

MASTER OF COMPUTER APPLICATIONS (M.C.A)

S.No	Course Code	Title of the Course	CIA Marks Max	ESE Marks Max	TOT Marks Max	C Max.	Hrs
FIRST YEAR							
I Semester							
1	31511	Digital Computer Organization	25	75	100	4	12
2	31512	Object Oriented Programming and C++	25	75	100	4	12
3	31513	Data Structure and Algorithms	25	75	100	4	12
4	31514	Discrete Mathematics	25	75	100	4	12
5	31515	Data Structures using C++ Lab	25	75	100	4	120
Total			125	375	500	20	168
II Semester							
6	31521	Accounting and Financial Management	25	75	100	4	12
7	31522	Relational Database Management Systems (RDBMS)	25	75	100	4	12
8	31523	Computer Graphics	25	75	100	4	12
9	31524	Visual Programming with •NET	25	75	100	4	12
10	31525	VB.NET and RDBMS Lab	25	75	100	4	120
Total			125	375	500	20	168
SECOND YEAR							
III Semester							
11	31531	Software Engineering	25	75	100	4	12
12	31532	Operating System	25	75	100	4	12
13	31533	Internet and Java Programming	25	75	100	4	12
14	31534	Computer Networks	25	75	100	4	12
15	31535	Data Mining and Warehousing	25	75	100	4	12
16	31536	Internet and Java Programming Lab	25	75	100	4	120
Total			150	450	600	24	180
IV Semester							
17	31541	Internet of Things (IoT)	25	75	100	4	12
18	31542	Artificial Intelligence and Soft Computing	25	75	100	4	12
19	31543	Big Data Analytics and R Programming	25	75	100	4	12
20	31544	Mobile Application Development	25	75	100	4	12
21	31545	Project Work	25	75	100	10	-
Total			125	375	500	26	48
Grand Total			525	1575	2100	90	

CIA : Continuous Internal Assessment **ESE** : End semester Examination **Max.** Maximum Marks; **C** : Credits; **Hrs** – PCP Hours

Course Code Legend:

3	1	5	S	C
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315 – Programme code for Master of Computer Applications (M.C.A).

S - Semester Number;

C – Course Number in the Semester

FIRST YEAR - SEMESTER I

Course Code	Title of the Course	Credits	Hours
31511	DIGITAL COMPUTER ORGANIZATION	4	12

Course Objectives:

- To impart the knowledge in the field of digital electronics.
- To impart knowledge about the various components of a computer and its internals.

Unit No	Description
BLOCK 1 :NUMBER SYSTEMS	
1	Number Systems : Binary, Octal, Decimal and Hexadecimal number systems – Conversion from one base to another base – Use of complements – binary arithmetic – Numeric and Character codes.
2	Boolean algebra and Combinational Circuits: Fundamental concepts of Boolean Algebra – De Morgan’s theorems
3	Simplification of expressions – Sum of products and products of sums – Karnaugh map simplification – Quine - McCluskey method – two level implementation of Combinational Circuits.
BLOCK 2 COMBINATIONAL CIRCUITS AND SEQUENTIAL CIRCUITS	
4	Combinational Circuits: Half Adder – Full Adder – Subtractors – Decoders – Encoders – Multiplexers – Demultiplexer.
5	Sequential Circuits: Flip flops – Registers – Shift Registers – Binary Counters – BCD Counters – Memory Unit.
6	Data Representation : Data Types – Complements – Fixed Point Representations – Floating Point Representations – Other Binary Codes –Error detection codes.
BLOCK 3 : BASIC COMPUTER ORGANIZATION AND DESIGN	
7	Instruction Codes : Instruction Codes – Computer Registers – Computer Instructions – Timing and Control
8	Instruction cycle: – Memory reference instructions – Input output and Interrupt – Complete Computer Description – Design on Basic Computer – Design of Accumulator logic
BLOCK : 4 CENTRAL PROCESSING UNIT	
9	Introduction – General Register organization – Stack organization
10	Instruction formats: – Addressing modes – Data transfer and manipulation – Program control.
11	Input – output organization: Peripheral devices – Input output interface – Asynchronous data transfer – Modes of transfer
12	Priority interrupt: – DMA – IOP – Serial Communication.
BLOCK : 5 MEMORY ORGANIZATION	
13	Memory Hierarchy – Main memory – Auxiliary memory – Associative memory
14	Memory organization: Cache memory – Virtual memory – Memory management hardware.

Reference and Text Books:

1. Albert Paul Malvino and Jerald A. Brown,(2008), *Digital Computer Electronics*, 3rd Edition, Tata McGraw Hill.
2. M. Morris Mano (2008), *Digital Logic and Computer Design*, Pearson Education.
3. Thomas C. Bartee (2008), *Digital Computer Fundamentals*, 6th Edition, Tata McGraw Hill.
4. V.C. Hamacher et al(2011), *Computer Organization*, 5th Edition, Tata McGraw Hill.

Course Code	Title of the Course	Credits	Hours
31512	OBJECT ORIENTED PROGRAMMING and C++	4	12

Course Objectives:

- To provide an overview of working principles of object oriented paradigm
- To understand and apply the OOPs fundamentals
- To implement the features of OOP in real world applications

Unit No.	Contents
	BLOCK 1: INTRODUCTION
1	Introduction and Features: Evolution of Object Oriented Language, Object oriented Paradigm, Basic concept of object-oriented programming- objects, classes, encapsulation and data abstraction, inheritance, polymorphism, dynamic binding, message passing
2	Popular OOP languages. Moving from C to C++ Introduction – Predefined console streams, hierarchy of console stream classes,
3	I/O operations; Unformatted I/O operations, formatted console I/O operations, manipulators, custom/user-defined manipulators.
	BLOCK 2 : CLASSES AND OBJECTS
4	Classes and Objects: Introduction, class specification, class objects, accessing class members, defining member functions, accessing member functions within a class, outside member functions as inline, private member function,
5	Memory allocation for objects: array of objects, function prototype, call by reference, return by reference, objects as function arguments, inline function, friend function, constant parameter and member function.
6	Object Initialization: Introduction - constructors, default constructor, parameterized constructors, multiple constructors in a class, dynamic initialization through constructors, copy constructor, dynamic constructor, destructor. Dynamic Objects: Introduction, pointers to objects, array of pointers to objects, this pointer.
	BLOCK 3 : INHERITANCE, POLYMORPHISM AND DATA CONVERSION
7	Inheritance: Introduction, derived class declaration, forms of inheritance, inheritance and member accessibility, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance.
8	Polymorphism: Introduction, Function overloading, Operator overloading introduction, unary operator overloading, binary operator overloading, assignment operator overloading, overloading with friend functions.
9	Data conversion: conversion between basic data types, conversion between objects and basic types, conversion between objects of different classes. Virtual function: Introduction, need for virtual functions, pure virtual functions, abstract classes.
	BLOCK 4 : TEMPLATES AND FILES
10	Generic Programming with Templates: Introduction - class templates – class template with multiple arguments
11	Function template: function template with multiple arguments. inheritance of class template.
12	Streams with Files: Introduction, hierarchy of file stream classes, opening and closing of files, file pointers and their manipulators, sequential access to a file, file input/output with stream class, random access to a file.

	BLOCK 5 : EXCEPTION HANDLING
13	Exception Handling: Introduction– Basics of exception handling,exception handling mechanism, throwing mechanism, catching mechanism. Exceptions in constructors and destructors
14	Other Exception Handling methods: Handling uncaught exceptions, exceptions in operator overloaded functions, exception in inheritance tree, exceptions in class templates, memory allocation failure exception.

