



**PROGRAMME SPECIFIC OUTCOMES AND  
COURSE OUTCOMES OF  
BCA, PGDCA, PGDIT, DCA,  
BSc. (CS) and M.Sc. (CS)**

**VISION**

**To produce professionals leaders in the field of software development and computer technology and applications who shall enhance the technological strength of the region.**

**MISSION**

**To produce skilled professionals of computer.**

**PROGRAM OUTCOME OF BCA, PGDCA, PGDIT, DCA****B.C.A.: BACHELOR OF COMPUTER APPLICATION  
(COURSE OUTCOME)**

Students will be able to recognize & appreciate the role of computing in a wide variety of activities & application of Modern society, including commerce, education, communication. Analyze a given problem and develop an algorithm to solve the problem. Demonstrate the basic technicalities of creating word document, creating power point presentation, design spreadsheet for office use.

**YEAR –I****PAPER II: BCA101: DISCRETE MATHEMATICS**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 101</b>	<b>DISCRETE MATHEMATICS</b>	<b>CO1:</b> Ability to apply mathematical logic to solve problems <b>CO2:</b> Understand sets, relations, functions and discrete structures <b>CO3:</b> Able to use logical notations to define and reason about fundamental mathematical concepts such as sets relations and functions <b>CO4:</b> Able to formulate problems and solve recurrence relations. <b>CO5:</b> Able to model and solve real world problems using graphs and trees.

**PAPER II: BCA102: COMPUTER FUNDAMENTAL**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 102</b>	<b>COMPUTER FUNDAMENTAL</b>	<b>CO1:</b> Computer System Characteristics and Capabilities, Computer Hardware and Software: Block Diagram of a Computer, Data Processing, Types of Computers, Computer Generations <b>CO2:</b> Input Devices: Categorizing Input Hardware, Scanning Devices, Output Fundamentals, Hardcopy Output Devices, Printers, Non-Impact Printers, Plotters, Cathode Ray Tube, Flat Screen Technologies <b>CO3:</b> Central Processing Unit: The Microprocessor, control unit, A.L.U., Registers, Storage Devices: Storage Fundamentals, Primary and Secondary Storage, – Sequential, Direct & Indexed Sequential, Tape Storage and Retrieval Methods Tape Storage Devices

		<p><b>CO4:</b> Computer Software, System software Vs. Application Software, Operating Systems programs, BootingLoader, Assembler, Compiler &amp; Interpreter. Types of Application Software, Program and Packages.</p> <p><b>CO5:</b> Introduction, History and Versions of DOS. Fundamentals of DOS, Disks &amp; DOS versions, Preparing Disks for use, Operating System function and definition, Overview of Linux / Unix.</p>
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**Paper III: BCA103: Programming in ‘C’ Language**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 103</b>	<b>PROGRAMMING IN ‘C’ LANGUAGE</b>	<p><b>CO1:</b> Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Console I/O formatting, Unformatted I/O functions: getch(), getchar, getche(), getc(), putc(), putchar()</p> <p><b>CO2:</b> If-else, conditional operators, switch and break, nested conditional branching statements, loops: For, do while, while, Nested loops, function components: Function arguments, return value, function call statement</p> <p><b>CO3:</b> Array: -Array declaration, One and Two dimensional numeric, String declaration, initialization, stringmanipulation, declaring structure and structure variable, Union: basics, declaring union and union variable</p> <p><b>CO4:</b> Definition of pointers, pointer declaration, using &amp; and * operators. Void pointer, dynamic memoryallocation functions – malloc, calloc, realloc and free, pointers vs. Arrays, pointer to structure, dynamicarray.</p> <p><b>CO5:</b> File handling: file pointer, file accessing functions, fopen, fclose, fputc, fgetc, fprintf, fflush, rewind, fseek, ferror. File handling through command line argument. Introduction to C preprocessor #include, #define, conditional.</p>

**PAPER IV: BCA104: PC SOFTWARE AND MULTIMEDIA**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 104</b>	<b>PC SOFTWARE AND MULTIMEDIA</b>	<p><b>CO1:</b> MS Word: Word Processing, Page Formatting, Mail Merge, Word Art, Images, Header, Footer, Tables, Hyperlink, Opening and Printing Document, Heading1, Heading2, Spelling &amp; Grammar Check</p> <p><b>CO2:</b> MS Excel: Formulas, Goal Seek, Macro, Page Break, Protect Sheet, working with Functions &amp; Formulas, using absolute reference, referencing cell by name, using cell</p>

		<p>label, giving name to cell and ranges</p> <p><b>CO3:</b> Creating presentation, working with slides, different types of slides, setting page layout, selecting background and applying design, adding graphics to slide, adding sound and movie</p> <p><b>CO4:</b> MS Access: Introduction to DBMS, Relationships, Importing Data, Pivot Table, Reports, creating tables in Access, defining datatypes, creating relationships, manipulating records</p> <p><b>CO5:</b> Basic concept of 2D/3D animation, principle of animation, various file format, animate text, transformation, basic action scripts, importing sound through flash</p>
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**PAPER V: BCA105: WEB TECHNOLOGY AND E-COMMERCE**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 105</b>	<b>WEB TECHNOLOGY AND E-COMMERCE</b>	<p><b>CO1:</b> History, evolution, internet applications, WWW, OSI and TCP/IP model, Email concept, SMTP, TELNET, Chat services, Internet messaging.</p> <p><b>CO2:</b> Introduction to HTML, HTML versions, Headings on web pages, Hyperlinks, Creating Paragraph, Images, Links, Tables, Frame, Creating an HTML Form, HTML Controls</p> <p><b>CO3:</b> DHTML Introduction, CSS, Inline Style Sheet, Event Handling, Java Script, Embedding JavaScript into HTML Pages, Handling events</p> <p><b>CO4:</b> Features and Advantages of PHP, Installing, Creating and running PHP, working with variables, Array, User Defined Function.</p> <p><b>CO5:</b> Definition of Ecommerce, Scope, E Payment System, Security Threats, Types of Ecommerce, B2B, B2C, Business to Business to Consumer, C2C</p>

**PAPER VI: BCA106: COMMUNICATION SKILLS**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 106</b>	<b>COMMUNICATION SKILLS</b>	<p><b>CO1:</b> Structure of Sentences: simplex, Complex, Compound, Clause, Tenses, Model, Participle: Non-finite and finite, infinitive</p> <p><b>CO2:</b> Transformation of sentences, Active to Passive, Affirmative to Negative, Explanative to Assertive, Interrogative to Assertive.</p> <p><b>CO3:</b> Report writing, Essay Writing,</p>

		<p>Application Writing, Description of events, Letter Writing.</p> <p><b>CO4:</b> Precis writing, reading comprehension, summarizing, presentation skills, paraphrasing.</p> <p><b>CO5:</b> Official communication: notice, Circular, Minutes of the meeting, Agenda of meeting, Morden mediaof communication.</p>
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## II YEAR

### PAPER I: BCA201: PART-I: CALCULUS AND DIFFERENTIAL EQUATIONS

PAPER CODE	SUBJECT	COURSE OUTCOMES
BCA 201	CALCULUS AND DIFFERENTIAL EQUATIONS	<p><b>CO1:</b> To find maxima and minima, critical points and inflection points of functions and to determine the concavity of curves.</p> <p><b>CO2:</b> To able to evaluate integrals of rational functions by partial fractions.</p> <p><b>CO3:</b> Series solutions of differential equations</p>

