Bachelor of Business Administration (Computer Application) (B.B.A.C.A.) under Commerce Faculty

◆ **Course Objectives :**

The objectives of the Programme shall be to provide sound academic base from which an advanced career in Computer Application can be developed. Conceptual grounding in computer usage as well as its practical business application will be provided.

◆ **Eligibility for Admission :**

In order to be eligible for admission to Bachelor of Computer Applications a candidate must have passed.

a. HSC (10+2) from any stream with English as passing Subject with minimum 40% marks in aggregate.

b. Two years Diploma in Pharmacy Course of Board of Technical Education, conducted by Government of Maharashtra or its equivalent.

c. Three Year Diploma Course (after S.S.C. i.e. 10th Standard), of Board of Technical Education conducted by Government of Maharashtra or its equivalent.

d. MCVC e. Every eligible candidate has to pass Common Entrance Test to be conducted by the respective Institute/College.

◆ **Course Duration :**

The duration of the B.C.A. Degree Program shall be three years divided into six semesters.

◆ **The scheme of Examinations :**

The BBACA Examination will be of 3600 marks as given Below

I) a) B.B.A.C.A.- I (Sem I + Sem II) : 1200 marks

b) B.B.A.C.A.- II (Sem III + Sem IV) : 1200 marks

c) B.B.A.C.A.- III (Sem V + Sem VI) : 1200 marks

II) For Theory Paper There Will Be 80:20 Pattern.

80 Marks : University Exam

20 Marks : Internal Exam

For Practical And Project Examination Sem I to VI : 100 marks

Sem. III , IV ,V ,VI : External Assessment

◆ The Standard of Passing and Award of Class In order to pass in the examination the candidate has to obtain 40 marks out of 100. (Min 32 marks must be obtained in University Examination. The class will be awarded on the basis of aggregate marks obtained by the candidate for all three years examinations.

The award of class will be as follows : Aggregate Percentage of Marks Class

(i) Aggregate 70% and above .... First Class with Distinction.

(ii) Aggregate 60% and above but less than 70% .... First Class

(iii) Aggregate 55% and more but less than 60% .... Higher Second Class

(iv) Aggregate 50% and more but less than 55%. .... Second Class.

(v) Aggregate 40% and more but less than 50% .... Pass Class.

(vi) Below 40% .... Fail.

◆ **RULES OF A.T.K.T.**

a) A student shall be allowed to keep term for the Second Year, if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subjects of the First year examination, which consist of First & Second Semester.

b) A student shall be allowed to keep term for the Third year, if he/she has no backlog of first Year & if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subject of the Second Year examination which consist of Third & Fourth Semester.

◆ The Medium of Instruction and Examination (Written and Viva) shall be English.

◆ **COURSE SYLLABUS**

▪ **FIRST YEAR -** Semester I

Subject Name : Modern Operating Environment And MS Office   **Course Code : 101**

	Topic Name
1.	**Introduction to computer :** Computer Characteristics, Concept of Hardware, Software , Evolution of computer and Generations, Types of computer – Analog & Digital computers, Hybrid computers, General purpose & Special Purpose Computer, Limitations of Computer Applications of Computer in Various fields.
2.	**Structure and Working of Computer :** Functional Block diagram of computer. CPU, ALU, Memory Unit, Bus structure of Digital Computer - Address, data and control bus.
3.	**Input /Output Devices :** Input device – Keyboard, Mouse, Scanner, MICR, OMR. Output devices – VDU, Printers – Dot Matrix, Daisy- wheel, Inkjet, Laser, Line printers and Plotters.
4.	**Computer Memory :** Memory Concept , Memory cell, memory organization, Semiconductor memory- RAM, ROM, PROM, EPROM, Secondary Storage devices - Magnetic tape, Magnetic Disk (floppy disk & Hard disk.), Compact Disk.
5.	**Computer Language and Software :** Algorithm, flowcharts, Machine language, Assembly language, High Level language, Assembler, Compiler, Interpreter. Characteristics of good Language. Software - System and application software.
6.	**Operating System :** Operating system, Evolution of operating system. Function of operating system. Types of operating systems. Detailed study of Windows Operating System. Introduction and features of LINUX OS
7.	**Networking :** Concept, Basic elements of a Communication System, Data transmission media, Topologies, LAN, MAN, WAN, Internet

8.	**MS-OFFICE :**
	Introduction to Ms-office, Components and features.
	MS-Word – Creating letter, table , fonts , page layout document formatting spell check, print preview, template, colour, mail merge, auto text, inserting picture , word art.
	MS-EXCEL – Introduction to Excel , Sorting , Queries, Graphs , Scientific functions.
	Power Point :- Introduction to Power Point Creation of Slides , Inserting pictures , Preparing slide show with animation.
	MS-ACCESS - Creation and Manipulation of Files.

Subject Name : Financial Accounting   **Course Code : 102**

	Topic Name
1.	**Introduction:**
	Financial Accounting- Definition, Scope, Objectives & Limitations Distinction between Accounting & Book Keeping, Branches of Accounting
2.	**Conceptual Frame work:**
	Accounting Concepts, Principles & Conventions Accounting Standards - Concept, objectives, benefits, Overview of Accounting Standards in India. Accounting Policies, Accounting as a measurement Discipline, Valuation Principles, Accounting Estimates.
3.	**Recording of Transactions:**
	Voucher system; Accounting Process, Journals, Ledger, Cash Book, subsidiary books, Trial Balance. Depreciation: Meaning , Need, Importance & Methods (WDV & SLM)
4.	**Preparation of Final Accounts:**
	Preparation of Trading Account, Profit & Loss Account & Balance Sheet of Sole Proprietary Business.
5.	**Introduction to Company Final Accounts:**
	Important provisions of Companies Act 1956 in respect of preparation of final Accounts. Understanding the final accounts of a Company
6.	**Accounting in Computerized Environment:**
	Computers and Financial Application Introduction to Accounting Software Package - Tally 9.0 An overview of Computerized Accounting systems - Salient Features and significance , Generating Accounting Reports

Subject Name : Principles of Programming and Algorithms   **Course Code : 103**

	Topic Name
1.	**Introduction:**
	1.1 Concept: problem solving, algorithm
	1.2 Program development cycle
	1.3 Characteristics of an algorithm
	1.4 Time complexity: Big-Oh notation
	1.5 Flowcharts 1.6 Simple Examples: Algorithms and flowcharts
2.	Simple Arithmetic Problems
	2.1 Addition / Multiplication of integers
	2.2 Determining if a number is +ve / -ve / even / odd
	2.3 Maximum of 2 numbers, 3 numbers

	2.4 Sum of first n numbers, given n numbers
	2.5 Integer division, Digit reversing, Table generation for n, ab
	2.6 Factorial, sine series, cosine series, nCr , Pascal Triangle
	2.7 Prime number, Factors of a number
	2.8 Other problems such as Perfect number, GCD of 2 numbers etc
	(Write algorithms and draw flowcharts)
3.	**Recursion**
	3.1 Concept
	3.2 Multiplication
	3.3 Factorial
	3.4 Ackerman function
	3.5 Fibonacci series
	3.6 Permutation Generation
4.	**Algorithms using arrays**
	4.1 Maximum and minimum of array, reversing elements of an array
	4.2 Mean and Median of n numbers
	4.3 Row major and Column major form of array representation
	4.4 Matrices: Addition, Multiplication, Transpose, Symmetry, upper/lower triangular
5.	**Sorting and Searching**
	5.1 Insertion sort
	5.2 Bubble sort
	5.3 Selection sort Page 12 of 27
	5.4 Quick sort (Recursive)
	5.5 Merge sort
	5.6 Radix Sort
	5.7 Bucket Sort
	5.8 Counting Sort
	5.9 Sequential and Binary search (Performance Analysis for space requirement and speed using Big-Oh notation is essential)

