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A Documentary Support

for

Matric No. – 1.1.1

Programme Outcomes & Course Outcomes

under the

Criteria – I

(Curriculum Design and Development)

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in

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POST GRADUATE DIPLOMA IN ARCHIVAL STUDIES AND MUSEOLOGY

2000

Mapping:

Local Need *Regional* *National* *Global Need*

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BACHELOR OF COMPUTER APPLICATION (B.C.A.)

DETAILED SYLLABUS

FIRST SEMESTER

S.No.	Name of the Course	Course Code	Course Content	Course Objective
1	Computer Fundamental and MS - Office	C-101	**UNIT-I** **Introduction to Computers:** Introduction, Characteristics of Computers, Block diagram of computer. Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages). Data Organization, Drives, Files, Directories. Types of Memory (Primary And Secondary) RAM ROM, PROM, and EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive) I/O Devices (Scanners, Plotters, LCD, Plasma Display) Number Systems Introduction to Binary, Octal, Hexadecimal system Conversion, Simple Addition, Subtraction, Multiplication.	CO1: To impart knowledge about the structure, components and functions of a computer system, different categories based on their capabilities and the Binary number system
			UNIT-II **Algorithm and Flowcharts Algorithm**: Definition, Characteristics, Advantages and disadvantages, Examples Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples	CO2: Understanding of the importance of algorithms in the development of computer applications and design of algorithm and flowchart

			UNIT-III Operating System and Services in O.S., DOS, History, Files and Directories, Internal and External Commands, Batch Files, Types of O.S.	CO3: Familiarization with the terms like Operating System, peripheral devices, networking, multimedia, internet, etc.
			UNIT-IV Windows Operating Environment Features of MS-Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush.	CO4: Learn the basics of operating windows and its features and how they can be used to make your academic work more efficient.
			UNIT-V Editors and Word Processors Basic Concepts, Examples: MS-Word, Introduction to desktop publishing. Spreadsheets and Database packages Purpose, usage, command, MS-Excel, Creation of files in MS-Access, Switching between application, MS-PowerPoint.	CO5: Learn basic word processing skills with Microsoft Word, Develop the skill to work with MS-Word, Excel , MS- Access and PowerPoint.
Suggested Books: 1. Fundamental of Computers,By V.Rajaraman B.P.B. Publications 2. Fundamental of Computers,By P.K. Sinha 3. MS-Office 2000(For Windows),By Steve Sagman 4. Computer Networks,By TennenbumTata MacGraw Hill Publication				
2.	Introduction to Programming using C	**C-102**	**UNIT-I** **C basics**: C character set, Identifiers and keywords, Data types, constants, variables and arrays, declarations, expressions statements, symbolic constants, compound statements ,arithmetic operators, unary operators, relational and logical	CO1: To learn advance structured and procedural programming and to improve C programming skills, the basic structure of a C program, role of variable, operators and keywords in programming.

			operators, assignment operators, conditional operators, bit operators.	
			UNIT-II **Decision Control Structures:** If Statement, If-else statement, Nested if (), If () ladder, Switch, case statement, Iterative statements: For loop, While loop, Do-while() loop, Conditional statements: Break, Continue, Storage Classes, Array: Declaration of an Array, Initialization of Array, Types of Array: Single Dimension Array, Two-Dimensional Array, Address Calculation of an Element of a 2-D Array	CO2: Learn and understand the working of conditional and looping statements and concept and importance of array in programming.
			UNIT-III **Functions:** Library Functions, User Defined Functions, Function Declaration, Prototype Declaration, Types of Arguments: Actual Arguments, Formal Arguments, Function Definition, Passing Arrays as Parameters, Methods to Call a Function: Call by Value, Call by Reference.	CO3: Understanding the working of function in code organization.
			UNIT-IV **Pointers:** Declaration of Pointer Variables, Pointer Arithmetic, Returning Multiple Output Values through a Function Strings.	CO4: Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
			UNIT-V Structures, Unions, Array of Structures, Enumerations, File Handling: Opening a File, Closing a File, File, Opening Modes, Reading from and Writing	CO5: Know the concept file handling, input output operations. Able to use the structure and union.

			to a File, Copying Content of an Existing File to another, Command Line Arguments, argc and argv Parameters, Pre-processor Directives.	
Suggested Books: 1. E.Balagurusamy, "Programming in ANSI C", TMH 2. PeterNorton's, "Introduction to Computers", TMH 3. YashwantKanetkar, "Let us C", BPB				
3.	Business Communication and Soft Skills	C-103	**UNIT-I** **Means of Communication**: Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of good communication, Communication barriers, 7C's of Communication, Types of Communication: Meaning, nature and scope.	CO1: Learn the importance of communication, its need & benefits and forms of communication.
			UNIT-II **Oral communication**: Principle of effective oral communication Techniques of effective speech, Media of oral communication (Face, to, face conversation, Teleconferences, Press Conference, Demonstration, Radio Recording, Dictaphone, Meetings, Rumour, Demonstration and Dramatisation, Public address system, Grapevine, Group Discussion, Oral report, Closed circuit TV). The art of listening, Principles of good listening. **Written Communication** Purpose of writing, Clarity in Writing, Principle of Effective writing, Writing Techniques, Electronic Writing Process. **Business Letters & Reports**: Need and functions of business letters, Planning & layout of business letter, Kinds of business letters, Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports.	CO2: Mastering the art of Formal correspondence writing, To actively participate in oral and written communication in practical applications.

			UNIT-III **Drafting of business letters:** Enquiries and replies, Placing and fulfilling orders, Complaints and follow, up Sales letters, Circular letters Application for employment and resume. **Information Technology for Communication:** Word Processor, Telex, Facsimile(Fax), E-mail, Voice mail, Internet Multimedia, Teleconferencing, Mobile Phone Conversation, Video Conferencing, SMS, Telephone Answering Machine, Advantages and limitations of these types. **Self Analysis:** SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem. Creativity: Out of box thinking, Lateral Thinking**.**	CO3: To study the development of skills of comprehension writing letters, and understand the use of information technology in communication.
			UNIT-IV **Attitude:** Factors influencing Attitude, Challenges and lessons from Attitude, Etiquette. Motivation: Factors of motivation, Self talk, Intrinsic & Extrinsic Motivators. Goal Setting: Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals. **Interpersonal Skills:** Gratitude: Understanding the relationship between Leadership Networking & Team work. Assessing Interpersonal Skills Situation description of Interpersonal Skill. Team Work: Necessity of Team Work Personally, Socially and Educationally.	CO4: Learn about the interpersonal skills and how the attitude plays a positive role in communication and how to motivate our self and work as motivator for others.
			UNIT-V **Leadership:** Skills for a good Leader, Assessment of Leadership Skills, Stress Management: Causes of Stress and its impact, how to manage & distress, Circle of control, Stress Busters. Emotional	CO5: Learn how to become a good leader with leadership skills and decision making and how to handle emotional challenges.

			Intelligence: What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales, Managing Emotions. **Conflict Resolution:** Conflicts in Human Relations – Reasons Case Studies, Approaches to conflict resolution. Decision Making: Importance and necessity of Decision Making, Process and practical way of Decision Making, Weighing Positives & Negatives.	

Suggested Books:

1. Business Communication, "K.K.Sinha, Galgotia Publishing Company, New Delhi".
2. Media and Communication Management, "C.S. Rayudu, Hikalaya Publishing House, Bombay".
3. Essentials of Business Communication, "Rajendra Pal and J.S. Korlhalli, Sultan Chand & Sons, New Delhi".