### PAPER II: BCA202: DBMS (ORACLE, SQL)

PAPER CODE	SUBJECT	COURSE OUTCOMES
BCA 202	DBMS (ORACLE, SQL)	<p><b>CO1:</b> Database, Definition of DBMS, Purpose of Database System, Data abstraction, Instances, Schema, Data Independence, Data administration roles, DBMS users</p> <p><b>CO2:</b> Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key.</p> <p><b>CO3:</b> Relational Algebra: select, project, cross product different types of joins (Inner join, outer joins, self- join); set operations, Simple and complex queries using relational algebra.</p> <p><b>CO4:</b> Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms.</p> <p><b>CO5:</b> Introduction to Commercial database query language, SQL &amp; its environment. SQL as a data definition language-creating tables, altering tables, drop tables. SQL as data manipulation language- Inserting, Deleting, Retrieving and updating data in a table.</p>

## PAPER III: BCA203: PROGRAMMING IN C++ AND VC++

PAPER CODE	SUBJECT	COURSE OUTCOMES
BCA 203	PROGRAMMING IN C++ AND VC++	<p><b>CO1.</b> Need for Object Oriented programming; Procedural Languages; The Object Oriented approach; advantages of Object-Oriented Programming; characterization of Object-Oriented Languages</p> <p><b>CO2:</b> Object and Class, Using the class, class construct, class destructors, object as function argument, struct and classes, array as class member, operator overloading.</p> <p><b>CO3:</b> Overview of C++ Programming; Loops and decisions; Structures and functions. Arrays and Pointers, Inheritance, Overloaded Function, Inline Function, Virtual Functions, pure virtual Functions Streams.</p> <p><b>CO4:</b> Object structure concepts; Object type; Attribute types; relationship type; Object behavioural concepts; Methodology for Object Oriented Design; Brooch methodology Relational Vs Object Oriented Databases.</p> <p><b>CO5:</b> Introduction to VC++ - C under windows, Overview of VC++, VC++ workspace &amp; projects, Introduction to MFC- The part of VC++ programs, the application object, the main window object.</p>

## PAPER IV: BCA204: COMPUTER NETWORKING

PAPER CODE	SUBJECT	COURSE OUTCOMES
BCA 204	COMPUTER NETWORKING	<p><b>CO1:</b> Data Communication, Networks - Distributed Processing, Network Criteria, Applications; Protocols, Standards, Standard Organization.</p> <p><b>CO2:</b> The model - Layered architecture, functions of the Layers-Physical layer, Data Link layer, Network layer, Transport layer, session layer, Presentation layer, Application layer.</p> <p><b>CO3:</b> Analog and Digital, digital data transmission - parallel transmission, serial transmission, data circuit terminating equipment, standards, modems- Transmission rate, Modem standards.</p> <p><b>CO4:</b> Architecture of Internet, Client server model, www, The concept of web publishing, The HTML Basics Review, Tables, frames, image maps, forms &amp; Introduction to CGI Scripting.</p> <p><b>CO5:</b> What is java, Introduction to java applet, Adding applet to web page, JavaScript, Structure of Java Script. Defining styles within HTML tags. Features of Style sheet, Web server, Publishing website, Case Studies</p>

## PAPER V: BCA205: OPERATING SYSTEMS WITH LINUX

PAPER CODE	SUBJECT	COURSE OUTCOMES
BCA 205	OPERATING SYSTEMS WITH LINUX	<p><b>CO1:</b> Introduction to Linux system, History and Emergence, Features of Linux system, Features of Linux filesystem, File types and permissions, getting started, Logging in /out with the concept of home directory.</p> <p><b>CO2:</b> Introduction to Text Processing, Vi editor, Vi Features, Vi Commands, Yanking, running shell commands, from within Vi, Command macros</p> <p><b>CO3:</b> Introduction to Shell &amp; Shell Programming: Features of a Shell, Different types of a Shell, why use more shell, the environment, set, setenv.</p> <p><b>CO4:</b> x-windows: what is X-windows, Microsoft windows verses x-windows, Using the GNOME &amp; KDE desktop environment: starting the GNOME desktop environment, the GNOME panel.</p> <p><b>CO5:</b> Installation &amp; system Administration of Linux: responsibilities of a system administrator, start up and shutdown process, inittub and profile file importance, security file access permission, user and group related jobs</p>

## PAPER VI: BCA206: B. ENGLISH LANGUAGE

PAPER CODE	SUBJECT CODE	COURSE OUTCOMES
BCA 206	ENGLISH LANGUAGE	<p><b>CO1:</b> Short answer questions.</p> <p><b>CO2:</b> Reading Comprehension of unseen passage, Vocabulary.</p> <p><b>CO3:</b> Report Writing</p> <p><b>CO4:</b> Expansion of an idea.</p> <p><b>CO5:</b> Grammar and Vocabulary.</p>

## IIIYEAR

## PAPER I: BCA301: STATISTICAL ANALYSIS

PAPER CODE	SUBJECT	COURSE OUTCOMES
BCA 301	STATISTICAL ANALYSIS	<p><b>CO1.</b> Tabular and graphical representation of data based on variables.</p> <p><b>CO2.</b> Conditions for the consistency' and criteria for the independence of data based on attributes.</p> <p><b>CO3.</b> Measures of central tendency, Dispersion, Skewness and Kurtosis.</p>



		<p><b>CO4.</b> Moments and their use in studying various characteristics of data.</p> <p><b>CO5.</b> Different approaches to the theory of probability.</p> <p><b>CO6.</b> Important theorems on probability and their use in solving problem</p> <p><b>CO7.</b> Concept of correlation, various correlation coefficients- Pearson's correlation coefficient, Spearman's rank correlation coefficient, partial correlation coefficient and Multiple correlation coefficient.</p> <p><b>CO8.</b> Concept of Principle of least squares for curve fitting and regression lines.</p>
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**PAPER III: BCA302: PROGRAMING IN PYTHON**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 302</b>	<b>PROGRAMING IN PYTHON</b>	<p><b>CO1:</b> Create your first program in Python IDLE.</p> <p><b>CO2:</b> Implement OOPs concepts in your programming.</p> <p><b>CO3:</b> Use Arrays, and Data structures.</p> <p><b>CO4:</b> Create an application with the support of graphics in Python.</p> <p><b>CO5:</b> Implement error handling.</p>

**PAPER 3: BCA303: DOT NET TECHNOLOGY**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 303</b>	<b>DOT NET TECHNOLOGY</b>	<p><b>CO1.</b> Design, formulate, and construct applications with VB.NET.</p> <p><b>CO2.</b> Integrate variables and constants into calculations applying VB.NET.</p> <p><b>CO3.</b> Determine logical alternatives with VB.NET decision structures.</p> <p><b>CO4.</b> Implement lists and loops with VB.NET controls and iteration.</p>

**PAPER IV: BCA304: SOFTWARE ENGINEERING**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 304</b>	<b>SOFTWARE ENGINEERING</b>	<p><b>CO1:</b> Introduction to Software Engineering, Definition, Need and Software problem, Software Crises, Software Engineering Problem, Software Engineering Approach.</p> <p><b>CO2:</b> Project Management, The Phase Management Process, Software Metrics, Size Oriented Metrics, Function Oriented Metrics.</p> <p><b>CO3:</b> Software Requirement and Specification, Introduction and Need of SRS, Structured Analysis, Data Flow Diagram, Context Diagram, Data Dictionary.</p> <p><b>CO4:</b> Software Design &amp; Coding, Principle of Software Design, Partitioning, Abstraction, Top Down and Bottom-</p>

