Table-1: Summarized Course Credits for the Bachelor's Examination of BCA Course of Kolhan University for session 2015-2018.

Semester	Name of Papers	Type of paper	Internal	External	Full Marks	Pass Marks %	Credit
I-I	Mathematics	Theory	30	70	100	45	4
I-II	Introduction to Computer Science	Theory	30	70	100	45	4
I-III	Programming in 'C'	Theory	30	70	100	45	4
I-IV	Communication Skills/Technical English	Theory	30	70	100	45	4
	C and IT lab	Practical	30	70	100	45	4
II.-I	Data Structures & C++	Theory	30	70	100	45	4
II-II	Probability & Statistics	Theory	30	70	100	45	4
II-III	Logic Design	Theory	30	70	100	45	4
II-IV	Managerial Economics	Theory	30	70	100	45	4
	Data Structures & C++ LAB	Practical	30	70	100	45	4
III-I	Scientific Computing	Theory	30	70	100	45	4
III-II	Software Engineering Principles	Theory	30	70	100	45	4
III-III	Rational Database Management System	Theory	30	70	100	45	4
III-IV	Operating System and Linux Programming	Theory	30	70	100	45	4
	OS (Linux) and RDBS (Oracle) Lab	Practical	30	70	100	45	4
IV-I	Data Communication and Computer Network	Theory	30	70	100	45	4
IV-II	Object Oriented Programming in JAVA	Theory	30	70	100	45	4
IV-III	Programming in Visual Basic	Theory	30	70	100	45	4
	LAB of JAVA	Practical	30	70	100	45	4
	LAB of Visual Basic	Practical	30	70	100	45	4
V-I	Electronic Commerce & Applications	Theory	30	70	100	45	4
V-II	Web Technology	Theory	30	70	100	45	4
V-III	Computer Graphics & Multimedia	Theory	30	70	100	45	4
	Web Technology	Practical	30	70	100	45	4

	and Multimedia (HTML, XML, JAVA SCRIPT, ASP.net)						
	Computer Graphics & Multimedia LAB (Graphics, 2d animation, Multimedia)	Practical	30	70	100	45	4
VI-I	Elective Paper [a], [b], [c], [d], [e]	Theory	30	70	100	45	4
VI-II	Distributed Computing	Theory	30	70	100	45	4
VI-III	Accounting and Finance Management	Theory	30	70	100	45	4
	Lab of Elective Papers	Practical	30	70	100	45	4
	Project	Practical	30	70	100	45	4
		Total Marks			3000	Total Credit	120

List of Elective Papers (VI-I)

[a]. Agile Software Development Process
[b]. Data Mining & Warehousing
[c]. System Programming
[d]. Distributed Database Systems
[e]. Decision Support System.

FIRST SEMESTER

KU BCA 101	MATHEMATICS	I –I

Differential Calculus: Successive differentiation, Leibnitz Theorem, Taylor's theorem with Lagrange's forms of remainders, Expansion of a function of one variable in Taylors and Maclanrin's infinite series. Maxima and Minima of one variable, partial Derivatives, Euler's theorem, change of variables, total differentiation, Errors and approximation. Taylor's series in two variables. Maxima and Minima of two or more Variables.
Integral Calculus: Definite integral and its application for area, length and volume. Multiple integrals. Change of order of integration. Transformation of integral from Cartesian to polar. Applications in areas, volume and surfaces.

Differential Equation: First degree and first order Differential equation: Higher order differential equation with constant coefficients. Linear partial differential equation of first order P.D.E. of higher with constant coefficients.
Books:
1. Das BC and Mukherjee, Differential Calculus, Calcutta, U.N. Dhar Publishers.
2. Das BC and Mukherjee, Integral Calculus, Calcutta, U.N. Dhar Publishers.
3. Grewal B.S., Higher Engineering Mathematics, Delhi Khanna Publishers.
4. Rajput B.S., Mathematical Physics