Reference and Text Books:

1. Balagurusamy.E,(2020),*Object oriented programming in C++*, 8th Edition, Tata McGrawHill Publications.
2. RoberLafore, (2010),*Object Oriented Programming in C++*, Fourth Edition, Galgotia Publications Pvt. Ltd., New Delhi.
3. Venugopal K.R and Rajkumar, T.Ravishankar (2006), *Mastering C++*, Tata McGrawHill Publishing Company Ltd.

Course Code	Title of the Course	Credits	Hours
31513	DATA STRUCTURE AND ALGORITHMS	4	12

Course Objectives:

- The learner should be able to learn the fundamentals of Algorithms, various data structures, should be able to use them appropriately as per need during development of programs.
- Also, the learner should know different sorting and searching techniques so that correct techniques can be used in different programs
- To understand the complexity of the program does not increase due the sorting/ search technique employed.

Unit No	Contents
	BLOCK 1 : INTRODUCTION
1	Introduction to Data Structure : Types of Data Structure , Primitive data types
	Algorithms: –Time and space Complexity of algorithms
2	Arrays: Array initialization, Definition of Array, Characteristic of Array ,One-dimensional Array, Two-dimensional array and Multi dimensional array
	BLOCK 2 : LINEAR DATA STRUCTURE
3	Stack : Stack related terms, Operations on a stack,
4	Representation of Stack: Implementation of a stack – application of Stack. Expression Evaluation Polish notation.
5	Queues: Operations on queue Circular Queue, Representation of Queues, Application of Queues
6	List: Merging lists, Linked list, Single linked list, Double LinkedList, Header Linked list
7	Operation on Linked List : Insertion and Deletion of linked list
8	Traversal: Traversing a linked list , Representation of linked list.
	BLOCK:3 NON-LINEAR DATASTRUCTURE
9	Trees: Binary Trees, Types of Binary trees, Binary Tree Representation
10	Binary Tree operations / Applications : Traversing Binary Trees, Binary Search tree,
11	Operations on Binary Tree: Insertion and Deletion operations, Hashing Techniques.
	BLOCK 4 : SEARCHING TECHNIQUES
12	Searching : Introduction, Searching, Linear Search, Binary Search
	BLOCK5 : SORTINGTECHNIQUES
13	Sorting: Bubble sort, Insertion sort, Radix sort
14	Other sorting Techniques: Selection sort, Quick sort, Tree sort.

Reference and Text Books:

1. Ashok N Kamthane, (2007), *Programming and Data Structure*, Pearson Edition.
2. Ellis Horowitz and Sartaj Sahini, (2007), *Fundamentals of Data structures*, Second Edition, Universities press.
3. Lipschutz, Vijayalakshmi Pai G.A., (2006), *Data Structures*, Seymour Second Edition , Schaum's Outlines, Tata Mc-Graw Hill Private Ltd.

Course Code	Title of the Course	Credits	Hours
31514	DISCRETE MATHEMATICS	4	12

Course Objectives:

- To understand the concepts and operations Set theory, Graph Theory
- To understand and apply the Mathematical Logic in computer science.

Unit No.	Contents
	BLOCK 1 : MATHEMATICAL LOGIC
1	Mathematical Logic: Statements and Notation - connectives -normal forms – The theory of inference for the statement calculus -
2	Predicate Calculus: The predicate calculus - Inference theory and predicate calculus.
3	Set theory: Sets – Basic concepts – notation - inclusion and equality of sets - the power set
	BLOCK 2 : RELATIONS
4	Relations and ordering properties – relation matrix and graph of a relation
5	Relations Partition – equivalence and compatibility relations
6	Composition and partial ordering: Composition – partial ordering – partially ordered set
	BLOCK 3 : FUNCTIONS
7	Functions – definition – composition – inverse – binary and n-ary operations
8	Other Functions : Characteristic function – hashing function.
	BLOCK 4 : ALGEBRAIC STRUCTURES
9	Algebraic Structures: Algebraic Systems: Examples and General Properties
10	Semigroups and Monoids: Definitions and Examples - Homomorphism of Semigroups and Monoids - Subsemigroups and Submonoids
11	Groups: Definitions and Examples - Cosets and Lagrange's Theorem
12	Normal Subgroups – Algebraic Systems with two Binary Operations.
	BLOCK 5 : GRAPH AND FINITE PROBABILITY
13	Graph theory: Basic concepts – definition–paths - reach -ability and connectedness – matrix representation of graphs -trees.
14	Finite Probability – Probability Distributions – Conditional Probability Independence – Bayes' Theorem – Mathematical Expectation

Reference and Text Books:

1. Bernard Kolman, Robert C. Busby, Sharn Cutter Ross, (2006), *Discrete Mathematical Structures*, Pearson Education.
2. J.P. Tremblay and R. Manohar, (2017), *Discrete mathematical structures with applications to Computer Science*, TMH Publishing Company.
3. Judith L. Gersting, (2014), *Mathematical Structures for Computer Science*, 7th Edition, W.H. Freeman and Company.
4. Narsingh Deo, (2003), *Graph Theory with Applications to Engineering and Computer Science*, PHI.
5. Ramasamy (2006), *Discrete Mathematical Structures with application to combinatorics*, Universities Press.
6. Richard Johnsonbaugh (2001), *Discrete Mathematics*, Fifth Edition, Pearson Education.
7. Venkatraman M K, Sridharan N and Chandrasekaran N, (2004), *Discrete Mathematics*, The National Publishing Company.

Course Code	Title of the Course	Credits	Hours
31515	DATA STRUCTURE USING C++ LAB	4	120

Course Objectives:

- To be able to solve data structure problems using C++ language
- To learn and implement C++ language programming techniques
- To introduce the efficiency of the algorithm
- The course is designed to develop skills to design and analyze simple linear and non linear data structures.
- It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem.
- To be able to solve fundamental data structure problems using C++ language
- To learn and implement linear data structure programming techniques

Experiments based on C++ programming and Data Structures Theory concepts

Unit No.	Contents
	BLOCK 1 : SIMPLE C++ PROGRAMS
1	Introduction Simple C++ Programs
2	Control Structures: Using if and switch constructs Programs
3	Looping , Arrays ,Structure statements: for, while, do-while, Strings and Matrices Programs Problems
	BLOCK 2 : OOPs CONCEPTS
4	Functions: static function, friend function ,constructor , destructor and operator overloading and Recursive programs
5	Inheritance and polymorphism: Inheritance types and polymorphism types, Virtual function
6	File: File Handling C++ Programs, opening and closing a data file - creating a data file, processing a data file.
7	Pointers : Pointers and Pointers with Arrays Programs
	BLOCK 3: LINEAR DATA STRUCTURE
8	Stacks : Stack Implementation, expression evaluation, Polish notation
9	Queues: Queue Implementation, Applications of Queue
10	Linked List programs: List, Merging lists, Linked list, Single linked list, Double Linked List, Header Linked list, Insertion and Deletion of linked list, Traversing a linked list.
	BLOCK 4 : NON LINEAR DATA STRUCTURE
11	Tree Programs : Trees, Binary Trees, Types of Binary trees, Binary Tree Representation, Traversing Binary Trees, Binary Search tree, Insertion and Deletion operations,

12	Graphs: Shortest Path Algorithms <ul style="list-style-type: none"> ○ Dijkstra's Algorithm ○ Graphs with Negative Edge costs ○ Acyclic Graphs ○ All Pairs Shortest Paths Algorithm Minimum cost Spanning Trees <ul style="list-style-type: none"> ○ Kruskal's Algorithm ○ Prims's Algorithm ○ Applications □ Breadth First Search
BLOCK 5 : SEARCHING AND SORTING ALGORITHMS	
13	Searching Techniques: Linear and Binary search Programs
14	Sorting techniques: Bubble sort, Quick sort, Insertion sort, Merge sort

Experiments based on C++ programming

- Simple C++ Programs
- Experiments using controls structures
- Experiments using arrays, Matrices and strings
- Problems using various types of functions and recursive programs
- Experiments using inheritance and polymorphism
- Experiments based on file handling in C++
- Practical problems using pointers and arrays.
- Problems based on real-time applications.