		<p>up Strategies, Concept of Module, Coupling, Cohesion, Structured Chart, Coding.</p> <p><b>CO5:</b> Software Testing and Maintenance, Definition, Testing Fundamentals, Error, Fault, Failure, TestOracles, Types of Testing, Level of testing- Unit, Integration, System, Acceptance, Introduction of Maintenance</p>
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**PAPER : BCA305: DATA STRUCTURE**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 305</b>	<b>DATA STRUCTURE</b>	<p><b>CO1:</b> Introduction, Basic terminology, Elementary data organization, Data structure, Data structure operation</p> <p><b>CO2:</b> Basic Terminology, Linear Array; Sorting: Bubble Sort; Searching: Liner Search, Binary Search, Pointers: Pointer Array; Records: Record Structures.</p> <p><b>CO3:</b> Link lists, traversing a linked list, searching a linked list; Insertion into a linked List, Deletion from a Linked List, Stacks, Array Representation of Stack; Queues.</p> <p><b>CO4:</b> Types of Trees, Binary Trees, Representing Binary, traversing binary tree, Searching and Inserting in Binary Tree, Deleting in Binary tree.</p> <p><b>CO5:</b> Sorting, Insertion Sort, Selection Sort, Merging, Merge.</p>

**PAPER I: BCA306: PART-III: COMPUTER SYSTEM ARCHITECTURE**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>BCA 306</b>	<b>COMPUTER SYSTEM ARCHITECTURE</b>	<p><b>CO1:</b> Data Representation – Data Types, Number System, Fixed Point Representation – 1’s, 2’scomplements, Binary operation, Overflow &amp; Underflow</p> <p><b>CO2:</b> Digital Logic Circuits –Gates &amp; their truth tables, NOR, NAND&amp; XOR Gates, Boolean algebra, Basic Boolean Law, Doorman's theorem, Map Simplification, Minimizing technique, K Map.</p> <p><b>CO3:</b> CPU organization, ALU &amp; Control circuit, Idea about arithmetic circuits, Program control, Instructionsequencing, Microprocessor architecture, System buses.</p> <p><b>CO4:</b> Input output organization, I/O Interface, Properties of simple I/Devices and their Controller, isolatedversus Memory mapped I/O, Modes of Data transfer.</p> <p><b>CO5:</b> Auxiliary memory - Magnetic drum, Disk &amp; Tape, Semiconductor memories, Memory Hierarchy, Associative memory, Virtual memory, address space &amp; memory space, Address mapping, Page table.</p>

**NEW SCHEMES OF BCA 2023-24**

<b>YEAR</b>	<b>COUSE CODE</b>	<b>SUBJECT NAME</b>
<b>FIRST</b>	BCA -1T	DISCRETE MATHEMATICS
	BCA -2T	COMPUTER FUNDAMENTAL AND MS OFFICE
	BCA -3T	PROGRAMMING WITH C AND C++
	BCA -4T	DATA STRUCTURE
	BCA -5T	DIGITAL ELECTRONICS
	BCA -6T	HINDI
	BCA -7T	ENGLISH
	BCA -1P	LAB 1:PC SOFTWARE
	BCA-2P	LAB 2: PROGRAMMING WITH C AND C++
<b>SECOND</b>	BCA -8T	NUMERICAL MATHEMATICS
	BCA -9T	OPERATING SYSTEM
	BCA -10T	RELATIONAL DATABASE MANAGEMENT SYSTEM
	BCA -11T	COMPUTER NETWORKING AND CYBER TECHNOLOGY
	BCA -12T	WEB TECHNOLOGY
	BCA -13T	HINDI
	BCA -14T	ENGLISH
	BCA -3P	LAB :3 RELATIONAL DATABASE MANAGEMENT SYSTEM
	BCA -4P	LAB 4: WEB TECHNOLOGY
<b>THIRD</b>	BCA -15T	PYTHON PROGRAMMING
	BCA -16T	JAVA PROGRAMMING
	BCA -17T	SOFTWARE ENGINEERING
	BCA -18T	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM
	BCA -19T	E-COMMERCE
	BCA -20T	COMMUNICATION SKILL
	BCA -5P	LAB 5: JAVA
	BCA -6P	Lab 6: Python
	BCA -7P	Lab 7: Project

**PROGRAMME OUTCOMES FOR BCA**

- (a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- (b) An ability to analyze a problem and identify and define the computing requirements appropriate to its solution.
- (c) An ability to design, implement and evaluate a computer based system, process, components or program to meet desired need.
- (d) An understanding of professional, ethical, legal, security and social issues and responsibilities.
- (e) An ability to analyze the local and global impact of computing on individuals, organizations and society.
- (f) An ability to use current techniques, skills and tools necessary for computing practice.
- (g) An ability to apply mathematical foundations, algorithmic principles and computer science theory in the modelling and design of computer based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- (h) An ability to apply design and development principles in the construction of software system of varying complexity.

**❖ PSO-1: PROGRAMMING SKILL**

- Gain knowledge of different programming languages for making software
- To develop skill in area Database Management, Software Development ,Computer languages, Software engineering and Web Base Application

**❖ PSO-2:FUNDAMENTAL AND TECHNICAL KNOWLEDGE**

Understand fundamental concept of computer, Business environment and IT application

**❖ PSO3:REASONING**

- Apply algorithmic reasoning to a variety of Computational Problems
- Design, correctly implement and document solution to significant computational problem
- Work effectively in teams to design and implement solution to computational problem

**❖ PSO4:-DATA STRUCTURE**

- Students get knowledge about storage of data and memory space allocate to each data using derived data types
- Knowledge of data structure programming

**❖ PSO5:-RESPONSIBILITIES:-**

Recognize the social and ethical responsibilities of a professional working in the discipline

**❖ PSO6:-KNOWLEDGE WORKING PRINCIPAL:-**

- Student gain knowledge of computer architecture and working process

**❖ PSO7:-PROJECT KNOWLEDGE**

- Students gets knowledge about project .Successfully understand and analyze technical data to reach actionable conclusion, including technological solution to the business

**COURSE PROFILE FOR BSc (COMPUTER SCIENCE AND IT)****❖ PSO-1: PROGRAMMING LANGUAGE.****❖ PSO-2: REASONING.****❖ PSO-3:-DATABASE.****❖ PSO-4:-RESPONSIBILITIES.****❖ PSO-5:-KNOWLEDGE WORKING PRINCIPAL.****I YEAR****COMPUTER SCIENCE: PAPER II: PROGRAMMING IN C LANGUAGE (PAPER CODE- 0806)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0806</b>	<b>PROGRAMMING IN C LANGUAGE</b>	<b>CO1:</b> Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Constants, Literals and Variables, Operators and Expressions. <b>CO2:</b> If-else, conditional operators, switch and break, nested conditional branching statements, loops, Definition, function components: Function arguments, return value, function call statement, function prototype