Subject Name : Business Communication   **Course Code : 104**

	Topic Name
1.	**Introduction to Communication :**
	1.1 Meaning
	1.2 Definition
	1.3 Objective, Process, importance.
	1.4 Principles of effective communication
	1.5 Barriers to Communication and its types
	1.6 Overcoming Barriers.
2.	**Methods of Communication**
	2.1 Verbal Communication
	2.1.1 Written Communication-Advantages & Limitations (Letters, Memo, Agenda, Notice & Reports)
	2.2.2 Oral Communication) -Advantages & Limitations (Personal & Telephonic)
	2.2 Non-Verbal Communication -Advantages & Limitations

	2.2.1 Silence
	2.2.2 Body Language
	2.2.3 Signs & Sy
3.	**Oral Communication**
	3.1 Meaning, Nature, Scope
	3.2, Principles of Effective Oral Communication
	3.3 Techniques of Effective Speaking
	3.4. The Art of Listening,
	3.5 Principles of Good Listening- Barriers to Listening
4.	**Business Correspondence**
	4.1 Need, Functions of Business Correspondence
	4.2 Components and layout of Business letter,
	4.3 Drafting of letters: Enquiry, order , Complaints and follow up , Sales, Circulars. 4.4 Email etiquette
5.	**Information Technology for Communication**
	Introduction, Advantages and Limitations of – Telex, Telegram, Fax, Voice Mail, Teleconferencing, Video Conferencing, Internet and Social Media Sites, E-communication at work place.
6.	**Job Seeking Skills**
	6.1 Job application letter
	6.2 Curriculum Vitae
	6.3 Group Discussion
	6.4 Interview Skills
	6.5 Presentation Skills

Subject Name : Principles of Management   **Course Code : 105**

	Topic Name
1.	**Nature of Management :**
	1. Meaning, Definition, Nature, Importance & Functions
	2. Management an Art, Science & Profession-Management as social System
	3. Concept of Management-Administration-Organization-Universality of management
2.	**Evolution of management Thoughts**
	2.1 Contribution of F.W.Taylor, Henri Fayol, Elton Mayo
3.	**Functions of Management : Part – I**
	3.1 Planning –Meaning –Need & Importance, types levels –advantages & limitations;
	3.2 Forecasting- Need & Techniques;
	3.3 Decision making – Types - Process of rational decision making & techniques of decision making.
	3.4 Organizing – Elements of organizing & process Types of organizations,
	3.5 Delegation of authority – Need, difficulties in delegation – Decentralization.
	3.6 Staffing – Meaning & importance
4.	**Functions of Management : Part –II**
	4.1 Direction - Nature – Principles
	4.2 Motivation - Importance – Theories
	4.3 Leadership – Meaning - qualities of effective Leadership & functions of leader

	4.4 Co-ordination - Need – Importance
	4.5 Controlling – Need, nature, Importance, Process & techniques
5.	**Strategic Management**
	5.1 Definition,
	5.2 Classes of Decisions
	5.3 Levels of Decisions
	5.4 Strategy
	5.5 Role of Strategic Management and its benefits
	5.6 Strategic Management in India
6.	**Recent Trends in Management**
	6.1 Management of change
	6.2 Disaster Management
	6.3 Total Quality Management
	6.4 Stress Management
	6.5 Social Responsibility of management

Subject Name : Laboratory Course - I (Based on Paper No. 101 and 103)   **Course Code : 106**

	Topic Name
1.	Details will be given in the Class room

- **FIRST YEAR -** Semester II

Subject Name : Procedure Oriented Programming using C   **Course Code : 201**

	Topic Name
1.	**Introduction to C language**
	1.1 History
	1.2 Basic structure of C Programming
	1.3 Language fundamentals
	1.3.1 Character set, tokens
	1.3.2 Keywords and identifiers
	1.3.3 Variables and data types
	1.4 Operators
	1.4.1 Types of operators
	1.4.2 Precedence and associativity
	1.4.3 Expression
2.	**Managing I/O operations**
	2.1 Console based I/O and related built-in I/O functions
	2.1.1 printf(), scanf()
	2.1.2 getch(), getchar()
	2.2 Formatted input and formatted output
3.	**Decision Making and looping**
	3.1 Introduction
	3.2 Decision making structure
	3.2.1 If statement

	3.2.2 If-else statement
	3.2.3 Nested if-else statement
	3.2.4 Conditional operator
	3.2.5 Switch statement
	3.3 Loop control structures
	3.3.1 while loop
	3.3.2 Do-while loop
	3.3.3 For loop
	3.3.4 Nested for loop
	3.4 Jump statements
	3.4.1 break
	3.4.2 continue
	3.4.3 goto
	3.4.4 exit
4.	**Functions and pointers**
	4.1 Introduction
	4.1.1 Purpose of function
	4.1.2 Function definition
	4.1.3 Function declaration
	4.1.4 Function call
	4.2 Types of functions
	4.3 Call by value and call by reference
	4.4 Storage classes
	4.5 Recursion
	4.6 Introduction to pointer
	4.6.1 Definition
	4.6.2 Declaration
	4.6.3 Initialization
	4.7 Indirection operator and address of operator
	4.8 Pointer arithmetic
	4.9 Dynamic memory allocation
	4.10 Functions and pointers
5.	**Arrays and Strings**
	5.1 Introduction to one-dimensional Array
	5.1.1 Definition
	5.1.2 Declaration
	5.1.3 Initialization
	5.2 Accessing and displaying array elements
	5.3 Arrays and functions
	5.4 Introduction to two-dimensional Array
	5.4.1 Definition
	5.4.2 Declaration
	5.4.3 Initialization
	5.5 Accessing and displaying array elements
	5.6 Introductions to Strings

	5.6.1 Definition
	5.6.2 Declaration
	5.6.3 Initialization
	5.7 Standard library functions
	5.8 Implementations without standard library functions.
6.	**Structures and union**
	6.1 Introduction to structure
	6.1.1 Definition
	6.1.2 Declaration
	6.1.3 Accessing members
	6.2 structure operations
	6.3 nested structure
	6.4 Introduction to union
	6.4.1 Definition
	6.4.2 Declaration
	6.5 Differentiate between structure and union
7.	**C Preprocessor**
	7.1 Definition of preprocessor
	7.2 Macro substitution directory
	7.3 File inclusion directory
	7.4 Conditional compilation
8.	**File handling**
	8.1 Definitions of files
	8.2 File opening modes
	8.3 Standard functions
	8.4 Random access to files
	8.5 Command line argument

Subject Name : Database Management Systems   **Course Code : 202**

	Topic Name
1.	**File Structure and Organization**
	1.1 Introduction
	1.2 Logical and Physical Files
	1.2.1 File
	1.2.2 File Structure
	1.2.3 Logical and Physical Files Definitions
	1.3 Basic File Operations
	1.3.1 Opening Files
	1.3.2 Closing Files
	1.3.3 Reading and Writing
	1.3.4 Seeking
	1.4 File Organization
	1.4.1 Field and Record structure in file
	1.4.2 Record Types
	1.4.3 Types of file organization