Experiments based on data structures using C++

- Design and Implement List data structure using i) array ii) singly linked list.
- Design and Implement basic operations on doubly linked list.
- Design and Implement stack using i) array ii) singly linked list
- Design and Implement Queue using i) array ii) singly linked list
- Design and Implement basic operations on Circular Queue
- Experiment on conversion of infix to postfix notation
- Design and implement expression evaluation
- Design and Implement basic operations (insertion, deletion, search, find min and find max) on Binary Search trees.
- Implementation of Breadth First Search Techniques.
- Implementation of Depth First Search Techniques.
- Implementation of various sorting techniques
- Implementation of searching techniques (Linear, Binary Search) using arrays.

Reference and Text Books:

1. Ashok N Kamthane(2007), Programming and Data Structure, Pearson Edition.
2. Balagurusamy.E (2020), *Object oriented programming in C++*, 8th Edition, Tata McGraw Hill Publications.
3. Ellis Horowitz and Sartaj Sahini (2008), *Fundamentals of Data structures in C*, Second edition, Universities press.
4. Robert Lafore (2010), *Object Oriented Programming in C++*, Fourth Edition, Galgotia Publications Pvt. Ltd., New Delhi.
5. Seymour Lipschutz, G.A.Vijayalakshmi Pai (2006), *Data Structures*, Second Edition , Schaum's Outlines, Tata Mc-Graw Hill Private Ltd.
6. Venugopal K.R and Rajkumar, T.Ravishankar (2017), *Mastering C++*, Tata McGraw Hill Publishing Company Ltd.

SEMESTER II

Course Code	Title of the Course	Credits	Hours
31521	ACCOUNTING AND FINANCIAL MANAGEMENT	4	12

Course Objectives:

- To understand the process of estimating the cost of a particular product.
- To Prepare the estimate for various business activities such as purchase, sale, production and cash budgets

Unit No	Contents
	BLOCK 1 : INTRODUCTION - Financial Accounting:
1	Financial Accounting: Meaning and Scope – Principles – Concepts – Conventions
2	Accounting process: Journal - Ledger – Trail Balance – Trading Account – Profit and Loss Account – Balance Sheet
3	Accounting Ratio Analysis – Funds Flow Analysis –Cash Flow Analysis – Computerized account.
	BLOCK 2 : COST AND MANAGEMENT ACCOUNTING
4	Introduction: Meaning Scope and uses of cost and management accounting – Elements of Cost
5	Cost Sheet – Marginal Costing and Cost Volume Profit Analysis
6	Break Even Analysis: Concept, Applications and Limitations
	BLOCK 3 : STANDARD COSTING AND BUDGETING:
7	Introduction : Concept and importance standard costing - Variance Analysis – Material – Labor – Overhead – Sales – Profit Variances -
8	Budgets and Budgetary Control – Meaning and Types of budgets – Sales Budget – Production Budget
9	Budgets: Cash Budget – Master Budget – Flexible budgeting – Zero Base Budgeting.
	BLOCK 4 : FINANCIAL MANAGEMENT
10	Introduction: Objectives and Functions of Financial Management – Risk – Return Relationship –Time Value of Money
11	Capital Budgeting: Basic Methods of Appraisal of investments –
12	Working Capital: Concepts of working Capital ,Factors Affecting working Capital – Estimation of working capital requirements
	BLOCK 5 : COST OF CAPITAL
13	Cost of Capital Structure and Dividend: Meaning and types of Cost of Capital – computation of cost for debt and equity sources of capital and weighted average cost of capital
14	Capital Structure Meaning and types of capital structure – determinants of capital structure – types of Dividend Policy – Types of Dividend decision.

Reference and Text Books:

1. Ambrish Gupta (2005), Financial Accounting for Management, Pearson Education.
2. Iyengar S.P, “Cost and Management Accounting”, Sultan Chand & Sons.
3. Khan and Jain (2011), *Management accounting: Text, problems and case*.
4. Maheswari S N (2018), Financial and Management Accounting, Sultan Chand & Sons.
5. Maheswari S.N (2010), “*Management Accounting & Financial Accounting*”, Vikas Publications.
6. Pandey I M(2015), Financial Management, 11th Edition, Vikas Publications.
7. Pandey.M, “*Elements of Management Accounting*”, Vikas Publishing House.
8. Ravi M Kishore(2010), *Management Accounting and Financial Analysis*”, Taxmons.
9. Shula and T.S.Grewal (2010), “*Advanced Accounting*”, S.Chand and Company.

Course Code	Title of the Course	Credits	Hours
31522	RELATIONAL DATABASE MANAGEMENT SYSTEMS (RDBMS)	4	12

Course Objectives:

- To understand the fundamentals of data models
- To make a study of SQL and relational database design.
- To know about data storage techniques and query processing.
- To impart knowledge in transaction processing, concurrency control techniques and External storage

Unit No	Contents
	BLOCK 1 INTRODUCTION
1	Data base System Applications , data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model
2	Model :Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.
3	History of Data base Systems - Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.
	BLOCK 2 : RELATIONAL MODEL
4	Introduction – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying / altering Tables and Views.
5	Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews –
6	Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.
	BLOCK 3 : SQL QUERY
7	Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement
8	Normal forms :Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF–
9	Join : Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.
	BLOCK4 TRANSACTION
10	Introduction :Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability

11	Protocols : Lock Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.
12	Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage- Advance Recovery systems- Remote Backup systems
	BLOCK 5 STORAGE
13	Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and
14	Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Reference and Text Books:

1. Colin Ritchie (2004), Relational Database Principles 2nd Edition.
2. ElmasriNavrate, Fundamentals of Database Systems, Pearson Education.
3. Peter Rob & Carlos Coronel, *Data base Systems design, Implementation, and Management*, 7th Edition.
4. Raghurama Krishnan, Johannes Gehrke(2014), *Data base Management Systems*, 3rd Edition, TATAMcGrawHill.
5. Silberschatz, Korth (2019), *Data base System Concepts*, 7th Edition, Tata McGraw Hill.
6. Sharad Maheswari and Ruchin Jain (2006), *Database management systems Complete Practical Approach*, Firewall media.

Course Code	Title of the Course	Credits	Hours
31523	COMPUTER GRAPHICS	4	12

Course Objectives:

- To understand computational development of graphics
- To provide in-depth knowledge of display systems, image synthesis, shape modeling of 3D application.

Unit No.	Contents
	BLOCK 1 : INTRODUCTION
1	Introduction Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.
2	Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms.
3	Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

	BLOCK 2 : 2 D TRANSFORM AND CLIPPING
4	2-D geometrical transform: Translation, scaling, rotation, reflection and shear transformations
5	2D Matrix representations: homogeneous coordinates, composite transforms, transformations between coordinate systems.
6	2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions,
7	Clipping Algorithms: Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.
	BLOCK 3 : 3D OBJECT REPRESENTATION
8	Introduction: Polygon surfaces, quadric surfaces, spline representation,
9	Curve and surfaces: Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.
	BLOCK 4 : 3D GEMETRIC TRANSFORMATION
10	3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.
11	3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.
	BLOCK 5 : VISIBLE SURFACE DETECTION METHODS AND ANIMATION
12	Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.
13	Computer animation: Design of animation sequence, general computer animation functions, raster animation,
14	Other Animation Techniques: Computer animation languages, key frame systems, motion specifications.