KU BCA 102	INTRODUCTION TO COMPUTER SCIENCE	I –II

Introduction to Computers
Introduction, Characteristics of computers, Evolution of computers, Generation of Computers, Classification of Computers, The Computer System, Applications of Computers.
Number Systems And Logic Gates
Introduction, Number Systems, Conversion between Number Bases, Arithmetic System, Signed and Unsigned Numbers, Concept of Overflow, Binary Coding, Logic Gates, Boolean algebra, Combination of Logic Gates.
Computer Architecture
Introduction, Central Processing Unit (CPU) Memory, Communication between Various Units of a Computer System, The Instruction Format, Instruction Set, Processor Speed, Multiprocessor Systems.
Primary Memory & Secondary storage
Introduction, Memory Hierarchy, Random Access Memory (RAM), Types of RAM, Read Only Memory (ROM), Types of ROM.Introduction, Classification of Secondary Storage Devices, Magnetic Tape, Magnetic Disk, Optical Disk, Magneto Optical disk.
Input Devices & Output Devices
Introduction, Keyboard, Pointing Devices, Speech Recognition, Digital Camera, Scanners, Optical Scanners. Introduction, Classification of Output, Hard Copy Output Devices, Printers, Plotters, Computer Output Microfilm (COM), Soft Copy Output Devices, Monitors, Audio Output, Projectors, Terminals.
Computer Program, Computer Languages, Computer Software
Introduction, Developing a Program, Algorithm, Flowchart, and Pseudo code (P-Code). Introduction, Evolution of Programming Languages, Classification of Programming Languages, Generations of Programming Languages, Features of a Good Programming Language, Selection of a Programming Language. Introduction, Software: Definition, Relationship between Software and Hardware, Software Categories, System Software, Application Software, Software Terminology.
Operating System
Introduction, Operating System, Evolution of Operating System, Types of Operating System, Functions of an Operating System, Modern Operating Systems.
Data Communication and Computer Network, Internet Basics
Introduction, Data Communication, Transmission Media, Multiplexing, Switching, Computer Network, Network Topologies, Communication Protocols, Network devices. Introduction, Evolution of Internet, Basic Internet Terms, Getting Connected to Internet, Internet Applications, Electronic Mail: An Introduction How E-Mail Works, Searching the Web (Search Engines), Languages of Internet, Internet and Viruses.
Text Book:
1. Introduction to computer Science, ITL Education solution Limited, R&D Wing, PEARSON Education, Edition 2004
Reference Book:
   1. Rajaraman V. – Fundamental of Computers, Prentice Hall of India Pvt. Ltd., New Delhi – 2nd edition, 1996.

History and Importance of C, Sample programming, Basic Structure and execution of C Programmes, Constants, Variables, and Data Types and various types of declarations, Different type operators and Expressions, Evaluation of Expressions, Operator Precedence and Associability, Mathematical Functions.

Managing Input and Output operations, Decision Making and Branching Decision Making and Looping.

One – dimensional Arrays and their declaration and Initializations, Two-dimensional Arrays and their initializations, Multidimensional Arrays, Dynamic Arrays, String Variables, Reading and Writing Strings, Arithmetic Operations on characters, Putting Strings together, Comparison of Two Strings, String – handling functions, Table and other features of Strings.

Need and Elements for user –defined Functions, Definition of Functions, Return values and their types, Function calls and Declaration, Arguments and corresponding return values, Functions that return multiple values, Nesting of functions, Recursion, Passing arrays and strings to functions, The Scope, Visibility and Life time of variables.

Defining Structure, Declaring Structure Variable and Accessing Structure Members, Initialization of Structure, Comparing Structure Variables, Operation on Individual Members, Arrays of Structures, Structures within structures, Structures and Functions, Unions, Size of Structures, Bit Fields.

Understanding Pointers, Accessing the Address of a Variable, Declaration and Initialization of Pointer Variables, Accessing a Variable through its Pointer, File Management in C.

Text Book:
1. E. Balagurusamy – Programming in ANSI C, 3rd Edn. , TMH, New Delhi; 2004
Reference:
1. Programming with C, B.S.Gottfried (TMH)
2. Y. Kanetkar – Let us C, 4th Edition, BPB Publication , New Delhi; 2002
3. Y. Kanetkar Pointer in C

Introduction:
Definition, Objectives, Stages of Communication, Essentials of Good/Effective Communication, Benefits of Good Communication, Gaps in Communication, Communication and Information Technology.
Business Correspondence:
Structure of a Letter, Inquiry Letter, Sales Letter, Order Letter, Complaints, Complaint Handling, Telemarketing.

Government Correspondence:
Noting, Routine Letter, Demi-Official Letter Memorandum, Circular, Telegrams, Newsletter.
Writing Skills:
Report Writing, Scientific Paper Writing, Writing Small Paragraphs & Essays, Composition.
Grammar:
Sentence Structure, Idiomatic Usage of Language, Tenses, Direct & Indirect Parts of Speech, Active & Passive Voice, Vocabulary.
Selected Short Stories:

2-3 classic short stories, 2-3 great short stories by Indian writers.
Preparation for Job:
Writing Applications for Jobs, Preparing Curriculum Vitae, Preparing for Interviews,
Preparing for Group Discussions.
Text Books:
1. Organizations - Structures, Processes and Outcomes; Richard h Hall; Prentice
Hall
India.
2. English for the Secretary; Yvonne Hoban; Tata McGraw Hill.
3. Technical Communication: M. Raman & S. Sharma; Oxford University Press.
4. Business Communication Process and Product: M.E. Guffey; Thomson Learning.
Reference Book:
1. Human Behavior at Work; John W Newstorm& Keith Davis; Tata McGraw Hill.
2. The Most Common Mistakes in English Usage; Thomas Elliot Berry, Tata McGraw
Hill
3. Business Communication: R.K. Madhukar; Vikas Publication.