	1.4.3.1 Sequential
	1.4.3.2 Indexed
	1.4.3.3 Hashed
	1.5 Indexing
	1.5.1 What is an Index?
	1.5.2 When to use Indexes?
	1.5.3 Types of Index
	1.5.3.1 Dense Index
	1.5.3.2 Sparse Index
2.	**Database Management System**
	2.1 Introduction
	2.2 Basic Concept and Definitions
	2.2.1 Data and Information
	2.2.2 Data Vs Information
	2.2.3 Data Dictionary
	2.2.4 Data Item or Field
	2.2.5 Record
	2.3 Definition of DBMS
	2.4 Applications of DBMS
	2.5 File processing system Vs DBMS
	2.6 Advantages and Disadvantages of DBMS
	2.7 Users of DBMS
	2.7.1 Database Designers
	2.7.2 Application programmer
	2.7.3 Sophisticated Users
	2.7.4 End Users
	2.8 Views of Data
	2.9 Data Models
	2.9.1 Object Based Logical Model
	a. Object Oriented Data Model
	b. Entity Relationship Data Model
	2.9.2 Record Base Logical Model
	a. Relational Model
	b. Network Model
	c. Hierarchical Model
	2.10 Entity Relationship Diagram (ERD)
	2.11 Extended features of ERD
	2.12 Overall System structure
3.	**Relational Model**
	3.1 Introduction
	3.2 Terms
	a. Relation
	b. Tuple
	c. Attribute
	d. Cordinality

	e. Degree of relationship set
	f. Domain
	3.3 Keys
	3.3.1 Super Key
	3.3.2 Candidate Key
	3.3.3 Primary Key
	3.3.4 Foreign Key
	3.4 Relational Algebra Operations : a. Select, b. Project, c. Union, d. Difference e. Intersection, f. Cartesian Product, g. Natural Join
4.	**SQL (Structured Query Language)** 4.1 Introduction 4.2 History Of SQL 4.3 Basic Structure 4.4 DDL Commands 4.5 DML Commands 4.6 Simple Queries 4.7 Nested Queries 4.8 Aggregate Functions

5.	**Relational Database Design**
	 5.1 Introduction
	 5.2 Anomalies of un normalized database
	 5.3 Normalization
	 5.4 Normal Form
	      5.4.1 1 NF
	      5.4.2 2 NF
	      5.4.3 3 NF
	      5.4.3.4 BCNF

Subject Name : Organizational Behavior   **Course Code : 203**

	Topic Name
1.	**Fundamentals of Organizational Behavior** Definition, Nature, Scope, and Goals of Organizational Behavior Fundamental Concepts of Organizational Behavior Models of Organizational Behavior Emerging aspects of Organizational Behavior: TQM, Managing Cultural Diversity, Quality Circles & Total Employee involvement
2.	Attitude Values and Motivation Effects of employee attitudes Personal and Organizational Values Nature and Importance of Motivation, Motivation Process - Motivation Model Theories of Work Motivation: (a) Maslow's Need Hierarchy Theory, (b) McGregcrs's Theory 'X' and Theory 'Y' (c) Herzberg's Two factor theory of Motivation
3.	**Personality** Definition of Personality, Determinants of Personality

	Theories of Personality – Trait theory : The Big Five Model Type Theory : Myers-Briggs Type Personality Self Theory : Locus of Control
4.	**Work Stress**
	Meaning and definition of Stress, Sources of Stress: Individual Level, Organizational Level, Type A and Type B Assessment of Personality Causes of stress in organization Effect of Stress – Physiological Effect, Psychological Effect, Behavioral Impact Stress Management – Individual Strategies, Organizational Strategies
5.	**Conflict in Organizations**
	Concept of Conflict, Process of Conflict Types of Conflict – Intrapersonal, interpersonal, intergroup, organizational, Johari Window Effects of Conflict, Conflict management Strategies
6.	**Group Behavior and Change in Organization**
	Nature of Group, Types of Groups Team Building & Effective Teamwork Goals of Organizational Change, resistance to change, Overcoming resistance to change.

Subject Name : Elements of Statistics   **Course Code : 204**

	Topic Name
1.	Introduction to statistical functions of Excel
	Concept of population and sample, Qualitative and Quantitative variables, Raw data, Basic Spreadsheet concept, data entry and its summary statistics using excel functions, preparation of grouped and ungrouped frequency distribution using excel, creating bar charts and pie chart, frequency curves and ogive curves. (There will be no theory question on above chapter separate practical exam of 20 marks of one hour should be conducted on it)
2.	**Methods of counting**
	Fundamental principles of counting
	Permutations and combination of n dissimilar objects taken r at a time, example and problems.
3.	**Elements of Probability Theory**
	Random experiments, all possible outcomes (sample space), events, algebra of events. Classical definition of probability, addition theorem of probability (without proof), Independence of events, Simple numerical problems.
4.	**Standard Discrete Distributions**
	Discrete Uniform : Probability distribution, cumulative probability distribution, mean, variance (without proof) Bernoulli : Probability function, Mean and variance Binomial : Probability distribution, cumulative probability distribution, mean, variance (without proof) Examples and problems.
5.	**Simulation Techniques**
	Random Number Generator Model sampling from discrete uniform and binomial distributions Monte Carlo Simulation examples and problems

Subject Name : E-Commerce Concepts   **Course Code : 205**

	Topic Name
1.	**Introduction to Electronic Commerce**
	1.1 What is E-Commerce (Introduction and Definition)
	1.2 Main activities E-Commerce
	1.3 Goals of E-Commerce

	1.4 Technical Components of E-commerce
	1.5 Functions of E-commerce
	1.6 Advantages and Disadvantages of E-commerce
	1.7 Scope of E-commerce
	1.8 Electronic commerce Applications
	1.9 Electronic commerce and Electronic Business (C2C, C2G, G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C)
2.	**Building own website**
	2.1 Reasons for building own website
	2.2 Benefits of website
	2.3 Bandwidth requirements
	2.4 Cost , Time , Reach
	2.5 Registering a Domain Name
	2.6 Web promotion
	2.7 Target email, Banner Exchange, Shopping Bots
3.	**Internet and Extranet**
	3.1 Definition of Internet
	3.2 Adv and Dis adv of the Internet
	3.3 Component of a Intranet Information technology structure
	3.4 Development of a Intranet
	3.5 Extranet and Intranet Difference
	3.6 Role of Intranet in B2B Application
4.	**Electronic payment System**
	4.1 Introduction
	4.2 Types of Electronic payment system
	4.3 Payment types
	4.4 Traditional payment
	4.5 Value exchange system
	4.6 Credit card system
	4.7 Electronic funds transfer
	4.8 Paperless bill
	4.9 Modern payment cash
	4.10 Electronic cash
5.	**Technology Solution**
	5.1 Protecting Internet Communications
	5.2 Encryption
	5.3 Symmetric Key Encryption
	5.4 Public key Encryption
	5.5 Public Key Encryption using digital signatures
	5.6 Digital Envelopes
	5.7 Digital Certificates
	5.8 Limitations to Encryption solutions
6.	**E-com Security**
	6.1 E-commerce security environment
	6.2 Security threats in E-com environment

	6.3 Malicious code and unwanted programs
	6.4 Phishing and identity theft
	6.5 Hacking and cyber vandalism
	6.6 Credit card fraud/Theft
	6.7 Spoofing
	6.8 Denial of service(DOS)
	6.9 Distributed denial of service (dDOS)

Subject Name : Laboratory Course - II (Based on Paper No. 201 and 202)   **Course Code : 206**

	Topic Name
1.	Details will be given in the Class room

- **SECOND YEAR -** Semester III

Subject Name : Relational Database Management System   **Course Code : 301**

	Topic Name
1.	**Introduction To RDBMS**
	1.1 Introduction to popular RDBMS product and their features
	1.2 Difference Between DBMS and RDBMS
	1.3 Relationship among application programs and RDBMS
2.	**PLSQL**
	2.1 Overview of PLSQL
	2.2 Data Types
	2.3 PLSQL Block
	2.3.1 % type, % rowtype
	2.3.2 Operators, Functions, comparison, numeric, character, date
	2.3.3 Control Statement
	2.4 Exception Handling
	2.4.1 Predefined
	2.4.2 User defined exceptions
	2.5 Functions , Procedures
	2.6 Cursor
	2.6.1 Definition
	2.6.2 Types of cursor- implicit, explicit (attributes)
	2.6.3 Parameterized cursor
	2.7 Trigger
	2.8 Package
3.	**Transaction Management**
	3.1 Transaction Concept
	3.2 Transaction Properties
	3.3 Transaction States
	3.4 Concurrent Execution
	3.5 Serializability
	3.5.1 Conflict Serializability