Reference and Text Books:

1. Donald Hearn and M.Pauline Baker (2007), *Computer Graphics C version*, Pearson Education.
2. M. Newman and F. Sproull, (2004), *Interactive Computer Graphics*, McGraw Hill.
3. Foley, VanDam, Feiner and Hughes,(2004),*Computer Graphics Principles and Practice*, 2nd Edition in C, Pearson Education.
4. Plastok and Gordon Kalley (2000), *Computer*, McGraw Hill.

Course Code	Title of the Course	Credits	Hours
31524	VISUAL PROGRAMMING WITH .NET	4	12

Course Objective:

- To develop an understanding of Visual Basic .Net
- To develop the skills necessary to create software solutions using VB with .Net
- To learn how to analyze certain types of problems with a software solution in mind

Unit No	Contents
	BLOCK 1 : INTRODUCTION
1	Introduction - What Is Visual Studio? - Navigating the Visual Studio - The Menu – Toolbar - Work Area
2	Toolbox - Solution Explorer - Status Bar - Managing VS Windows
3	Visual Studio Project Types - Windows Projects - Web Projects - Office Projects - SharePoint Projects - Database Projects
	BLOCK 2 : C# AND VB.NET
4	Basic Syntax - Code Skeleton - The Main Method - The Program Class - The First Program Namespace - VS Code Editor - Class and Member Locators – Bookmarks - Running Programs - Primitive Types and Expressions - Enums - Branching Statements - Loops
5	Creating Classes - Class Inheritance – Class Snippet - Writing Methods - Parameters Passing - Returning Data
6	Method Snippets - Coding Fields and Properties - Declaring and Using Properties - The Property Snippet
	BLOCK 3 : UNDERSTANDING DELEGATES AND EVENTS
7	Events - Delegates - Handler Code - Implementing Interfaces - The interface Snippet - Applying Arrays and Generics -
8	Creating and Building Projects - Constructing Solutions and Projects - Navigating the Solution Explorer - Examining Property Settings – AssemblyName - Default Namespace - Target Framework - Output Type
9	Building Projects :Startup Object - Icon and Manifest - Compiling Applications - Rebuilding Solutions/Projects - Cleaning Solutions/Projects - Managing Dependencies, Compilation Settings - Navigating with Class View - Using the Class Designer - Class Designer Code Generation
	BLOCK 4 : DEBUGGING WITH VISUAL STUDIO
10	Debugging methods: Breakpoints - Stepping Through Code – Inspecting Application State - Locals and Autos Windows - Watch Windows - The Immediate Window - The Call Stack Window - The Quick Watch Window - Watching Variables with Pin To Source - Working with IntelliTrace
11	Working with Databases - Server Explorer - Creating a Database - Adding Tables - Relating Tables with Foreign Keys - Adding Stored Procedures - Configuring Database Options
	BLOCK 5 : BUILDING PROGRAMS WITH VS 2010
12	Building Desktop Applications with WPF - Starting a WPF Project - Understanding Layout - Grid Layout - StackPanel Layout - DockPanel Layout - WrapPanel Layout - Canvas Layout
13	Using WPF Controls - Managing Windows for Controls - Setting Properties - Handling Events - Coding Event Handlers - Working with Data in WPF - Data Source - Configuring a ComboBox

14	Reading and Saving Data - Using the DataGrid - Summary -Creating Web Applications with ASP.NET MVC - Designing Silverlight Applications- Deploying Web Services with WCF
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Reference and Text Books:

1. Andrew Moore(2010), *Visual Studio 2010 All-in-One for Dummies*, Wiley Publishing.
2. Joe Mayo(2010), *Visual Studio 2010 - A Beginner's Guide*, Tata Mc Graw Hill Edition.
3. Nick Randolph, David Gardner (2010), *Professional Visual Studio 2010*, Wiley Publishing.

Course Code	Title of the Course	Credits	Hours
31525	VB .NET and RDBMS LAB	4	120

Course Objectives:

- To develop an understanding of Visual Basic .Net
- To develop the skills necessary to create software solutions using VB with .Net
- To learn how to analyze certain types of problems with a software solution in mind
- To understand the fundamentals of data models
- To make a study of SQL and relational database design.
- To know about data storage techniques and query processing.
- To impart knowledge in transaction processing, concurrency control techniques and External storage.

Lab Experiments should be based on Visual Programming with .NET Theory for solving real time applications.

Contents
SIMPLE APPLICATIONS
Simple Applications: Developing simple applications using VB.NET <ul style="list-style-type: none"> a. Finding factorial Value b. Money Conversion c. Quadratic Equation d. Temperature Conversion e. Login control
Login form: Create and Validate Login Form, Program to design Class, Program to demonstrate Inheritance, Polymorphism and Interfaces.
CONTROLS
Controls: Advance Controls, Common Dialog Controls. <ul style="list-style-type: none"> 2. Adrotator Control 3. Calendar control <ul style="list-style-type: none"> a. Display messages in a calendar control b. Display vacation in a calendar control c. Selected day in a calendar control usings tyle d. Difference between two calendar dates 4. Treeview control a) Treeview control and datalist b)Treeview operations 5. Validation controls
Active X Controls: Working with intrinsic controls and ActiveX controls
MDI AND DATA CONTROLS
MDI: Application with multiple forms
Data controls: Application using data controls
DIALOGS AND MENU
Dialogs: Application with dialogs
Common Dialogs: Application using Common Dialogs
Menus: Application with Menus
EVENTS AND DATABASE
Events and Database: Drag and Drop Events Database Management Creating ActiveX Controls

DataGridView: ADO.NET Code to show records in DataGridView Control. 1. Databinding using datalist control 2. Datalist control templates 3. Databinding using datagrid 4. Datagrid control template 5. Datagrid hyperlink 6. Datagrid button column 7. Datalist event 8. Datagridpaging
Database operations: ADO.NET Code to perform Insert, Delete, Update and Select operations.
CRYSTAL REPORTS AND WEB APPLICATION
Crystal Reports
Web Application using ASP.NET that uses validation controls.

RDBMS



Practical Lab exercises based on the following for solving various real-time applications like student, employee, electricity, railway etc., database manipulations.

Contents
TABLE MANIPULATION
Table creation, renaming a Table, copying another table, Dropping a Table
Table Description: Describing Table Definitions, Modifying Tables, Joining tables, Number and Date functions.
SQL QUERIES AND SUB QUERIES
SQL Queries: Queries, Sub Queries, and aggregate functions
DDL: Experiments using database DDL SQL statements
DML: Experiment using database DML SQL statements
DCL: Experiment using database DCL SQL statements
INDEX AND VIEW
Index : Experiment using database index creation, Renaming a index, Copying another index, Dropping a index
Views: Create Views, Partition and locks
EXCEPTION HANDLING AND PL/SQL
Exception Handling: PL/SQL Procedure for application using exception handling
Cursor: PL/SQL Procedure for application using cursors
Trigger: PL/SQL Procedure for application using triggers
Package: PL/SQL Procedure for application using package
Reports: DBMS programs to prepare report using functions
APPLICATION DEVELOPMENT
Design and Develop Application: Library information system, Students mark sheet processing, Telephone directory maintenance, Gas booking and delivering, Electricity bill processing, Bank Transaction, Pay roll processing. Personal information system, Question database and conducting Quiz and Personal diary

Reference and Text Books:

1. Andrew Moore (2010), *Visual Studio 2010 All-in-One for Dummies*, Weiley Publishing.
2. Colin Ritchie (2004), *Relational Database Principles*, 2nd Edition.

