2[20]	Lecture	Seminar	1
2.2	Goal Stack Planning, Non-Linear Planning using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques	15-19	5	2[40]	Lecture	Seminar	1
2.3	**Understanding:** What is Understanding? What makes Understanding Hard?	20-22	3	2[20]	Lecture	Seminar	1
2.4	Understanding as Constraint Satisfaction	23-24	2	2[20]	Lecture	Seminar	1
3.1	**Natural Language Processing:** Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing	25-27	3	3[20]	Smart Class	Assignment	1
3.2	Statistical Natural Language Processing, Spell Checking	28-29	2	3[20]	Smart Class	Assignment	1
3.3	**Parallel and Distributed AI:** Psychological Modeling	30-31	2	3[20]	Smart Class	Assignment	1
3.4	Parallelism in Reasoning Systems	32-33	2	3[20]	Smart Class	Quiz	1
3.5	Distributed Reasoning Systems	34-36	3	3[20]	Smart Class	Quiz	1
4.1	**Genetic Algorithms: Copying Nature's Approaches:** A Peek into the Biological World, Genetic Algorithms, Significance of Genetic Operators, Termination Parameters	37-39	3	4[20]	Group Discussion	Quiz	1
4.2	Nitching and Speciation, Evolving Neural Networks, Theoretical Grounding, Ant Algorithms	40-42	3	4[20]	Group Discussion	Assignment	1
4.3	**Artificial Immune Systems:** The Phenomenon of Immunity, Immunity and Infection, The Innate Immune System, The Adaptive Immune System	43-45	3	4[20]	Group Discussion	Assignment	1
4.4	Recognition, Clonal Selection, Learning, Immune Network Theory, Mapping Immune Systems to Practical Applications, Other Applications	46-48	3	4[40]	Group Discussion	Assignment	1
5.1	**Prolog-The Natural Language of Artificial Intelligence:** Converting English to Prolog Facts and Rules, Goals, Prolog Terminology, Variables, Control Structures, Arithmetic Operators, Matching in Prolog	49-52	4	5[30]	Lecture	Seminar	1
5.2	Backtracking, Cuts, Recursion, Lists, Dynamic Databases, Input/output and Streams	53-56	4	5[30]	Lecture	Seminar	1
5.3	Some Aspects Specific to LPA Prolog	57-60	4	5[40]	Lecture	Seminar	1

Reference Books

1. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "*Artificial Intelligence"*, Tata McGraw Hill, Third Edition, 2009.
2. P.H.Winston, "*Artificial Intelligence"*, Pearson Education, Third Edition, 2001.
3. Nills J. Nilson, "*Principles of Intelligence Artificial"*, Narosa Publishing House, First Edition, 1998.

SEMESTER - II

Course Title: Elective II-2.5 Financial Accounting	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy : Minimum Contact Hours: 36
Total Score %: Internal: 40 External: 60
Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.R.Suguna Jasmin	Dr.B.Shamina Ross	Mrs.S.Gnana Sophia
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand fundamental principles of accounting.	3[4],6[2],9[2],10[2]	K2
CO-2	apply and evaluate final accounts.	3[4],6[2],9[2],10[2]	K3, K5
CO-3	apply and create bills of exchange.	3[4],6[2],9[2],10[2]	K3, K6
CO-4	analyze and evaluate consignment account.	3[4],6[2],9[2],10[2]	K4, K5
CO-5	analyze joint venture.	3[4],6[2],9[2],10[2]	K4

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
Fundamental Principles of Accounting							
1.1	Definition, Accounting Principles, Double Entry System of Accounting	1-6	6	1[50]	Lecture	Assignment Problem	1
1.2	Journal, Ledger, Trial Balance, Subsidiary Books, Bank Reconciliation Statement, Errors and Rectification	7-12	6	1[50]	Lecture	Assignment Problem	1
Final Accounts							
2.1	Trading, Profit and Loss Accounts, Closing Entries, Balance Sheet	13-18	6	2[50]	Lecture	Assignment Problem	1
2.2	Adjustment Entries: Loss of Stock by Fire, Goods Distributed as Free Samples, Manager's Commission, Goods Sale on Approval Basis etc., Manufacturing Account	19-24	6	2[50]	Lecture	Problem	1
Bills of Exchange							
3.1	Essentials, Accounting Treatment, Renewal of the Bill	25-30	6	3[50]	Lecture	Problem	1
3.2	Noting Charges, Retiring the Bill, Insolvency, Accommodation Bill	31-36	6	3[50]	Lecture	Problem	1
Consignment Account							
4.1	Meaning, Account Sales, Accounting Treatment, Valuation of Stock Lying with the Consignee	37-42	6	4[50]	Lecture	Problem	1
4.2	Normal Loss, Abnormal Loss, Invoicing Goods Higher than Cost	43-48	6	4[50]	Smart Class	Problem	1

Joint Venture							
5.1	Meaning, Each Co-venture Maintaining a Joint Venture Account and other Co-ventures Account in his own Books Accounts	49-54	6	5[50]	Smart Class	Problem	1
5.2	Memorandum Joint Venture Method, Separate Books	55-60	6	5[50]	Group Discussion	Problem	1

Reference Books

1. Dr. M. A. Arulanantham, Dr. K. S. Raman, "*Advanced Accountancy"*, Himalaya Publishing House, Seventh Revised Edition, 2019.
2. V. Sudhakar, M. Anbalagan, K. Jeyalakshmi, "*Fundamentals of Financial Accounting"*, S. Chand & Company LTD, New Delhi, First Edition, 2009.
3. Kochanek, Richard F, "*Financial Accounting: A Focus on Interpretation and Analysis"*, Thomson Learning Custom Publishing, Fifth Edition, 2013.

SEMESTER - II

Course Title: Elective II-2.5 Management Information Systems	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.R.Suguna Jasmin	Dr.B.Shamina Ross	Mrs.P.Ezhil Roja
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	**PSOs Mapped with %**	**KL**
CO-1	understand the fundamentals of information systems in business.	3[4],6[2],9[2],10[2]	K2
CO-2	understand what challenges do information system technologies pose for business professionals.	3[4],6[2],9[2],10[2]	K2
CO-3	analyze how business applications of information systems are accomplished in today's networked enterprises.	3[4],6[2],9[2],10[2]	K4
CO-4	analyze and create how can business professionals plan, develop and implement strategies and solutions that use information technologies help to meet the challenges and opportunities faced in today's business environment.	3[4],6[2],9[2],10[2]	K4, K6
CO-5	analyze what managerial challenges do information systems pose for today's business enterprises.	3[4],6[2],9[2],10[2]	K4

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Foundations of Information Systems in Business:** Information System in Business, The Components of Information Systems	1-6	6	1[50]	Lecture	Seminar	1
1.2	**Competing with Information Technology:** Fundamentals of Strategic Advantage, Using Information Technology for Strategic Advantage	7-12	6	1[50]	Lecture	Seminar	1
2.1	**Data Resource Management:** Managing Data Resources, Technical Foundations of Database Management	13-18	6	2[50]	Lecture	Assignment	1
2.2	**Telecommunications Network:** The Networked Enterprise, Telecommunications Network Alternatives.	19-24	6	2[50]	Lecture	Assignment	1
3.1	**Electronic Commerce Systems:** Electronic Commerce Fundamentals, Electronic Commerce Applications and Issues	25-30	6	3[60]	Lecture	Assignment	1
3.2	**Decision Support Systems:** Decision Support in Business, Artificial Intelligence Technologies in Business	31-36	6	3[40]	Lecture	Assignment	1
4.1	**Developing Business/IT Strategies:** Planning Fundamentals, Implementation Challenges.	37-42	6	4[60]	Lecture	Seminar	1
4.2	**Developing Business/IT Solutions:** Developing Business Systems, Implementing Business Systems	43-48	6	4[40]	Lecture	Seminar	1
5.1	**Security and Ethical Challenges:** Security, Ethical and Social Challenges, Security Management of Information Technology	49-54	6	5[50]	Lecture	Assignment	1
5.2	**Enterprise and Global Management of Information Technology:** Management Information Technology, Managing Global IT	55-60	6	5[50]	Lecture	Assignment	1

Reference Books

1. James A O'Brien, George M Marakas, *"Management Information Systems"*, McGraw-Hill Companies, Seventh Edition, 2009.
2. Edward W. Cundiff, Richard Ralph Still, Norman A. P. Govoni, "*Fundamentals of Modern Marketing"*, Prentice Hall of India, Third Edition, 1980.