4.	Introduction to HTML, CSS- XML	C- 104	**UNIT-I** Basics of Internet and Web The basics of Internet, World Wide Web, Web page, Home page, Web site, Static, Dynamic and Active web page, Overview of Protocols, Simple Mail Transfer Protocol, Gopher, Telnet,Emails,TFTP,Simple Network Management Protocol, Hyper Text Transfer Protocol,Client server computing concepts.Web Client and Web Sever Web Browser, Browsers e.g.,Netscape navigator,Internet Explorer,Mozilla Firefox,Client,Side Scripting Languages,VB Script and Java Script, Active X control and Plug-ins,Web Server Architecture, Image maps,CGI,API web database connectivity,DBC,ODBC	CO1: To learn the basic knowledge of softwrae use in website development, improve the visual design and content structuring.
			UNIT-II Dynamic HTML, Document Object Model, Features of DHTML, CSSP (Cascading Style Sheet Positioning) and JSSS (JavaScript assisted Style Sheet), Layers of Netscape, The ID Attribute, DHTML Events	CO2: Learn the basics of HTML , DHTML programming and importance of CSS.
			UNIT-III **Introduction to HTML:** Editors, Basics, Element,	CO3: Understanding the use of HTML tags, Designing

			Attribute, Headings, Paragraphs, Styles, Formatting, Quotations,Comments,CSS,Links,Images,Tables,Lists, Blocks,Classes,ID, frames, File Paths, Head, Layout, Computer Code, Entities, Symbols, Charset, Colorand Background of Web Pages, Hypertext, Hyperlink and Hypermedia, Links, Anchors and URLs, Links to External Documents, Different Section of a Page and Graphics, Footnote and E-Mailing, Creating Table, Frame, Form and Style Sheet.	and Developing web pages using HTML, Create Format cells, rows, columns, and entire worksheets.
			UNIT-IV **CSS:** Introduction, Syntax, Colors, Backgrounds, Borders, Margins, Padding, Height/ Width, Box Model, Outline, Text, Fonts, Icons, Links, Lists, Tables, Display, Max, Width, Position, Overflow, Float, Inline, Block, Align, Combinators,Pseudo,Class,Pseudo Elements, Opacity, Navigation Bar, Dropdowns, Image Gallery, Image Sprites, Attr Selectors, Forms, Counters, Website Layout, Units,Specificity.	Learn the basic of styling web page using CSS.
			UNIT-V **XML:** Introduction, Tree, Syntax, Elements, Attributes, Namespaces, Display, HTTP request, Parser, DOM, XPath, XSLT,XQuerry,XLink, Validator, DTD, Schema, Server	Learn and understand how the XML supports information exchange between computer systems such as websites, databases, and third-party applications.
Suggested Books: 1. Shelley Powers, “Dynamic Web Publishing” 2 2. Html & CSS: The Complete Reference 5th Edition (English, Paperback, Thomas A. Powell) 3. XML: The Complete Reference Book by Heather Williamson				
5.	Mathematics -I	C-105	**UNIT-I** **Determinants:** Definition,Minors,Cofactors,Properties of Determinants MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices,Adjoint, Inverse,Cramers Rule, Rank of Matrix Dependence of	CO1: Learn the uses of matrices and determinants to solve a system of simultaneous linear equations.

			Vectors, Eigen Vectors of a Matrix,Caley,Hamilton Theorem (without proof).	
			UNIT-II **Limits & Continuity:** Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities	CO2: Learn how a function of two variables can approach different values at a boundary point, depending on the path of approach.
			UNIT-III **Differentiation:** Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation,Rolle's Theorem, Mean Value Theorem,Expansion of Functions (Maclaurin's& Taylor's),Indeterminate Forms, L-Hospitals Rule,Maxima & Minima,CurveTracing,Successive Differentiation & Liebnitz Theorem.	CO3: Learn how the Differentiation is used to study the small change of a quantity with respect to unit change of another.
			UNIT-IV **Integration:**Integral as Limit of Sum, Fundamental Theorem of Calculus(without proof.), Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Reduction Formulae for Trigonometric Functions, Gamma and Beta Functions(definition).	CO4: Learn how the integration is used to add small and discrete data, which cannot be added singularly and representing in a single value.
			UNIT-V **Vector Algebra:** Definition of a vector in 2 and 3 Dimensions, Double and Triple Scalar and Vector Product and physical interpretation of area and volume.	Understand how the vector algebra perform algebraic operations on vectors and vector spaces.

Suggested Books:

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.
2. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999.

3. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand & Company, 9th Revised Edition, 2001.

BACHELOR OF COMPUTER APPLICATION (B.C.A.)

DETAILED SYLLABUS

SECOND SEMESTER

1.	Object Oriented Programming Using C++	C- 201	**UNIT-I** **Introduction:**Introducing ObjectOriented Approach, Procedural Programming Language Vs Object Oriented Language. Basic concept of OOPs, operators, tokens, variables, Keywords, Data types, identifiers, characters,typedef statement, constants, Enumerated data type.	CO1: To give an overview of benefits of Object-Oriented Programming (OOP) approach over the Traditional Programming approaches.
			UNIT-II **Control Flow:** If statement, If Else statement, Nested If, Else, Statements, For Loop, While Loop, Do, While Loop, Break, Switch, Continue, goto. Classes and Objects,Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, Constructors and destructors, Default parameter value, object types,C++ garbage collection,dynamic memory allocation,Metaclass / abstract classes.	CO2: Learn how to analyze the concept of classes and object, array, functions, constructor and destructor and statements, and skill to write codes in C++ by applying concept of OOP.
			UNIT-III **Array:** Array Illustration, Multi, Dimensional arrays, Strings, Array of Strings, Function prototype, function return data type, parameter passing, Default argument, Inline function, Function Overloading, Array Function, Operator Overloading,	CO3: Learn uses of array in programming and the concept of function and operator overloading in OOPS.
			UNIT-IV **Pointers:** Pointer to Derived Class, array of Pointers,	CO4: Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers,

			Inheritance and Polymorphism: Inheritance,Class hierarchy,derivation,public,private & protected, abstract Classes, Single, Multilevel, Multiple, Hierarchical, Hybrid, benefits of Inheritance.	declarations, initialization, operations on pointers and their usage.
			UNIT-V **Files and ExceptionHandling:** Streams and files,Namespaces,Exception handling.	CO5: Ability to isolate and learn how to handle exception using exception handling in C++programs

Suggested Books:

1. A.R.Venugopal,Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997.
2.S.B.Lippman&J.Lajoie," C++ Primer",3rdEdition, Addison Wesley, 2000.The C programming Lang.,PersonEcl,Dennis Ritchie
3. R.Lafore,"Object Oriented Programming using C++",Galgotia Publications,2004
4. D.Parasons,"Object Oriented Programming using C++",BPB Publication

2.	Digital Electronics	C-202	**UNIT-I** **Number System & Boolean Algebra:** Number System: Binary, Octal, Decimal, Hexadecimal, Conversion of Number System, Binary Arithmetic &Complement, Binary Codes: Weighted &Non Weighted, Gray Code, Excess-3 Code. Error Detection Codes, Hamming Code, Boolean Function, Boolean Postulates, De-Morgan's Theorem, Boolean Expressions: Sum of Product, Product of Sum, Minimization of Boolean Expressions using K-Map, Logic Gates: AND, OR,NOT,NAND, NOR, XOR, XNOR, Implementations of Logic Functions using Gates, NAND, NOR Implementations, Multilevel gate Implementations.	CO1: To acquire the basic knowledge of number and understanding of the fundamental concepts & techniques used in digital electronics.
			UNIT-II **Combinational Circuits:** Adders & Subtractors: Half Adder, Full Adder, Binary Adder, Half Subtractor, Full Subtractor, Magnitude Comparator: Two Bit Magnitude Comparator, Three Bit Magnitude Comparator, Multiplexer &De-Multiplexer: 4*1	CO2: The ability to understand, analyze and design various combinational circuits.

			Multiplexer, 8*1Multiplexer, Decoder & Encoder, Parity Checker &Generator, Code Converter.	
			UNIT-III **Sequential Circuit:** Introduction to Flip Flops: SR, JK, T, D, Master Slave Flip Flops, Conversion of Flip Flops, Characteristic Table & Equation, Edge Triggering & Level Triggering, Excitation Table, State Diagram, State Table, State Reduction, Design of Sequential Circuits.	CO3: The ability to understand, analyze and design various sequential circuits.
			UNIT-IV: **Registers**: Introduction of Registers, Classification of Registers, Register with Parallel Load, Shift Registers, Bidirectional Shift Register with Parallel Load.	CO4: Demonstrate the knowledge of register and learn the working of its classification.
			UNIT-V: **Counters:** Introduction of Counter, Asynchronous/Ripple Counters, Synchronous Counters, BCD Counter,4-bit Binary Counter with Parallel Load, Design of Synchronous Counters, Ring Counter, Johnson Counter.	CO5: Demonstrate the knowledge of counters and Analyse & design sequential digital circuits like counters.
Suggested Books: 1. Digital Logic and Computer design (PHI) 1998 :M.M. Mano 2. Computer Architecture (PHI) 1998 : M.M. Mano 3. Digital Electronics (TMH) 1998 :Malvino and Lea				
3.	Data Structure Using'C'/'C++'	C-203	**UNIT-I** Classification of Data Structure, Operations on Data Structure, Address Calculation, Application of arrays, Limitation of Array, Application of Arrays, Array as Parameters, Sparse Matrices	CO1: To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.
			UNIT-II **Continuous Implementation (Stack):** Array Representation, Operations on Stacks: Push & Pop, Applications of stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive	CO2: Describe how stacks & queues are represented in memory and used by algorithms and understand the concept writing recursive methods.