SECOND SEMESTER

KU BCA 201	DATA STRUCTURES & C++	2-I

INTRODUCTION TO C++:
A First look at a C++ Program, Variables and Constants, Arithmetic Expressions,
Arrays, Logical Expressions and if-else Statements, Iterative Statements, The switch
Statement, Pointers, References, Dynamic Memory Allocation, Strings, Structures.
LINKED LIST:
Data Structures and Abstract Data Types, Linked List Data structure, Linked List
Traversal, The Insert Function, Remove Function, Linked Lists vs. Arrays, Linked
Lists with a Tail and Doubly Linked Lists.
STACKS:
Introduction, Array Implementation of Stack, The Hardware Stack.
CLASSES:
Introduction, Public and Private Members, Encapsulation, Implementation of a Class,
Syntax for Accessing Class Members, Constructors and Destructors, Arrays of Class
Objects, Operator Overloading for Classes, Classes and Efficiency.
QUEUES:
Introduction, Ring Buffer and Linked List Queue Implementations.
TREES:
Introduction, Binary Search Trees, The Destroy, Find, and Insert Functions for
Binary Search Trees, The Remove Function for the Binary Search Tree, Binary Tree
Traversals, Implementing Tree as a Class.

SEARCHING AND SORTING:
Introduction, Sequential and Binary Search, Selection Sort, Insertion Sort, Bubble
Sort, Merge sort, Quick sort, Tree sort and Heap sort, Radix Sort.

TEXT BOOK:
1. M.Litvin&G.Litvin- Programs with C++ and Data structures-Vikas Publishing
Home, New Delhi, 2005.
REFERENCE BOOKS:
1. S.Sahni- Data Structures, Algorithms and Applications in C++, 2nd Edn.
Universities Press, India, 2005.

KU BCA 202	PROBABILITY & STATISTICS	2-II

Probability: Introduction, Events & Different Types of Events, Addition &
Multiplication Law, Conditional Probability, Bay's Theorem.

Probability Distribution: Random Variables, Probability Function, Binomial Poison & Normal Distribution.
Statistics: Definition, Function & Scope of Statistics.
Measures of Central Tendency: Arithmetic Mean, Weighted A.M., Median, Mode, Geometric & Harmonic Mean and Their Merits & Demerits.
Measures of Variation: Range, The Interquartile Range or Quartile Deviation, Average (Mean), Deviation Standard Deviation, Coefficient of Variation, Skewness, Moments & Kurtosis.
Correlation Analysis: Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient.
Regression Analysis: Difference between Correlation & Regression, Regression Lines, Regression Equations, Regressions Coefficient.
Sampling Distribution: Chi Square *(X2)* Distribution and Its Properties, Chi - Square Test, Application of Chi -Square Distribution: Chi-Square Test for Population Variance, Chi- Square Test of Goodness of Fit.
1. S.P. Gupta & M.P. Gupta, "Business Statistics", Sultan Chand & Sons.
2. S.C. Gupta & V.K. Kapoor,"Fundamental of Mathematical Statistics", Sultan Chand & Sons.

KU BCA 203	LOGIC DESIGN	2 –III

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.
Boolean Algebra and Logic Gates: Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Fonns, Other Logic Operating, Digital Logic Operations, Digital Logic Gates, Integrated Circuits.
Gate - Level Minimization: The Map Method, Four - Variable Map, Five - Variable Map, Product of Sums Simplification, Don't - Care Conditions, NAND and NOR Implementations, Other Two- Level Implements, Exclusive - OR Function.
Combinational Logic: Combinational Circuits? Analysis Procedure, Design Procedure, Binary Adder - Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers
Synchronous Sequential Logic: Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure.
Registers and Circuits: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters.
Memory and Programmable Logic: Introduction, Random-Access Memory, Memory Decoding, Error Detection and Correction, Read-Only Memory, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices.
Text Book:
M.Morris Mano- Digital Design, 3rd Edn, Pearson Education, New Delhi - 2005.
Reference Book:
A.B.Marcovitz- Introduction to Logic Design, TMH, New Delhi - 2002.

KU BCA 204	MANAGERIAL ECONOMICS	2-IV

Meaning, nature, scope and significance of economics Consumer Behaviour. Utility approach, Law of diminishing marginal utility. Law of equip marginal utility. Indifference curve approach, Consumer equilibrium income, prices & substitution effects.
Revealed Preference theory of law of Demand, Elasticity of demand and its measurements, methods of Demand forecasting, Concepts of cost and revenue, Short run and long run cost curves, Concept of total, average and marginal revenues.

Relationship between average revenue, marginal revenue and elasticity of demand. Price determination under perfect, oligopoly, duopoly, monopoly, monopolistic competition price discrimination. Investment decision – capital building, public investment decision, risk and uncertainty

Reference Books:
1. **Elements of Economics** – Dewett&Dewett
2. **Managerial Economics** – Vartshney&Maheswari
3. **Managerial Economics** – J.G.Verma
4. **Economical Analysis for Management Decisions** – T.W.Elliot
5. **Business Economics** – V.G.Mankar
6. **Managerial Economics** – N.F. Dufty