3. ElmasriNavrate, *Fundamentals of Database Systems*, Pearson Education.
4. Joe Mayo (2010), *Visual Studio 2010 - A Beginner's Guide*, Tata Mc Graw Hill Edition.
5. Nick Randolph (2010), David Gardner, *Professional Visual Studio 2010*, Wiley Publishing.
6. Peter Rob & Carlos Coronel, *Data base Systems design, Implementation, and Management*, 7th Edition.
7. Raghurama Krishnan (2014), Johannes Gehrke, *Data base Management Systems*, 3rd Edition, TATA McGrawHill.
8. Sharad Maheswari and Ruchin Jain (2006), *Database management systems Complete Practical Approach*, Firewall media.
9. Silberschatz, Korth (2019), *Data base System Concepts*, 7th Edition, Tata McGraw Hill.

SECOND YEAR -SEMESTER III

Course Code	Title of the Course	Credits	Hours
31531	SOFTWARE ENGINEERING	4	12

Course Objective:

- To know of how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software

Unit No.	Contents
	BLOCK 1 : INTRODUCTION
1	Software: Role of software, Software myths. Generic view of process: A layered technology, a process framework, The Capability Maturity Model Integration (CMMI)
2	Process patterns, Process assessment, Personal and Team process models.
3	Process model: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.
	BLOCK 2 : REQUIREMENT ENGINEERING:
4	Design and Construction, Requirement Engineering Tasks, Requirements Engineering Process, Validating Requirements.
5	Building the Analysis Model: Requirement analysis, Data Modeling concepts, Object-Oriented Analysis
6	Modeling: Scenario-Based Modeling, Flow-Oriented Modeling Class-Based Modeling, Creating a Behavioral Model.
	BLOCK3 : SYSTEM DESIGN
7	Design Engineering: Design process and quality, Design concepts, the design model.
8	Architectural Design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.
9	User interface design: The Golden rules, User interface analysis and design, Interface analysis, Interface design steps, Design evaluation.
	BLOCK 4 : SYSTEM TESTING
10	Testing Strategies: Approach to Software Testing, Unit Testing, Integration Testing, Test strategies for Object-Oriented Software, Validation Testing, System Testing, the art of Debugging, Black-Box and White-Box testing.
11	Product Metrics: Software Quality, Product Metrics, Metrics for Analysis Model, Design Model, Source code and Metrics for testing, Metrics for maintenance. Metrics for Process and Projects Domains: Software Measurement, Metrics for Software Quality and Software Process.
	BLOCK 5 : RISK and QUALITY MANAGEMENT
12	Risk Strategies: Reactive vs. Proactive Risk strategies, software risks, Risk identification.
13	Risk Protection and refinement: Risk projection, Risk refinement, Risk Mitigation, Monitoring and Management, RMMM Plan.
14	Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal Technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

Reference and Text Books:

1. Agarwal K.K & Yogesh Singh(2007), *Software Engineering*, 3rd Edition New Age International Publishers.
2. James F. Peters, Witold Pedrycz (2000), *Software Engineering an Engineering Approach*, John Wiley & Sons.
3. Roger S. Pressman (2015), *Software Engineering - A practitioner's Approach*, McGraw-Hill 8th Edition.
4. Richard Fairlay (2008), *Software Engineering Concepts*, McGraw Hill Book Company.
5. Pankaj Jalote (2005), *An Integrated Approach to Software Engineering*, 3rd Edition , Narosa Publishing House.
6. Somzerville (2007), *Software Engineering*, 8th Edition, Pearson Education.
7. Waman S Jawadekar (2004), *Software Engineering Principles and Practice*, Tata McGraw-Hill.

Course Code	Title of the Course	Credits	Hours
31532	OPERATING SYSTEMS	4	12

Course Objectives:

- Able to understand the operating system principles
- Able to know the Principles of Deadlock, processor scheduling and memory management.

Unit No.	Contents
	BLOCK 1 : INTRODUCTION
1	Introduction: Definition of Operating Systems – Computer System Organization
2	Computer System Architecture – Operating System Structure – Operating System Operations
3	System Structures: Operating System Services – System Calls – System Programs – Operating System Design and Implementation.
	BLOCK 2 : PROCESS CONCEPT
4	Process Concept: Process Scheduling – Operations on Processes – Inter Process Communication
5	Process Scheduling: Scheduling Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple Processor Scheduling
	BLOCK 3 : SYNCHRONIZATION
6	Synchronization: The Critical Section Problem – Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Monitors
7	Deadlocks: Deadlocks Characterization – Methods for Handling Deadlocks
8	Deadlock Prevention – Avoidance – Detection – Recovery from Deadlock.
	BLOCK 4 : MEMORY MANAGEMENT
9	Memory Management Strategies: Swapping – Contiguous Memory Allocation – Paging – Segmentation
	BLOCK 5 : FILE SYSTEM
10	File Concept – Access Methods – Directory
11	Structure – File System Mounting – File Sharing – Protection.
12	Implementing File Systems: File System Structure – File System Implementation
13	Directory Implementation – Allocation Methods – Free Space Management
14	Secondary Storage Structure: Overview of Mass Storage Structure – Disk Structure – Disk Attachment – Disk Scheduling – Disk Management.

Reference and Text Books:

1. Abraham Silberschatz (2009), Peter Baer Galvin and Greg Gagne, “*Operating System Principles*”, 7th Edition, Wiley India Edition.
2. Andrew S.Tanenbaum (2006), *Operating Systems Design and Implementation*, 3rd edition, Prentice Hall.
3. Harvey M. Deitel (2007), *An Introduction to Operating Systems*, 3rd Edition, Addison Wesley.

Course Code	Title of the Course	Credits	Hours
31533	INTERNET AND JAVA PROGRAMMING	4	12

Course Objectives:

- To provide an overview of working principles of internet, web related functionalities
- To understand and apply the fundamentals core java, packages, database connectivity for computing

Unit No.	Contents
	BLOCK 1 : INTRODUCTION
1	Basic Internet Concepts: Connecting to the Internet – Domain Name System – E-mail
2	The World Wide Web – Internet Search Engines – Web Browsers – Chatting and conferencing on the Internet
3	Online Chatting –Messaging – Usenet Newsgroup – Internet Relay chat (IRC) – FTP – Telnet.
	BLOCK 2 : FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING
4	Basic concepts of OOP – Benefits – Applications. Java Evolution: Features – how java differs from C and C++ - java and internet- java support system – java environment
5	Overview of Java Language –Introduction – Simple Java Program – Comments – Java Program Structure – Tokens – Java Statements – Implementing a Java Program – JVM – Command Line Arguments. Constants – Variables – Data Types – Type Casting.
6	Operators and Expressions: Arithmetic Operators – Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special Operators – Arithmetic Expressions, Evaluation of Expression – Precedence of Arithmetic Operators – Type Conversions – Operator Precedence and associativity – Mathematical Functions. Decision Making and Branching: If –if....else –Nesting of if..... Else – else if–switch. Decision Making and Looping: While – do – for – jump in loops – labeled loops.
	BLOCK 3 : CLASSES, OBJECTS AND METHODS
7	class: Defining a class –fields –methods –creating objects – accessing class members – constructors – methods overloading –static members –nesting of methods – Inheritance –overriding methods –final variables-classes –methods
8	Arrays, Strings and Vectors :One dimensional Arrays –creating of array – Two dimensional arrays- strings –vectors –Wrapper classes – Enumerated Types - Interfaces: Multiple Inheritance
9	Packages: Defining interface –Extending interfaces – Implementing Interfaces - Putting Classes Together
	BLOCK 4: MULTITHREADING, EXCEPTION AND APPLETS
10	Multithreaded Programming – Creating Threads –Extending the thread class – Stopping and Blocking a thread –Life cycle of a thread –using thread methods – Thread Exceptions –Priority –Synchronization –Implementing the ‘Runnable’ Interface
11	Managing Error and Exceptions: Types of errors –Exceptions –Syntax of