			Definition and Processes, Principles of Recursion, Tower of Hanoi Problem, Recursion Vs. Iteration Continuous. Implementation (Queue): Array representation and implementation of Queues, Operations on Queue: Create, Add,Delete,Full and Empty Queue, Circular Queue, Dequeue and Priority Queue	
			UNIT-III **Non Continuous Implementation:** Link Lists: Linear List concept, Linked List Terminology, Representation of Linked List in Memory, Types of Linked List, Single Linked List, Doubly Linked List, Single Circular Linked list, Circular Doubly Linked List, Operations on Link List: Create List Insert node (empty list ,beginning ,middle, end),Delete node(first, general case), Traversing node, Searching node, Print list, Count Nodes, Sort Lists	CO3: Understand the concept and implementation of linked list and design an algorithms of operation performed on linked list.
			UNIT-IV: **Trees:** Introduction to Tree & its Terminology, Binary trees, Types of Binary trees, Representation of Binary Tree, Traversals (Inorder, Preorder,Postorder),Tree Expression, Binary Search Tree, Insertion and Deletion in BST.	CO4: Learn the concept of trees and solve the problem trees .
			UNIT-V: **Sorting & Searching Techniques:** Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Sequential Search, Binary Search	CO5: Understand the concept of sorting and searching techniques, and learn to apply Algorithm for solving problems like sorting, searching.

Suggested Readings:

1. S. Lipschutz," Data structures", Mc, Graw, Hill International Editions,1986.
2. A. Michael Berman,"Data Structures via C++",Oxford University Press,2002.
3. M. Weiss,"Data Structures and Algorithm Analysis in C++",Pearson Education

4.	Principles of Management	C-204	**UNIT-I** **Nature of Management:** Meaning, Definition, it's nature purpose, importance & Functions,	CO1: Describe the primary functions and importanceof

			Management as Art, Science & Profession- Management as social System Concepts of management, Administration, Organization, Evolution of Management.	management and the roles of administration and organization.
			UNIT-II **Functions of Management:** Planning - Meaning - Need & Importance, type's levels, advantages & limitations. Forecasting - Need & Techniques Decision making – Types, Process of rational decision making & techniques of decision making Organizing.	**CO2:** ➢ Able to understand decision making process
			UNIT-III **Elements of organizing & processes:** Types of organizations, Delegation of authority - Need, difficulties in delegation - Decentralization Staffing - Meaning & Importance Direction, Nature, Principles Communication, Types & Importance Motivation, Importance, theories, Leadership - Meaning - styles, qualities & functions of leaders	**CO3:** ➢ Understanding of communication principles, Importance Motivation and Leadership - Meaning
			UNIT-IV **Functions of Management:** Controlling - Need, Nature, importance, Process & Techniques Coordination - Need – Importance, Strategic Management Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits Strategic Management in India.	CO4: ➢ Able to understand techniques Coordination, Levels of Decision

			UNIT-V **Recent Trends in Management:** Social Responsibility of Management – environment friendly management, Management of Change Management of Crisis Total Quality Management Stress Management International Management	CO5: ➢ Explain about recent Trends in Management

Suggested Books:

1. Essential of Management - Horold Koontz and IteinzWeibrich– McGrawhills International
2. Management Theory & Practice - J.N.Chandan
3. Essential of Business Administration - K.Aswathapa Himalaya Publishing House

5.	**Numerical Methods**	**C-205**	**UNIT-I** **Roots of Equations:** Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.	**CO1:** ➢ Reason mathematically about basic discrete structures such as numbers, Newton's Raphson Method and roots, used in computer science
			UNIT-II **Interpolation and Extrapolation :**Finite Differences, The operator E-Newton's Forward and Backward Differences, Newton's dividend differences formula, Lagrange's Interpolation formula for unequal Intervals, Gauss's Interpolation formula, Starling formula, Bessel's formula, Laplace, Everett formula.	**CO2:** ➢ Able to get knowledge about Interpolation and Extrapolation
			UNIT-III **Numerical Differentiation Numerical Integration :**Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula, Trapezoidal rule, Simpson's One third rule, Simpson's	**CO3:** ➢ Familiar with propositional calculus.

			three, eight rule.	
			UNIT-IV **Solution of Linear Equation:** Gauss's Elimination method and Gauss's Siedel iterative method.	**CO4:** ➢ Understanding the linear equations using different methods.
			UNIT-V **Solution of Differential Equations:** Euler's method, Picard's method, Fourth-order RangaKutta method.	**CO5:** ➢ Formulate Limit, Continuity and Differentiability

Suggested Books:

1. Scarbourogh, "Numerical Analysis".
2. Gupta & Bose S.C. "Introduction to Numerical Analysis, "Academic Press, Kolkata, 3. S.S.Shashtri,"Numerical Analysis", PHI

S.No.	Name of the Course	Course Code	Course Content	Course Objective
	Numerical Methods	**C-205**	**UNIT-I** **Roots of Equations:** Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.	**CO1:** ➢ Reason mathematically about basic discrete structures such as numbers, Newton's Raphson Method and roots, used in computer science
			UNIT-II **Interpolation and Extrapolation :**Finite Differences, The operator E-Newton's Forward and Backward Differences, Newton's dividend differences formula, Lagrange's Interpolation formula for unequal Intervals, Gauss's Interpolation formula, Starling formula, Bessel's formula, Laplace, Everett formula.	**CO2:** ➢ Able to get knowledge about Interpolation and Extrapolation
			UNIT-III **Numerical Differentiation Numerical Integration :**Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula, Trapezoidal rule, Simpson's One third rule, Simpson's three, eight rule.	**CO3:** ➢ Familiar with propositional calculus.
			UNIT-IV **Solution of Linear Equation:** Gauss's Elimination method and Gauss's Siedel iterative method.	**CO4:** ➢ Understanding the linear equations using different methods.
			UNIT-V **Solution of Differential Equations:** Euler's method, Picard's method, Fourth-order RangaKutta method.	**CO5:** ➢ Formulate Limit, Continuity and Differentiability

BACHELOR OF COMPUTER APPLICATION (B.C.A.)

DETAILED SYLLABUS
THIRD SEMESTER

S.No.	Name of the Course	Course Code	Course Content	Course Objective
1	**Data Base Management System**	**C-301**	**UNIT-I** **Introduction:** Database System Concepts, Database Users, and Architecture Introduction to Database System with example, Introduction to Traditional File Oriented System, Characteristics of the Database Approach, Components of Database System, Database Users, Advantages and disadvantages of Using a DBMS, Structure of DBMS, Database Schemas and Instances , DBMS Architecture, Data Independence, Database Languages and Interfaces, Classification of Database Management Systems.	**CO1:** ➢ **To understand** Database System Concepts, Database Users, and Architecture ➢ Apply knowledge of database for real life applications.
			UNIT-II Data Modelling & Relational Database Management System Data Modelling Using the Entity Relationship Model: Entity Types, Entity Sets, Attributes, Keys, Relationships, Relationship Types, Roles, and Structural, Constraints, Weak Entity Types, ER Diagrams, Naming Conventions, Design Issues.	**CO2:** ➢ Identify the basic concepts and various data model used in database design ER modelling concepts and architecture use and design queries using SQL.
			UNIT-III **The Relational Data Model**: Relational Constraints and the Relational Algebra: Relational Model Concepts, Relational Constraints and Relational Database Schemas Update Operations and Dealing with Constraint Violations, Basic Relational Algebra Operations, Additional Relational Operations, Examples of Queries in Relational Algebra.	**CO3:** ➢ Apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression queries
			UNIT-IV	**CO4:**

			SQL:SQL and Database Design Theory and Methodology Structured Query Language The Relational Database Standard: Data Definition, Constraints and Schema Changes in SQL, Types of SQL Commands, SQL Operators and their Procedure, Insert, Delete, and Update Statements in SQL Queries and Sub Queries, Aggregate Functions, Joins,Unions,Intersection,Minus, Views (Virtual Tables) in SQL. Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Armstrong Rules, Closure of Attributes, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce Codd Normal Form.	➢ Recognize/ identify the purpose of query processing and optimization and also demonstrate the basic of query evaluation. ➢ Identify and solve the redundancy problem in database tables using normalization.
			UNIT-V **Transaction Processing:** Concurrency Control and Distributed Database Transaction Processing Concepts: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Concurrency Control Techniques, Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering.	**CO5:** ➢ Apply and relate the concept of transaction, concurrency control and recovery in database.
Suggested Books: 1. A.K.Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996. 2. Bipin Desai, "An Introduction to database systems",Galgotia Publications, 1991				
2.	**E-Commerce and ERP**	**C-302**	**UNIT-I** **Introduction:** Defining E-Commerce, Main Activities of Electronic Commerce, Benefits of E-Commerce, Goals of Electronic Commerce, Main Components of E-Commerce, Functions of Electronic Commerce, Communication, Process Management, Service Management, Transaction Capabilities, Process of E-Commerce, Types of E- Commerce, Role of Internet and Web in E- Commerce, Technologies Used in E-	**CO1:** ➢ To understand the Concept of E-commerce and Business Strategy in Electronic Age and different models of E-Commerce.