	3.5.2 View Serializability
	3.6 Recoverability
	3.6.1 Recoverable Schedule
	3.6.2 Cascadless Schedule
4.	**Concurrency Control**
	4.1 Lock Based Protocol
	4.1.1 Locks
	4.1.2 Granting of Locks
	4.1.3 Two Phase Locking Protocol
	4.2 Timestamp Based Protocol
	4.2.1 Timestamp
	4.2.2 Timestamp ordering protocol
	4.2.3 Thomas's Write Rule
	4.3 Validation Based Protocol
	4.4 Deadlock Handling
	4.4.1 Deadlock Prevention
	4.4.2 Deadlock Detection
	4.4.3 Deadlock Recovery
5.	**Recovery System**
	5.1 Failure Classification
	5.1.1 Transaction Failure
	5.1.2 System Crash
	5.1.3 Disk Failure
	5.2 Storage Structures
	5.2.1 Storage Types
	5.2.2 Data Access
	5.3 Recovery & Atomicity
	5.3.1 Log based Recovery
	5.3.2 Deferred Database Modification
	5.3.3 Immediate Database Modification
	5.3.4 Checkpoints
	5.4 Recovery with Concurrent Transaction
	5.4.1 Transaction Rollback
	5.4.2 Restart Recovery
	5.5 Remote Backup System

Subject Name : Data Structure Using C   **Course Code : 302**

	Topic Name
1.	**Basic Concept and Introduction to Data Structure**
	1.1 Pointers and dynamic memory allocation
	1.2 Algorithm-Definition and characteristics
	1.3 Algorithm Analysis
	-Space Complexity
	-Time Complexity
	-Asymptotic Notation
	Introduction to Data structure

	1.5 Types of Data structure
	1.6 Abstract Data Types (ADT)
	Introduction to Arrays and Structure
	1.7 Types of array and Representation of array
	1.8 Polynomial
	- Polynomial Representation
	- Evaluation of Polynomial
	- Addition of Polynomial
	1.9 Self Referential Structure
2.	**Searching and Sorting Techniques**
	2.1 Linear Search
	2.2 Binary Search(Recursive , Non-Recursive)
	2.3 Bubble Sort
	2.4 Insertion Sort
	2.5 Selection Sort
	2.6 Quick Sort
	2.7 Heap Sort (No Implementation)
	2.8 Merge Sort
	2.9 Analysis of all Sorting Techniques
3.	**Linked List**
	3.1 Introduction
	3.2 Static & Dynamic Representation
	3.3 Types of linked List
	- Singly Linked list(All type of operation)
	- Doubly Linked list (Create , Display)
	- Circularly Singly Linked list (Create, Display)
	3.4 Circularly Doubly Linked list (Create, Display)
4.	**Stack and Queue**
	4.1 Introduction stack
	4.2 Static and Dynamic Representation
	4.3 Primitive Operations on stack
	4.4 Application of Stack
	4.5 Evaluation of postfix and prefix expression
	4.6 Conversion of expressions- Infix to prefix & Infix to postfix
	Queue
	4.7 Introduction queue
	4.8 Static and Dynamic Representation
	4.9 Primitive Operations on Queue
	4.10 Application of Queue
	4.11 Type of Queue - Circular Queue, De Queue, Priority Queue
5.	**Trees**
	5.1 Introduction & Definitions
	5.2 Terminology
	5.3Static and Dynamic Representation
	5.4 Types of tree
	5.5 Operations on Binary Tree & Binary Search Tree
	5.6 Tree Traversal - Inorder, Preorder, Postorder (Recursive & Iterative)
	5.7.AVL Tree
6.	**Graphs**
	6.1Representation
	-Adjacency Matrix

	-List
	6.2 In degree , out degree of graph
	6.3 Graph operation- DFS , BFS
	6.4 Spanning Tree

Subject Name : Introduction to Operating System   **Course Code : 303**

	Topic Name
1.	**Introduction to Operating System** 1.1 What is operating system 1.2 Computer system architecture 1.3 Services provided by OS 1.4 Types of OS
2.	**System Structure** 2.1 User operating system Interface 2.2 System Calls 2.3 Process or job control 2.4 Device Management 2.5 File Management 2.6 System Program 2.7 Operating System Structure
3.	**Process Management** 3.1 What is Process 3.2 Process State 3.3 Process Control Block 3.4 Context Switch 3.5 Operation on Process - Process Creation, Process Termination

4.	**CPU Scheduling**
	4.1 What is scheduling
	4.2 Scheduling Concepts
	    4.2.1 CPU- I/O Burst Cycle
	    4.2.2 CPU Scheduler
	    4.2.3 Preemptive and Non-preemptive scheduling
	    4.2.4 Dispatcher
	4.3 Scheduling criteria (Terminologies used in scheduling)
	4.4 Scheduling Algorithms
	    4.4.1 FCFS
	    4.4.2 SJF (Preemptive & non-preemptive)
	    4.4.3 Priority Scheduling (Preemptive & Nonpreemptive)
	    4.4.4 Round Robin Scheduling
	4.5 Multilevel Queues
	4.6 Multilevel Feedback queues

5.	**Process Synchronization**
	5.1 Introduction
	5.2 Critical section problem
	5.3 Semaphores
	    5.3.1 Concept
	    5.3.2 Implementation
	    5.3.3 Deadlock & Starvation
	    5.3.4 Binary Semaphores
	5.4 Critical Sections

	5.5 Classical Problems of synchronization
	5.6 Bounded buffer problem
	5.7 Readers & writers problem
	5.8 Dining Philosophers problem
6.	**Deadlock**
	6.1 Introduction
	6.2 Deadlock Characterization
	6.3 Necessary Condition
	6.4 Resource allocation graph
	6.5 Deadlock Prevention
	6.6 Deadlock Avoidance
	Safe State
	Resource allocation graph algorithm
	Bankers algorithm
	6.7 Deadlock Detection
	6.8 Recovery from deadlock - Process Termination, Resource Preemption
7.	**Memory Management**
	7.1 Introduction to memory management
	7.2 Address Binding
	7.3 Dynamic Loading
	7.4 Dynamic Linking
	7.5 Overlays
	7.6 Logical vs. physical addresses
	7.7 Swapping
	7.8 Contiguous memory allocation
	7.8.1 Single Partition Allocation
	7.8.2 Multiple Partition Allocation
	7.8.3 External and Internal Fragmentation
	7.9 Paging
	7.10 Segmentation
	7.11 Segmentation with paging
	7.12 Virtual memory
	7.13 Demand paging
	7.14 Page replacement algorithms – FIFO, MRU, LRU, LRU approximation using reference bit, MFU, LFU, Second Chance algorithm, Optimal replacement
8.	**File System**
	8.1 Introduction & File concepts (file attributes, Operations on files)
	8.2 Access methods - Sequential access, Direct access
	8.3 File structure -
	Allocation methods
	Contiguous allocation
	Linked Allocation
	Indexed Allocation
	8.4 Free Space Management - Bit Vector, Linked List, Grouping, Counting
9.	**I/O System**
	9.1 Introduction
	9.2 I/O Hardware
	9.3 Application of I/O Interface
	9.4 Kernel I/O Subsystem
	9.5 Disk Scheduling – FCFS, Shortest Seek time first, SCAN, C- SCAN, C- Look

Subject Name : Business Mathematics   **Course Code : 304**

	Topic Name
1.	**Ratio, Proportion and Percentage** Ratio- Definition, Continued Ratio, Inverse Ratio, Proportion, Continued Proportion, Direct Proportion, Inverse Proportion, Variation, Inverse Variation, Joint Variation, Percentage- Meaning and Computations of Percentages
2.	**Profit And Loss** Terms and Formulae, Trade discount, Cash discount, Problems involving cost price, Selling Price, Trade discount and Cash Discount. Introduction to Commission and brokerage, Problems on Commission and brokerage.
3.	**Interest** Simple Interest, Compound interest (reducing balance & Flat Interest rate of interest), Equated Monthly Installments(EMI), Problems
4.	**Matrices And Determinants (upto order 3 only)** Multivariable data, Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Ad joint of a Matrix, Inverse of a Matrix via ad joint Matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Nonhomogeneous System of Linear equations (not more than three variables). Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix, Problems.
5.	**Linear Programming problem (L.P.P.)** Meaning of LPP, Formulation of LPP, and solution by graphical methods.
6.	**Transportation problem (T.P.)** Statement and meaning of T.P. methods of finding initial basic feasible solution by North West corner Rule, Matrix Minimum method and Vogel's approximation method. Simple numerical problems (concept of degeneracy is not expected).