	Exception Handling code – Multiple Catch statements –using finally statement – Throwing our own Exceptions – using exceptions for Debugging - Graphics Programming: The Graphics Class – Lines and Rectangles – Circles and Ellipses – Drawing Arcs – Drawing Polygons – Line Graphs – Using Control Loops in Applets – Drawing Bar Charts.
12	Applet Programming: How applets differ from Applications – preparing to write applets – Building Applet Code – Applet life cycle – creating an Executable Applet – Designing a Web Page – Applet Tag – Adding Applet to HTML file – Running the Applet – Passing parameters to Applets – Displaying Numerical values – Getting input from the user
	BLOCK 5 : MANAGING INPUT/OUTPUT FILES IN JAVA
13	Introduction – concept of streams –stream classes – byte stream classes – character Stream
14	I/O classes: –using stream –using the file class –Input / output Exceptions – creation of files – Reading / writing characters – reading writing bytes Random access files- Interactive input and output –Other stream classes

Reference and Text Books:

1. Balagurusamy.E (2010), *Programming with Java*, 4e, Tata McGraw-Hill.
2. Deitel, Deitel and Nieto (2000), *Internet and World Wide Web – How to program*, Pearson Education.
3. Cay S. Horstmann (2003), *Gary Cornell, Core Java*, Volume I and II, 5th Edition, Pearson Education.
4. Elliotte Rusty Harold (2000), *Java Network Programming*, O'Reilly Publishers.
5. Ed Roman (1998), *Enterprise Java Beans*, Wiley Publishers.
6. Hunt (2004), *Guide to J2EE Enterprise Java*, Springer Publications.
7. Krishnamoorthy R and Prabhu.S (2013), *Internet and Java Programming*, New Age\ International Publishers.
8. Mohamal Ibrahim .B (2006), *Java : J2SE – A Practical Approach*, Firewall media.
9. Naughton and H.Schildt (2006), *Java 2 - The complete reference*, Fourth edition, Tata McGraw-Hill.
10. Topley (2002), *J2ME in A Nutshell*, O'Reilly Publishers.

Course Code	Title of the Course	Credits	Hours
31534	COMPUTER NETWORKS	4	12

Course Objectives:

- To understand networking concepts and basic communication model
- To understand network architectures and components required for data communication.

Unit No.	Contents
	BLOCK 1 : INTRODUCTION & PHYSICAL LAYER
1	Introduction; Computer Networks - Applications - Line configuration - Topology - Transmission Modes
2	Categories of Network: LAN, MAN, WAN - OSI Layer.
3	Physical Layer: Analog and Digital Signals Performance - Transmission Media
	BLOCK 2 : DATA LINK LAYER
4	Data Link Layer: Error Detection and correction – Introduction – Block Coding – Cyclic Redundancy Check – Framing – Flow and error Control –
5	Data link layer protocols: stop - wait protocol and sliding window protocol - ARQ, Go-back-n ARQ, selective - repeat ARQ.
6	Multiple Access Protocols: ALOHA – CSMA – CSMA/CD – CSMA/CA.
	BLOCK 3 : NETWORK LAYER
7	Introduction: Circuit switching - packet switching - message switching - Virtual circuit and Datagram subnets
8	Routing algorithm : Static routing -shortest path routing, Flooding, Flow based routing - Dynamic routing - distance vector routing, link state routing
9	Other Routing Algorithms: Hierarchical routing, Broad cast, Multi cast routing - Congestion, Control Algorithms
	BLOCK 4 : TRANSPORT LAYER
10	Introduction: Process to process delivery – UDP – TCP - Connection oriented Vs connectionless services.
11	Applications and services: Domain name system - Remote Logon – Mail Exchange - File Transfer
12	Remote Procedure Call - Remote File Access – WWW and HTTP – SNMP.
	BLOCK 5 : NETWORK SECURITY
13	Introduction: Cryptography – Encryption model – Transposition and Substitution Chipers – Cryptographic principles
14	Symmetric key cryptography: DES – AES – Asymmetric key cryptography: RSA – Security services.

Reference and Text Books:

1. Andrew S Tanenbaum (2013), *Computer Networks*, 5th Edition, Pearson Education.
2. Behrouz A. Forouzan, (2017), *Data Communications and Networking*, 4th Edition, TMH.
3. S.Keshav(2008), *An Engineering Approach to Computer Networks*, 2nd Edition, Pearson Education.
4. William Stallings (2007), *Data and Computer Communications*, 8th Edition, PrenticeHall.



Course Code	Title of the Course	Credits	Hours
31535	DATA MINING AND WAREHOUSING	4	12

Course Objective:

- This course presents on depth of to data mining techniques; association rule, clustering, classification, web mining, temporal and sequential data mining and provide a practical exposure using data mining tool orange.
- To enable the students to learn the basic functions, principles and concepts of Data Mining
- To understand the fundamentals of Big Data Analytics

Unit No.	Contents
	BLOCK 1 : DATA MINING and WAREHOUSING INTRODUCTION
1	Data Warehousing Introduction – Definition-Architecture-Warehouse Schema-Warehouse server-OLAP operations. Data Warehouse technology – Hardware and operating system
2	Data Mining - Definition – DM Techniques – current trends in data mining - Different forms of Knowledge – Data selection, cleaning, Integration, Transformation, Reduction and Enrichment.
3	Data: Types of data - Data Quality - Data Preprocessing - Measures of similarity and dissimilarity. Exploration: Summary statistics – Visualization.
	BLOCK 2 : ASSOICATION RULE MINING AND CLASSIFICATION
4	Association rules: Introduction – Methods to discover association rule – Apriori algorithm Partition Algorithm
5	AR Algorithms: Pincher search algorithm – Dynamic Item set algorithm – FP Tree growth algorithm.
6	Classification: Decision Tree classification – Bayesian Classification – Classification by Back Propagation.
	BLOCK 3 : CLUSTERING TECHNIQUES AND MACHINE LEARNING
7	Introduction – Clustering Paradigms – Partitioning Algorithms – K means & K Mediod algorithms – CLARA – CLARANS – Hierarchical clustering – DBSCAN – BIRCH – Categorical Clustering algorithms – STIRR – ROCK – CACTUS.
8	Introduction to machine learning – Supervised learning – Unsupervised learning – Machine learning and data mining.
9	Neural Networks: Introduction – Use of NN – Working of NN Genetic Algorithm: Introduction –Working of GA.
	BLOCK 4 : WEB MINING AND VISUAL DATA MINING
10	Introduction –Web content mining – Web structure mining –Web usage mining –Text mining –Text clustering, Temporal mining -Spatial mining
11	Visual data mining – Knowledge mining – Various tools and techniques for implementation using Weka, Rapidminer and Matlab.
	BLOCK 5 : INTRODUCTION TO BIG DATA ANALYTICS
12	Big Data Characteristics- Types of Big Data- Traditional Versus Big Data Approach
13	Technologies Available for Big Data
14	Hadoop – Introduction - What is Hadoop? - Core Hadoop Components - Hadoop Ecosystem - Physical Architecture – Hadoop Limitations

Reference and Text Books:

1. Arun K Pujari (2008), “*Data Mining Techniques*”, Universitypress.
2. Alex Berson, Stephen J.Smith(2004) , “*Data Warehousing , Data Mining & OLAP*”,

TataMcGraw Hill.

3. C S R Prabhu (2002), "*Data Warehousing – concepts, techniques and applications* ", 2nd Edition, Prentice Hall of India.
4. DT Editorial Services (2016), "*Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)*", Dream tech Press edition.
5. Jaiwei Han, Michelinne Kamber (2008), "*Data Mining: Concepts and Techniques*", Harcourt India, Morgan Kauffman publisher.
6. Radha Shankarmani, M Vijayalakshmi (2016), "*Big Data Analytics*", first Edition, Wiley Publications,
7. Seema Acharya, Subhashini Chellappan (2016), "*Big Data and Analytics*", Wiley Publication, first edition.