SEMESTER - II

Course Title: Elective-II - 2.5 Principles of Management	Course Type: Theory

Total Hours: 60	Hours/Week: 5	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 45 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	remember the basics of management and understand planning.	3[4],6[2],9[2],10[2]	K1, K2
CO-2	understand, apply and analyze decision making and organization.	3[4],6[2],9[2],10[2]	K2, K3, K4
CO-3	apply and analyze coordination, staffing, training and development.	3[4],6[2],9[2],10[2]	K3, K4
CO-4	direction, supervision and communication.	3[4],6[2],9[2],10[2]	K4
CO-5	analyze leadership and managerial control.	3[4],6[2],9[2],10[2]	K4

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Nature and Functions of Management:** Importance of Management, Definition of Management, Management Functions or the Process of Management, Levels of Management, Organisational or Business Functions, Roles of a Senior Manager, Managerial Skills, Managerial Effectiveness, Management and Administration, Management – A Science or an Art?, Management – A Profession?, Professional Management vs Family Management, Management of International Business	1-6	6	1[40]	Lecture	Assignment	1
1.2	**Development of Management Thought:** Early Classical Approaches, Neo-Classical Approaches	7-8	2	1[20]	Lecture	Assignment	1
1.3	**Planning:** Nature of Planning, Importance of Planning, Types of Plans, Steps in Planning, Strategic Planning Process, Limitations of Planning, Making Planning Effective, Planning Skills, Strategic Planning in the Indian Industry	9-12	4	1[40]	Lecture	Assignment	1

2.1	**Decision-Making:** Meaning of a Decision, Types of Decisions, Steps in Rational Decision-Making, Rationality in Decision-Making, Environment of Decision-Making, Common Difficulties in Decision-Making	13-16	4	2[35]	Lecture	Quiz	1
2.2	**Organization:** What is an "Organisation"?, Process of Organising, Principles of Organizing, Span of Management, Departmentalisation, Process Departmentalisation, Purpose Departmentalisation	17-21	5	2[35]	Lecture	Quiz	1
2.3	Organisation Structure, What Type of Structure is Best?, Emerging Organisation Structures, Committees, Teams, International Organisation Structures	22-24	3	2[30]	Lecture	Quiz	1
3.1	**Coordination:** Distinction Between Coordination and Cooperation, Distinction Between Coordination and Control, Need for Coordination, Requisites for Excellent Coordination, Types of Coordination, Techniques of Coordination , Difficulty of Coordination, Coordinating Global Operations	25-28	4	3[35]	Smart Class	Assignment	1
3.2	**Staffing:** Importance and Need for Proper Staffing, Manpower Planning, Recruitment, Selection, Placement, Induction, Manpower Planning in India, Staffing from a Global Perspective	29-32	4	3[35]	Smart Class	Assignment	1
3.3	**Training and Development:** Difference between Training, Education and Development, Advantages of Training, Steps in Setting up a Training and Development Programme, Design and Development of the Training Programme, Evaluation of Training and Development, Executive Training Practices in India, Mentoring, Learning Organisation, Knowledge Mangement	33-36	4	3[30]	Smart Class	Assignment	1
4.1	**Direction and Supervision:** Requirements of Effective Direction, Giving Orders, Motivation, Job Satisfaction, Organisational Commitment, Morale, First-level or Front-line Supervision	37-40	4	4[35]	Lecture	Assignment	1
4.2	**Communication:** Importance of Communication, Purpose of Communication, Formal Communication, Forms of Communication, Informal Communication,	41-44	4	4[35]	Lecture	Assignment	1
4.3	The Communication Process, Barriers to Communication, Principles of Effective Communication, Communication Networks, Checks on in-plant Communication, Communication in Indian Industries	45-48	4	4[30]	Lecture	Assignment	1

5.1	**Leadership:** Difference between a Leader and a Manager, Characteristics of Leadership, Functions of a Leader, Traditional Approaches to Leadership, Situational Factors Determining Choice of Leadership Style	49-52	4	5[30]	Group Discussion	Seminar	1
5.2	New Approaches to Leadership, Leadership Assessment, Leadership Style in Indian Organisations, Worker Participation in Management in India	53-55	3	5[20]	Lecture	Seminar	1
5.2	**Managerial Control:** Steps in a Control Process, Need for Control System, Benefits of Control, Essentials of Effective Control System, Problems of the Control System, Control Techniques	56-60	5	5[50]	Group Discussion	Seminar	1

Reference Books

1. P.C. Tripathi & P N Reddy, "*Principles of Management"*, Tata McGraw-Hill Publishing Company Limited, Sixth Edition, 2019.
2. Heins Weihrich & Harold Koontz, "*Management a Global Perspective"*, McGraw Hill, International Edition, 2000.
3. Koonts & O'Donnel, "*Principles of Management"*, McGraw Hill, International Edition, 2001.
4. L.M Prasad, "*Principles and Practice of Management"*, Sultan Chand & Sons, Ninenth Edition, 2020.

SEMESTER - II

Course Title: Elective II-2.5 E-Commerce & Web Applications	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the basic concepts of e-commerce.	3[4],6[2],9[2],10[2]	K2
CO-2	apply and analyze the business strategy in e-commerce.	3[4],6[2],9[2],10[2]	K3,K4
CO-3	analyze electronic data interchange.	3[4],6[2],9[2],10[2]	K4
CO-4	apply consumer trade transaction using web page.	3[4],6[2],9[2],10[2]	K3
CO-5	apply and create e-business using the elements of e-commerce advertising and marketing on the internet.	3[4],6[2],9[2],10[2]	K3,K6

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Electronic Commerce:** The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic Commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, e-Commerce in Perspective	1-4	4	1[30]	Lecture	Assignment	1
1.2	**The Value Chain:** Supply Chains, Porter's Value Chain Model, Inter Organisational Value Chains	5-8	4	1[35]	Lecture	Assignment	1
1.3	**Competitive Advantage:** Competitive Strategy, Porter's Model, First Mover Advantage, Sustainable Competitive Advantage, Competitive Advantage using e-Commerce	9-12	4	1[35]	Lecture	Assignment	1
2.1	**Business Strategy:** Introduction to Business Strategy, Strategic Implications of IT, Technology, Business Environment, Business Capability, Existing Business Strategy, Strategy Formulation and Implementation Planning, e-Commerce Implementation, e-Commerce Evaluation	13-15	3	2[25]	Lecture	Seminar	1
2.2	**Case Study: e-Commerce in Passenger Air Transport:** Choices, Airline Booking Systems, Competition and Customer Loyalty, Web Booking Systems, Competitive Outcomes	16-18	3	2[25]	Lecture	Seminar	1
2.3	**Inter-organisational Transactions:** Inter-organisational Transactions, The Credit Transaction Trade Cycle, A Variety of Transactions, Pens and Things	19-21	3	2[25]	Lecture	Seminar	1
2.4	**Electronic Markets:** Markets, Electronic Markets, Usage of Electronic Markets, Advantages and Disadvantages of Electronic Markets, Future of Electronic Markets	22-24	3	2[25]	Lecture	Seminar	1
3.1	**Electronic Data Interchange(EDI):** Introduction to EDI, EDI Definition, The Benefits of EDI, EDI Example	25-27	3	3[20]	Lecture	Quiz	1
3.2	**EDI: the Nuts and Bolts:** EDI Technology, EDI Standards, EDI Communications, EDI Implementation, EDI Agreements, EDI Security, Nuts, Bolts and the Tool Kit	28-30	3	3[30]	Lecture	Quiz	1
3.3	**EDI and Business:** Organisations that use EDI, EDI Trading Patterns, EDI Transactions, EDI Adoption and EDI Maturity, IOS, EDI and Internet e-Commerce	31-33	3	3[25]	Smart Class	Multiple Choice Questions	1

3.4	**Inter-organisational e-Commerce:** Inter-Organisational Transactions, Purchasing Online, After-Sales Online, e-Commerce in Desk-Top Facilities Management, Pens and Things and the Web	34-36	3	3[25]	Smart Class	Multiple Choice Questions	1
4.1	**Consumer Trade Transactions:** What you want, when you want it, Internet e-Commerce, The e-Shop, Internet Shopping and the Trade Cycle, Other e-Commerce Technologies, Advantages and Disadvantages of Consumer e-Commerce, consumer e-Commerce at Pens and Things	37-40	4	4[40]	Group Discussion	Assignment	1
4.2	**The Internet:** The Internet, The Development of the Internet, TCP/IP, Internet Components, Uses of the Internet, Internet Age Systems	41-44	4	4[30]	Group Discussion	Assignment	1
4.3	**A Page on the Web:** HTML, the Basics, Introduction to HTML, Further HTML, Client Side Scripting, Server Side Scripting, HTML Editors and Editing	45-48	4	4[30]	Group Discussion	Assignment	1
5.1	**The Elements of e-Commerce:** Elements, e-Visibility, The e-Shop, Online Payments, Delivering the Goods, After-Sales Service, Internet e-Commerce security, A Web Site Evaluation Model	49-52	4	5[30]	Smart Class	Assignment	1
5.2	**e-Business:** Introduction, Internet Bookshops, Grocery Supplies, Software Supplies and Support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the Net, e-Diversity	53-56	4	5[35]	Smart Class	Seminar	1
5.3	**Electronic Commerce: Let a Thousand Flowers Bloom:** The Full Set, Technology Adoption, Integrating the Supply Chain, e-Choice	57-60	4	5[35]	Smart Class	Seminar	1

Reference Books

1. David Whiteley, "*e-commerce-Strategy, Technology and Applications"*, Tata McGraw-Hill Publishing Company Limited, First Edition, Reprint 2007.
2. P.T. Joseph. S.J., *"e-commerce, An Indian Perspective"*, PHI Learning Private Limited, Fourth Edition, 2019.
3. Henry Chan, Raymond L,Tharam Dillon, Elizabeth Chang, "*E-Commerce Fundamentals and Applications"*, John Wiley, First Edition, 2007.