THIRD SEMESTER

KU BCA 301	SCIENTIFIC COMPUTING	3-I

Errors in Numerical Calculations: Numbers and their accuracy, Errors and their Computations- Absolute, Relative and Percentage, General Error Formula.
Solution of Algebraic and Transcendental Equations: Introduction, Bisection method, Iteration method, Method of False Position, Newton- Raphson method, Graeffe's Root-Squaring method.
Interpolation: Introduction, Errors in Polynomial Interpolation, Finite Differences- Forward, Backward and Central, Detection of errors using Difference tables, Differences of a Polynomial, Newton's formulae for Interpolation, Central Difference Interpolation Formulae- Gauss's Central Difference Formula, Interpolation with unevenly spaced points, Lagrange's Interpolation Formula, Divided Differences and their properties- Newton's General Interpolation Formula, Inverse Interpolation.
Numerical Differentiation and Integration: Introduction, Numerical Differentiation and Errors, Numerical Integration – Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Weddle's Rule, Romberg Integration, Newton- Cotes Integration Formulae.
Numerical Solution of Linear System of Equations: Direct Methods- Matrix Inversion Method, Gauss-Jordan Method, Gauss Elimination Method, Method of Factorization, Ill- conditioned Linear System.
Numerical Solution of Ordinary Differential Equations: Solution by Taylor's Series, Euler's method, Modified Euler's method, Runge-Kutta method of 2nd and 4th order.
Text Book:
1. S.S.Sastry -Introductory methods of Numerical Analysis, 4thEdition, Prentice Hall of India, New Delhi, 2006

Reference Books:
1. V.N.Vedamurthy et.al.-Numerical Methods, Vikas Publishing House, New Delhi, 2005.
2. B.S.Grewal- Numerical Methods in Engineering & Science, Khanna Publishers, Delhi, 2005.

KU BCA 302	SOFTWARE ENGINEERING PRINCIPLES	3-II

Introduction to Software Engineering: Characteristics, Emergence of Software Engineering, Software Metrics & Models, Process & Product Metrics.
Software Life Cycle Models: Waterfall, Prototype and Spiral Models and their Comparison.
Software Project Management: Size Estimation- LOC and FP Metrics, Cost Estimation-Delphi and Basic COCOMO.
Software Requirements Specification: SRS Documents, their Characteristics and Organization.

Software Design: Classification, Software Design Approaches, Function Oriented Software Design, Structured Analysis- Data flow Diagrams and Structured Design, Introduction to Object Oriented Design.
Coding and Testing of Software: Unit Testing, Block Box Testing, White Box Testing, Debugging, Program Analysis Tools, System Testing.
Software Quality Assurance: ISO 9000 and SEI CMM and their Comparison.
Software Maintenance: Maintenance Process Models and Reverse Engineering, Estimation of Maintenance Costs.
Software Development Tools: Introduction to "Rational Rose".
Text Book:
1. Rajib Mall -Fundamentals of Software Engineering, Prentice Hall of India, New Delhi, 2005
Reference Book:
1. PankajJalote- An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, New Delhi,2005
2. Richard Fairley- Software Engineering Concepts, Tata McGraw Hill, New Delhi, 2006.

KU BCA 303	RELATIONAL DATABASE MANAGEMENT SYSTEMS 3-III

DATABASE SYSTEM CONCEPTS & ARCHITECTURE:
Data Independence, Schemas, Instances, Database Languages, Database System Environments Data Models, Basic Structure of Oracle System, Storage Organization in Oracle.

DATA MODELING:
Use of High –level Conceptual Data Models, ER Diagrams, Subclasses, Superclasses and
Inheritance, Specialization & Generalization, Conceptual Object Modeling using UML Class Diagrams, Knowledge Representation Concepts, Exercises.
RELATIONAL DATA MODEL:
Relational Constraints, Domain Constraints, Key Constraints Referential Integrity Constraints, Relational Algebra, Fundamental Operations of Relational Algebra & their Implementation, Interdependence of Operations, Example Queries.

ER AND EER TO RELATIONAL MAPPING:
Mapping EER Model Concepts to Relation, Tuple Relational Calculus, Domain Relational Calculus Queries.
DATABASE DESIGN:
Functional Dependencies, Irreducible Sets of Dependencies, Nonloss Decomposition, 1st, 2nd
& 3rd NF, Dependency Preservation, Boyce Codd NF, Multivalued Dependency & 4th NF, Join
Dependency & 5 NF, Domain Key Normal Form, Restriction –Union Normal Form, Denormalization.
DATABASE SECURITY & AUTHORIZATION:
Specifying Privileges, Revoking Privileges, Propagation of Privileges, Statistical Database Security.

TEXT BOOKS:
1. Fundamental of Database Systems- ElmasriNavathe- Pearson Education Asia
2. Database- Principles, Programming and Performance- Parick O' Neil Elizabeth O' Niel, Harcourt Asia PTE Limited
REFERENCES BOOKS:
1. An Introduction to Database Systems- C.J.Date, Addison Wesley, Pearson Education Press