Course Code	Title of the Course	Credits	Hours
31536	INTERNET AND JAVA PROGRAMMING LAB	4	120

Course Objective:

- To understand and practice markup languages
- To understand and practice embedded dynamic scripting on client side Internet Programming
- To understand and practice web development techniques on client-side

Experiments based on Internet Programming Theory

Unit No.	Contents
	BLOCK 1 : JAVA FUNDAMENTAL PROBLEMS:
1	Simple Java Problems
2	class and objects
3	Conditional control using java
4	Looping using java
	BLOCK 2 : OOP CONCEPTS
5	Function overloading programs
6	Operator overloading programs
7	Inheritance programs, Packages
8	Polymorphism programs Message passing programs
	BLOCK 3 : THREAD & VIRTUAL FUNCTION
9	Threads
10	Virtual function programs
	BLOCK 4 : I/O AND EXCEPTION HANDLING
11	Exception handling programs
12	I/O manipulation programs,
	BLOCK 4 :NETWORK PROGRAMMING
13	Applet programs
14	Implementation of simple network programs using java

Reference and Text books:

1. Balagurusamy.E (2010), Programming with Java, 4e, Tata McGraw-Hill.
2. Deitel, Deitel and Nieto (2000), Internet and World Wide Web – How to program, Pearson Education.
3. Cay S. Horstmann (2003), *Gary Cornell, Core Java*, Volume I and II, 5th Edition, Pearson Education.
4. Elliotte Rusty Harold (2000), Java Network Programming, O'Reilly Publishers.
5. Ed Roman (1998), *Enterprise Java Beans*, Wiley Publishers.
6. Hunt (2004), *Guide to J2EE Enterprise Java*, Springer Publications.
7. Krishnamoorthy R and Prabhu.S (2013), Internet and Java Programming, New Age International Publishers.
8. Mohamal Ibrahim .B (2006), *Java : J2SE – A Practical Approach*, Firewall media.
9. Naughton and H.Schildt (2006), Java 2 - The complete reference, Fourth edition, Tata McGraw-Hill.
10. Topley (2002), *J2ME in A Nutshell*, O'Reilly Publishers.

SEMESTER IV

Course Code	Title of the Course	Credits	Hours
31541	Internet of Things	4	12

Course Objectives:

- To understand the basics of Internet of things and protocols.
- To introduce some of the application areas where Internet of Things can be applied.

Unit No.	Contents
	BLOCK 1: INTRODUCTION
1	Introduction: Definition and characteristics of IoT – Elements of IoT Eco system – IoT challenges.
2	IoT Design: Physical Design of IoT – IoT protocols - Logical Design of IoT – functional blocks – communication models – communication API
3	Technologies: IoT Enabled Technologies – IoT Levels – Domain Specific IoTs
	Block 2 : M2M and IoT components
4	IoT and M2M – Introduction – Difference between IoT and M2M – SDN and NFV for IoT
5	IOT Design Methodology IoT systems management - IoT design methodology-Specifications - Integration and Application Development
6	IOT Components Sensors and activators - Communication modules - Zigbee-RFID-Wi-Fi-Power sources.
	BLOCK 3: IoT Platforms and Applications
7	Building IOT with Hardware Platforms Platform - Arduino/Intel Galileo/Raspberry Pi- Physical device – Interfaces.
8	IoT Applications / case studies Illustration IoT design: Home Automation – Cities- Smart Agriculture – Smart Environment - Smart Grid– Smart Healthcare - Connecting IoT to cloud-Cloud storage for IoT-Data Analytics for IoT- Software & Management - Tools for IoT.
	Block 4: IoT systems Logical Design using Python
9	Introduction: History of Python - Installing Python – Python character set - data types - expressions
10	Decision Statements: Introduction - if , if-else , nested if statements – multi-way if-else if statements. Loop Control Statements: Introduction – while loop – range() function – for loop = nested loops – break and continue statements
11	Functions: Introduction – Syntax and basics of function – use of function – parameters and arguments in function – local and global variables – return statement. Strings: Introduction – The str class – built in functions for string – index[] operator - traversing string – immutable strings – string operators – string operations.
	Block 5 : List, Tuples And Sets
12	Lists : Introduction – creating lists – accessing the elements of a list – negative list indices – list slicing – built-in functions for list – list operator – list methods – passing list to a function – returning list from function
13	Tuples and sets: Introduction to tuples - creating – tuple() function – built-in functions for tuples - indexing -slicing – operators – list and tuples – sorting - traversing. Sets – creating – set in and not in operator – set classes - operations.
14	Python packages of Interest for IoT : JSON, XML – HTTPlib – URL lib – SMTP lib

Reference and Text Books:

1. Ashok Namdev Kamthane, Amit Ashok Kamthane(2018),*Programming and Problem solving with Python*, Mc GrawHill Education.
2. ArshdeepBahga, Vijay Madiseti (2015), "*Internet of Things-A hands-on approach*", Universities Press.
3. Jan Ho" ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle.(2014).*From Machine to-Machine to the Internet of Things - Introduction to a New Age of Intelligence*. Elsevier..
4. Manoel Carlos Ramon (2014), *Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers*, Apress,.
5. Marco Schwartz(2014), *Internet of Things with the ArduinoYun*, Packt Publishing.
6. Olivier Hersent, David Boswarthick, Omar Elloumi.(2012).*The Internet of Things – Key Applications and Protocols*. Wiley.

Course Code	Title of the Course	Credits	Hours
31542	ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING	4	12

Course Objective:

- To learn the key aspects of Artificial Intelligence (AI) and Soft computing principles and approaches.
- To know about the components and building block hypothesis of Genetic algorithm.
- To study the fuzzy logic components.

Unit No.	Contents
ARTIFICIAL INTELLIGENCE	
BLOCK 1 : PROBLEMS AND SEARCH	
1	Introduction: The Artificial Intelligence (AI) Problem – What is an AI technique - Criteria for success.
2	Problems, Problem Spaces, Search: Defining Problems, Problem Spaces, Search State space search - Production Systems – Problem characteristics - Production system characteristics – Application areas.
3	Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First search – Problem reduction – constraint satisfaction - Means-end analysis.
BLOCK 2 : KNOWLEDGE REPRESENTATION	
4	Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.
5	Using Predicate logic: Representing simple facts in logic – Representing Instance and ISA relationships - Computable functions and predicates - Resolution.
6	Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming - Forward Vs Backward reasoning - Matching – Control knowledge.
SOFT COMPUTING	
BLOCK 3: INTRODUCTION	
7	Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics – Applications.
8	Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process.
9	ANN model: McCulloch-Pitts Model –Linear Separability -Hebb Network.
BLOCK 4: FUZZY LOGIC	
10	Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets
11	Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation
12	Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.
BLOCK 5 : GENETIC ALGORITHM	
13	Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function.
14	Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA - The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.

Reference and Text Books:

1. Elaine Rich and Kevin Knight (2008), "*Artificial Intelligence*", Tata McGraw Hill, Third Edition, Publishers company Pvt Ltd.
2. Jang J.S.R., C.T. Sun, E. Mizutani (2015), "*Neuro-Fuzzy and Soft Computing*", Pearson.
3. Rajasekaran .S, G.A.V. Pai (2017), "*Neural Networks, Fuzzy Logic, Genetic Algorithms*", second edition, Prentice Hall India.
4. Sivanandam S.N., S.N. Deepa (2011), "*Principles of Soft Computing*", 2nd edition, Wiley India.
5. Venugopal C.K (2019), *Artificial Intelligence and Machine Learning*, Pacific Books International.