		<p><b>CO3:</b> Array declaration, one and two dimensional numeric and character arrays. Multidimensional arrays, String declaration, initialization, declaring structure, Union</p> <p><b>CO4:</b> Definition of pointers, Pointer declaration, Using &amp;* operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, Dynamic memory allocation functions</p> <p><b>CO5:</b> File handling: file pointer, File accessing functions: fopen, fclose, fputc, fgetc, fprintf, fscanf, fread, fwrite, be of, fflush, rewind, fseek, ferror. File handling through command line argument.</p>
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**COMPUTER SCIENCE: PAPER I: COMPUTER FUNDAMENTALS (PAPER CODE- 0805)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE- 0805</b>	<b>COMPUTER FUNDAMENTALS</b>	<p><b>CO1:</b> History of computer, Generation of computer, calculator vs computer. Digital and Analogue computers and its evolution. Major components of digital computers, Memory addressing capability of CPU.</p> <p><b>CO2:</b> Parts of CPU-ALU control unit, Registers; Architecture of Intel 8085 microprocessor, Instruction for Intel 8085 microprocessor, Instruction Word size, Various addressing mode, Interrupts some special control signals</p> <p><b>CO3:</b> Memory hierarchy, Primary and Secondary Memory, Cache memory, Virtual Memory, Direct Access storage devices (DASD) Destructive and Non-destructive Readout</p> <p><b>CO4:</b> I/O Devices-Keybaord, Mouse, Monitor, Impact and Non-Impact Printers, Plotters, Scanner, other Input/output devices: Scan method of Display, Raster Scan, Vector Scan, Bit Mapped Scan, CRT Controller</p> <p><b>CO5:</b> Application and System Software: Introduction, Example, Difference etc. Open-Source Software suchas Unix/Linux (Ubuntu), Liber office etc. Machine Language Assembly Language</p>

**INFORMATION TECHNOLOGY: PAPER I: FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE (PAPER CODE-0824)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0824</b>	<b>FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE</b>	<p><b>CO1:</b> Concept of IT and information system, Application of IT (In Business, Education Medicine Science Governance and Agriculture) Impact of IT on society E and industry, Legal and Ethical aspect of IT, Security Threats in IT.</p> <p><b>CO2:</b> Basic Concept of Computer Network Internet Concept Lan, Man, Wan Topology, Wireless Communication Mobile Internet Gps,3g, 4g Wi-Fi Bluetooth, Social Network Evolutions of Social Network Site</p> <p><b>CO3:</b> Introduction word processing (MS-Word) Advantage of word processing, Introduction and Installation Editing a file using paragraph styles, Newspaper style columns using macros advanced word processing</p> <p><b>CO4:</b> Introduction to spreadsheets (MS-EXCEL), Definition and advantage of electronics worksheet, working on spread sheets range and related operations, setting saving and retrieving worksheets Inserting,Deleting</p> <p><b>CO5:</b> Presenting with Power point: Creating presentation working with slides, Different type of slides,Settings page layout, selecting background and applying designs</p>

**INFORMATION TECHNOLOGY: PAPER II: PROGRAMMING IN C LANGUAGE (PAPER CODE-0825)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0825</b>	<b>PROGRAMMING IN C LANGUAGE</b>	<p><b>CO1:</b> Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Constants, Literals and Variables, Operators and Expressions.</p> <p><b>CO2:</b> If-else, conditional operators, switch and break, nested conditional branching statements, loops, Definition, function components: Function arguments, return value, function call statement, function prototype</p> <p><b>CO3:</b> Array declaration, one and two dimensional numeric and character arrays. Multidimensional arrays, String declaration, initialization, declaring structure, Union</p> <p><b>CO4:</b> Definition of pointers, Pointer declaration, Using &amp; and* operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, Dynamic memory allocation functions</p> <p><b>CO5:</b> File handling : file pointer, File accessing</p>

**II YEAR**

**COMPUTER SCIENCE: PAPER I: COMPUTER HARDWARE (PAPER CODE-0855)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0855</b>	<b>COMPUTER HARDWARE</b>	<p><b>CO1:</b> Digital and Analog computers and its evolution. Major components of digital computers; Memory addressing capability of CPU; word length and processing speed of computers</p> <p><b>CO2:</b> CPU organization, ALU control unit registers. Instructions for INTEL 8085, Instruction word size, Various addressing mode interrupts and exceptions, some special Control signals</p> <p><b>CO3:</b> Main memory secondary memory, backup memory, cache memory; real and virtual Memory Semiconductor memory. Memory controller and magnetic memory; RAM;</p> <p><b>CO4:</b> I/O devices of micro controller; processors. I/O devices, printer, plotter, other output devices, I/O port serial data transfer scheme</p> <p><b>CO5:</b> ML, AL, HLL, stack subroutine debugging of programs macro, micro programming, Program Design, software development, flow &amp; chart multi programming</p>

**COMPUTER SCIENCE: PAPER II: COMPUTER SOFTWARE (PAPER CODE-0856)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0856</b>	<b>COMPUTER SOFTWARE</b>	<p><b>CO1:</b> Concept of a Web Site, Web Standards, Basic HTML Tags, Structure- Head Section, Structure-BodySection, Text Emphasis Elements, Netscape, Microsoft and Advanced Standard Elements List</p> <p><b>CO2:</b> List, FONT, BASEFONT and CENTER Insertion of images using the element IMG, Element and Attributes, Image as Hypertext Anchor, Practical IT Application Designing web pages' links with each other</p> <p><b>CO3:</b> Advantages of OOP, The Object-Oriented Approach, Function Declaration, Calling Function, Function Defines, Passing Argument to function, Passing Constant</p> <p><b>CO4:</b> Object and Class, Using the class, class constructor, class destructors, object as function argument, copy constructor, Type of inheritance, Base class, Derive class. Access Specifier: protected.</p> <p><b>CO5:</b> pointers: &amp; and * operator pointer variables, pointer to pointer, void pointer, pointer and array, VirtualFunction, File and Stream.</p>



**INFORMATION TECHNOLOGY: PAPER I: DIGITAL CIRCUIT & COMPUTER HARDWARE (PAPER CODE-0874)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0874</b>	<b>DIGITAL CIRCUIT &amp; COMPUTER HARDWARE</b>	<p><b>CO1:</b> Octal and hexadecimal number, decimal rep., complements, addition,</p> <p><b>CO2:</b> Half adder, full adder, flip-flop: SR, JK, D, T, sequential circuits: encoder, decoder, multiplexer, shift register, binary counters, BCD adder</p> <p><b>CO3:</b> Monostable, a stable, bistable, smith trigger, clocked RS, master-slave flip-flop, edge triggered flip-flop, latch;</p> <p><b>CO4:</b> Introduction, register organisation, stack organisation, Instruction formats, Addressing modes</p> <p><b>CO5:</b> Memory hierarchy, main memory, Auxiliary memory, Associative memory, cache memory, virtual memory, memory management techniques</p>

**INFORMATION TECHNOLOGY: PAPER II: PROGRAMMING IN C++ (PAPER CODE- 0875)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0875</b>	<b>PROGRAMMING IN C++</b>	<p><b>CO1:</b> Introduction to OPP: Advantages of OPP, the Object-oriented approach, characteristics of object-oriented languages</p> <p><b>CO2:</b> Function: function declaration, calling function, function definition, passing arguments to function, passing constant, passing value</p> <p><b>CO3:</b> Object and classes, using the classes, class constructor, class destructor, object as function argument, copy constructor, struct and classes, array as class member, static class data</p> <p><b>CO4:</b> Pointers: &amp; and * operator pointer variables, pointer to pointer, void pointer, pointer and array, pointer and functions, pointer and string, memory management.</p> <p><b>CO5:</b> File and stream: C++ streams, C++ manipulators, Stream class, string I/O, char I/O; object I/O, I/O with multiple objects, disk I/O.</p>