			Commerce Systems, Scope of E- Commerce, E-Business Models.	
			UNIT-II **E-Commerce Activities**: Various Activities of E-Commerce, Various Modes of Operation Associated with E- Commerce, Matrix of E- Commerce Types, Elements and Resources Impacting E- Commerce and Changes, Types of E- Commerce Providers and Vendors, Man Power Associated with E- Commerce Activities, Opportunity Development for E- Commerce Stages, Development of E- Commerce Business Case, Components and Factors for the Development of the Business Case, Steps to Design and Develop an E-Commerce Website.	**CO2:** ➢ Evaluate E-commerce models and identify the requirements for starting up and operating E-business sites.
			UNIT -III **Internet** :The Backbone for E- Commerce: Early Ages of Internet, Networking Categories, Characteristics of Internet, Components of Internet, Internet Services, Elements of Internet, Uniform Resource Locators, Internet Protocol, Shopping Cart, Cookies and E-Commerce, Web Site Communication, Strategic Capabilities of Internet. Implementation of E-Commerce: WWW.EBAY.COM, B2C Website-Registration, Time factor, Bidding process, Growth of eBay, PayPal, New Trend in Making Payments Online-National Electronic Funds Transfer.	**CO3:** ➢ Administer and Maintain B2B E-Business sites. ➢ Evaluate E-commerce models and identify the requirements for starting up and operating E-business sites.
			UNIT-IV	**CO4:**

			ISP, WWW and Portals: Internet Service Provider (ISP), World Wide Web (WWW), Portals, Steps to build homepage, Metadata, Advantages of Portal, Enterprise Information Portal (EIP).E-Marketing: Traditional Marketing, E- Marketing, Identifying Web Presence Goals, Achieving web presence goals, Uniqueness of the web, Meeting the needs of website visitors, Maintaining a Website, Metrics Defining Internet Units of Measurement, Online Marketing, Advantages of Online Marketing. Content: format and access, Maintaining a Website- Metrics Defining Internet Units of Measurement, Online Marketing, Advantages of Online Marketing. E- Security: Security on the Internet, Network and Website Security Risks, Denial, of, Service attacks, Viruses, Unauthorized access to a computer network, Vulnerability of Internet Sites, Network and Website Security, Transaction security and data protection, Security audits and penetration testing, E-Business Risk Management Issues, Firewall, Network policy, Advanced authentication mechanism, Packet filtering, Application gateways, Defining Enterprise Wide Security Framework.	➢ Ability to create an integrated marketing communications plan which includes promotional strategies ➢ Define and apply knowledge of various aspects of managerial decision making related to pricing strategy and tactics. ➢ Able to know about E- Security and various attacks.
			UNIT -V E- Payment Systems: Electronic Funds Transfer, Digital Token Based E- Payment Systems, Modern Payment Systems, Steps for Electronic Payment, Payment Security, Net Banking, Customer Relationship Management: Customer Relationship Management (CRM), Marketing automation, Enterprise customer management, Customer Relationship Management Areas, CRM Processes, Event triggers, business logic and rules repository, Decision support tools, Higher level statistical analysis, Forecasting and planning	**CO5:** ➢ Understand the Internet Architecture and Electronic Payment System. ➢ Able to get familiarity about Customer Relationship Management

			tools, True channel management, Workflow management, Collateral management, Electronic Customer Relationship Management, Need, Architecture and Applications of Electronic CRM	

Suggested Books:

1. The Story of India's First E-Commerce Company" by K Vaitheeswaran"
2. E – Commerce: Strategy, Technologies and Applications" by David Whiteley"
3. E-Commerce: An Indian Perspective" by P T Joseph"

3.	**Computer Organization and Architecture**	**C- 303**	**UNIT I** **Computer Evolution:** Brief history of Computer, Classification of Computer, Structure of a Computer System, Arithmetic Logic Unit, Control Unit, Von Neumann Architecture.Integer Addition and Subtraction ,Floating point representation., Signed numbers, Binary Arithmetic, 1's and 2's Complements , Booths Algorithm, Hardware Implementation, IEEE Standards, Floating Point Arithmetic , The accumulator, Shifts, Carry and Overflow.Instruction Characteristics, CPU with Single BUS, Types of Operands, Types of Operations, Addressing Modes, Instruction Formats.	**CO1:** ➢ Understand the theory and architecture of central processing unit. ➢ Explain the organization of basic computer its design and the design of control unit.
			UNIT II **Processor Organization:** Parallelism and Computer arithmetic, Computer arithmetic associatively. Floating Point in the 8086, Programmers Model of 8086, Register Organization, 8086 Registers, Instruction Cycles, Addressing Modes.Micro operations, The Instruction cycle, Control of the CPU, Functional Requirements, Single, Two,Three bus structure, Execution of a complete instruction, Branching, Sequencing of Control Signals, Hardwired Control Unit, Micro-Programmed Control.	**CO2:** ➢ Analyze a detailed s/w & h/w structure of the Microprocessor. ➢ Analyze the properties of Microprocessors (8085/8086)

			UNIT III **Memory Organization:** Characteristics of Memory Systems, Main Memory, Types of Memory, Memory system considerations, Design of memory subsystem using Static, Dynamic Memory Chips, Memory interleaving **High Speed Memories:** Cache Memory,Structure of cache and main memory, Elements of Cache Design, Mapping functions, Replacement algorithms, External Memory, Virtual memory	**CO3:** ➢ Understanding the hierarchical memory system, cache memories and virtual memory
			UNIT IV **I/O Organization:** Input / Output Module:Need, Techniques, Interrupt Driven I/O, Basic concepts of an Interrupt , Response of CPU to an Interrupt, Design Issues, Priorities, Interrupt handling, Types of Interrupts**.**Data Transfer Techniques, Data Memory Access, Buses, Types of buses, I/O Interface, Synchronous and Asynchronous Data Transfer, Serial I/O, Input Devices, Output Devices, Multiprogramming vs. Multiprocessing, Comparison between closely coupled and loosely coupled Multiprocessor	**CO4:** ➢ Understanding the different ways of communicating with I/O devices and standard I/O interfaces
			UNIT V **Microprogramming:** Basic Principles, Features , Hardwired vs. micro programmed computers, Applications and advantages of microprogramming, Limitations of microprogramming, Computer Clock, MicroInstructions and its Control Path, Microcode, Machine Instruction**.** Parallel Organization, Instruction Set Architecture (ISA), RISC and CISC, Characteristics of CISC, Characteristics of RISC, RISC versus CISC, Vector Processing Requirements and Characteristics of vector processing	**CO5:** ➢ Demonstrate the working of central processing unit and RISC and CISC Architecture ➢ Learn the concepts of parallel processing, , Vector Processing Requirements and Characteristics of vector processing and inter processor communication.

Suggested Books:

1. Computer Organization & Architecture– by Stallings

2. Computer Organization and Architecture: Designing for Performanceby William Stallings 3. Computer Architecture and Organizationby John Hayes				
4.	**Operating System**	**C-304**	**UNIT-I** **Introduction:** What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time- Sharing Systems, Personal – Computer Systems, Parallel systems, Distributed systems, Real- Time Systems. **Memory Management:** Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation **Virtual Memory:** Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations	**CO1:** ➢ To understand the basic components of a computer operating system, and the interactions among the various components. ➢ Explain various memory management techniques, concept of thrashing and virtual memory
			UNIT-II **Processes:** Process Concept, Process Scheduling, Operation on Processes. CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling. Process **Synchronization:** Background, The Critical – Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization	**CO2:** ➢ Describe the various CPU scheduling algorithms and various synchronization problems.
			UNIT-III **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	**CO3:**
			UNIT-IV **Device Management:** Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering, Secondary Storage Structure: Disk Structure, Disk Scheduling, Disk	**CO4:** ➢ Use disk management and disk scheduling algorithms for better utilization of external memory

			Management, Swap- Space Management, Disk Reliability.	
			UNIT-V **Information Management:** Introduction, A Simple File system, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File – System Implementation: File – System Structure, Allocation Methods, Free-Space Management.	**CO5:** ➢ Recognize file system interface, Directory Structure, protection and security mechanisms.