SEMESTER - II

Course Title: Core Practical 4 – 2.6 C# & .NET Technology Lab	Course Type: Practical

Total Hours: 75	Hours/Week: 5	Credits: 3

Pass-Out Policy :	Minimum Contact Hours: 45 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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Sl.No.	Description
C# & .NET Programs Implementing	
1.	ADO.NET
2.	Data Binding-C#
3.	LINQ Query
4.	Exception Handling
5.	Standard Controls
6.	Navigation Controls
7.	Validation Controls
8.	Login Control
9.	Data Binding-ASP.NET
10.	Database Control

Reference Books

1. Vikas Gupta, *Comdex.NET 4.5 "Programming Course Kit"*, Dreamtech, First Edition, 2014.
2. Balagurusamy, "*Programming in C# A Primer"*, Tata McGraw Hill, Third Edition, 2011.
3. David S Platt, "*Introducing Microsoft.NET"*, Microsoft Press, Third Edition, 2003.

SEMESTER - II

Course Title: Core Practical 3-2.7 Advanced JAVA Programming Lab	Course Type: Practical

Total Hours: 75	Hours/Week: 5	Credits: 3

Pass-Out Policy :	Minimum Contact Hours: 45 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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Sl.No.	Description
JAVA Programs Implementing	
1.	AWT Applets
2.	AWT Graphics
3.	Swing Applets
4.	Java Beans
5.	JDBC
6.	RMI
7.	Servlet
8.	Swing Components (Using Event Handling)

Reference Books

1. KoGENT Solutions INC, "*Java 6 Programming Black Book"*, Dreamtech Press, New Edition 2008.
2. KoGENT Solutions INC, "*Java Server Programming Black Book"*, Dreamtech Press, Platinum Edition, 2014.
3. Herbert Schildt, "*The Complete Reference"*, Tata McGraw-Hill, Seventh Edition, 2007.

SEMESTER - III

Course Title: Core 9 – 3.1 Research Methodology	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand research methodology, research problem, research design.	3[4],4[2],8[4],9[4]	K2
CO-2	analyze design of sample surveys, measurement and , data collection.	3[4],4[2],8[4],9[4]	K4
CO-3	understand data, apply and evaluate descriptive statistics.	3[4],4[2],8[4],9[4]	K2, K3, K5
CO-4	understand sampling and statistical inference and applying chi-square tests.	3[4],4[2],8[4],9[4]	K2, K3
CO-5	understand, eevaluate and apply analysis of variance, other nonparametric methods.	3[4],4[2],8[4],9[4]	K2, K3, K5

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Research Methodology:** Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research	1-3	3	1[30]	Lecture	Assignment	1
1.2	**Defining the Research Problem:** What is a Research Problem?, Selecting the Problem, Necessity of Defining a Problem	4-6	3	1[20]	Lecture	Assignment	1
1.3	**Research Design:** Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design	7-8	2	1[20]	Lecture	Multiple Choice Questions	1
1.4	Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs	9-12	4	1[30]	Lecture	Multiple Choice Questions	1

2.1	**Design of Sample Surveys:** Sample design, Sampling and Non-sampling Errors, Sample Survey Vs. Census Survey, Types of Sampling Designs	13-15	3	2[20]	Lecture	Seminar	1
2.2	**Measurement and Scaling:** Quantitative and Qualitative Data, Classifications of Measurement Scales, Goodness of Measurement Scales, Sources of Error in Measurement, Techniques of Developing Measurement Tools, Scaling, Scale Classification Bases, Scaling Techniques, Multidimensional Scaling, Deciding the Scale	16-19	4	2[40]	Lecture	Seminar	1
2.3	**Data Collection:** Experiments and Surveys, Collection of Primary Data	20-22	3	2[20]	Lecture	Seminar	1
2.4	Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method	23-24	2	2[20]	Lecture	Seminar	1
3.1	**Data Preparation:** Data Preparation Process, Some Problems in Preparation Process	25-27	3	3[20]	Smart Class	Assignment	1
3.2	Missing Values and Outliners, Types of Analysis, Statistics in Research	28-30	3	3[20]	Smart Class	Assignment	1
3.3	**Descriptive Statistics:** Measures of Central Tendency, Measures of Dispersion, Measures of Skewness	31-32	2	3[20]	Smart Class	Assignment	1
3.4	Kurtosis, Measures of Relationship	33-34	2	3[20]	Smart Class	Quiz	1
3.5	Association in Case Attributes, Other Measures	35-36	2	3[20]	Smart Class	Quiz	1
4.1	**Sampling and Statistical Inference:** Parameter and Statistic, Sampling and Non-sampling Errors, Sampling Distribution, Degree of Freedom, Standard Error	37-39	3	4[20]	Group Discussion	Quiz	1
4.2	Central Limit Theorem, Finite Population Correction, Statistical Inference	40-42	3	4[20]	Group Discussion	Assignment	1
4.3	**Chi-Square Tests:** Test of Difference for more than Two Proportions, Test of Independence of Attributes	43-45	3	4[20]	Group Discussion	Assignment	1
4.4	Test of Goodness of Fit, Caution in Using Chi-Square Tests	46-48	3	4[40]	Group Discussion	Assignment	1
5.1	**Analysis of Variance:** The ANOVA Technique, The Basic Principle of ANOVA. One way ANOVA, Two Way ANOVA	49-51	3	5[20]	Lecture	Seminar	1
5.2	Latin-square Design, Analysis of Co-variance(ANOCOVA), Assumptions in ANOCOVA	52-54	3	5[30]	Lecture	Seminar	1

5.3	**Other Nonparametric Methods:** Sign Tests, Wilcoxon Signed Rank Sum Test for single Population, Mann Whitney U Test	55-57	3	5[20]	Lecture	Seminar	1
5.4	Run Test, Kruskal Wallis Test, Spearman's Rank Correlation, Some Features of Non-parametric Tests	58-60	3	5[30]	Lecture	Seminar	1

Reference Books

1. C. R. Kothari, Gaurav Garg, "*Research Methodology Methods and Techniques"*, New Age International Publishers, Fourth Edition, 2019.
2. Chawla Deepak, Neena Sodhi, "*Research Methodology Concepts and Cases Paperback"*, Vikas Publishing House, Second Edition, 2015.
3. Donald Cooper & Pamela Schindler, "*Business Research Methods"*, TMGH, Nineth Edition, 2006.

SEMESTER - III

Course Title: Core 10 – 3.2 Web Programming	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the physical & logical style of text, create list, tables and images in HTML.	2[3], 10[5]	K2,K6
CO-2	create webpage using HTML.	2[3], 10[5]	K6
CO-3	apply CSS in web pages.	2[3], 10[5]	K3
CO-4	understand the basics of PHP.	2[3], 10[5]	K2
CO-5	create web programs and apply SQL, MySQL **&** integrate web forms and databases.	2[3], 10[5]	K3,K6

Module	**Course Description**	**Day**	**Hours**	**CO with %**	**Teaching Learning**	**Activity**	**Reference**
1.1	**HTML: Physical Styles of Text, Logical Styles of Text, Lists**	1-6	6	1[50]	Lecture	Assignment	1
1.2	**Tables, Images**	7-12	6	1[50]	Lecture	Web Page	1
2.1	**Links, Image Maps**	13-18	6	2[50]	Lecture	Assignment	1

2.2	**Forms, Frames**	19-24	6	2[50]	Lecture	Web Page	1
3.1	**CSS** : Introduction to CSS, Fonts in CSS	25-27	3	3[20]	Lecture	Quiz	1
3.2	Text in CSS	28-30	3	3[20]	Lecture	Seminar	1
3.3	Boxes In CSS, CSS Positioning	31-33	3	3[30]	Lecture	Programs	1
3.4	Tables in CSS, Lists in CSS	34-36	3	3[30]	Lecture	Programs	1
4.1	**Learning PHP Syntax and Variables:** PHP's Syntax, Comments, Variables, Types in PHP, The Simple Types and Output	37-38	2	4[30]	Lecture	Programs	2
4.2	**Learning PHP Control Structures and Functions:** Boolean Expressions. Branching, Looping, Alternate Control Syntaxes,	39-42	4	4[40]	Smart Class	Programs	2
4.3	Terminating Execution, Using Functions, Function Documentation, Defining Your Own Functions, Functions and Variable Scope, Function Scope	43-44	2	4[10]	Smart Class	Programs	2
4.4	**Passing Information with PHP:** HTTP is Stateless, GET arguments, A Better Use for GET-Style URLs, POST Arguments, Formatting Form Variables, PHP Super global Array	45-48	4	4[20]	Lecture	Programs	2
5.1	**Learning PHP String Handling:** Strings in PHP , String Functions.	49-50	2	5[10]	Smart Class	Seminar	2
5.2	**Learning Arrays:** The Use of Arrays, What are PHP Arrays? Creating Arrays, Retrieving Values, Multi-Dimensional Arrays, Inspecting Arrays, Deleting from Arrays, Iteration	51-53	3	5[35]	Group Discussion	Programs	2
5.3	**Learning Structured Query Language:** Relational Database and SQL, SQL Standards, The Workhorses of SQL, Database Design, Privileges and security	54-56	3	5[20]	Group Discussion	Programs	2
5.4	**Integrating PHP and MySQL:** Connecting to MySQL, Making MySQL Queries, Fetching Data Sets, Getting Data about Data, Multiple Connections, Building in Error checking, Creating MySQL Database with PHP, MySQL Functions	57-60	4	5[35]	Lecture	Programs	2

Reference Books

1. Teodoru Gugoiu, "*HTML, XHTML, CSS and XML by EXAMPLE A Practical Guide"*, Laxmi Publications Pvt.Ltd., New Delhi, First Edition, Reprint, 2016.
2. Steve Suehring, Tim Converse, Joyce Park, "*PHP6 and MySQL Bible"*, WILEY, First Edition, Reprint 2016.
3. Steven Holzner, "*The Complete reference PHP"*, Tata Mc-Graw Hill, Fifth Edition, Reprint 2011.
4. Daniel Gra, "*Web Design Fundamentals Hand Book"*, Climatic Press, First Edition, 2000.
5. Jennifer Niederst, "*Web Design in a NutShell"*, SPD, First Edition, 1999.