Subject Name : Software Engineering   **Course Code : 305**

	Topic Name
1.	**Introduction to System Concepts** 1.1 Definition , Elements of System 1.2 Characteristics of System 1.3 Types of System 1.4 System Concepts
2.	**Requirement Analysis** 2.1 Definition of System Analysis 2.2 Requirement Anticipation 2.3 Knowledge and Qualities of System Analyst 2.4 Role of a System Analyst 2.5 Feasibility Study And It's Types 2.6 Fact Gathering Techniques 2.7 SRS (System Requirement Specification)
3.	**Introduction to Software Engineering** 3.1 Definition Need for software Engineering 3.2 Software Characteristics 3.3 Software Qualities (McCall's Quality Factors
4.	**Software Development Methodologies** 4.1 SDLC (System Development Life Cycle)

	4.2 Waterfall Model 4.3 Spiral Model 4.4 Prototyping Model 4.5 RAD MODEL
5.	**Analysis and Design Tools** 5.1 Entity-Relationship Diagrams 5.2 Decision Tree and Decision Table 5.3 Data Flow Diagrams (DFD) 5.4 Data Dictionary 5.4.1 Elements of DD 5.4.2 Advantage of DD 5.5 Pseudo code 5.6 Input And Output Design 5.7 CASE STUDIES (Based on Above Topic)

6.	**Structured System Design**
	6.1 Modules Concepts and Types of Modules
	6.2 Structured Chart
	6.3 Qualities of Good Design
	    6.3.1 Coupling, Types of Coupling
	    6.3.2 Cohesion, Types of Cohesion

7.	**Software Testing**
	7.1 Definition, Test characteristics
	7.2 Types of testing
	    7.2.1 Black-Box Testing
	    7.2.2 White-Box Testing
	    7.2.3 Unit testing
	    7.2.4 Integration testing
	7.3 Validation
	7.4 Verification

Subject Name : Laboratory Course - III (Based on Paper No. 301 and 302)   **Course Code : 306**

	Topic Name
1.	Details will be given in the Class room

- **SECOND YEAR -** Semester IV

Subject Name : Object Oriented Programming Using C++   **Course Code : 401**

	Topic Name
1.	**Introduction to C++** 1.1 Basic concepts of OOP, benefits, applications of OOP 1.2 A simple C++ program 1.3 Structure of C++ program 1.4 Creating a source file, compiling and Linking
2.	**Tokens, Expressions and Control structures** 2.1 Introduction 2.2 Tokens, keywords, Identifiers and constants 2.3 Data types - Basic, User defined and Derived 2.4 Symbolic constant 2.5 Type Compatibility 2.6 Variables - Declaration and Dynamic initialization

	2.7 Reference variable 2.8 Operators in C++ 　　2.8.1 Scope resolution operator 　　2.8.2.Member Referencing operators 　　2.8.3Memory management operators 　　2.8.4 Manipulators 　　2.8.5 Type cast operators 2.9 Expression and their types 2.10 Special Assignment Expressions 2.11 Implicit conversions 2.12 Operator overloading introduction 2.13 Operator precedence 2.14 Control structures – if-else, do-while, for , switch
3.	**Functions in C++** 3.1 Introduction 3.2 The main function 3.3 Function prototyping 3.4 Call by reference 3.5 Return by reference 3.6 Inline function – Making an outside function Inline 3.7 Arguments - default, constant 3.8 Math library functions
4.	**Classes and Objects** 4.1 Introduction 4.2 Creating a class and objects 4.3 Defining member functions inside and outside class definition 4.4 Nesting of member functions 4.5 Private member functions 4.6 Arrays within a class 4.7 Memory allocation of objects 4.8 Static data members and static member functions 4.9 Array of objects 4.10 Objects as function arguments 4.11 Friend functions 4.12 Returning objects 4.13 Constructors 4.14 Types of constructor 4.15 Destructors
5.	**Inheritance** 5.1 Introduction 5.2 Base class and derived class examples 5.3 Types of Inheritance 5.4 Virtual base class 5.5 Abstract class 5.6 Constructors in derived class
6.	**Polymorphism** 6.1 Compile Time Polymorphism 　　6.1.1 Function overloading 　　6.1.2 Operator Overloading Introduction 　　6.1.3 Overloading unary and binary operator 　　6.1.4 Overloading using friend function

	6.1.5 Overloading insertion and extraction operators
	6.1.6 String manipulation using operator overloading
	6.2 Runtime Polymorphism
	6.2.1 this Pointer, pointers to objects, pointer to derived classes
	6.2.2 Virtual functions and pure virtual functions
7.	**Managing console I/O operations**
	7.1 Introduction
	7.2 C++ streams and C++ stream classes
	7.3 Unformatted I/O operations
	7.4 Formatted console I/O operations
	7.5 Managing output with manipulators
8.	**Working with Files**
	8.1 Classes for File Stream operations
	8.2 File operations - Opening, Closing and updating
	8.3 Error handling during File operations
	8.4 Command Line arguments
9.	**Templates**
	9.1 Introduction
	9.2 Class Templates
	9.3 Function Templates
	9.4 Exception Handling(Introduction)

Subject Name : Programming in Visual Basic **Course Code : 402**

	Topic Name
1.	**Getting started with V. B.**
	1.1 Object Oriented Concept
	1.2 Event Driven Programming Language
	1.3 Working with properties
	1.3.1 Studying the Events of a Form
	1.3.2 Working code for events
	1.3.3 Planning the Design
2.	**Constants, Variables , Operators, Control Structure, Looping & Array**
	2.1 Constant
	2.2 Data Types
	2.2.1 Number , long ,Boolean ,doubles ,variant, String
	2.2.2 User defined data types
	2.3 Variables
	2.4 Operators
	2.5 Control Structures
	2.5.1 If
	2.5.2 If….Else
	2.5.3 Nested If….Else
	2.5.4 Select Case
	2.6 Looping
	2.6.1 Do Loop
	2.6.2 While Loop
	2.6.3 Until Loop
	2.6.4 For Loop
	2.6.5 With Statement
	2.7 Array

	2.7.1 Single Dimensional Array
	2.7.2 Multidimensional Array
	2.7.3 Control Array
	2.8 Functions(Built in and user defined)
3.	**Working with Controls**
	3.1 Adding controls on form
	3.2 Working with Properties and Methods of each Controls
	3.3 Creating an application
	3.4 Creating MDI application
	3.3.1 Working with Multiple Forms
	3.3.2 Loading, Showing & Hiding Forms
	3.3.3 Setting the Startup form
	3.3.4 Creating forms in Code
	3.3.5 Using the MDI
	3.3.6 Arranging MDI Child Window
	3.3.7 Opening new MDI child window
	3.3.8 Creating Properties in a form
	3.3.9 Creating a method in a form
4.	**Working with ActiveX Controls & Menus**
	4.1 Creating Status Bar For your program
	4.2 Working with Progress Bar
	4.3 Working with Toolbar
	4.4 Setting up the Image List Controls
	4.4.1 Adding and Deleting Images with code
	4.4.2 Study of Different Dialog Boxes
	4.5 Menus
	4.5.1 Creating new Menu Item
	4.5.2 Modifying & Deleting Menu Item
	4.5.3 Adding Access Characters
	4.5.4 Adding Shortcut Keys
	4.5.5 Creating Sub Menus
	4.6 Pop-up Menus
	4.6.1 Creating pop-up menu
	4.6.2 Displaying pop-up menu
	4.7 Adding & Deleting Menus At Run-time
	4.8 Adding Menu Items for MDI Child Form
5.	**Working With Database**
	5.1 Data Control
	5.1.1 Studying the Properties and methods of Data Control
	5.1.2 Connectivity with MS-Access
	5.1.3 Operations of database through coding
	5.2 ADO Data Control
	5.2.1 Advantages of ADODC over DC
	5.2.2 Studying the properties and Methods of ADODC
	5.2.3 Connectivity with MS-Access
	5.2.4 Connectivity with Oracle
	5.2.5 Report Generation
	5.3 Developing ADO application through ADODC and coding
	5.4 Report Generation