Suggested Books:

1. Silbersachatz and Galvin, "Operating System Concepts", Person, 5th Ed. 2001
2. Madnick E., Donovan J., "Operating Systems:, Tata McGraw Hill, 2001
3. P C Software for Windows by R K Taxali
4.Unix Shell Programming" by Yashavant P Kanetkar

5.	**Statistical Method and Application**	**C-305**	**UNIT I** Classification of data, Tabulation of data, Preparation of frequency distribution, Presentation of data through histogram, frequency polygon, frequency curve	**CO1:** ➢ Analyze the data pertaining to attributes and to interpret the results.
			UNIT II **Measures of Central Tendency:** Computation of Arithmetic mean, median and mode for ungrouped data and grouped data, Verification of median through ogives.	**CO2:** ➢ **Understanding the basic Measures of Central Tendency**
			UNIT III Measures of dispersion: Computation of Range, Quartile deviation, mean deviation and Standard	**CO3:** ➢ know about Measures of dispersion techniques

			deviation, coefficient of variation. (Numerical Applications Only)	
			UNIT IV Concept of Skewness, Karl Pearson's and Bowley's Coefficients of Skewness(Numerical Applications Only)	**CO4:** ➢ Able to get acquaintance about Pearson's correlation coefficient techniques
			UNIT V Meaning of Correlation, types of correlation, correlation coefficient, Karl Pearson, spearman's rank correlation coefficient. (Numerical Applications Only)	**CO5:** ➢ To recognize and evaluate the relationship between two quantitative variables through simple linear correlation and regression .

Suggested Books:

1. StatisticalMethods,"Dr.S.P. Gupta,SultanChand&Sons".
2. Quantitative Techniques by "C. Sathyadevi,S. Chand".
3. FundamentalofMathematicalStatistics,"S.C.Gupta&V.K.Kapoor,SultanChand"
4. StatisticalMethods,"SnedecorG.W.&CochranW.G.oxford&+DII"
5. Elementsof Statistics,"Mode.E.B.,PrenticeHall"

BACHELOR OF COMPUTER APPLICATION (B.C.A.)

DETAILED SYLLABUS

FOURTH SEMESTER

S.No.	Name of the Course	Course Code	Course Content	Course Objective
1.	Java Programming	C-401	**UNIT-I** Introduction, Java Tokens, Java Statements, Command Line Arguments, Programming Style. Constants, Variables and	**CO1:** ➢ Learn basic concepts Java Programming

			Data Types Constants, Variables, Data Types, Declaration of Variables, Giving Values of Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Java Program Structure, Java Virtual Machine.	Language, data types and Scope of Variables.
			UNIT-II **Operators, Expressions and Statements**: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evolution of Expressions, Precedence of Arithmetic Operators. Decision Making and Branching: Introduction, Decision Making with if Statement, Simple if Statement, The if... else Statement, Nesting of if ... else Statements, else if Ladder, switch Statement, ?: Operator. Decision Making and Looping: Introduction, while Statement, do Statement, for Statement.	**CO2:** ➢ Acquire knowledge of decision statement and control structures.
			UNIT-III **Classes, Objects and Methods:** Defining a Class, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class, Overriding Methods, final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control. Arrays, One, Dimensional Arrays, Creating an Array, Two Dimensional Arrays, Strings, Vectors, Wrapper Classes.	**CO3:** ➢ To understand and use different class methods objects and array.
			UNIT-IV **Interfaces and Packages**: Introduction, Defining Interfaces, Extending Interfaces, implementing Interfaces, Accessing Interface Variables. Packages: Introduction, Java API Packages, Using system Packages, Naming Conventions,	**CO4:** ➢ Defining various Java Packages and Multithreaded Programming

			Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes. Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, and Synchronization.	
			UNIT-V **Applet Programming:** Introduction, How Applets Differ from Application, 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, More About Applet Tag. Managing Errors and Exceptions: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging.	**CO5:** ➢ Create wide range of Applications and Applets using Java. ➢ To get knowledge about java applet programming and exception handling.

Suggested Books:

1.E. Balagurusamy, Programming with Java, A Primer Second Edition, Tata McGraw Hill, New Delhi.
2.P.Naughton and H. Schildt, JAVA: The Complete Reference, TMH, New Delhi 2005.
3.D.Jana, Java and Object Oriented Programming Paradigm, PHI, New Delhi, 2005

2.	Web Technology using PHP and MYSQL	C-402	**UNIT I** **PHP:** Introduction to PHP Evaluation of PHP, Basic Syntax, Defining variable and constant, PHP Data type, Operator and Expression, Decisions and loop Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html. Function: Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing. String Searching & Replacing String, Formatting String, String Related Library function.	**CO1:** ➢ To be able to implement basic programming concept using PHP ➢ Understand, analyze and apply the role of languages like HTMLand PHP.

			UNIT II **Array:** Anatomy of an Array, Creating index based and Associative array Accessing array. Element Looping with Index based array, Looping with associative array using each () and foreach(),Some useful Library function. Handling Html Form with PHP Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission.	**CO2:** ➢ To get understanding of arrays and dynamic form for capturing the data.
			UNIT III **Working with file and Directories:** Understanding file& directory, Opening and closing, a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.	**CO3:** ➢ Understanding of various operations on file and Directories
			UNIT IV **Session and Cookie:** Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session. 8. Database Connectivity with	**CO4:** ➢ Able to understand the concepts of session and cookies in web design.
			UNIT V **MySQL:** Introduction to RDBMS, Connection with MySQL Database, Performing basic database operation (DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query Join (Cross joins, Inner joins, Outer Joins, Self joins.) Exception Handling Understanding Exception	**CO5:** ➢ Create connection with database(mysql), manipulation of data and exception handling.

			and error, Try, catch, throw. Error tracking and debugging.	

Suggested Books:

1.V.Rajaraman, Analysis and Design of Information System, Pearson Education, 1991.
2. J.A.Senn, "Analysis and Design of Information Systems"
3. J.K.Whiten, L.D.Bentley, V.M.Beslow, "System Analysis and Design Methods",

3	Artificial Intelligence	C-403	**UNIT-I** AI Concepts, Various definitions of AI, Knowledge, Knowledge Pyramid, People and Computers: What computers can do better that people, what people can do better than computers, Characteristics of AI Problems, Problem Representation in AI, Components of AI, AI Evolution, Application Areas of AI, History of AI, The Turing Test and The Revised Turing Test	**CO1:** ➢ Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents. ➢ The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications.
			UNIT-II **Expert System:** Components of Expert System: Knowledge Base, Inference Engine, User Interface, Features of Expert System, Expert System Life Cycle, Categories of Expert System, Rule Based vs. Model Based Expert Systems, Advantages/Limitations of Expert System, Developing an Expert System: Identification, Conceptualization, Formalization, Implementation, Testing, Using an Expert System, Application Areas of Expert System	**CO2:** Understand the theoretical base of the expert system and its development process. Analyze the development process of expert system through various case studies.
			UNIT-III **AI and Search Process:** Brute Force Search,Depth First/Breadth First Search,Heuristic Search: Hill Climbing,Constraint Satisfaction, Mean End Analysis,Best First Search, A* Algorithm, AO* Algorithm, Beam Search.	**CO3:** ➢ Able to learn different type of AI search process algorithm.
			UNIT-IV	**CO4:**

			Natural Language Processing: Introduction, Need, Goal, Fundamental Problems in Natural Language Understanding, How People overcome Natural Language Problems, Speech Recognition: Introduction, Advantages and Approaches, Introduction to Robotics: Parts of a Robot, Controlling	➢ To know about Natural Language Processing techniques and problems
			UNIT-V **Applications:** Communication ,Communication as action, Formal grammar for a fragment of English, Syntactic analysis, Augmented grammars, Semantic interpretation, Ambiguity and disambiguation, Discourse understanding, Grammar induction, Probabilistic language processing, Probabilistic language models, Information retrieval, Information Extraction, Machine Translation.	**CO5:** ➢ The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications.
Suggested Books: 1. V S Janakiraman, "Foundation of Artificial Intelligence and Expert Systems" 2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems"				
4.	Computer Network	C-404	**UNIT I** **Introduction:** Definition of a Computer Network,Components of a computer network**,**Types of Network: Based on Topology (Bus,Star,Ring Mesh,Tree), Based on Size Technology and ownership (LAN, MAN, WAN). Network topologies,Linear Bus Topology,Ring Topology,Star Topology,Hierarchical orTree Topology,Topology Comparison, Considerations when choosing a Topology: Switching, Circuit switching,Message switching,Packet switching,Implementation of packet switching, Relationship between Packet Size and Transmission time,Comparison of switching techniques: Multiplexing, FDM,Frequency division multiplexing,WDM,Wavelength division multiplexing, TDM,Time division multiplexing.	**CO1:** ➢ Obtain the knowledge about basic computer network terminologies. ➢ Able to know about switching and multiplexing