**III YEAR**

**COMPUTER SCIENCE: PAPER I: COMPUTER HARDWARE (PAPER CODE-0909)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0909</b>	<b>COMPUTER HARDWARE</b>	<p><b>CO1:</b> Basic Components of Micro-computer: Basic Block, Interconnecting Components in a Micro-computer, The Registers of CPU, Memory addressing modes of P-8088</p> <p><b>CO2:</b> Block diagram with various parts of PC, The Mother Board of General P.C.: 8088 CPU; ROM &amp; RAM, The Serial I/O ports, COM-1 &amp; COM-2, Video Monitors; Monochrome and colour</p> <p><b>CO3:</b> Introduction to UNIX, ENIX, SUN, The ROM-BIOS Serial Port Services, INT 14H, The Execution of the programs under DOS</p> <p><b>CO4:</b> Logical Structure of a Disk: Organization of disk for use; Boot record, Memory Management under DOS: EXEC loader; Memory Management &amp; its functions;</p> <p><b>CO5:</b> Types of interrupts, Filters in operating systems, Setup Installation, Networking features, The Filters Supplied with DOS</p>

**COMPUTER SCIENCE: PAPER II: COMPUTER SOFTWARE (PAPER CODE-0910)**

<b>PAPER CODE</b>	<b>SUBJECT CODE</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE-0910</b>	<b>COMPUTER SOFTWARE</b>	<p><b>CO1:</b> Introduction to DBMS: - Purpose of Data base systems, views of data, E-R Model: Basic concepts, Constraints, Keys</p> <p><b>CO2:</b> Relational Model: Structure of Relational Database, Relational Algebra, Domain Relational Calculus, Relational Database Design</p> <p><b>CO3:</b> Introduction to personal and Enterprises Oracle, DDL and DML: Creating Table, Rows in as Table, Block Structure in PL/SQL</p> <p><b>CO4:</b> Visual Basic: Event Driven Programming, IDE, Variables, Declaring, Scope, Arrays, Saving data to file, Sequential and Random-access file</p> <p><b>CO5:</b> Concept of DAO, RDO, ADO, input validation, Using the ADO data control, Data Environment &amp; Data Report</p>

**INFORMATION TECHNOLOGY: PAPER II: FUNDAMENTAL DATA  
STRUCTURE (PAPER CODE-0929)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER CODE- 0929</b>	<b>FUNDAMENTAL DATA STRUCTURE</b>	CO1: The concept of data structure, Abstract data structure, Introduction to stack & primitive operation on stack, Stack as an abstract data type CO2: Introduction to the linked list of stacks, the linked list of queues, Header nodes, doubly linked list CO3: Trees: Basic Terminology, Binary Trees, Tree Representations as Array & Linked list, Binary tree representation CO4: Searching & Sorting: Sequential Searching, Binary search, Insertion sort, Selection sort, Quick sort. CO5: Tables & Graphs: Hash Table, Collision resolution Techniques, Introduction to graphs, Definition, Terminology, Directed

**COURSE PROFILE**  
**M.Sc. COMPUTER SCIENCE**

- **PSO 1:** Able to apply the knowledge gained during the course of the program from all computer science courses in particular to identify, formulate and solve real life complex problems faced in the context of cultural, societal, and environmental situations.
- **PSO 2:** Able to provide socially acceptable technical solutions to complex computer science problems with the application of modern and appropriate techniques for sustainable development relevant to professional practice.
- **PSO 3:** Able to apply the knowledge of ethical and management principles required to work in a team as well as to lead a team.
- **PSO 4:** Able to comprehend and write effective project reports in multidisciplinary environment in the context of changing technologies.

## COURSE OUTCOMES FOR M.Sc. (COMPUTER SCIENCE)

### **M.SC.COMPUTER SCIENCE**

To Understand the basic language implementation techniques, develop ability to learn and write small programs in different programming Languages, to classify the problem and apply the appropriate design strategy to develop algorithm, to design algorithm in context of space and time complexity and apply asymptotic notation, to understand detailed architecture, define objects, load data, query data and performance tune NoSQL databases

#### **M.SC (Computer Science) Semester I**

##### **PAPER-I: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER -I</b>	<b>MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE</b>	CO1: Notations, Algebra of Propositions & Propositional functions, logical connectives, Sets, Subsets, Power sets, Complement, Union and Intersection, De-Morgan's law Cardinality.  CO2: Lattices as Algebraic System, Sub lattices, some special Lattices, Axiomatic definitions of Booleanalgebra as algebraic structures with two operations, Switching Circuits.  CO3: Groups, axioms, permutation groups, subgroups, Definition, Structure, Minimal Polynomials,Irreducible Polynomials  CO4: Simple Graph, Multigraph & Pseudograph, Degree of a Vertex, Types of Graphs, Sub Graphs and Isomorphic Graphs  CO5: Trees, Properties of trees, pendant vertices in a tree, center of tree, Spanning tree, Binary tree, TreeTraversal

##### **PAPER-II: ADVANCE OPERATING SYSTEM**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER -II</b>	<b>ADVANCE OPERATING SYSTEM</b>	CO1: What is operating system, basic concept, terminology, batch processing, spooling, multiprogramming,time-sharing, real-time systems  CO2: Multi- threaded operating system architecture micro-kernels operating system architecture multipleoperating system- subsystem and environments

		<p>CO3: Virtual address space, description of user process and kernel, virtual memory architecture of Pentium group of processors</p> <p>CO4: Deadlock introduction, deadlock characterization, Disk structure, disk attachment, disk scheduling, disk management, RAID structure</p> <p>CO5: Virtual file systems and v-node architecture, distributed file system, network file system, remote procedure call</p>
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**PAPER-III: DATA STRUCTURE THROUGH ALGORITHMS USING ‘C’**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -III	<b>DATA STRUCTURE THROUGH ALGORITHMS USING ‘C’</b>	<p>CO1: Basic terminology, Elementary data organization, Data structure, Data structure operation, Algorithms: complexity</p> <p>CO2: Basic Terminology, Storing String, Character Data Type, String Operations, Word Processing, Pattern Matching Algorithms. Linear Array</p> <p>CO3: Linked list, Representation of linked lists in memory, traversing a linked list, Searching a linked list, Memory Allocation; Garbage Collection,</p> <p>CO4: Binary Trees, Representing Binary Trees in Memory, traversing binary tree, Traversal Algorithms using stacks, header nodes; threads</p> <p>CO5: Sorting, Insertion Sort, Selection Sort, Merging, Merge Sort, Radix Sort, Searching and data modification, hashing</p>

**PAPER-IV: OBJECT ORIENTED PROGRAMMING USING ‘C++’**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -IV	<b>OBJECT ORIENTED PROGRAMMING USING ‘C++’</b>	<p>CO1: Advantages of OOP, The Object-Oriented Approach, History of C++, Data Types, Constants and Variables</p> <p>CO2: structures, specify the structures, defining a structure variable, Passing Value, Reference Argument, Passing struct variable</p> <p>CO3: Object and Class, Using the class, class construct, class destructors, object as function argument, struct and classes</p> <p>CO4: Pointers: &amp; and * operator pointer variables, pointer to void, pointer and array, pointer and function, pointer and string</p> <p>CO5: Virtual member function, accesses with pointer, Late binding, File and Stream: C++ streams, Streamclass</p>