2. Database System Concepts- Abraham Silberschat, Henry F. Korth, S.Sudarshan, Tata McGraw Hill.

KU BCA 304	OPERATING SYSTEMS &LINUX PROGRAMMING	3-IV

Introduction: What is an Operating System? Mainframe Systems, Desktop Systems, Multiprocessor Systems, Distributed Systems, Clustered Systems, Real-Time Systems.
Computer-System Structures: Operation, I/O Structure, Storage Structure, Storage Hierarchy.
Operating-System Structures: System Components; Operating-System Services; System Calls; System Programs; System Structure, System Design and Implementation, System Generation.
Processes: Process Concept; Process Scheduling, Operations On Processes.
CPU Scheduling: Basic Concepts; Scheduling Criteria; Scheduling Algorithms.
Storage Management: Memory Management- Backward, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging.
File-System Interface: File Concept; Access Methods; Directory Structure; Protection.
Mass-Storage Structure: Disk Structure; Disk Scheduling; Disk Management; Swap- Space Management.
The Linux System: History; Design Principles; Kernel Modules; Process Management; Scheduling; Memory Management; File Systems; Input And Output; Security.
Text book:
1. A. Silberschatz et.al.-Operating System Concepts, 6th Edition, John Wiley Inc., 2003
Reference books:
1. H.M. Deitel -Operating Systems , 6th Edition, Pearson Education, 2006
2. D.M. Dhandhare - Operating Systems, 2nd Edition, Tata McGraw Hill, New Delhi, 2006
3. A. Robbins-Linux Prog.by Examples-Pearson Education, Newdelhi.

FOURTH SEMESTER

KU BCA 401	DATA COMMUNICATION AND COMPUTER NETWORK	4-I

Data Transmission Basic Concepts and Terminology: Data Communication Model, Communication Tasks, Parallel & Serial Transmission, Transmission Models, Transmission Channel, Data Rate, Bandwidth Signal Encoding Schemes, Data Compression, Transmission Impairments, Layering and Design Issues, OSI Model, Services and Standards.
Computer Network: Network Topology, Performance of Network, Network Classification, Advantages & Disadvantages of Network, Transmission Media (guided and unguided), Network Architecture, OSI Reference Model, TCP/IP.
Data Line Devices: Modems, DSL, ADSL.
Data Link Layer: Need for Data Link Control, Frame Design Consideration, Flow Control & Error Control (Flow control mechanism, Error Detection and Correction techniques) Data Link Layer Protocol, and HDLC.
Network Layer: Routing, Congestion control, Internetworking principles, Internet Protocols (IPv4 packet format, Hierarchal addressing sub netting, ARP, PPP), Bridges, Routers.
Physical Layer: Function and interface, physical layer standard, null modem.
Network Security: Security Requirement, Data encryption strategies, authentication protocols, Firewalls.
Basic Applications: Telnet, FTP, NFS, SMTP, SNMP and HTTP.
Text Book:

1. Prakash C. Gupta -Data Communications & Computer Networks, PHI, New Delhi.
Reference Books:
1. William Stallings- Data & Communications, 6th Edition, Pearson Education.
2. Tanenbaum- Computer Networks, 3rd Edition, PHI, New Delhi.

KU BCA 402	OBJECT ORIENTED PROGRAMMING IN JAVA 4-II

Java Evolution and Overview of Java Language: How Java differs from C and C++, Java and Internet, Java and World Wide Web, Introduction, Simple Java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style.
Constants, Variables, and Data Types: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values of Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.
Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evolution of Expressions, Precedence of Arithmetic Operators, Type Conversion in Expressions, Operator Precedence and Associativity, Mathematical Functions.
Decision Making and Branching: Introduction, Decision Making with if Statement, Simple If Statement, The if... else Statement, Nesting of if ... else Statements, The else if Ladder, The switch Statement, The? Operator.
Decision Making and Looping: Introduction, The while Statement, The do Statement, The for Statement, Jumps in Loops, Labelled Loops.
Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a. Class, Overriding Methods, final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control.
Arrays, String and Vectors: Arrays, One-Dimensional Arrays, Creating an Array, Two- Dimensional Arrays, Strings, Vectors, Wrapper Classes.
Interfaces: Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, implementing Interfaces, Accessing Interface Variables.
Packages: Putting Classes Together: Introduction, Java API Packages, Using system Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes.
Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, and Synchronization.
Managing Errors and Exceptions: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging.

Text Book:
1. E. Balagurusamy, Programming with Java, A Primer Second Edition, Tata McGraw Hill, New Delhi.
Reference Books:
1. H.M.Deitel&P.J.Deitel- JA V A- How to Program, 5th Edn, Pearson Education, New Delhi-2004.
2. P.Naughton and H. Schildt-JAVA: The Complete Reference, TMH, New Delhi 2005.
3. D.Jana- Java and Object Oriented Programming Paradigm, PHI, New Delhi-2005.

KU BCA 403	PROGRAMMING IN VISUAL BASIC 4-III

Integrated Development Environment: Introduction, Integrated Development Environment Overview, Project Window, Toolbox, Form Layout Window, Properties Window, Menu Bar and Tool Bar, A Simple Program: Displaying a Line of Text.

Introduction to Visual Basic Programming: Introduction, Visual Programming and Event-Driven Programming, A Simple Program: Printing a Line of Text on the Form, Another Simple Program: Adding Integers, Memory Concepts, Arithmetic, Operator Precedence, and Decision Making: Comparison Operators.

Control Structures: Introduction, Algorithms, Pseudo code, Introduction to Control Structures, If/Then Selection Structure, If Then/Else Selection Structure, While Repetition Structure, Do While Repetition Structure, Do Until Repetition Structure, Essentials of Computer- Controlled Repetition, For Repetition Structure, Examples Using the For/Next Repetition Structure, Select Case Multiple-Selection Structure, Do/Loop While Repetition Structure, Do/Loop Until Repetition Structure, Exit Do and Exit For Statements, Data Type Boolean, Constant Variables, Logical Operators, Structured Programming Summary, Visual Basic Data Types.