			UNIT II **Network Software & Network Standardization**: Introduction: Networks Software, Protocol hierarchy,Design issues for the layers,Merits and De-merits of Layered Architecture,Service Primitives: Reference models,The OSI Reference Model,The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Model	**CO2:** ➢ Understand computer network basics, network architecture, TCP/IP and OSI reference models.
			UNIT III **Data Link Layer:** Services provided to the Upper Layer, Framing, Error Control, Flow Control, IEEE Standards for MAC Sublayer, Network Layer: Services provided to the Upper Layer: Routing Algorithms (Centralized, Distributed),Congestion Control (Token Based and Non Token Based), Internetworking.	**CO3:** ➢ Describe data link protocols, multi-channel access protocols and IEEE 802 standards for MAC ➢ Obtain the knowledge about error deduction and correction in Data Link Layer
			UNIT IV **Data Communications**: **Introduction:** Theoretical basis for communication, Fourier analysis, Band limited signals, Maximum data rate of a channel: Transmission impairments, Attenuation distortion, Delay distortion, Dispersion, Noise: Data transmission modes, Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission:	**CO4:** ➢ To get knowledge about basic data communication Terminologies and Transmission impairments
			UNIT V Transmission Medium: Introduction: Transmission medium,Guided & Unguided Transmission medium, Twisted pair, Coaxial cable, Optical fiber, Comparison of fiber optics and copper wire: Wireless transmission.	**CO5:** ➢ To get basic understanding of basic transmission medium and comparisons.
Suggested Books: 1. W. Stallings, "Data and Computer Communication", Pearson Education. 2. A. S. Tanenbaum, "Computer Network", 4th, Edition, Pearson Education. 3. Forouzan, "Data Communication and Networking", 2nd Edition, Tata McGraw Hill.				
5.	Optimization Techniques	C-405	**UNIT-I** Basics of operation research (OR): Characteristics of	**CO1:**

			OR,Necessity of OR in industry,OR and decision making,role of computers in OR.Linear Programming: Formulations and graphical solution of (2 variables) canonical and standard terms of linear programming problem.	➢ Ability to apply the theory of optimization methods and algorithms to develop and for solving various types of optimization problems.
			UNIT-II Algebraic solution: Simplex methods,Charnes method of penalties,two phase simplex method.	**CO2:** ➢ Ability to go in research by applying optimization techniques in problems of Engineering and Technology.
			UNIT-III Transportation Model: Definition,formulation and solution of transportation models,The row, minima, column,minima,matrix,minima and Vogel's approximation methods. Assignment model: Definition of assignment model,comparison with transportation model,formulation and solution of assignment model.	**CO3:** ➢ Understand the concept of extrema to create, critical path and analyzing for application in Engineering. ➢ Applying the concept of extrema to evaluate inventory and replenishment problems
			UNIT-IV Sequencing Problem: Processing of n jobs through 2 machines,processing n jobs through 3 machines,processing 2 jobs through m machines.	**CO4:** ➢ Analyze the concept of simulation in different ways by simulation techniques methods.
			UNIT-V Game Theory: Characteristics of games, maxima,minimax criteria of optimality,dominance property,algebraic and graphical method of solution of solving 2 x 2 games	**CO5:** ➢ Remember the concept of matrices, maxima and minimize to evaluate the value of the game and create the model

Suggested Books:

1. Introduction to Management Science Operations Research,"KantiSwarup".
2. Operations Research Quantitative Techniques For Management,"V. K. Kapoor".
3. Nonlinear Programming: Theory and Algorithms"by Mokhtar S Bazara and C M Shetty".

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DETAILED SYLLABUS

FIFTH SEMESTER

S.No.	Name of the Course	Course Code	Course Content	Course Objective
1	Network Security	C-501	**UNIT-I** **Network Security: Introduction:** OSI Security Architecture-Classical Encryption techniquesCipher Principles,Data Encryption Standard, Block Cipher Design Principles and Modes of Operation	**CO1:** ➢ To know about the basic understanding of OSI architecture and encryption techniques.
			UNIT-II **Public Key Cryptography:** Key Management, Diffie-Hellman key Exchange-Elliptic Curve Architecture and Cryptography, Introduction to Number Theory, Confidentiality using Symmetric Encryption, Public Key Cryptography and RSA.	**CO2:** ➢ To understand the cryptography and key exchange algorithm.
			UNIT-III **Authentication and Hash Function:** Authentication requirements, Authentication functions –Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs,MD5 message Digest algorithm, Secure Hash Algorithm, RIPEMD,HMAC Digital Signatures, Authentication Protocols, Digital Signature Standard	**CO3:** ➢ To get knowledge about different authentication function and digital signature standard

			UNIT-IV **Network Security:** Authentication Applications: Kerberos,X.509 Authentication Service, Electronic Mail Security, PGP, S/MIME,IP Security, Web Security.	**CO4**: ➢ Able to understand authentication application and services such as Kerberos, S/MIME, IP sec.
			UNIT-V **System Level Security:** Intrusion detection, password management, Viruses and related Threats, Virus Counter measures, Firewall Design Principles, Trusted Systems.	**CO5:** ➢ To explain various malware detection techniques, firewall design principles and trusted system.

Suggested Books:

1. William Stallings,"Cryptography and Network Security,Principles and Practices", Prentice Hall of India,Third Edition,2003.
2. AtulKahate-"Cryptography and Network Security",Tata McGraw,Hill,2003.
3. Bruce Schneier, "Applied Cryptography",John Wiley & Sons Inc, 2001.

2.	Visual Basic .NET	**C-502**	**UNIT-I** **Visual Basic .NET and the .NET Framework:** Introduction to .net framework ,Features, Common Language Runtime (CLR) ,Framework Class Library(FCL).Visual Studio.Net – IDE, Languages Supported, Components. Visual Programming, VB.net, Features, IDE, Menu System, Toolbars, Code Designer, Solution Explorer, Object Browser, Toolbox, Class View Window, Properties Window, Server Explorer, Task List, Output Window, Command Window.	**CO1:** ➢ Able to Use and understand Visual Studio IDE to design application.
			UNIT-II **Elements of Visual Basic .net:** Properties, Events and Methods of Form, Label, TextBox, ListBox, ComboBox, RadioButton, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box, HScrollbar,VScrollBar, Group Box, ToolTip, Timer.	**CO2:** ➢ Develop GUI Application using Form Controls and its events.
			UNIT-III **Programming in Visual basic .net:** Data Types, Keywords, Declaring Variables and Constants, Operators,Understanding Scope and accessibility of variables, Conditional Statements, If- then, If- then-else, Nested If, Select Case, Looping Statement, Do loop, For Loop,For Each,Next Loop, While Loop, Arrays, Static and Dynamic.	**CO3:** ➢ Apply decision statement and control statements in the language.
			UNIT-IV Functions, Built-In Dialog Boxes, Menus and Toolbar: Menus and toolbars, Menu Strip, Tool Strip, Status Strip, Built-In Dialog Boxes –Open File Dialogs, Save File Dialogs, Font Dialogs, Color Dialogs, Print Dialogs, InputBox, MsgBox, Interfacing With End user, Creating MDI Parent and Child, Functionsand	**CO4:** ➢ To understand and use different user interface options and various function

			Procedures, Built-In Functions, Mathematical and String Functions, User DefinedFunctions and Procedures.	
			UNIT-V Advanced Concepts in VB.Net: Object Oriented Programming, Creating Classes, Objects, Fields, Properties,Methods, Events, Constructors and destructors, Exception Handling, Models,Statements, File Handling, Using File Stream Class, File Mode, File Share, FileAccess Enumerations, Opening or Creating Files with File Stream Class, Reading andWriting Text using StreamReader and StreamWriter Classes, Data Access withADO.Net – What are Databases? Data Access with ServerExplorer,Data Adapter andDataSets, ADO.NET Objects and Basic SQL.	**CO5:** ➢ Apply Object Oriented concepts in GUI Application. ➢ Use Data access controls to store data in Database and retrieve it.
Suggested Books: 1. Jesse liberty :"Learning Visual Basic.net" 2. Steven Holzner: " VB.NETBlackBook " 3. Chuck Easttom: " LearnVB.NET"				
3.	Computer Graphics	**C-503**	**UNIT I** **Introduction:** The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Application Development of Hardware and software for computer Graphics, Conceptual Framework for Interactive Graphics: Overview, Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses.	**CO1:** ➢ Be able to understand the basics of computer graphics and conceptual framework for Interactive Graphics ➢ Understand the basics of computer graphics, different graphics systems and applications of computer graphics.