**PAPER-V: COMPUTER SYSTEM ARCHITECTURE**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -V	COMPUTER SYSTEM ARCHITECTURE	CO1: Number system, Integer & Floating-point representation Character code (ASCII, EBCDIC), Error Detect and Correct code CO2: Concepts of bus, data movement along registers, a language to represent conditional data transfer, data movement from its memory CO3: Instruction code, Computer Instructions, Timing and Control, Execution of Instruction, Input and Output Interrupt, Design of Computer CO4: Programming Language, Assembly Language, Assembler, Program Loops, CO5: Input –Output Organization: Peripheral Devices, Input/output Interface, Memory Organization:Auxiliary Memory

**M.SC (COMPUTER SCIENCE) SEMESTER II****PAPER-I: RDBMS (SQL PROGRAMMING WITH ORACLE)**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -I	RDBMS (SQL PROGRAMMING WITH ORACLE)	CO1: Data, Information and knowledge, Increasing use of data as a corporate resource, data processingverses data management CO2: Entity - Relationship model as a tool for conceptual design-entities, Relational Algebra: select, project,cross product different types of joins CO3: SQL constructs, Nested queries, and correlated nested queries, Types – internal, user-defined CO4: PL/SQL tables and records, Functions - procedures – input-output parameters CO5: Normalization concept in logical model, Normal forms, Data Organization

**PAPER-II: ADVANCE COMPUTER NETWORK**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -II	ADVANCE COMPUTER NETWORK	CO1: The Concept of Networking, Data Communication, Required network elements, The role of Standards Organization, Design Issues for the Layers. Interfaces and services,

		<p>CO2: Shannon’s and Nyquist theorems for maximum data rate of a channel, The Concept of Multiplexing-FDM, TDM, WDM. The Concept of Switching- Circuiting</p> <p>CO3: Line Discipline, Flow Control- stop and wait, sliding window, Routing algorithms- shorted path first,Distance Vector, Link State</p> <p>CO4: The Concept of client and Server in terms of Socket addressing in Transport layer, The concept ofATM</p> <p>CO5: X.25, Frame Relay, ATM, SONET, SMDS, ISDN, The importance of Security in Networking.</p>
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**PAPER-III: PROGRAMMING IN VISUAL BASIC**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -III	PROGRAMMING IN VISUAL BASIC	<p>CO1: The Visual Basic Program Development Process, Numeric Constants;</p> <p>CO2: Visual Basic Control Tools; Control tool Categories; Working with controls; Naming Forms andControls; Building Drop-down Menus</p> <p>CO3: Syntax Errors; Logical Errors; Setting break Points; Defining Watch Values, Modules and Procedures,Array, Object Oriented Principles</p> <p>CO4: Introduction to ActiveX Components and Component Object Model, Creating an ActiveX Control;Benefits of ActiveX Control,</p> <p>CO5: Data Access Technology with VB; The ActiveX Data Object Model; Advantages of ADO, DataEnvironment Designers.</p>

**PAPER-IV: PRINCIPLES OF COMPILER DESIGN**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -IV	PRINCIPLES OF COMPILER DESIGN	<p>CO1: Introduction to Compilers: Overview, Structure, implementation. Programming Language Grammars:Inter Language grammars</p> <p>CO2: Scanning and Parsing Techniques: The Scanner, parser, translation, elementary symbol tableorganization, structures</p> <p>CO3: Memory Allocation: Static and dynamic memory allocation, array allocation and access, allocation forstrings, structure allocation</p> <p>CO4: Compilation of Control Structures: Control transfers, procedural calls, conditional execution,integration control constructs</p> <p>CO5: Code Optimization: Major issues, optimizing transformations, local optimizations, program flowanalysis, Global Optimization.</p>

**PAPER-V: NUMERICAL ANALYSIS**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PAPER -V</b>	<b>NUMERICAL ANALYSIS</b>	<p>CO1: Bisection method, Regalia's method &amp; Newton's method, Solution of Cubic &amp; Biquadrate Equation</p> <p>CO2: Gauss-Jordan method, Cholesky's method, Reduction to lower or upper Triangular forms, Inversion of matrix, method of partitioning</p> <p>CO3: Divided difference table for evenly or unevenly spaced data, polynomial curve-fitting - Newton's, Gauss and Lang ranges form of interpolation</p> <p>CO4: Forward and Backward differential operators, Newton – cotes integration formula: Trapezoidal Rule, Simpson's Rule</p> <p>CO5: Numerical Solution of ordinary differential equations, one step method, Taylor's Series, Predictor-Corrector Method</p>

**M.SC (COMPUTER SCIENCE) SEMESTER III****PAPER-I: PROGRAMMING IN JAVA**

<b>PAPER CODE</b>	<b>SUBJECT CODE</b>	<b>COURSE OUTCOMES</b>
<b>PAPER -I</b>	<b>PROGRAMMING IN JAVA</b>	<p>CO1: History and features of Java, Difference between C, C++ &amp; JAVA, Structure of Java program, JAVA tokens and Statements, Constants &amp; Variables, Data types, Operators</p> <p>CO2: Specifying sub class, types of inheritance, visibility control: public, private, protected, package, packages, naming conventions, Creation threads, Extending Thread class</p> <p>CO3: Managing errors, types of errors, exceptions, Java I/O package, Byte/Character Stream, Applet Vs. Application, Creating applets, life cycle</p> <p>CO4: Components and Graphics, Containers, Frames and Panels, Layout Managers, Border layout, Javadatabase connectivity, Types of JDBC drivers</p> <p>CO5: Networking basics, Sockets, port., Internet addressing, Introduction Servlet API Overview, Writing and running Simple Servlet</p>



**PAPER-II: COMPUTER GRAPHICS**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -II	COMPUTER GRAPHICS	CO1: Introduction of computer Graphics and its applications, Overview of Graphics systems, Video display devices, Raster scan display CO2: Line drawing algorithms, DDA, Bradenham's, Circle generating, Midpoint circle algorithm, Ellipsegenerating CO3: Basic transformation's, Translation, Rotation, Scaling, Matrix representation's & homogeneous co-ordinates, Composite transformation's CO4: Spline representation, Cubic spline, Bezier curve, Bezier surfaces, Beta spline, B-spline surfaces, B-spline curve CO5: Fractal's geometry Fractal generation procedure, Classification of Fractal, Fractal dimension, Fractal construction methods.