SEMESTER - III

Course Title: Core 11 – 3.3 Multimedia Systems	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand text and images in multimedia	2[3], 10[4]	K2
CO-2	apply animation using sound and video	2[3], 10[4]	K3
CO-3	analyze the stages of multimedia and planning and costing	2[3], 10[4]	K4
CO-4	create projects	2[3], 10[4]	K6
CO-5	understand mobile multimedia, testing and delivering	2[3], 10[4]	K2

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Text:** About Fonts and Faces, Using Text in Multimedia	1-3	3	1[25]	Lecture	Assignment	1
1.2	Computers and Text, Font Editing and Design Tools, Hypermedia and Hypertext	4-7	4	1[35]	Lecture	Assignment	1
1.3	**Images:** Before You Start to Create, Making Still Images, Color, Image File Formats	8-12	5	1[40]	Smart Class	Seminar	1
2.1	**Sound:** The Power of Sound, Digital Audio, MIDI Audio, MIDI vs. Digital Audio, Multimedia System Sounds, Audio File Formats, Vaughan's Law of Multimedia Minimums, Adding Sound to Your Multimedia Project	13-17	5	2[40]	Smart Class	Program	1
2.2	**Animation:** The Power of Motion, Principles of Animation, Animation by Computer, Making Animations.	18-20	3	2[25]	Smart Class	Program	1
2.3	**Video:** Using Video, How Video Works and Is Displayed, Digital Video Containers, Obtaining Video Clips, Shooting and Editing Video	21-24	4	2[35]	Lecture	Program	1

3.1	**Making Multimedia:** The Stages of a Multimedia Project, What You Need: The Intangibles, What You Need: Multimedia Skills, What You Need: Hardware, What You Need: Software, What You Need: Authoring Systems	25-29	5	3[40]	Lecture	Seminar	1
3.2	**Planning and Costing:** The Process of Making Multimedia, Scheduling	30-33	4	3[35]	Lecture	Seminar	1
3.3	Estimating, RFPs and Bid Proposals	34-36	3	3[25]	Lecture	Seminar	1
4.1	**Designing and Producing:** Designing, Producing	37-39	3	4[25]	Smart Class	Program	1
4.2	**Content and Talent:** Acquiring Content, Ownership of Content, Created for a Project, Acquiring Talent	40-43	4	4[35]	Group Discussion	Program	1
4.3	**Internet and Multimedia:** Internet History, Internetworking, Multimedia on the Web, Developing for the Web, Text for the Web, Images for the Web, Sound for the Web, Animation for the Web, Video for the Web.	44-48	5	4[40]	Lecture	Program	1
5.1	**Mobile Multimedia:** Digital Revolution Worldwide, Mobile Hardware, Mobile Operating Systems.	49-52	4	5[35]	Group Discussion	Seminar	1
5.2	**Delivery:** Testing, Preparing for Delivery, Delivering on CD–ROM, Delivering on DVD	53-56	4	5[35]	Lecture	Program	1
5.3	Wrapping it up, Delivering on Worldwide Web, Delivering through and App Store	57-60	4	5[30]	Smart Class	Quiz	1

Reference Books

1. Tay Vaughan, "*Multimedia: Making It Work"*, Tata McGraw Hill, Fourth Edition, 2016.
2. S. Heath, *"Multimedia & Communication Systems"*, Focal Press, Second Edition, 1999.
3. K. Andleigh and K. Thakkar, *"Multimedia System Design"*, PHI learning Private Limited, Second Edition, 2000.

SEMESTER - III

Course Title: Elective III – 3.4 Cloud Computing	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand and analyze cloud computing and cloud computing architecture.	3[2], 4[2], 6[2], 8[4]	K2, K4
CO-2	analyze virtualization and security issues in cloud computing.	3[2], 4[2], 6[2], 8[4]	K4
CO-3	understand virtualization system specific attacks and apply on web services.	3[2], 4[2], 6[2], 8[4]	K2, K3
CO-4	apply and create service oriented architecture and migrating applications to the cloud computing.	3[2], 4[2], 6[2], 8[4]	K3,K6
CO-5	understand the standards in cloud computing and analyze mobile cloud computing.	3[2], 4[2], 6[2], 8[4]	K2, K4

Module	**Course Description**	**Day**	**Hours**	**CO with %**	**Teaching Learning**	**Activity**	**Reference**
1.1	**Cloud Computing An Overview** : Introduction, History, Characteristics, Cloud Computing Model	1-2	2	1[20]	Lecture	Seminar	1
1.2	Issues And Challenges, Advantages And Disadvantages Of Cloud Computing, Security, Privacy and Trust	3-5	3	1[20]	Lecture	Assignment	1
1.3	Virtualization, Threats to Cloud Computing, Next Generation of Cloud Computing.	6-7	2	1[20]	Lecture	Seminar	1
1.4	**Cloud Computing Architecture:** Introduction, Cloud Architecture	8-9	2	1[10]	Lecture	Seminar	1
1.5	Cloud Computing Models, of Comparisons of Service Models, Deployment Models, Identity as a Service	10-12	3	1[30]	Smart Class	Essay	1
2.1	**Virtualization In Cloud :** Virtualization, Implementation of Virtualization, Virtualization Support at the OS Level, Middleware Support for , Advantages of Virtualization	13-14	2	2[20]	Smart Class	Essay	1
2.2	Application Virtualization , Virtualization Implementation , Hardware Virtualization, Types Of Virtualization, Load Balancing in Cloud Computing, Logical Cloud Computing Model , Virtualization For Data-Centre.	15-17	3	2[20]	Smart Class	Assignment	1
2.3	**Security Issues and Challenges in Cloud Computing:** Introduction ,Security Challenges in Cloud Computing, Information Security in Cloud Computing, Security, Privacy and Trust	18	1	2[10]	Smart Class	Multiple Choice Questions	1

2.4	**Security Management** : Introduction, Security in Reference Architecture, Security Issues in Cloud Computing, Classification Of Security Issues,, Types Of Attackers	19-22	4	2[30]	Lecture	Seminar	1
2.5	Security Risk In Cloud Computing, Security Threats Against Cloud Computing, Novel Security Approaches, Emerging Trends in Security and Privacy	23-24	2	2[20]	Lecture	Multiple Choice Questions	1
3.1	**Virtualization System Specific Attacks :** Attacks in Cloud Computing Environment Attacks in Hypervisor	25-27	3	3[25]	Group Discussion	Multiple Choice Questions	1
3.2	Security Challenges , Virtualization Security Solutions	28-31	4	3[25]	Group Discussion	Multiple Choice Questions	1
3.3	Desktop Virtualization Security Planning And Deployment For Secure Virtualization	32-34	3	3[25]	Lecture	Quiz	1
3.4	**Web Services:** Amazon Web Services, Microsoft Azure, Google App Engine	35-36	2	3[25]	Smart Class	Multiple Choice Questions	1
4.1	**Service Oriented Architecture:** SOA Components, Design Principles Of SOA, SOA Requirements, Benefits of SOA	37-38	2	4[20]	Lecture	Quiz	1
4.2	Significance of SOA in Cloud Computing, Challenges Associated with SOA, Enterprise Service Bus, Web Services, Recurring Architectural Capabilities	39-41	3	4[20]	Lecture	Quiz	1
4.3	**Migrating Applications to the Cloud Computing:** Motivations in Migration	42	1	4[10]	Smart Class	Assignment	1
4.4	Issues In Migrating the Applications to the Cloud, Challenges in Migrating the Applications to the Cloud , Solutions, Types of Migration, Planning for Migrating the Application to the Cloud, Migration Roadmap, Cloud Bursting	43-45	3	4[30]	Lecture	Multiple Choice Questions	1
4.5	**Cloud Computing Applications:** Business Applications, Finance and Banking Applications, Cloud Computing in Education	46-48	3	4[20]	Lecture	Multiple Choice Questions	1
5.1	**Standards in Cloud Computing :** Standardization Activities, Challenges, Fields of Standardization, Role of Standards in Cloud Computing Environment, Standardization Organizations in Cloud Computing	49-51	3	5[25]	Lecture	Assignment	1
5.2	**Mobile Cloud Computing :** Needs of Mobile Cloud, Computing- Mobile Cloud Computing Architecture, Technologies for MCC , MCC Applications, Issues in MCC, Challenges in Building Applications Platforms	52-55	4	5[35]	Smart Class	Seminar	1

5.3	**Micro Services:** Need Of Micro Services, Micro Service Architecture, Benefits of Micro Services	56-58	3	5[20]	Lecture	Assignment	1
5.4	Drawbacks of Micro Services, Communication Mechanisms, Decentralized Data Management, Essential Check-Lists for Migration From Monolithic to Micro Services, Comparison of Micro Services With SOA.	59-60	2	5[20]	Lecture	Assignment	1

Reference Books

1. V.K.Pachghare, "*Cloud Computing"*, PHI, First Edition, 2016.
2. Michael Miller, "*Cloud Computing"*, Pearson Education, First Edition, 2009.
3. Kumar Saurbh, "*Cloud Computing – Insights into New-Era Infrastructure"*, Wiley India, First Edition, 2011.
4. John W.Rittinghouse and James F. Ransome, "*Cloud Computing Implementation, Management and Security"*, CRC Press, First Edition, 2009.
5. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "*Distributed and Cloud Computing, From Parallel Processing to the Internet of Things"*, Morgan Kaufmann Publishers, First Edition, 2012.