	Topic Name

1.	**Basics of Computer Networks**
	1.1 Computer Network
	    1.1.1 Definition
	    1.1.2 Goals
	    1.1.3 Applications
	    1.1.4 Structure
	    1.1.5 Components
	1.2 Topology
	    1.2.1 Bus
	    1.2.2 Star
	    1.2.3 Ring
	    1.2.4 Mesh
	1.3 Types of Networks
	    1.3.1 LAN, MAN, WAN, Internet
	    1.3.2 Broadcast & Point-To-Point Networks
	1.4 Communication Types
	    1.4.1 Serial
	    1.4.2 Parallel
	1.5 Modes of Communication :
	    1.5.1 Simplex
	    1.5.2 Half Duplex
	    1.5.3 Full Duplex
	1.6 Server Based LANs & Peer-to-Peer LANs
	    1.6.1 Comparison of both
	1.7 Protocols and Standards

2.	**Network Models**
	2.1 Design issues of the layer
	2.2 Protocol Hierarchy
	2.3 ISO-OSI Reference Model :
	    2.3.1 Layers in the OSI Model
	    2.3.2 Functions of each layer
	2.4 Terminology
	    2.4.1 SAP
	    2.4.2 Connection Oriented services
	    2.4.3 connectionless services
	    2.4.4 Peer Entities
	2.5 Internet Model (TCP/IP)
	2.6 Comparison of ISO-OSI & TCP/IP Model
	2.7 Addressing
	    2.7.1 Physical Addresses
	    2.7.2 Logical Addresses
	    2.7.3 Port Addresses
	2.8 IP Addressing
	    2.8.1 Classful addressing
	    2.8.2 Classless addressing

3.	**Transmission Media**
	3.1 Guided Media(Wired) :
	    3.1.1 Coaxial Cable:- Physical Structure, Standards, BNC Connector, Applications
	    3.1.2 Twisted Pair :- Physical Structure, UTP vs STP, Connectors, Applications
	    3.1.3 Fiber Optics Cable :- Physical Structure, Propagation Modes (Single

	Mode & Multimode), Connectors, Applications
	3.2 Unguided Media (Wireless)
	3.2.1 Electromagnetic Spectrum For Wireless Communication
	3.2.2 Propagation Methods
	3.2.2.1 Ground,
	3.2.2.2 Sky,
	3.2.2.3 Line-Of-Sight
	3.3.3 Wireless Transmission
	3.3.3.1 Radio Waves
	3.3.3.2 Infra-Red,
	3.3.3.3 Micro-Wave
4.	**Wired and Wirless LANs**
	4.1 IEEE Standards
	4.2 Standard Ethernet
	4.2.1 MAC Sublayer
	4.2.2 Physical layer
	4.3 Fast Ethernet
	4.3.1 MAC Sublayer
	4.3.2 Physical layer
	4.4 Gigabit Ethernet
	4.4.1 MAC Sublayer
	4.4.2 Physical layer
	4.5 Network Interface Cards(NIC)
	4.5.1 Components of NIC
	4.5.2 Functions of NIC
	4.5.3 Types of NIC
	4.6 Wireless LAN
	4.6.1 IEEE802.11 Architecture
	4.6.2 MAC Sub layer
	4.6.3 Frame Format
	4.6.4 Frame Types
	4.6.5 Addressing Mechanism
	4.6.6 Bluetooth (Architecture, Piconet and Scatternet, Applications)
5.	**Network Connectivity Devices**
	5.1 Categories of Connectivity Devices
	5.1.1 Passive & Active Hubs
	5.1.2 Repeaters
	5.1.3 Bridges
	5.1.3.1 Transparent Bridges(Loop Problem, Spanning Tree)
	5.1.3.2 Source Routing Bridges
	5.1.4 Switches
	5.1.5 Router
	5.1.6 Gateways
	5.2 Network Security Devices
	5.2.1 Firewalls
	5.2.1.1 Packet-Filter firewall
	5.2.1.2 Proxy firewall
6.	**Internet Basics**
	6.1 Concept of Intranet & Extranet
	6.2 Internet Information Server(IIS)
	6.3 Web Server

	6.4 World Wide Web (WWW)
	6.4.1 Architecture,
	6.4.2 Web Documents :- static, dynamic and active documents
	6.5 Search Engines
	6.6 Internet Service Providers(ISP)
	6.7 HTTP
	6.7.1 HTTP Transaction
	6.7.2 Persistent and non persistent connection

Subject Name : Enterprise Resource Planning   **Course Code : 404**

	Topic Name
1.	**ERP : An Overview**
	1.1. What is ERP
	1.2. Reasons for Growth Of ERP
	1.3. Problem areas in ERP implementations.
	1.4. The future of ERP
	1.5. Characteristics and features of ERP
	1.6. Benefits of ERP.
2.	**Enterprise Modeling and Integration for ERP**
	2.1.Enterprise-An overview
	2.2.What is enterprise
	2.3.Integrated Management Information
	2.4.The role of enterprise
	2.5.Business modeling
	2.6.Integrated Data Model
	2.7.Role of Common/Shared Enterprise Database
	2.8.Linkages of the Enterprise
	2.8.1.Establishing Customer-Enterprise Link
	2.8.2.Establishing Vendor-Enterprise Link
	2.8.3.Establishing Links within the Enterprise
	2.8.4.Establishing Links with Environment
	2.9. Scope of Enterprise system
	2.10.Generic Model of ERP System
	2.11.Client/Server Architecture and Enterprise – wide Computing
	2.11.1. Characteristics of client/Server Architecture
	2.11.2. Different Components of ERP Client/Server Architecture
3.	**ERP And related Technologies**
	3.1.BPR (Business Process reengineering)
	3.1.1.Definition
	3.2.BPR –The different phases
	3.3.Enterprise Redesign Principles
	3.4.BPR and IT
	3.5.Data Warehousing
	3.6.Data Warehouse Components
	3.7.Structure and Uses of Data Warehouse
	3.8.Data Mining
	3.9.What Is Data Mining
	3.10.Data Mining Process
	3.11.Advantages and Technologies Used In Data Mining
	3.12.OLAP

	7.7. Future Directions in ERP

Subject Name : Human Resource Management   **Course Code : 405**

	Topic Name
1.	**Introduction To HRM** Definition and Concept of HRM and Personnel Management, Difference between PM and HRM, Importance of HRM, activities and functions of HRM, Challenges before HRM, HRD, HRP, Concept of recruitment –sources of recruitment. Concept of Selection –selection Procedure, Induction and placement
2.	**Performance Appraisal, Training and development** Meaning and Definition-need- objective –importance of training, training method –evaluation of training program, Concept and Objective Performance Appraisal-Process of performance appraisal method –uses and limitation of performance appraisal, Promotion and demotion policy, Transfer Policy
3.	**Wages and Salary Administration** Method of wage payment –Employee Remuneration factors determining the level of remuneration-profit sharing –fringe benefit and employee services
4.	**Grievance and discipline** Meaning, Definition and nature of Grievance. Grievance procedure-Grievance Machinery. Definition of Discipline-aim and objective of discipline Principle of discipline
5.	**The E-HR** Nature of E-HRM, E-HR activity, E-Recruitment, E-Selection, E-learning, E-Compensation