Sub Procedures and Function Procedures: Introduction, Form Modules, Sub Procedures, Function Procedures, Call-by-Value vs. Call-by-Reference, Exit Sub and Exit Function, Storage Classes, Scope Rules.

Arrays: Introduction, Arrays, Declaring Arrays, Examples Using Arrays, Passing Arrays To Procedures, Sorting Arrays, Searching Array: Linear Search and Binary Search, Multidimensional Arrays, Control Arrays, Dynamic Arrays, Variable Arguments: ParamArray, Function Array.

Strings, Dates and Times: Introduction, Fundamentals of Characters and Strings, String Data Type, String Cop. Catenation with & and +, C°I1!paring Character Strings, Operator Like, Manipulating the Individual Characters in a String: Mid$, Left$, Right$, and InStr, Searching for Substrings in String Using InStr and InStrRev, Ltrim$, Rtrim$, and Trim$, Sting$ and Space$, Replacing Substrings in a String with Function Replace, Reversing Strings with Function StrReverse, Converting Strings to Uppercase and Lowercase, Conversion Functions, String Formatting, Date and Time Processing, Date and Time Formatting, String Arrays.

Basic Graphical User Interface Concepts: Introduction, Controls, TextBox Control, MaslcEdit Control, ComboBox Control, ListBox Control, Scrollbars, Slider Control, Menus, Pop-Up Menus, Function MsgBox.

Advanced Graphical User Interface Concepts: Introduction, Multiple Document Interface (MDI), Multiple Forms.

Text Book:
Deitel&Deitel& T.R. Nieto-Visual Basic 6 How to Program, Pearson Education, New Delhi-2005.

Reference Book:
Content Development Group, Visual Basic 6, Tata McGraw Hill, New Delhi.

<center>**FIFTH SEMESTER**</center>

KU BCA 501	ELECTRONIC COMMERCE & APPLICATION	5-1

Introduction to E-commerce: E-commerce: The revolution is just beginning, The visions and forces behind E-commerce, Understanding E-commerce.

E-commerce business models and concepts: E-commerce business models, Major business-to-consumer (B2C) business models, Major business-to-business (B2B) business models, Business models in emerging E-commerce areas, How the internet and the Web change business.

E-commerce infrastructure: The Internet, Technology background, The internet today, The world wide web.

Building an E-commerce web site: A systematic approach, choosing server software, choosing the hardware for an E-commerce site, other E-commerce site tools.

Security and Encryption: The E-commerce security environment, Security threats in the E-commerce environment, Technology solutions, Policies, Procedures and Laws.

E-commerce payment systems: Payment systems, Credit card E-commerce transactions, E-commerce digital payment systems in the B2C arena, B2B payment systems.

Ethical, Social, and Political issues in E-commerce: Understanding ethical, social, and political issues in E-commerce, Privacy and information rights, Intellectual property rights, Governance, Public safety and welfare.

Text Book:
K.C. Laudon& C.G. Traver, E-commerce, Pearson Education, 2003

Reference Books:
1. R. Kalakota&A.B.Whiilston-' Frontiers of Electronic Commerce, Pearson
Education- 2006.
2. K.K.Bajaj&D.Nag- E-Commerce, Tata McGraw Hill, New Delhi, Second
Edition.

KU BCA 502	WEB TECHNOLOGY	5-II

Introduction to HTML: HTML, HTML Tags, Commonly Used HTML Commands, Title and Footers, Text Formatting, Text Style, Lists, Adding Graphics to HTML Documents, Tables, Linking Documents, and Frames.

Java Script: Java Script in Web Pages, Advantages of Java Script, Advantages of Java Script, Data Types and Literals, Type Casting, Java Script Array, Operators and Expression, Conditional Checking, Function, User Defined Function.

Understanding XML: SGML, XML, XML and HTML, Modeling XML Data, Styling XML with XSL, XHTML

Creation of Dynamic Web pages using JSP: Dynamic Web Page, Introduction of JSP, Pages Overview, JSP Scripting, Standard Action, Page Directive, Include Directive

Text Books:
1. Ivan Bay Ross- Web Enable Commercial Application Using HTML, DHTML,
BPB Publication
2. Michel Morrison -HTML and XML for Beginners, PHI, New Delhi- 2001
3. H.M Dietal and P.J Dietal -Java How to Program, PHI, New Delhi- 2005

Reference Book:
1. Java Server Side Programming -WROX Publication

KU BCA 503	COMPUTER GRAPHICS & MULTIMEDIA	5-III

Overview of Graphics Systems: Video Display Devices, Refresh Cathode Ray Tubes, Raster-Scan and Random-Scan Systems, Input Devices, Hard-Copy Devices and Graphics Software.

Output Primitives: Points, Line Drawing Algorithms (DDA and Bresenham's Line Drawing Algorithm), Circle- Generating Algorithms (Bresenham's and Midpoint Circle Algorithms), Ellipse-Generating Algorithms (Midpoint Ellipse Algorithm only), Filled-Area Primitives: Scan –Line Polygon Fill Algorithm, Boundary-Fill Algorithm, Flood-Fill Algorithm.