SEMESTER–III

Course Title: Elective III – 3.4 Big Data Analytics	Course Type: Theory
Total Hours: 60 Hours/Week: 4 Credits: 4	
Pass-Out Policy : Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]	

Course Creator	Expert 1	Expert 2
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CO. No.	**CourseOutcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with%	KL
CO-1	understand evolution and basics of Big Data.	3[2],4[2], 6[2],8[4]	K2
CO-2	analyze Big Data Analytics concepts.	3[2],4[2], 6[2],8[4]	K4
CO-3	analyze and apply Hadoop.	3[2],4[2], 6[2],8[4]	K4, K3
CO-4	analyze and apply Hive.	3[2],4[2], 6[2],8[4]	K4, K3
CO-5	analyze and apply Machine Learning and evaluate Big Data trends in 2019 and beyond.	3[2],4[2], 6[2],8[4]	K4, K3,K5

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Introduction to Big Data:** Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data	1-3	3	1[25]	Lecture	Seminar	1
1.2	What is Big Data?, Other Characteristics of Data Which are not Definitional Traits of Big Data, Why Big Data?, Are We Just an Information Consumer or Do We also Produce Information?	4-7	4	1[35]	Lecture	Assignment	1
1.3	Traditional Business Intelligence (BI) versus Big Data, A Typical Data Warehouse Environment, A Typical Hadoop Environment, What is New Today?	8-12	5	1[40]	Smart Class	Quiz	1
2.1	**Big Data Analytics:** Where do we Begin?, What is Big Data Analytics?, What Big Data Analytics Isn't?	13-15	4	2[25]	Lecture	Seminar	1
2.2	Why this Sudden Hype Around Big Data Analytics?, Classification of Analytics, Greatest Challenges that Prevent Businesses	16-18	4	2[25]	Group Discussion	Seminar	1
2.3	Top Challenges Facing Big Data, Why is Big Data Analytics Important?, What Kind of Technologies are we Looking Toward to Help Meet the Challenges Posed by Big Data?	19-21	4	2[25]	Group Discussion	Assignment	1
2.4	Data Science, Data Scientist…Your New Best Friend!!!, Terminologies Used in Big Data Environments, Basically Available Soft State Eventual Consistency (BASE), Few Top Analytics Tools	22-24	4	2[25]	Smart Class	Quiz	1
3.1	**Introduction to Hadoop:** Introducing Hadoop, Why Hadoop?, Why not RDBMS?	25-27	3	3[30]	Lecture	Seminar	1
3.2	RDBMS versus Hadoop, Distributed Computing Challenges,	28-29	2	3[15]	Smart Class	Assignment	1
3.3	Hadoop Overview, Use Case of Hadoop, Hadoop Distributors	30-31	2	3[15]	Lecture	Quiz	1
3.4	HDFS (Hadoop Distributed File System), Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN, Interacting with Hadoop Ecosystem	32-36	5	3[40]	Smart Class	Seminar	1
4.1	**Introduction to Hive:** What is Hive?, Hive Architecture, Hive Data Types	37-40	4	4[35]	Lecture	Assignment	1
4.2	Hive File Format, Hive Query Language (HQL), RCFile Implementation	41-44	4	4[35]	Smart Class	Seminar	1

4.3	SerDe, User-Defined Function (UDF)	45-48	4	4[30]	Lecture	Assignment	1
5.1	**Introduction to Machine Learning:** Introduction to Machine Learning	49-51	3	5[25]	Smart Class	Assignment	1
5.2	Machine Learning Algorithms	52-56	5	3[45]	Lecture	Seminar	1
5.3	**Big Data Trends in 2019 and Beyond:** Streaming the IoT for Machine Learning, Open Source, Hadoop is Fundamental and will Remain So!	57-60	4	3[30]	Smart Class	Quiz	1

Reference Books

1. Seema Acharya, SubhasiniChellappan, *"Big Data Analytics"*, Wiley, Second Edition, 2015.
2. Tom White "Hadoop: The Definitive Guide", O'reily Media Third Edition , 2012.
3. Bhuvaneswari, T. Devi, *"Big Data Analytics",* Scitech Publications Pvt. Ltd,First Edition, 2018.

SEMESTER - III

Course Title: Elective III – 3.4 Data Mining	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.S.Gnana Sophia	Dr.B.Shamina Ross	Mrs.P.Ezhil Roja
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the basics of mining and its applications	3[2], 4[2], 6[2], 8[4]	K2
CO-2	analyze the classifications of data mining.	3[2], 4[2], 6[2], 8[4]	K4
CO-3	analyze the difference between web search and information retrieval.	3[2], 4[2], 6[2], 8[4]	K4
CO-4	understand data warehouse metadata OLAP.	3[2], 4[2], 6[2], 8[4]	K2
CO-5	understand information privacy and data mining.	3[2], 4[2], 6[2], 8[4]	K2

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**What is Data Mining:** The Data Mining Process, Software Development Approach, The Data Mining process, The CRISP-DM Approach	1-2	2	1[30]	Lecture	Seminar	1
1.2	Data Mining Applications, Data Mining Technique, Practical Examples of Data Mining, The future of Data Mining , Guidelines for Successful Data Mining, Limitations of Data Mining, Using WEKA Software in Class, Data Mining Software	3-5	3	1[30]	Lecture	Assignment	1
1.3	**Data Understanding and Data Preparation:** Data Collection and Preprocessing, Outliers	6-7	2	1[20]	Lecture	Seminar	1
1.4	Missing data, Types of Data, Computing Distance, Data Summarizing Using Basic Statistical Measurements	8-9	2	1[10]	Lecture	Seminar	1
1.5	Displaying Data Graphically, Multidimensional Data Visualization	10-12	3	1[10]	Case Study	Quiz	1
2.1	**Association Rules Mining:** Basics, The Task and a Naïve Algorithm, The Apriori Algorithm	13-14	2	2[10]	Smart Class	Quiz	1
2.2	Improving the Efficiency of the Aprioro Algorithm, Apriori TID-DHP-DIC- FP Growth, Performance Evaluation of Algorithms	15-17	3	2[25]	Smart Class	Assignment	1
2.3	**Classification :** Introduction, Decision Tree-Building a Decision Tree, Split Algorithm based on Information Theory	18	1	2[30]	Case Study	Quiz	1
2.4	Split Algorithm based on Gini Index, Over fitting and Pruning, Decision Tree Rules, Decision Tree Summary, Naïve Bayes Method	19-22	4	2[15]	Lecture	Seminar	1
2.5	Estimating Predictive Accuracy of Classification Methods, Improving Accuracy of Classification Methods, Classification Software	23-24	2	2[20]	Case Study	Quiz	1
3.1	**Cluster Analysis:** Desired Features of Cluster Analysis, Types of Cluster Analysis Methods, Partitioned Methods, Hierarchical Methods	25-26	2	3[20]	Group Discussion	Assignment	1
3.2	Density based Methods, Dealing with Large Databases, Quality and Validity of Cluster Analysis Methods, Cluster Analysis Software	27	1	3[10]	Case Study	Programs	1

3.3	**Web Data Mining:** Web Mining, Web Terminology and Characteristics, Locality and Hierarchy in the Web, Web Content Mining	28-31	4	3[20]	Group Discussion	Programs	1
3.4	Web Usage Mining, Web Structure Mining, Web Mining Software	32-34	3	[30]	Lecture	Problems	1
3.5	**Search Engine and Query Mining:** Difference between Web Search and Information Retrieval, Characteristics of Search Engines, Search Engine Functionality	35-36	2	3[20]	Case Study	Quiz	1
4.1	Data Warehousing : Data Warehouses, Data Warehouse Design, Guidelines for Data Warehouse Implementation	37-40	4	4[30]	Lecture	Quiz	1
4.2	**Data Warehouse Metadata OLAP:** Characteristics of OLAP Systems, Motivations for using OLAP, Multidimensional View and Data Cube, Data Cube Implementations	41-46	6	4[60]	Lecture	Quiz	1
4.3	Date Cube operations- Guidelines for OLAP Implementation	47-48	2	4[10]	Group Discussion	Report Writing	1
5.1	**Information Privacy and Data Mining:** What is Information Privacy, Basic Principles to Protect Information Privacy	49-52	4	5[35]	Group Discussion	Report Writing	1
5.2	Privacy Legislation in India, Uses and Misuses of Data Mining, Primary Aims of Data Mining	53-56	4	5[35]	Group Discussion	Report Writing	1
5.3	Pitfalls of Data Mining, Why Current Privacy Principles are Infective for Data Mining, Set of Privacy Principles for Data Mining, Technological Solutions	57-60	4	5[30]	Group discussion	Report Writing	1

Reference Books

1. G.K.Gupta, "*Introduction to Data Mining with Case Studies"*, PHI, Third Edition, 2016.
2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "*Introduction to Data Mining"*, Pearson Education, Second Edition, 2007.
3. Jiawei Han and Micheline Kambar, "*Data Mining Concepts and Techniques"*, Elsevier, Second Edition, Reprinted 2008.
4. Marget H. Dunham, "*Data Mining Introductory and Advanced Concepts"*, Pearson Education, First Edition, 2003.