Subject Name : Laboratory Course - IV (Based on Paper No. 401 and 402)   **Course Code : 406**

	Topic Name
1.	Details will be given in the Class room

- **THIRD YEAR -** Semester V

Subject Name : Java Programming   **Course Code : 501**

	Topic Name

1.	**Introduction to Java**
	1.1 Features of java
	1.2 JDK Environment & tools like(java, javac, appletviewer, javadoc, jdb)
	1.3 OOPs Concepts Class, Abstraction , Encapsulation, Inheritance, Polymorphism
	1.4 Difference between C++ and JAVA
	1.5 Structure of java program
	1.6 Data types ,Variables ,Operators, Keywords ,Naming Convention
	1.7 Decision Making (if, switch), Looping(for, while)
	1.8 Type Casting
	1.9 Array - Creating an array, Types of Array
	1.10 String
	   - Arrays , Methods.
	   - StringBuffer class

2.	**Classes and Objects** 2.1 Creating Classes and objects 2.2 Memory allocation for objects

	2.3 Constructor
	2.4 Implementation of Inheritance Simple, Multilevel,
	2.5 Interfaces
	2.6 Abstract classes and methods
	2.7 Implementation of Polymorphism
	2.8 Method Overloading, Method Overriding
	2.9 Nested and Inner classes.
	2.10 Modifiers and Access Control
	2.11 Packages - Packages Concept, Creating user defined packages
	2.12 Java Built in packages
	    java.lang->math
	    java.util->Random, Date,
	    Hashtable
	2.13 Wrapper classes

3.	**Collection** 3.1 Collection Framework. 3.1.1 Interfaces - Collection - List - Set - SortedSet - Enumeration - Iterator - ListIterator 3.1.2. Classes - LinkedList - ArrayList - Vector - HashSet - TreeSet - Hashtable 3.2 Working with maps 3.2.1 Map interface 3.2.2 Map classes - HashMap - TreeMap

4.	**File and Exception Handling Exception**
	4.1 Exception types
	4.2 Using try catch and multiple catch Nested try, throw , throws and finally
	4.3 Creating user defined Exceptions
	File Handling
	4.4 Stream - ByteStream Classes, CharacterStream Classes
	4.5 File IO basics
	4.6 File operations -
	    Creating file
	    Reading file(character, byte)
	    Writing file (character, byte)

5.	**Applet, AWT and Swing Programming**
	Applet
	  5.1 Introduction
	  5.2 Types applet
	  5.3 Applet Life cycle
	     - Creating applet

	- Applet tag
	5.4 Applet Classes
	- Color
	- Graphics
	- Font
	AWT
	5.5 Components and container used in AWT
	5.6 Layout managers
	5.7 Listeners and Adapter classes
	5.8 Event Delegation model
	Swing
	5.9 Introduction to Swing Component and Container Classes

Subject Name : Web Technologies   **Course Code : 502**

	Topic Name
1.	**Web Essentials**
	1.1 Clients- Servers and Communication
	1.2 Internet-Basic ,Internet Protocols(HTTP,FTP,IP)
	1.3 World Wide Web(WWW)
	1.4 HTTP request message, HTTP response message
2.	**Markup Languages**
	2.1 Introduction to HTML
	2.2 Basic HTML Structure
	2.3 Common HTML Tags
	2.4 Physical and Logical HTML
	2.5 Types of Images, client side and server-side Image mapping
	2.6 List, Table, Frames
	2.7 Embedding Audio, Video
	2.8 HTML form and form elements
	2.9 Introduction to HTML Front Page
	2.10 CSS with HTML
3.	**JAVA Script**
	3.1 Introduction to Java Script
	3.2 Identifier & operator, control structure, functions
	3.3 Document object model(DOM),
	3.4 DOM Objects(window, navigator, history, location)
	3.5 Predefined functions, math & string functions
	3.6 Array in Java scripts
	3.7 Event handling in Java script
4.	**Introduction to PHP**
	4.1Introduction to PHP
	4.2 What does PHP do?
	4.3 Lexical structure
	4.4 Language basics
	4.4.1 Variable, constant, keywords, Data Types
	4.4.2 Control Structures
	4.4.3 Variables variable
	4.4.4 Type casting, Type Juggling
	4.4.5 $_GET, $_POST,$_REQUEST Variables
5.	**Function and String in PHP**
	5.1 Defining and calling a function
	5.2 Default parameters

	5.3 Variable parameters, Missing parameters 5.4 Variable function, Anonymous function 5.5 Types of strings in PHP 5.6 Printing functions 5.7 Encoding and escaping 5.8 Comparing strings 5.9 Manipulating and searching strings
6.	**Arrays in PHP** 6.1 Indexed Vs Associative arrays 6.2 Identifying elements of an array 6.3 Storing data in arrays 6.4 Multidimensional arrays 6.5 Extracting multiple values 6.6 Converting between arrays and variables 6.7 Traversing arrays 6.8 Sorting 6.9 Action on entire arrays

Subject Name : Dot Net Programming **Course Code : 503**

	Topic Name
1.	**Introduction to .Net Framework** 1.1 IDE (Integrated Development Environment) 1.2 Event Driven Programming 1.3 . NET Framework 1.4 Architecture of .Net 1.5 Execution Process of .Net Application 1.6 Features of .Net 1.7 Advantages of .Net 1.8 Develop simple .Net Application

2.	**Introduction to VB.Net**
	2.1 Basics of VB.Net
	    2.1.1 Operators
	    2.1.2 Data Types
	2.2 Control Structures
	    2.2.1 Decision making statements
	    2.2.2 Loops - For, while, do while etc.
	2.3 Exit Statements
	2.4 Build Console Applications
	    2.4.1 Methods - Read(), Readline(), Write(), Writeline() etc.
	2.5 Build Windows Applications
	    2.5.1 Controls - Form, TextBox, Button, Label, CheckBox, Listbox, ComboBox, RadioButton. DateTimePicker, MonthCalender, Timer, Progressbar, Scrollbar, PictureBox, ImageBox, ImageList, TreeView, ListView, Toolbar, StatusBar, Datagridview
	    2.5.2 Menus and PopUp Menu
	    2.5.3 Predefined Dialog controls
	    2.5.4 DialogBox - InputBox(), MessageBox(), MsgBox()

3.	**Object Oriented Programming in VB .Net** 3.1 Class and Object 3.2 Properties, methods and events. 3.3 Constructors and Destructors 3.4 Method overloading

	3.5 Inheritance 3.5.1 MyBase , MyClass keywords. 3.6 Access modifiers: Public, Private, Protected, Friend. 3.7 Method Overriding. 3.8 Interfaces. 3.9 Polymorphism. 3.10 Exception Handling
4.	**Architecture Of ADO.Net** 4.1 Database : Connection, Command, DataAdapter, DataSet, DataReader, DataTable 4.2 Connection to database with Server Explorer 4.3 Multiple Table Connection 4.4 Data binding with controls like TextBox, ListBox, DataGrid. 4.5 Navigating data source 4.6 DataGridView, DataFormwizard, Data validation
5.	**Crystal Report** 5.1 Connection to Database, Table, Queries, Building Report, Modifying Report, Formatting Fields and Object 5.2 Header, Footer, Working with formula fields, Parameter fields, Special fields 5.3 Working with Multiple Tables