			UNIT II Hardcopy Technologies, Display Technologies, Raster,Scan Display System,Video Controller, Random,Scan Display processor, Input Devices for Operator Interaction,Image Scanners, Working exposure on graphics tools like Dream Weaver, 3D Effects etc,Clipping Southland, Cohen Algorithm, Cyrus,Beck Algorithm, Midpoint Subdivision Algorithm	**CO2:** ➢ Be familiar with display technologies and identify various computer Graphics Tools. ➢ Extract scene with different clipping methods and its transformation to graphics display device.
			UNIT III **Geometrical Transformation:** 2D Transformation,Homogeneous Coordinates and Matrix Representation of 2D Transformations, composition of 2D Transformations, the WindowtoViewport Transformations, Introduction to 3D Transformations Matrix.	**CO3:** ➢ Understand Graphical formula in3-D to 2-Dimensional objects.
			UNIT IV **Representing Curves & Surfaces:** Polygon meshes parametric,Cubic Curves,Quadric Surface. Solid Modeling: Representing Solids, Regularized Boolean Set Operation primitive Instancing Sweep Representations, Boundary Representations, Spatial Partitioning Representations, and Constructive Solid Geometry Comparison of Representations.	**CO4:** ➢ To follow a series of stages collectively known as Graphics Pipeline and understanding the Curves & Surfaces
			UNIT V **Introductory Concepts:** Multimedia Definition,CD-ROM and the multimedia highway, Computer Animation (Design, types of animation, using different functions), Uses of Multimedia,Introduction to making multimedia,The stage of Project, hardware & software requirements to make good multimedia skills and Training opportunities in Multimedia Motivation for Multimedia usage	**CO5:** ➢ To be familiar with Multimedia applications and usage.

Suggested Books: 1. Foley, Van Dam,Feiner, Hughes, Computer Graphics Principles& practice,2000. 2. D.J. Gibbs & D.C. Tsichritzs: Multimedia programming Object Environment & Frame work, 2000. 3. D.Haran& Baker. Computer Graphics Prentice Hall of India, 1986				
4.	System Analysis and Design	C-504	**UNIT-I** Overview of Systems Concepts, Analysis and Design Life cycle,Introduction to System Concept: Characteristics of the system,Elements of a System,Types of Systems,Physical and Abstract System,Open and Closed System,Formal and Informal System,Introduction to Data And Information: Types of Information System,Categories of Information System,Needs of Information Systems,Qualities of Information System,Software DevelopmentLife Cycle (SDLC), Role and Attributes of System Analyst.	**CO1:** ➢ Understand the life cycle of a systems development project.
			UNIT-II System Planning and Requirements Determination System planning and initial investigation: Strategic Plan for Information processing, Tools for Planning, Problems in Planning, Need for requirement definition.	**CO2:** ➢ Understand the analysis and development techniques required as a team member of a medium-scale information systems development project
			UNIT-III Information gathering tools: Review of Literature, procedures and forms, Methodologies, Tools and Techniques of Analysis Systems Analysis and Design: Decision Tree, Data Dictionary, Decision Table, Structured English, Data Flow Diagram, Components of a DFD, Zero Level DFD,DFD Transformation and Decomposition, Context Diagram, Levelling a DFD, Feasibility Study: Economic Feasibility (Cost & Benefit Analysis), Organizational Feasibility, Technical Feasibility, Behavioural Feasibility study.	**CO3:** ➢ Able to know about information gathering tools such as DFD, decision tree, data dictionary..

			UNIT-IV System Design and Implementation Process of Design: Logical and Physical Design, Design Methodologies, Elements of Form Design, Design of Output, Design of Input, Design of File, Design of procedure, Audit Trail, System Implementation and Testing: Operational and Test Environment, Conversion Preparation, Database installation, Users Training and Final Report to Management, Creating a new System, Test Plan: Activity Network for system Testing, Types of Testing. .	**CO4:** ➢ Define the concept of designing and test environment
			UNIT-V System Quality Assurance, IT infrastructure Selection and Evaluation of Processing and Maintenance Quality Assurance: Quality factors specifications, Levels of Quality Assurance, Computer Hardware and Software Selection, Computer Configuration Determination, Requesting Proposal from Vendors, Evaluation of Vendor's Proposals,Acceptance of system, Evaluation of Processing, Need of Maintenance	**CO5:** ➢ Basic understanding about Quality Assurance, Computer Configuration Determination and maintenance.

Suggested Books:

1.V.Rajaraman, Analysis and Design of Information System, Pearson Education, 1991.
2. J.A.Senn, "Analysis and Design of Information Systems"
3. J.K.Whiten,L.D.Bentley,V.M.Beslow, "System Analysis and Design Methods",

5.	Design and Analysis of Algorithm	C-505	**UNIT-I** **Basic Concepts of Algorithms:** Definition of algorithm, Characteristic of algorithm, Pseudo Codes &Time Complexity of Basic ControlStructures, Time and Space Complexity of Insertion Sort,Selection Sort, Heap Sort, Bubble Sort,Asymptotic Notations	**CO1:** ➢ Define the basic concepts of algorithms and analyze the performance of algorithms. ➢ Basic understanding of various sorting algorithm

			(Growth of Functions).	
			UNIT-II **Divide and conquer:**Binary Search, Maximum &Minimum, Merge Sort, Quick Sort, Greedy Method: General method,Knapsack Problem, JobSequencing with deadline- Optimal Storage on tapes,Huffman Codes.	**CO2:** ➢ Discuss various basic **Divide and conquer** algorithm and greedy approaches for developing algorithms.
			UNIT-III **DynamicProgramming:**Matrix, ChainMultiplications,Longest CommonSubsequence-Backtracking:General method,N QueensProblem,Sum of subsets.	**CO3:** ➢ Understanding and analysis of various dynamic and backtracking algorithms.
			UNIT-IV Basic Traversals and search techniques, techniques of binary trees, techniques of graphs: BFS, DFS.	**CO4:** ➢ Understanding of various graph traversal algorithms and trees.
			UNIT-V **Analysis ofGraph Algorithms:**Elementary Graph Algorithms,Multistage Graphs,Minimum Spanning Trees: Kruskal's& Prim's Algorithm,Single Source Shortest Path, Dijkstra's& Bellman Ford,All Pairs Shortest Path:Warshal Algorithm.	**CO5:** ➢ Discuss various Elementary Graph Algorithms and shortest path graph algorithms.

Suggested Books:

1. Thomas H. Coremen,"Introduction to Algorithms",PHI.
2. Horowitz&Sahani,"Fundamental of Algorithms",Galgotia.
3.Aho,"Design & Analysis of Computer Algorithms",Pearson.
4. Johnsonbaugh,"Algorithms",Pearson.

BACHELOR OF COMPUTER APPLICATION (B.C.A.)

DETAILED SYLLABUS

SIX SEMESTER

S.No.	Name of the Course	Course Code	Course Content	Course Objective
1.	Python Programming	C-601	**UNIT-I** Basic of Python, Features, Application, Python interpreter, Interpreters vs Compilers, Data Types, Identifiers and keywords, Literals, Strings, Assigning Values to Variables, Multiple Assignment, Basic Operators in Python: Arithmetic, Comparison, Assignment, Bitwise, Logical Membership Operators (in, not in), Identity Operators (is, is not), Operators Precedence.	**CO1:** ➢ Understand different data types and operators ➢ To read and write simple Python programs.
			UNIT-II Creating Python Programs: Input and Output Statements, Conditional Statement- if...else, Difference between break, continue and pass, Control statements (Looping- while Loop, for Loop, Loop Control nested nested loops).	**CO2:** ➢ To develop Python programs with conditionals and control statements.
			UNIT-III Python Strings, Accessing Values in Strings, String Special Operators, String Formatting Operator, Triple Quotes, Indexing and Slicing, Built-in String functions. Python Lists -Accessing Values in Lists, Updating Lists,	CO3: To define Python strings and to use Python data structures – lists, tuples, dictionaries.