SEMESTER - III

Course Title: Elective III – 3.4 Data Communication & Computer Networks	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Dr.B.Shamina Ross	R.Suguna Jasmin	Mrs.P.Ezhil Roja
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand network topologies, switching and routing algorithms.	3[2], 4[2], 6[2], 8[4]	K2
CO–2	understand local area networks, metropolitan area networks and wide area networks.	3[2], 4[2], 6[2], 8[4]	K2
CO–3	understand the working of X.25 protocol, frame relay and congestion control.	3[2], 4[2], 6[2], 8[4]	K2
CO–4	understand wireless communication, internetworking concepts and architecture and analyze the ways of accessing the internet.	3[2], 4[2], 6[2], 8[4]	K2, K4
CO-5	understand TCP/IP-DNS, Email, FTP, TFT, WWW HTTP and TELNET and multimedia communications.	3[2], 4[2], 6[2], 8[4]	K2

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Network Topologies, Switching and Routing Algorithms:** Mesh Topology, Star Topology, Tree Topology, Ring Topology, Bus Topology, Hybrid Topology	1-4	4	1[30]	Lecture	Assignment	1
1.2	Basics of Switching, Router and Routing, Routing Algorithms	5-8	4	1[20]	Lecture	Assignment	1
1.3	**Networking Protocols and OSI Models:** Protocols in Computer Communications, The OSI Model	9-10	2	1[20]	Lecture	Multiple Choice Questions	1
1.4	OSI Layer Functions, OSI Layer Functions, Queuing Theory and M/M/I Queues	11-12	2	1[30]	Lecture	Quiz	1
2.1	**Local Area Networks(LAN), Metropolitan Area Networks(MAN) and Wide Area Networks(WAN):** LAN, Ethernet, VLAN Fast and Gigabit Ethernet, Token Ring, FDDI	13-15	3	2[20]	Lecture	Seminar	1
2.2	Comparison of Ethernet, Token Ring and FDDI, MAN, DQDB,(SMDS), WAN	16-18	3	2[40]	Lecture	Seminar	1

2.3	Wan Architecture, WAN Transmission Mechanism, WAN Addressing	19-21	3	2[20]	Lecture	Seminar	1
2.4	Packet Forwarding, Next-hop Tables and Routing, Pure and Slotted ALOHA	22-24	3	2[20]	Lecture	Seminar	1
3.1	**X.25 Protocol:** Understanding How X.25 Works, Characteristics of X.25, Packet Format, X.25 Operation, CCITT X.21	25-28	4	3[30]	Smart Class	Assignment	1
3.2	**Frame Relay and Congestion Control:** The Need for Frame Relay, How Frame Relay Works, Frame Relay Frame Format	29-33	5	3[40]	Smart Class	Assignment	1
3.3	Congestion Control, Congestion Control Algorithms, Traffic Control, FRAD, Other Features	34-36	3	3[30]	Smart Class	Assignment	1
4.1	**Wireless Communication:** Overview of Wireless Networks, IEEE Standards for LAN, MAN, and WAN-802.1, 802.2, 802.3, 802.4, 802.5, 802.11, Infrared Communication, Bluetooth, 802.11 Wireless LAN	37-40	4	4[30]	Group Discussion	Quiz	1
4.2	**Internetworking Concepts, Devices and Architecture:** Devices, Repeaters, Bridges, Routers, Gateways, Internet topology, Internal Architecture of an ISP	41-44	4	4[30]	Group Discussion	Assignment	1
4.3	**Ways of Accessing the Internet:** Dialup Access for an Individual User. Leased Lines, DSL, Cable Modems, DTE-DCE Interface, EIA RS-232 and EIA RS-449 Interface, SONET/SDH- Synchronous Transport Signals, SONET Layers Applications	45-48	4	4[40]	Group Discussion	Assignment	1
5.1	**TCP/IP-DNS, Email, FTP and TFTP:** Domain Name System, Electronic Mail, File Transfer Protocol, Trivial File Transfer Protocol	49-52	4	5[20]	Lecture	Seminar	1
5.2	**TCP/IP-WWW, HTTP and TELNET:** The Basics of WWW and Browsing, Locating Information on the Internet, Hyper Text Markup Language	53-55	3	5[30]	Lecture	Seminar	1
5.3	Web Browser Architecture, Web Pages and Multimedia, Remote Login (TELNET), Static, Dynamic and Active Web Pages	56-68	2	5[20]	Lecture	Seminar	1
5.4	**Multimedia Communications:** Basics of Multimedia, Multimedia Applications, Multimedia Protocols, Session Initiation Protocol	59-60	2	5[30]	Lecture	Seminar	1

Reference Books

1. Achyut S. Godbole, Atul Kahate, "*Data Communications and Networks"*, McGraw Hill Education Private Limited, Second Edition, 2019.
2. James F. Kurose. Keith W, Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet"*, Pearson Education, Seventh Edition, 2017.
3. Tanenbaum, "*Computer Networks"*, Pearson Education, Fifth Edition, 2013.

SEMESTER - III

Course Title: Elective IV-3.5 Software Engineering	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand software engineering and software process structure.	3[2],4[2],6[2],9[2]	K2
CO–2	understand the requirements of software and requirements modeling.	3[2],4[2],6[2],9[2]	K2
CO–3	analyze architectural design of software.	3[2],4[2],6[2],9[2]	K4
CO–4	understand component level design.	3[2],4[2],6[2],9[2]	K2
CO-5	understand testing conventional applications.	3[2],4[2],6[2],9[2]	K2

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Software Engineering:**Defining the Discipline, The Software Process, Software Engineering Practice, Software Development Myths	1-3	3	1[30]	Lecture	Assignment	1
1.2	**Software Process Structure:** A Generic Process Model, Defining a Framework Activity, Identifying a task Set, Process Patterns, Process Assessment and Improvement	4-6	3	1[20]	Lecture	Assignment	1
1.3	**Process Models:** Prescriptive Process Models, Specialized process Models, The Unified Process	7-10	4	1[20]	Lecture	Multiple Choice Questions	1
1.4	Personal and Team Process Models, process technology, Product and process	11-12	2	1[30]	Lecture	Multiple Choice Questions	1
2.1	**Principles That Guide Practice:** Software Engineering Knowledge, Core Principles, Principles that guide each framework activity	13-15	3	2[30]	Lecture	Seminar	1
2.2	**Understanding Requirements:** Requirements Engineering, Establishing the groundwork, Eliciting Requirements, Developing Use Cases, Building the Analysis Model, Negotiating Requirements, Requirements Monitoring, Validating Requirements, Avoiding Common Mistakes	16-20	5	2[40]	Lecture	Seminar	1

2.3	**Requirements Modeling Scenario Based Method**: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement The Use Case	21-24	4	2[30]	Lecture	Seminar	1
3.1	**Design Concepts:** Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model	25-29	5	3[30]	Smart Class	Assignment	1
3.2	**Architectural Design:** Software Architecture, Architectural Genres, Architectural styles, Architectural Considerations, Architectural Decisions, Architectural Design	30-33	4	3[40]	Smart Class	Assignment	1
3.3	Accessing Alternative Architectural Design Pattern-based Architecture Review, Architecture Conformance Checking, Agility and Architecture	34-36	3	3[30]	Smart Class	Assignment	1
4.1	**Component Level Design:** What is a component?, Designing Class-Based Component	37-40	4	4[40]	Group Discussion	Quiz	1
4.2	Conducting component-level design, component-level design for web Apps, Designing Traditional Component, component based development	41-48	8	4[60]	Group Discussion	Assignment	1
5.1	**Testing Conventional Applications:** Software Testing Fundamental, Internal and External Views of Testing, White- Box testing, Basis path testing, Control structure testing	49-54	6	5[50]	Lecture	Seminar	1
5.2	Block-Box Testing, Model-Based Testing, Testing Documentation and Help Facilities, Testing for Real Time Systems, Patterns for Software Testing	55-60	6	5[50]	Lecture	Seminar	1

Reference Books

1. Roger S. Pressman, Bruce R. Maxim, "*Software Engineering A Practitioner's Approach"*, Tata McGraw-Hill Education, Eighth Edition, 2019.
2. Ian Sommerville, "*Software Engineering"*, Pearson Education, Sixth Edition, 2001.
3. Rod Stephens, "*Beginning Software Engineering"*, PHI, John Wiley & Sons, Tenth Edition, 2017.
4. Steve McConnell, "*Software Estimation: Demystifying the Black Art"*, Microsoft Press, First Edition, 2006.