Two Dimensional Geometric Transformations: Basic Transformations, Matrix

Representations and Homogeneous Coordinates, Composite Transformations, Reflection and Shear, Transformations between Coordinates Systems, Raster Methods for Transformations.

Two-Dimensional Viewing: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-View Port Coordinate Transformation, Clipping- Point, Line (Cohan-0Sutherland Line Clipping and Liang –Barsky Line Clipping and Nicholl-Lee-Nicholl Line Clipping) and Polygon Clipping(Sutherland- Hodgeman Polygon Clipping, Weiler-Atherton Polygon Clipping).

Three Dimensional Geometric Transformations: Translation, Rotation, Scaling, Reflection and Shears, Composite Transformations, Modeling and Coordinate Transformations.

Three Dimensional Viewing: Viewing Pipeline, Viewing Coordinates, Projections and Clipping.

Multimedia Systems Design: Multimedia Elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Multimedia Data Interface Standards, the Need for Data Compressions, Multimedia Database.

Text Books:
1. D. Hearn & M. P. Baker -Computer Graphics C Version, 2nd Edn, Pearson Education, New Delhi, 2006
2. J. F. KoegelBuferd -Multimedia Systems, Pearson Education, New Delhi, 2006

Reference Books:
1. R.A. Plastock et.al.- Computer Graphics(Schaums Outline Series),
2nd Edn, TMH, New Delhi, 2006.
2. J.D.Foley- Computer Graphics, 2nd Edn, Pearson Education, New
Delhi, 2004

SIXTH SEMESTER

ELECTIVE PAPERS	VI-I

Agile Software development Process

Module I
 Introduction to Agile Project Management: Introduction, What Is Agile?, Agile Manifesto Values And Principles, Agile Methodologies, Agile Principles, Agile Frameworks And Terminology, Agile Roles, Agile Project Management, Agile Project Life Cycle.

Module II
 Communications: Communications Management, Dimensions Of Communication, Barriers To Communications, Plan Communications, Communication Methods.

Module III
Planning, Monitoring and Adapting: Introduction, What Is Adaptive Planning?, Progressive Elaboration, Iteration and Release Planning.

Module IV
 Agile Metrics And Estimations: Relative Sizing, Story Points, Wideband Delphi, Probe Technique, Planning Poker, Ideal Time, Affinity Diagram And Estimating, Agile Project Cost Management.

Module V
 Agile Analysis And Design: Introduction, Product Roadmap, Backlog , Story Maps, Agile Modeling.

Module VI

Agile Project Risk Management: Introduction, Plan Risk Management, Identify Risks, Risk Adjusted Backlog, Risk Burn-Down Graphs, Perform Qualitative Risk Analysis, Risk-Based Spike, Plan Risk Responses, Monitoring And Control Risks, Projects, Common.

Module VII

Agile Methodologies: Introduction, Variance In Agile Methods And Approaches, Applying New Agile Practices.

Text Book:

1. **PMI Agile Certified Practitioner—Excel with Ease,** by Saikat Dutt, Subramanian Chandramouli, and Publisher: Pearson Education India, 2012.

Reference Book:

1. **Agile I.T Organization Design, 1/e, by** Sriram Narayan, Pearson Education, 2016.

DISTRIBUTED DATABASES

Module I
Introduction to Distributed Data Processing: Advantages of DDB's, Problem areas.

Module II
Distribute Database Management System Architecture: DBMS Standardization, Architectural models for DDBMS Distribute DBMS Architecture.

Module III
Distributed Database Design: Design Strategies, Distribution design issues, Fragmentation, Allocation.

Module IV

Semantic Data Control: view management, data security, Integrity control.

Module V
Query processing and Optimization: Quarry Processing Problem, Characterization of Query Processors, Layers of query Processing, Query decomposition, Query Optimization.

Module VI
Transaction Management and Concurrency Control: Introduction, Properties, Serializability Theory, Locking Based Concurrency control Algorithm Time Stamp based concurrency control Algorithms, Dead Lock management.

Module VII

Recovery and Reliability: Failures' and fault tolerance in distributed system, Distributed & local reliability protocol.

Text Book:
1. M. Tamer Ozsee, Patric Valduriez - Principle of Distributed Database Systems 2nd Edition, Pearson Education Asia,2001.

Data Mining & Warehousing

Data Mining

Introduction: Basic Data Mining Tasks, Data Mining versus knowledge Discovery in Databases, Data Mining Issues, Data Mining Metrics, Social Implications of Data Mining, Data Mining from a Database Perspective.

Data Mining Techniques: Introduction, Similarity Measures, Decision Trees.

Classification: Introduction, Distance-Based Algorithms, Decision Tree-Based Algorithms.

Clustering: Introduction, Similarity and Distance Measures, Outliers, Hierarchical Algorithms, Partitional Algorithms (Minimum Spanning Tree, K-Means Clustering, Nearest Neighbor Algorithm).

Association Rules: Introduction, Large Item-sets, Basic Algorithms.