**PAPER-III: LINUX**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -III	LINUX	CO1: Introduction to Multi-user System, Emergency and history of Unix, Feature of Unix File System CO2: Introduction to shell feature, wild card characters, i/out redirections, standard error redirection, systemand user created shell variable CO3: Features, changing the login shell, cshrc, login, logout files, Process management, process states andtransition CO4: I/O Sub system, terminal drives, disk drives, messages, shared memory, semaphores, memorymanagement, System Calls CO5: Process and Scheduling, Security, Basic System Administration: - Adding a User, User Passwords,Delete of a User

**PAPER-IV: IMAGE PROCESSING**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -IV	IMAGE PROCESSING	CO1: Digital Image fundamentals: Introduction, An image model, sampling & quantization, basic relationshipsbetween Pixels, imaging geometry CO2: Image Transforms: Properties of 2 – D Fourier transform, FFT algorithm and other separable image transforms. CO3: Image Enhancement: Background, enhancement by point processing, Image filtering and restoration:

		<p>degradation model</p> <p>CO4: Image compression: Fundamentals, image compression modes, Image segmentation: Detection of discontinuities</p> <p>CO5: Representation and description: Various schemes for representation, boundary descriptors, Imagereconstruction from Projections</p>
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**PAPER-V: OBJECT ORIENTED DESIGN ANALYSIS AND DESIGN**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -V	OBJECT ORIENTED DESIGN ANALYSIS AND DESIGN	<p>CO1: Two views of software Developments: SSAD and OOAD, Object Oriented Design –Booch, ObjectModelling Techniques</p> <p>CO2: Unified Approach: Diagramming and Notational Techniques using the UML, UML Notation, Generalization/Specialization, Aggregation and composition, Rational Unified Process, Four Major phases</p> <p>CO3: Behavioural Analysis, Domain Analysis or Business Object Analysis, Use-case Driven Object-Oriented analysis</p> <p>CO4: Translating Analysis Concept into Design, Optimizing classes and Objects: The Multi- TieredArchitecture View, Mapping System functions to objects.</p> <p>CO5: Designing for Extensibility, Design for reusability, The Cood Data Management Domain, ObjectPersistence</p>

**M.SC (COMPUTE SCIENCE) SEMESTER IV**

**PAPER-I: SOFTWARE ENGINEERING**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -1	SOFTWARE ENGINEERING	<p>CO1: Software Crisis, Software Processes &amp; Characteristics, Software life cycle models, Waterfall, Requirement engineering, requirement elicitation techniques like FAST</p> <p>CO2: Size Estimation like lines of Code &amp; Function Count, Cost Estimation Models, COCOMO, Cohesion&amp; Coupling, Classification of Cohesiveness</p> <p>CO3: Software measurements: What &amp; Why, Token Count, Importance, Hardware Reliability &amp; Software Reliability, Failure and Faults</p> <p>CO4: Testing process, Design of test cases, Introduction to functional testing, Integration and SystemTesting, Debugging, Alpha &amp; Beta Testing</p> <p>CO5: Management of Maintenance, Maintenance Process, Maintenance Models, Regression Testing.</p>

**PAPER-II: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -II		<p>CO1: The AI problems; what is an AI technique, General problem solving; production systems; control strategies: forward and backward and backward chaining</p> <p>CO2: Hill climbing; Branch and Bound technique, Minimax search procedure; Alpha-Beta cut-offs; Additional Refinements</p> <p>CO3: First order predicate calculus; Solemnization Resolution principle, Introduction to Lisp, Syntax and Numeric functions; List manipulation functions</p> <p>CO4: Parsing technique; context—context- free grammar, An example Domain: The Blocks Word; Component of planning systems</p> <p>CO5: Introduction to expert systems and Applications, Role learning; learning by induction</p>

**PAPER-III: DATA MINING AND DATA WAREHOUSE**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
PAPER -III		<p>CO1: What is data mining? Data Mining: On what kind of data? Data mining functionality, Are all the patterns interesting? Classification of data mining systems</p> <p>CO2: Why pre-process the data? Data cleaning, Data integration and transformation, Data reduction, Discrimination and concept hierarchy generation</p> <p>CO3: Association rule mining, mining single-dimensional Boolean association rules from transactional databases, Mining multilevel association rules from transactional databases</p> <p>CO4: What is classification? What is prediction? Issues regarding classification and prediction, Classification by decision tree induction, Bayesian Classification</p> <p>CO5: Multidimensional analysis and descriptive mining of complex data objects, mining spatial databases, mining multimedia databases, Mining timeseries and sequence data.</p>

**P.G.D.C.A.****PROGRAMME OUTCOMES FOR PGDCA****❖ PSO-1:PROGRAMMING SKILL**

- Gain knowledge of different programming languages for making software
- To develop skill in area Database Management, Software Development ,Computer languages, Software engineering and Web Base Application

**❖ PO-2:TECHNICAL KNOWLEDGE:-**

- Are aware of the latest knowledge in the relevant field

**❖ PO-3:-CAREER ORIENTED:-**

Learn skill developing subject which is useful for our career and for making our own business

**❖ PO-4:PROGRAMMING SKILL**

- Gain knowledge of different programming languages for making software
- To develop skill in area Database Management, Software Development ,Computer languages, Software engineering and Web Base Application

**❖ PO-5:-PROJECT KNOWLEDGE**

Students gets knowledge about project .Successfully understand and analyze technical data to reach actionable conclusion, including technological solution to the business

The broad objective of the PGDCA programme is to prepare Post Graduates for productive careers in software industry, corporate sector, govt. organisations and academia by providing skill-based environment

for teaching and research in the core and emerging areas of the discipline. PGDCA graduates who will have successful careers based on their understanding of formal and practical methods of Application Development using the concepts of computer programming, software and design principles.

**P.G.D.C.A. Semester I**  
**COURSE OUTCOMES****PAPER-I: INTRODUCTION TO SOFTWARE ORGANIZATION**

<b>PAPER CODE</b>	<b>SUBJECT</b>	<b>COURSE OUTCOMES</b>
<b>PGDCA-101</b>	<b>INTRODUCTION TO SOFTWARE ORGANIZATION</b>	CO1: Computers – Introduction, Computer System Characteristics, Strength and Limitations of Computer, Development of Computers, Types of Computers CO2: Central Processing Unit – Arithmetic Logic Unit, Control Unit, Registers, Instruction Set, Processors speed. Storage Devices. CO3: Basics of Software – needs of Software, Types of Software; Free Domain Software; Open-Source Software; Compiler, Interpreter and Assembler CO4: Introduction, Comparison between Human and Computer Language; Program; Data, Information and Knowledge; Characteristics of Information CO5: Communication – Introduction, Communication process, Communication Types, Communication Protocols, Communication Channels/Media. Networks – Introduction; Types of Networks

**PAPER-II: PROGRAMMING IN 'C'**

<b>PAPER CODE</b>	<b>SUBJECT CODE</b>	<b>COURSE OUTCOMES</b>
<b>PGDCA-102</b>	<b>PROGRAMMING IN 'C'</b>	CO1: Introduction Character set, Identifiers and Keywords, Variables, displaying variables, Reading Variables, Character and Character String, Qualifiers CO2: Control Structure: If - statement, If -else statement, Multi decision, Compound Statement, Loops: For -loop, While -loop, Do-While loop CO3: Function main, Functions accepting more than one parameter, User defined and library functions, Concept associatively with functions, Arrays CO4: Pointers: Definition and use of pointer, address operator, pointer variable, referencing pointer, void pointers, pointer arithmetic CO5: Declaring and using Structure, Structure initialization, Structure within Structure, Operations on Structures, Array of Structure, Array within Structure