SEMESTER - III

Course Title: Elective IV – 3.5 Software Project Management	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2

Mrs.P.Ezhil Roja	Dr.B.Shamina Ross	Mrs.S.Gnana Sophia
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the basic concepts of software project management, project evaluation and programme management.	3[2],4[2],6[2],9[2]	K2
CO-2	analyze different process models.	3[2],4[2],6[2],9[2]	K3
CO-3	understand and evaluate risk management.	3[2],4[2],6[2],9[2]	K2, K5
CO-4	understand managing contracts.	3[2],4[2],6[2],9[2]	K2
CO-5	understand team work and evaluate software quality.	3[2],4[2],6[2],9[2]	K2, K5

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Introduction to Software Project Management:** Introduction, Why is Software Project Management Important?, What is a Project?, Software Projects versus Other Types of Project, Contract Management and Technical Project Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies	1-2	2	1[15]	Lecture	Assignment	1
1.2	Some Ways of Categorizing Software Projects, Project Charter, Stakeholders, Setting Objectives, The Business Case, Project Success and Failure, What is Management?, Management Control, Project Management Life Cycle, Traditional versus, Modern Project Management Practices.	3-4	2	1[15]	Lecture	Assignment	1

1.3	**Project Evaluation and Programme Management:** Introduction, Business Case, Project Portfolio Management, Evaluation of Individual Projects, Cost-benefit Evaluation Techniques, Risk Evaluation, Programme Management	5-6	2	1[15]	Lecture	Seminar	1
1.4	Managing the Allocation of Resources within programmes, Strategic Programme Management, Creating a Programme, Aids to Programme Management, Some Reservations about Programme Management, Benefits Management	7-8	2	1[15]	Lecture	Assignment	1
1.5	**An Overview of Project Planning:** Introduction to Step Wise Project Planning	9-12	4	1[40]	Lecture	Seminar	1
2.1	**Selection of an Appropriate Project Approach:** Introduction, Choosing Methodologies and Technologies, Software Processes and Process Models, Choice of Process Models, Structure versus Speed of Delivery, The Waterfall Model, The Spiral Model, Software Prototyping	13-14	2	2[15]	Lecture	Seminar	1
2.2	Other Ways of Categorizing Prototypes, Incremental Delivery, Atern/Dynamic Systems Development, Method, Rapid Application Development, Agile Methods, Extreme Programming (XP), Scrum, Lean Software Development, Managing Iterative Processes, Selecting the Most Appropriate Process Model	15-16	2	2[15]	Lecture	Assignment	1
2.3	**Software Effort Estimation:** Introduction, Where are the Estimates Done?, Problems with Over- and Under-Estimates, The Basis for Software Estimating, Software Effort Estimation Techniques, Bottom-Up Estimating, The Top-Down Approach and Parametric Models	17-18	2	2[15]	Smart Class	Assignment	1
2.4	Expert Judgement, Estimating by Analogy, Albrecht Function Point Analysis, Function Points Mark II, COSMIC Full Function Points, COCOMO II: A Parametric Productivity Model, Cost Estimation, Staffing Pattern, Effect of Schedule Compression, Capers Jones Estimating Rules of Thumb	19-20	2	2[15]	Lecture	Assignment	1

2.5	**Activity Planning:** Introduction, Objectives of Activity Planning, When to Plan, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Models, Formulating a Network Model	21-22	2	2[20]	Lecture	Seminar	1
2.6	Adding the Time Dimension, The Forward Pass, Backward Pass, Identifying the Critical Path, Activity Float, Shortening the Project Duration, Identifying Critical Activities, Activity-on-Arrow Networks	23-24	2	2[20]	Smart Class	Assignment	1
3.1	**Risk Management:** Introduction, Risk, Categories of Risk, Risk Management Approaches, A Framework for Dealing with Risk, Risk Identification, Risk Assessment, Risk Planning, Risk Management	25-27	3	3[25]	Lecture	Multiple Choice Questions	1
3.2	Evaluating Risks to the Schedule, Boehm's Top l0 Risks and Counter Measures, Applying the PERT Technique, Monte Carlo Simulation, Critical Chain Concepts	28-30	3	3[25]	Group Discussion	Seminar	1
3.3	**Resource Allocation:** Introduction: Nature of Resources, Identifying Resource Requirements, Scheduling Resources, Creating Critical Paths, Counting the Cost, Being Specific, Publishing the Resource Schedule, Cost Schedules, Scheduling Sequence	31-33	3	3[25]	Lecture	Seminar	1
3.4	**Monitoring and Control:** Introduction, Creating the Framework, Collecting the Data, Review, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, Software Configuration Management (SCM)	34-36	3	3[25]	Lecture	Assignment	1
4.1	**Managing Contracts:** Introduction, Types of Contract, Stages in Contract Placement	37-39	3	4[25]	Lecture	Multiple Choice Questions	1
4.2	Typical Terms of a Contract, Contract Management, Acceptance	40-42	3	4[25]	Smart Class	Seminar	1
4.3	**Managing People in Software Environments:** Introduction, Understanding Behaviour, Organizational Behaviour: A Background, Selecting the Right Person for the Job	43-45	3	4[25]	Lecture	Multiple Choice Questions	1

4.4	Instruction in the Best Methods, Motivation, The Oldham-Hackman Job Characteristics Model, Stress, Stress Management, Health and Safety, Some Ethical and Professional Concerns	46-48	3	4[25]	Group Discussion	Seminar	1
5.1	**Working in Teams:** Introduction, Becoming a Team, Decision Making, Organization and Team Structures	49-51	3	5[25]	Lecture	Assignment	1
5.2	Coordination Dependencies, Dispersed and Virtual Teams, Communication Genres, Communication Plans, Leadership	52-54	3	5[25]	Group Discussion	Seminar	1
5.3	**Software Quality:** Introduction, The Place of Software Quality in Project Planning, Importance of Software Quality, Defining Software Quality, Software Quality Models, Product and Process Metrics	55-57	3	5[25]	Lecture	Assignment	1
5.4	Product versus Process Quality Management, Quality Management Systems, Process Capability Models, Techniques to Help Enhance Software Equality, Testing, Software Reliability, Quality plans	58-60	3	5[25]	Group Discussion	Multiple Choice Questions	1

Reference Books:

1. Mike Cotterell, Bob Hughes, Rajib Mall, "*Software Project Management"*, McGraw Hill Education, Sixth Edition, 2018.
2. Kalpesh Ashar, "*Project Management-Essentials You Always Wanted to Know"*, Vibrant Publications, Fourth Edition, 2014.
3. Subramanian, Chandra Mouli, Saikat Dutt, "*Software Project Management"*, Pearson, First Edition, 2015.

SEMESTER - III

Course Title: Elective III – 3.5 Object Oriented Analysis and Design	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy :	Minimum Contact Hours: 36 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	analyze the problems in information systems development and avoid the problems.	3[2],4[2],6[2],9[2]	K4
CO-2	create models and diagrams.	3[2],4[2],6[2],9[2]	K6
CO-3	analyze the requirements, class diagrams.	3[2],4[2],6[2],9[2]	K4
CO-4	create an operation specification.	3[2],4[2],6[2],9[2]	K6
CO-5	create system design.	3[2],4[2],6[2],9[2]	K6

Module	**Course Description**	**Day**	**Hours**	**CO with %**	**Teaching Learning**	**Activity**	**Reference**
1.1	**Information Systems what are they?**: Information and Information Systems **Problems in Information Systems Development**: What are the Problems, Why Things go Wrong, The Ethical Dimension, Costs of Failure	1-2	2	1[20]	Lecture	Assignment	1
1.2	**Avoiding the Problems**: Project Lifecycles, Managing Information System Development	3-6	4	1[40]	Lecture	Assignment	
1.3	User Involvement, Methodogical Approaches, CASE	7-8	2	1[10]	Lecture	Assignment	1
1.4	**What Is Object Orientation:** Basic Concepts, The Origins of Object Orientation, Object Oriented Languages Today	9-12	4	1[30]	Lecture	Assignment	1
2.1	**Modeling Concepts**: Models and Diagrams, Drawing Activity Diagrams, A Development Process	13-16	4	2[30]	Case Study	Seminar	1
2.2	**Requirements Capture:** User Requirements, Fact Finding Techniques	17-20	4	2[30]	Case Study	Seminar	1
2.3	User Involvement, Documenting Requirements, Use Cases, Requirements Capture and Modeling	21-24	4	2[40]	Case Study	Seminar	1
3.1	**Requirements Analysis**: Use Case Realization, The Class Diagram, Drawing a Class Diagram, CRC cards, Assembling the Analysis Class Diagram	25-30	6	3[50]	Group Discussion	Report Writing	1
3.2	**Refining The Requirements Model:** Component Based Development, Adding Future Structure, Software Development Patterns	31-36	6	3[50]	Group Discussion	Report Writing	1
4.1	**Object Interaction:** Object Interaction and Collaboration, Interaction Sequence Diagrams, Collaboration Diagrams, Model Consistency	37-40	4	4[30]	Lecture	Quiz	1

4.2	**Specifying Operations**: The Role of Operation Specifications, Contracts, Describing Operation Logic, Object Constrained Language, Creating an Operation Specification	41-44	4	4[30]	Lecture	Quiz	1
4.3	**Specifying Control:** States and Events Basic Notation, Further Notation, Preparing a State Chart, Consistency Checking, Quality Guidelines	45-48	4	4[40]	Lecture	Quiz	1
5.1	**Moving into Design**: Logical and Physical Design, System Design and Detailed Design, Qualities and Objectives of Analysis and Design, Measurable Objectives in Design, Planning for Design	49-54	6	5[50]	Case Study	Report Writing	1
5.2	**The System Design**: The Major Elements of System Design, Software Architecture, Concurrency Processor Allocation, Data Management Issues, Development Standards	55-60	6	5[50]	Case Study	Report Writing	1

Reference Books

1. Simson Bennett, Steve McRobb and Ray Farmer, "*Object-Oriented Systems Analysis And Design Using UML"*, McGraw Hill, Second Edition, 2010.
2. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, Kelli A. Houston, "*Object-Oriented Analysis and Design with Applications"*, Addison Wesley, Third Edition, 2010.