Subject Name : Object Oriented Software Engineering   **Course Code : 504**

	Topic Name

1.	**Object Oriented Concepts, Modeling and UML**
	1.1 What is Object Orientation? (Introduction to class, object, inheritance, polymorphism)
	1.2 Model
	    1.2.1 Introduction of Modeling
	    1.2.2 Object Oriented Modeling
	1.3 Object oriented system development
	    1.3.1 Function/data methods
	    1.3.2 Object oriented analysis
	    1.3.3 Object oriented construction
	    1.3.4 Object oriented testing
	1.4 Identifying the elements of an object model
	    1.4.1 Identifying classes and objects
	    1.4.2 Specifying the attributes
	    1.4.3 Defining operations
	    1.4.4 Finalizing the object definition
	1.5 Introduction to UML
	1.6 Overview of UML
	1.7 Conceptual Model of UML
	1.8 Architecture
	1.9 Advantages of UML

2.	**Basic and Advanced Structural Modeling** 2.1 Classes and Relationship 2.2 Common mechanism 2.3 Diagrams 2.4 Class diagram 2.5 Advanced classes 2.6 Advanced Relationship 2.7 Interface, Types and Roles 2.8 Packages 2.9 Object Diagram

3.	**Basic Behavioral and Architectural Modeling** 3.1 Use cases, Use Case Diagram 3.2 Interaction Diagram 3.3 Sequence Diagram 3.4 Activity Diagram 3.5 State Chart Diagram 3.6 Collaboration Diagram 3.7 Components Diagram 3.8 Deployment Diagram **(Minimum 2 case studies for each diagram)**
4.	**Object Oriented Analysis** 4.1 Iterative Development 4.2 Understanding requirements 4.3 Unified process & UP Phases Inception Elaboration Construction Transition
5.	**Object Oriented Design** 5.1 The Booch Method, The Coad and Yourdon Method and Jacobson and Rambaugh Method 5.2 Generic components of OO Design model 5.3 System Design process 5.3.1 Partitioning the analysis model 5.3.2 Concurrency and subsystem allocation 5.3.3 Task Management component 5.3.4 Data Management component 5.3.5 Resource Management component 5.3.6 Inter sub-system communication 5.4 Object Design process

Subject Name : Software Project - I (Based on C++ / VB Technology)   **Course Code : 505**

	Topic Name
1.	Details will be given in the Class room

Subject Name : Laboratory Course - V (Based on Paper No. 501 and 502)   **Course Code : 506**

	Topic Name
1.	Details will be given in the Class room

- **THIRD YEAR -** Semester VI

Subject Name : Advanced Web Technologies   **Course Code : 601**

	Topic Name
1.	**Introduction to Object Oriented Programming in PHP** 1.1 Classes 1.2 Objects 1.3 Introspection 1.4 Serialization 1.5 Inheritance 1.6 Interfaces 1.7 Encapsulation

2.	**Web Techniques** 2.1 Web Variables 2.2 Server information 2.3 Self Processing forms 2.4 Setting response headers 2.5 Maintaining state (Cookies and Sessions)
3.	**Databases** 3.1 Using PHP to access a databases 3.2 Mysql Database functions 3.3 Relational databases and SQL 3.4 PEAR DB basics 3.5 Advanced database techniques 3.6 Sample application
4.	**XML** 4.1 What is XML? 4.2 XML document Structure 4.3 PHP and XML 4.4 XML parser 4.5 The document object model 4.6 The simple XML extension 4.7 Changing a value with simple XML
5.	**Web services** 5.1 Web services concepts 5.2 WSDL, UDDI 5.3 Introduction to SOAP XML-RPC 5.4 Creating web services 5.5 Calling web services
6.	**Ajax** 6.1 Understanding java scripts for AJAX 6.2 AJAX web application model 6.3 AJAX –PHP framework 6.4 Performing AJAX validation 6.5 Handling XML data using PHP and AJAX 6.6 Connecting database using PHP and AJAX

Subject Name : Advanced Java   **Course Code : 602**

	Topic Name
1.	**JDBC** 1.1 The design of JDBC 1.2 Basic JDBC program Concept 1.3 Drivers 1.4 Architecture of JDBC 1.5 Making the Connection, Statement, ResultSet, PreparedStatement, CollableStatement 1.6 Executing SQL commands 1.7 Executing queries
2.	**Networking** 2.1 The java.net package 2.2 Connection oriented transmission – Stream Socket Class 2.3 Creating a Socket to a remote host on a port (creating TCP client and server) 2.4 Simple Socket Program Example
3.	**Servlet and JSP**

	3.1 Introduction 3.2 How It differ from CGI 3.3 Types of servlet 3.4 Life cycle of servlet 3.5 Execution process of Servlet Application 3.6 Session Tracking 3.7 Cookie class 3.8 Servlet- Jdbc **JSP** 3.9 Introduction to JSP 3.10 Components of JSP - Directives, Tags, Scripting Elements 3.11 Execution process of JSP Application 3.12 Building a simple application using JSP 3.13 JSP with Database
4.	**Multithreading** 4.1 Introduction to Thread 4.2 Life cycle of thread 4.3 Thread Creation - By using Thread Class - By Using Runnable interface 4.4 Priorities and Synchronization 4.5 Inter thread communication 4.6 Implementation of Thread with Applet
5.	**Java Beans and RMI** **Java Beans** 5.1 What is bean 5.2 Advantages 5.3 Using Bean Development kit(BDK) 5.4 Introduction to jar and manifest files 5.5 The java beans API **Remote Method Invocation** 5.6 Introduction to remote object RMI architecture 5.7 Stubs and skeleton 5.8 Registry 5.9 Setting up RMI 5.10Using RMI with applet

Subject Name : Recent Trends in IT   **Course Code : 603**

	Topic Name
1.	**Software Process And Project Metrics, Analysis Concepts And Principles** Measures, metric indicators, metric in process and the project domains, software measurement, metrics for software quality, software quality assurance, Requirement analysis, communication techniques, analysis principles, software prototyping, Case Study
2.	**Distributed Databases** Standalone v/s Distributed databases, Replication, Fragmentation, Client / Server architecture, types of distributed databases **Object – Relational Databases** Abstract Data types, Nested Tables, Varying Arrays, Large Objects, Naming Conventions for Objects, Case Study
3.	**Data Warehouse** What is Data Warehouse?, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data cube Technology, From

	Data Warehousing to Data Mining, Data Mining, Functionalities, Data Cleaning, Data Integration and Transformation, Data Reduction
4.	**Network Security** Cryptography; Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, One-Time Pads, Two Fundamental Cryptographic Principles; Symmetric Key Algorithms; DES-The Data Encryption Standards, AES – The Advances Encryption Standard; Public Key algorithms; RSA, Other Public Key algorithms; Digital Signatures, Symmetric-Key Signature, Public key Signature, Message Digests
5.	**Computing and Informatics** Introduction to computing, Types of computing: Cloud, Green, Soft, Mobile, Case Study

Subject Name : Software Testing   **Course Code : 604**

	Topic Name
1.	**Software Testing** Introduction, Nature of errors, Testing principles & Testing fundamentals, Debugging
2.	**Approaches to Testing – I** White Box Testing, Black Box Testing, Gray Box Testing, Unit Testing Integration- Top-down, Bottom up Big Bang Sandwich
3.	**Testing for Specialized Environments** Testing GUI's, Testing of Client/Server Architectures, Testing Documentation and Help Facilities, Testing for Real-Time Systems
4.	**Software Testing Strategies &Software metrics** Validation Testing, System Testing, verification, Performance Testing, Regression Testing, Agile testing, Acceptance testing, Smoke Testing, Load Testing, Introduction, Basic Metrics, Complexity Metrics
5.	**Specialized Testing & Testing Tools (Introduction**) Test Case Design, Junit, Apache Jmeter, Winrunner Loadrunner, Rational Robot

Subject Name : Software Project - II (Java / Dot net technology)   **Course Code : 605**

	Topic Name
1.	Details will be given in the Class room

Subject Name : Laboratory Course - VI (Based on Paper No. 601 and 602)   **Course Code : 606**

	Topic Name
1.	Details will be given in the Class room