			Basic List Operations, Indexing, Slicing, and Matrixes, Built-in List Functions & Methods Python Tuples - Accessing Values in Tuples, Updating Tuples, Delete Tuple Elements, Basic Tuples Operations, Indexing, Slicing Built-in Tuple Functions. Python Dictionary - Accessing Values in Dictionary, Updating Dictionary Python Programming, Delete Dictionary Elements, Built-in Dictionary Functions & Methods.	
			Unit-IV Functions: Defining a Function, Syntax, Calling a Function, call by value and call by reference, Pass by reference vs value, Function Arguments, Required arguments, Keyword arguments, Default arguments, Variable-length arguments, The return Statement, Scope of Variable.	**CO4:** ➢ To define and use Python functions, arguments and scope.
			Unit-V File Manipulation, Opening Text File, Working with a File on Python, The open function, File modes, The file object attributes, close() method, write() method, read() method, Files: Input, Files Output, Reading files, Renaming & deleting files, Writing into a file, remove() method.	**CO5:** ➢ To perform various input/output operations with files in Python.

Suggested Books:

1. Guido Van Rossum, Learning Python: Crash Course Tutorial Paperback – 22 July 2020.

2. Mark Lutz, Python Pocket Reference, 5th edition Feb, 2014 3. G van Rossum, An Introduction to Python				
2.	Software Engineering	C-602	**UNIT-I** **Introduction:** Definition of Software, Type of Software, Characteristic of Software, Attributes of Good Software, Definition of Software Engineering Software Engineering Costs, Key Challenges that Software Engineering Facing, System Engineering and Software Engineering.	**CO1:** Enables students to understand the various software characteristics and key challenges.S
			UNIT-II **Software Development Process Model:** Software Process. Software Process Model: The Waterfall Model, Evolutionary Development, Component- Based Software Engineering (CBSE). Process iteration: Incremental Delivery, Spiral Development: Rapid Software Development: Agile Methods, Extreme Programming, Rapid Application Development.	**CO2:** ➢ Plan a software engineering process life cycle , including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements
			UNIT-III **Design Concept:** Abstraction, Architecture, Patterns, Modularity: Cohesion, Coupling, Information Hiding, Functional Independence, Model, Client Server Model, Layered Model User Interface Design: Human-Computer Interaction, Information Presentation, Interface Evaluation; Design Notation	**CO3:** ➢ Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
			UNIT-IV **Software Testing and Quality Assurance:** Verification and Validation, Techniques of Testing: Black-Box and	**CO4:**

			White Box Testing, Inspections. Level of Testing: Unit Testing. Integration Testing, Interface testing, System Testing, Alpha and Beta Testing, Regression Testing. Design of test Cases, Quality Management activities, Product and process quality, capability Maturity Model (CMM)	➢ Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice
			UNIT-V **Software Cost Estimation:** Introduction- Software Cost Factors, Software Cost Estimation Techniques, Stating Level estimation, Estimating Software Maintenance Costs Software Requirements Definition, Software Requirements Specification, Specification Techniques, Languages and Processors for Requirements	**CO5:** ➢ Able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project ➢ understand the software cost estimation techniques
Suggested Books: 1. lan Sommerville, Pearson Software Engineering, 10th Edition 2. Amiya Kumar Rath, Fundamental of Software Engineering. 3. Roger's Pressman, McGrewHill, Software Engineering a practitioner Approach				
3.	Soft Skills	C-603	**UNIT I: Conversational &Social Skills:** Definition of Conversation, Speech and Listening and Conversation, Rules of Conversation, Conversation and Personality, Importance of Conversation; Social Skills: Role of Communication; Purposeful Socializing, Attributes: Effective Communication, Relationship Management; Respect, Improvement Techniques: Feedback, Goal Setting, Adopting Interpersonal Skills.	**CO1:** ➢ To understand the conversation competencies and socialization
			UNIT II: Motivation Skills: Motivation: Definition, Sources of Motivation: Initiative, Willingness To Work, Eagerness to take on Work, Initiative; Learning	**CO2:** ➢ Able to get knowledge about various motivational aspects and learning.

			Ability, Learning And Analysis; Motivating Others: Techniques, Understanding; Individual Motivation; Mobilizing Optimal Performance, Praise and Compliment, Goal Setting for Individual Employee, Trust in the Working Hands.	
			UNIT III: Work-Place Skills: Managing Stress, Techniques: Application of 4 A's, Avoid, Alter, Access, Adapt, Resilience: Flexibility in Thought and Behavior, Tolerance and Self-Belief, Team-Work and Communication.	**CO3:** ➢ Able to analyse the knowledge of 4 A's and team work capabilities**.**
			UNIT IV: Creativity: Creativity: Definition, Characteristics of Creative Person: Fluency, Originality, Curiosity, Compassion in Leadership, Communication Skills, Listening and Responding, Speaking Skills, Positive Thinking: Controlling Mind.	CO4: ➢ To understand the leadership and communication skills.
			UNIT V: Critical Thinking: Critical Thinking: Definition Abilities: Discerning Facts and Claims Credibility Analysis, Identifying Valid Reasons, Distinguishing Relevant from Irrelevant Fact/Claims, Detecting Bias, Knowing the Hidden Motives, Creative Methods, Features	CO5: Able to specify the irrelevant facts, hidden moves and creative features.
4.	Professional Skills and Human Values	C-604	**UNIT I:** Professional Ethics: Value based Life and Profession, Professional Ethics and Right Understanding, Competence in Professional Ethics, Issues in Professional Ethics – The Current Scenario, Vision for Holistic Technologies, Production System and Management Models.	**CO1:** Explain the importance of human resources and their effective management in organizations. Comprehend the role and function of human resource management in industry .

			UNIT II: Natural acceptance of human values , Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people-friendly and eco friendly production systems, c) Ability to identify and develop appropriate technologies and management patterns for above production systems, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations	**CO2:** ➢ Analyze the key issues related to administering the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics, and training
			UNIT III: Specialized Knowledge, Competency, Honesty and Integrity, Accountability, Self-Regulation, Professional appearance, Reliable, Ethical behavior, Professional Code of Ethics, Accountable, Positive attitude, Separates personal and professional, Emotional control, Respectful of others, Strong communicator, Possesses soft skills	**CO3:** ➢ Identify and explain the importance of integrity, ethics, emotional balance and soft skills.
			UNIT IV: Understanding the need, basic guidelines, content	**CO4:**

			and process for Value Education, Self-Exploration, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations.	➢ Correct evaluation of happiness, prosperity, human aspiration and value education.
			UNIT V: Work place rights and responsibility, Norms of professional conduct vs profession, Responsibility, obligation and moral values in professional ethics, Emotional Intelligence, Value education, Basic theories, case studies and examples.	**CO5:** ➢ Explain the concept and business relevance of ethics and emotional intelligence.

Program Outcomes (PO)

PO1	**Computational information**	Recognise and use mathematical organisation, computation, and domain knowledge to conceptualise computer models free from obvious downsides.
PO2	**Difficulty Analysis**	Ability to categorise, critically assess, and prepare complex computing problems using computer knowledge and request domains basics.
PO3	**Technical Implementation Skills**	The ability to choose modern computing tools, as well as the abilities and methods required for unique software solutions
PO4	**Proficient and Value Education**	At the level of individuals socially and ecologically responsible engineers and technologists. Identify the need and enlarge the ability to appoint in professional education as a Computing qualified.
PO5	**Mission Administration**	Knowledge of computing along with the ability to recognise administration and computing philosophy is necessary for project management in multidisciplinary settings.
PO6	**Presentation and communication skills**	Knowing excellent documentation and presentations can help students to communicate with the computing society and culture.
PO7	**Professional Competence and Team Ability**	Ability to job as a part or manager in various teams in multidisciplinary situations.
PO8	**Modernization and Private Enterprise**	Classify opportunities, private enterprise dream and use of original thoughts to build worth and means for the betterment of the human being and the world.
PO9	**Design / Development of Solutions**	Understand, analyse and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system.
PO10	**Critical thinking**	Problem solving abilities and business practices which aids to become more productive and thoughtful evaluation of information

Program Specific Outcome (PSO)

PSO1	An ability to enhance the application of knowledge of theory subjects in diverse fields.
PSO2	Develop language proficiency to handle corporate communication demands.
PSO3	Preparing students for various technology areas such as computers applications, computer networks, software development, JAVA, database concepts, programming.
PSO4	In order to enhance programming skills of the students, the concept of project development in using the technologies learnt during the semester has been introduced.
PSO5	To enhance knowledge in Artificial Intelligence, Expert System, Natural Language Processing, Robotics in order to provide the exposure for real life application.
PSO6	Preparing students for future aspects by building and improving their creativity, social awareness, human values, soft skills and general knowledge.
PSO7	Encouraging students to convert their start-up idea to reality by implementing.
PSO8	Ability to understand the changes or future trends in the field of computer application.
PSO9	Ability to identify, formulate, analyse and solve problems of programming using different languages such as C, C++, java, python.
PSO10	Ability to enhance the business and communication skills in order to identify the components and factors for the development and management of business cases