SEMESTER - III

Course Title: Elective IV-3.5 Software Testing and Quality Assurance	Course Type: Theory

Total Hours: 60	Hours/Week: 4	Credits: 4

Pass-Out Policy : Minimum Contact Hours: 36
Total Score %: Internal: 40 External: 60
Minimum Pass %:50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.R..Suguna Jasmin	Mrs.S.Gnana Sophia	Mrs.P.Ezhil Roja
Assistant Professor	Assistant Professor	Assistant Professor
Mobile: 9486941443	Mobile: 9944281506	Mobile: 9944479273
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CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the basics of software testing	3[2],4[2],6[2],9[2]	K2
CO-2	analyze testing in the software life cycle & test levels	3[2],4[2],6[2],9[2]	K4
CO-3	analyze dynamic analysis	3[2],4[2],6[2],9[2]	K4
CO-4	understand test management	3[2],4[2],6[2],9[2]	K2
CO-5	understand software quality & software measurement metrics	3[2],4[2],6[2],9[2]	K2

Module	Course Description	Day	Hours	CO with %	Teaching Learning	Activity	Reference
1.1	**Introduction:** Introduction, **Fundamentals of Testing:** Terms and Motivation, The Fundamental Test Process	1-6	6	1[50]	Lecture	Seminar	1
1.2	The Psychology of Testing, General Principles of Testing, Ethical Guidelines	7-12	6	1[50]	Lecture	Quiz	1
2.1	**Testing in the Software Life Cycle:** The General V-Model, Component Test	13-16	4	2[20]	Lecture	Seminar	1
2.2	Integration Test, System Test, Acceptance Test	17-20	4	2[40]	Lecture	Seminar	1
2.3	Testing New Product Versions, Generic types of Testing	21-24	4	2[40]	Lecture	Programs	
3.1	**Static Test:** Structured Group Evaluations, Foundations, Reviews, The General Process	25-28	4	3[40]	Lecture	Seminar	1
3.2	Roles of Responsibilities, Types of Reviews, Static Analysis, The Compiler as a Static Analysis Tool	29-32	4	3[30]	Lecture	Seminar	1
3.3	Examination of Compliance to Conventions and Standards, Execution of Data Flow Analysis, Execution of Control Flow Analysis, Determining Metrics	33-36	4	3[30]	Lecture	Seminar	1
4.1	**Dynamic Analysis–Test Design Techniques:** Black Box Testing Techniques, White Box Testing Techniques	37-42	6	4[50]	Group Discussion	Programs	1
4.2	Intuitive and Experience-Based Test Case Determination	43-48	6	4[50]	Group Discussion	Programs	1
5.1	**Test Management:** Test Organization, Planning, Cost and Economy Aspects, Choosing the Test Strategy and Test Approach	49-53	5	5[40]	Lecture	Assignment	1
5.2	Managing The Test Work, Incident Management, Requirements to Configuration Management, Relevant Standards	54-57	4	5[30]	Lecture	Seminar	1
5.3	**Test Tools:** Types of Test Tools, Selection and Introduction of Test Tools	58-60	3	5[30]	Case Study	Seminar	1

Reference Books

1. Andreas Spillner, Tilo Linz, Hans Schaefer, "*Software Testing Foundations"*, Shoff Publishers and Distributors, Fourth Edition, 2014.
2. Glenford J. Myers, "*The ART of Software Testing"*, Wiley India, Second Edition , 2004.
3. Srinivasan D. and Gopalswamy R, *Software Testing: Principles and Practices*, Pearson Education, Second Edition, 2007.

SEMESTER - III

Course Title: Core Practical 5 – 3.6 Web Programming Lab	Course Type: Practical

Total Hours: 75	Hours/Week : 5	Credits: 3

Pass-Out Policy :	Minimum Contact Hours: 45 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.R.Suguna Jasmin	Dr.B.Shamina Ross	Mrs.S.Gnana Sophia
Assistant Professor	Assistant Professor	Assistant Professor
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Sl. No.	Description
HTML, CSS & PHP Web Programs Implementing	
1.	Tables
2.	Images
3.	Forms
4.	Frames
5.	CSS Positioning
6.	CSS Tables and Lists
7.	Control Structures and Functions in PHP
8.	String Handling and Arrays
9.	Passing Information with PHP
10.	Integrating PHP and XML

Reference Books

1. Teodoru Gugoiu, "*HTML, XHTML, CSS and XML by EXAMPLE A Practical Guide"*, Laxmi Publications Pvt. Ltd., New Delhi, First Edition, Reprint, 2016.
2. Steve Suehring, Tim Converse, Joyce Park, "*PHP6 and MySQL Bible"*, WILEY, First Edition, Reprint 2016.
3. Steven Holzner, "*The Complete reference PHP"*, Tata Mc-Graw Hill, Fifth Edition, Reprint 2011.
4. Daniel Gra, "*Web Design Fundamentals Hand Book"*, Climatic Press, First Edition, 2000.
5. Jennifer Niederst, *Web Design in a NutShell*, SPD, First Edition, 1999.

SEMESTER - III

Course Title: Core Practical 6 – 3.7 Multimedia Systems Lab	Course Type: Practical

Total Hours: 75	Hours/Week : 5	Credits: 3

Pass-Out Policy :	Minimum Contact Hours: 45 Total Score %: Internal: 40 External: 60 Minimum Pass %: 50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.R.Suguna Jasmin	Dr.B.Shamina Ross	Mrs.S.Gnana Sophia
Assistant Professor	Assistant Professor	Assistant Professor
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Sl. No.	Description
FLASH	
1.	To Move an Object in the Path
2.	Text Flip, Text Color Change
3.	Creating a Link Using Texts and Objects, Change the Color of the Object
4.	Shape Tweening and Using Shape Hints, Motion Tweening, Hybrid Tweening
5.	Character Animation, Object Animation, Drawing Images Character Animation, Object Animation, Drawing Images
6.	An Application to Show the Masking Effect
7.	Slide Show Presentation
PHOTOSHOP	
8.	Greeting Card, Create Background Picture
9.	Text Effects, Photo Effects
10.	Color , Buttons
11.	Editing Images
12.	Designing Web Page
DREAM WEAVER	
13.	Text Management
14.	Tables – Layers
15.	Creating Menu Bar
16.	Creating Pages and Sites
17.	Animating Images

Reference Books

1. Vikas Gupta, "*Multimedia and Web Design*", Dreamtech Press, First Edition, 2013.
2. Sherry Bishop, Chris Botello, Barbara M. Waxer, "*Adobe CS6 Web Tools: Dreamweaver, Photoshop, and Flash",* First Edition. 2013.

SEMESTER – IV

Course Title: Project	Course Type: Project

Total Hours: Full Semester 30 Hours/weak	Credit : 12

Pass-Out Policy :	Minimum Contact Hours: 15 Total Score %: Internal: 40 External: 60 Minimum Pass %:50[No Minimum for Internal]

Course Creator	Expert 1	Expert 2
Mrs.R..Suguna Jasmin	Mrs.S.Gnana Sophia	Mrs.P.Ezhil Roja
Assistant Professor	Assistant Professor	Assistant Professor
Mobile: 9486941443	Mobile: 9944281506	Mobile: 9944479273
suguna.jasmin@gmail.com	gnanasophias@gmail.com	roja_z@yahoo.com

CO. No.	**Course Outcomes** *Upon completion of this course, students will be able to:*	PSOs Mapped with %	KL
CO-1	understand the problem.	1[2],2[2],3[2],4[4], 5[6],6[4],7[4],8[4], 9[4],10[2]	K2
Co-2	analyze the requirements.	1[2],2[2],3[2],4[4], 5[6],6[4],7[4],8[4], 9[4],10[2]	K4
CO-3	create a real time system.	1[2],2[2],3[2],4[4], 5[6],6[4],7[4],8[4], 9[4],10[2]	K6
CO-4	apply different types of testing algorithms.	1[2],2[2],3[2],4[4], 5[6],6[4],7[4],8[4], 9[4],10[2]	K3
CO-5	create documentation & implement the system.	1[2],2[2],3[2],4[4], 5[6],6[4],7[4],8[4], 9[4],10[2]	K6

This course is to train the students to develop and execute real time application software and submit the report of work done.

The project work is to be carried out either in a software industry or in an academic institution for the entire semester and the report of the work done is to be submitted to the institution.