**PAPER-III: OFFICE AUTOMATION & TALLY**

<b>PAPER CODE</b>	<b>SUBJECT CODE</b>	<b>COURSE OUTCOMES</b>
<b>PGDCA-103</b>	<b>OFFICE AUTOMATION &amp; TALLY</b>	<p>CO1: Windows Concepts, Features, Structure, Desktop, Icons, Taskbar, Start Menu, My Computer, RecycleBin, my document, creating shortcut. Accessories</p> <p>CO2: Word: Creating, Editing, &amp; Previewing Documents, Formatting, Advanced Features, WorksheetBasics, Creating, Opening, &amp; Moving in Worksheet</p> <p>CO3: Creating a presentation, modifying visual Elements, adding objects, Applying Transitions, animations and linking, preparing handouts, presenting a slide show</p> <p>CO4: Introduction to MS Access, The Tables of a Database, Introduction to the Record of a Table, Introduction to Controls Design, Details on Controls Design, The Characteristics of a Table, The Characteristics of a Form</p> <p>CO5: Setting up Ledger &amp; Groups. Study of recording of transactions in the 'Voucher', Study of Final A/C preparation</p>

**P.G.D.C.A. Semester II****COURSE OUTCOME****PAPER-I: PROGRAMMING IN VISUAL BASIC**

<b>PAPER CODE</b>	<b>SUBJECT CODE</b>	<b>COURSE OUTCOMES</b>
<b>PGDCA-104</b>	<b>PROGRAMMING IN VISUAL BASIC</b>	<p>CO1: Editions of Visual Basic, Event Driven Programming, Terminology, working environment, Introduction to objects, controlling objects, Properties, methods and events, Working with forms</p> <p>CO2: Overview of variables, Declaring, Scope, arrays, User-defined data types, Comparison and logical operators, if...Then statements, Select Case Statements looping structures</p> <p>CO3: Types of controls, Overview of standard controls, Combo Box and List Box, Overview of run-time errors, error handling process, The Err object, Errors and calling chain, Errors in an error-handling routine</p> <p>CO4: Sequential and Random Files - Saving data to file, basic filling, data analysis and file, Overview of ActiveX data Objects, Visual Basic data access features</p>

		CO5: Overview of Report, Data Report, add groups, Data Environment, Connection to database, Overview of drag and drop, Mouse events, Drag-and drop basics, Date Time Control, Calendar
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**PAPER-II: DATABASE MANAGEMENT SYSTEM**

<b>PAPER CODE</b>	<b>SUBJECT CODE</b>	<b>COURSE OUTCOMES</b>
PGDCA-105	DATABASE MANAGEMENT SYSTEM	<p>CO1: Data, Information and knowledge, concept of DBMS, Advantages of DBMS, data independence, database administration roles, DBMS architecture</p> <p>CO2: Entity - Relationship model as a tool for conceptual design-entities, attributes and relationships. ER diagrams</p> <p>CO3: Structure to Relational Database, Relational Algebra, Extended Relational- Algebra Operation, Simple and complex queries</p> <p>CO4: Pitfalls in Relational Database Design, Decomposition, Functional Dependencies, Normalization: 1NF, 2NF, BCNF, 3NF, 4NF, 5NF</p> <p>CO5: Creating Table, Specify Integrity Constraint, Modifying Existing Table, Management of Roles, Changing Password, Granting Roles &amp; Privilege</p>

**PAPER-III: ESSENTIALS OF E-COMMERCE AND HTML**

<b>PAPER CODE</b>	<b>SUBJECT CODE</b>	<b>COURSE OUTCOMES</b>
PGDCA-106	ESSENTIALS OF E-COMMERCE AND HTML	<p>CO1: The scope of E-commerce; Size, growth and future projection of Ecommerce Market Worldwide and in India; Internet and its impact on traditional businesses.</p> <p>CO2: Security of Data/Information in Internet/web environment; Client security, Network security; Virus protection and Hacking</p> <p>CO3: Concept of a Web Site, Web Standards, what is HTML? HTML Versions, Naming Scheme for HTML Documents,</p> <p>CO4: Netscape, Microsoft and Advanced Standard Elements List, FONT, BASEFONT and CENTER. Insertion of images using the element IMG</p> <p>CO5: Concept of static web pages and dynamic web pages. Hosting &amp; promotion of the web site, Domain Name Registration, Web Space allocation.</p>

**COURSE OUTCOMES FOR P.G.D.I.T.**

<b>PAPER CODE</b>	<b>SCHEMES</b>
<b>PGDIT101</b>	<b>COMPUTER HARDWARE AND NETWORKING</b>
<b>PGDIT102</b>	<b>PROGRAMMING IN C AND C++</b>
<b>PGDIT103</b>	<b>DBMS</b>
<b>PGDIT104</b>	<b>MS OFFICE AND OS</b>
<b>PGDIT105</b>	<b>PROGRAMMING IN C,C++ AND NETWORKING</b>
<b>PGDIT106</b>	<b>PROGRAMMING C# AND ASP.NET</b>
<b>PGDIT107</b>	<b>PROGRAMMING IN JAVA</b>
<b>PGDIT108</b>	<b>INTERNET,HTML,PHP</b>
<b>PGDIT109</b>	<b>PRACTICAL IN JAVA,HTML,PHP</b>
<b>PGDIT110</b>	<b>PRACTICAL IN C# AND ASP.NET</b>

**❖ CO-1: FUNDAMENTAL AND TECHNICAL KNOWLEDGE**

- Understand fundamental concept of computer ,Business environment and IT application

**❖ CO-2: PROGRAMMING SKILL**

- Gain knowledge of different programming languages for making software
- To develop skill in area Database Management, Software Development ,Computer languages, Software engineering and Web Base Application

**❖ CO-3: TECHNICAL KNOWLEDGE:-**

- Are aware of the latest knowledge in the relevant field

**❖ CO-4:-CAREER ORIENTED:-**

Learn skill developing subject which is useful for our career and for making our own business

**❖ CO-5: PROGRAMMING SKILL**

- Gain knowledge of different programming languages for making software
- To develop skill in area Database Management, Software Development ,Computer languages, Software engineering and Web Base Application

**❖ CO-6:-PROJECT KNOWLEDGE**

Students gets knowledge about project .Successfully understand and analyze technical data to reach actionable conclusion ,including technological solution to the business



**COURSE OUTCOMES FOR D.C.A**

PAPER CODE	SCHEMES
<b>FIRST SEMESTER</b>	
DCA101	ESSENTIAL OF INFORMATION TECHNOLOGY AND OS
DCA102	ESSENTIAL OF OFFICE AUTOMATION
DCA103	PROGRAMMING IN C
DCA104	PRACTICAL BASED ON DCA102 AND DCA103
<b>SECOND SEMESTER</b>	
DCA105	GUI-PROGRAMMING VB
DCA106	E-COMMERCE
DCA107	HTMLAND INTERNET APPLICATION
DCA108	PRACTICAL BASED ON DCA105 AND DCA107

**❖ CO-1:FUNDAMENTAL AND TECHNICAL KNOWLEDGE**

- Understand fundamental concept of computer, Business environment and IT application

**❖ CO-1:PROGRAMMING LANGUAGE**

- Understand simple CPU implementation.
- Write SW that manages system resources.
- Apply a variety of fundamental algorithm design techniques to computational problems.
- Basics computer skills
- MS-OFFICE Application.
- Internet basics

**❖ CO-2:PROGRAMMING SKILL**

- Gain knowledge of different programming languages for making software
- To develop skill in area Database Management, Software Development ,Computer languages, Software engineering and Web Base Application
- Gain knowledge of different programming languages for making software
- To develop skill in area Database Management, Software Development ,Computer languages, Software engineering and Web Base Application

**❖ CO-3:-RESPONSIBILITIES:-**

- Recognize the social and ethical responsibilities of a professional working in the discipline



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