Course Code	Title of the Course	Credits	Hours
31543	BIG DATA ANALYTICS AND R PROGRAMMING	4	12

Course Objective:

- Able to understand the characteristics of Big Data.
- Student will learn how to use R for effective data analysis
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Unit No.	Contents
	BIG DATA
	BLOCK 1 : BIG DATA
1	Introduction: Big Data Characteristics- Types of Big Data- Traditional Versus Big Data Approach.
2	Technologies Available for Big Data - Infrastructure for Big data – Use of data analytics – Big data Challenges - Desired Properties of a Big Data System -
3	Hadoop – Introduction - What is Hadoop? - Core Hadoop Components – Hadoop Ecosystem - Physical Architecture – Hadoop Limitations.
	BLOCK 2 : MapReduce
4	MapReduce and The New Software Stack- MapReduce- Algorithms Using MapReduce
5	Finding Similar Items – Introduction - Nearest Neighbor Search - Applications of Nearest Neighbor Search- Similarity of Documents
6	Collaborative Filtering as a Similar-Sets Problem - Recommendation Based on User Ratings- Distance Measures.
	BLOCK 3: NoSQL
7	What is NoSQL? - NoSQL Business Drivers - NoSQL Case Studies - NoSQL Data Architectural Patterns
8	Variations of NoSQL Architectural Patterns - Using NoSQL to Manage Big Data
	R PROGRAMMING
	BLOCK 4: Introduction to R Programming
9	Introduction to R – History of R - Features of R - Essentials of the R language – R-Environment setup – Basic syntax: command prompt, script file, comments. Data types - Variables – operators: operator types -expressions.
10	Control statements – Decision making- if – if-else – nested if - switch– loops – repeat- while – for – loop control statements - break – next statement.
11	Functions: function definition -function components –built-in functions – user defined function - calling function - Recursion - Strings: Rules of strings - string manipulation.
	BLOCK 5: OBJECTS AND PACKAGES
12	Objects: Vectors – Vector creation – Vector Manipulation – Lists: Creating a list, naming, accessing, manipulating list elements- merge list -converting list to Vector – Arrays- Names columns and rows – Accessing array elements, manipulating array elements – operations of array elements-
13	Matrices – Accessing elements of Matrix – operations on matrix– Factors – Frames – Create data frames - getting the structure of data frame- Extract data from data frame
14	Packages – available R packages - install a new package – load package to library - Data reshaping – joining columns and rows in a data frame- merging dt frames – melting and casting.

Reference and Text Books:

1. Andrie de Vries, Joris Meys(2016), *R Programming for Dummies*, 2nd edition, Wiley.
2. DT Editorial Services (2016), “*Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)*”, Dream tech Press edition.
3. Mark Gardener(2013), *Beginning R The Statistical Programming Language*, Kindle edition.
4. Rajendra B. Patil (2017) , HirenDand & Rupali Dahake, *A practical Approach to R*, First edition , Shroff/X-Team.
5. Radha Shankarmani, M Vijayalakshmi (2016), “*Big Data Analytics*”, second Edition, Wiley Publications.
6. Scott Burger(2018), *Introduction to Machine Learning with R: Rigorous Mathematical Analysis*, Shroff/O'Reilly.
7. Seema Acharya, Subhashini Chellappan (2016), “*Big Data and Analytics*”, first edition, Wiley Publication.

Course Code	Title of the Course	Credits	Hours
31544	MOBILE APPLICATION DEVELOPMENT	4	12

Course objective:

- To provide an overall knowledge about mobile devices, communication methodologies and its application development

Unit No.	Contents
	BLOCK 1: MOBILE ECOSYSTEM
1	Introduction: The mobile ecosystem, operators, networks
2	Devices : platforms, operating systems
3	Applications : application frameworks, applications, services
	BLOCK 2 : MOBILE DEVICE PROFILES
4	Categories : SMS, mobile websites, mobile web widgets
5	Native applications: Games, utility apps, location based services(LBS)
6	Apps : Informative apps, Enterprise apps
	BLOCK 3 : MOBILE INFORMATION ARCHITECTURE
7	Introduction : sitemaps, click streams, wireframes, prototyping, architecture
8	Mobile design : Interpreting design, Elements of mobile design
9	Mobile design tools : Designing for different device/ screens
	BLOCK 4 : J2ME
10	Introduction : J2ME architecture and development environment, small computing device requirements, Run-time environment, MIDlet programming
11	Languages : J2ME, J2ME SDK, J2ME wireless toolkit
	BLOCK 5 : CASE STUDY
12	Introduction : Google Android introduction, Android development Environment
13	Development framework, SDK, Eclipse, Emulator, Android AVD
14	Project framework: Apple IOS, RIM Blackberry, Samsung Bada, Nokia Symbian, Microsoft windows phone

Reference and Text Books

- Brian Fling(2009), *Mobile Design and Development*, OReilly media.
- James Keogh, J2ME (2003), *The Complete Reference*, Tata McHill.
- Mark L.Murphy (2009), *Beginning Android*”, Apress.
- Pei zheng and Lionel Ni (2006), *Smart phone and Next Generation Mobile Computing*, Elsevier.

Course Code	Title of the Course	Credits	Hours
31545	PROJECT WORK	10	-

Course Objective:

- To provide practical training on some live projects that will increase capability to work on actual problem in industry.
- To undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market and it will be useful for their future employment in industry.

Course Requirement:

- Basic concepts of Web and C/ Java /VB /ASP .NET programming

Course Outcome:

- Explore markup languages features and create interactive web pages
- Able to design front end web page and connect to the back end databases.
- Able to study, design, develop , implement and maintain software applications

Instructions

- *Design, develop and implement project work based on latest cutting edge technologies using latest software's.*
- *Do the project under the supervision of Alagappa university recognized supervisor.*
- *Submit the project report documentation (2 copies)*

The **layout guidelines** for the Project & Seminar Report:

A4 size paper

Font: Arial (10 points) or Times New Roman (12 points)

Line spacing: 1.5 Top & bottom margins: 1 inch/ 2.5 cm

Left & right margins: 1.25 inches/ 3 cm

The project report composed of the following sections;

Title Page

Student declaration

Certificate

Acknowledgement

Table of contents

Abstract of the project

Introduction

SYSTEM STUDY

Identify the Problem (Aim & Objectives) Problem description

Scope of the Problem

Motivation

Identify the existing system and its Limitations, Feasibility study Proposed system to overcome limitations

SYSTEM DESIGN

Prepare Input / Output Design, Prepare Form Design

Prepare software design

(UML Diagram, Data Dictionary, Use case, Activity diagram, E-R diagram)

SYSTEM DEVELOPMENT

System Development and Implementation the project

SYSTEM TESTING

System testing

methods SYSTEM

MAINTENANCE

System maintenance of the project

CONCLUSION

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- a) Summary of question posed
- b) Summary of findings
- c) Summary of main limitations of the study at hand
- d) Details of possibilities for related future research

REFERENCES

APPENDIX

Sample Source Code

Reports/Screen

Layouts

Reference Books and text books:

1. Ali Bahrami (2008), *Object Oriented System Development*, Tata McGraw Hill Edition.
2. Elias, M Award (2010), *System analysis and design*, second edition, Galgotia Publications Pvt Ltd.
3. Grady Booch, Robert A.Maksimchuk et.al (2009), *Object Oriented Analysis and Design with applications*, 3rd Edition, Pearson Education.
4. Ivar Jacobson(2004), *Object Oriented Software Engineering: A Use Case Driven Approach*, Addison wesley.
5. James Rumbaugh et.al (2006), *Object Oriented Modeling and Design*, Addison Wesley.
6. Larman (2003), *Applying UML & Patterns, An Introduction to Object Oriented Analysis and Design*, 2nd Edition, Pearson Education.
7. Martin Fowler, Kendall Scott (2004), *UML, Distilled* Addison Wesley.