Data Warehousing

The Data Warehouse Environment: The Structure of the Data Warehouse, Subject Orientation, Day 1-Day *n* Phenomenon, Granularity, Exploration and Data Mining, Living Sample Database , Partitioning as a Design Approach, Structuring Data in the Data Warehouse, Cost Justification, Data Homogeneity/Heterogeneity, Purging Warehouse Data.

The Data Warehouse and Design: Beginning with Operational Data, Data/Process Models and the Architected Environment, The Data Warehouse and Data Models, Meta Data.

Granularity in the Data Warehouse: Raw Estimates, Input to the Planning Process, Data in Overflow?

The Data Warehouse and Technology: Managing Large Amounts of Data, Managing Multiple Media.

Text Books:

1. M H Dunham & S. Sridhar-Data Mining: Introductory and Advanced Topics, Pearson Education, 2006.

2. W H Inmon: Building the Data warehouse, 3rd Edn, Wiley Dreamtech India (P) Ltd., 2003.

Reference Book:

1. S. Anahory & D. Murray-Data Warehousing, Pearson Education, New Delhi-2000.

2. A. Berson & S.J. Smith-Data Warehousing, Data Mining & OLAP, TMH, New Delhi-2006.

Decision Support System

Module I
Introduction to DSSs defined, Ingredients of a DSS, Data and Model Management, DSS knowledge Base, User Interfaces, The DSS User, Categories and classes of DSSs.

Module II

Decisions and Decision Makers: Decision Makers, Decision Styles, Decision Effectiveness, How can a DSS help? A topologies of Decisions. Decision in the Organization: Understanding the Organization, Supporting Organizational Decision Making.

Module III
Modeling Decision Processes: Defining the problem and its structure, Decision models, Types of Probability, Techniques for forecasting Probabilities.

Module IV
Expert System and Artificial Intelligence (Intelligent Decision Support Systems): The Concept of Expertise, The Intelligence of Artificial Intelligence, The concepts and structure of Expert Systems, Designing and Building Expert Systems, Evaluating the benefits of ES.

Module V
Designing and Building Decision Support Systems: Strategies for DSS Analysis and Design, The DSS Developer, Tools for DSS Development.

Module VI
Implementing and Integrating Decision Support Systems: DSS Implementation, System Evaluation, The Importance of Integration.

Module VII
Decision Support in the Twenty – First Century: The Future of Decision Support Systems, The future of Expert and Artificial Intelligence Systems.

Text Book:
1. George M. Marks-Decision Support Systems in the 2151 Century, 2nd Edition, Pearson Education, 2006.

Reference Book:
1. Efrain Turban- Decision Support Systems and Intelligent System, ih Edition, Pearson Education, 2006.

SYSTEM PROGRAMMING

Module I

Background: Introduction, System Software and Machine Architecture, The Simplified Instructional Computer (SIC), Traditional (CISC) machines, RISC Machines.

Module II
Assemblers: Basic Assembler Functions, Machine – Dependent Assembler Features, Machine – Independent Assembler Features.

Module III+IV
Loaders and Linkers: Basic Loader Functions, Machine - Dependent Loader Features, Machine – Independent Loader Features.

Module V
Macro Processors: Basic Macro Processor Functions, Machine – Independent Macro Processor Features, Macro Processor Design Options.

Module VI
Software Engineering -Issues: Introduction to Software Engineering Concepts, System Specifications.

Module VII
Procedural System Design, Object – Oriented Design, System Testing Strategies.

Text Book:
1. L. L. Beck – System Software – An Introduction to Systems Programming, 3/e, Pearson Education, New Delhi, 2004

Reference Books:

1.   J.J. Donovan – System Programming, McGraw Hill, New Delhi- 1993.

KU BCA 602	DISTRIBUTED COMPUTING	6-II

Distributed Computing- An Introduction: Definitions, The History of Distributed Computing, Different Forms of Computing, The Strengths and Weaknesses of Distributed Computing, Basics of Operating Systems, Network Basics, Software Engineering Basics.
Interprocess Communications: An Archetypal IPC Program Interface, Event
Synchronization, Timeouts and Threading, Deadlocks and Timeouts, Data Representation, Data Encoding, Text-Based Protocols, Request-Response Protocols, Event Diagram and Sequence Diagram, Connection-Oriented versus Connectionless IPC.
Distributed Computing Paradigms: Paradigms and Abstraction, Paradigms for Distributed Applications, Trade-offs.
The Socket API: Background, The Socket Metaphor in IPC, The Datagram Socket API, The Stream- Mode Socket API, Sockets with Nonblocking I/O Operations, Secure Socket API.
The Client-Server Paradigm: Background, Client-Server Paradigm Issues, Software Engineering for a Network Service, Connection-Oriented and Connectionless Servers, Iterative Server and Concurrent Server, Stateful Servers.

Text Book:

1. M.L.Liu- Distributed Computing: Principles and Applications, 1st Indian Reprint, Pearson Education, 2004.

KU BCA 603	ACCOUNTING AND FINANCE MANAGEMENT	6-III

Accounting: Basic of Accounting, Accounting Mechanics- Double Entry System, Classification, Rules for Debit and Credit Concepts & Conventions.
Journal, Ledger and Trial Balance:
Journal: Meaning of Journal, Advantages, and Subdivision.
Ledger: Meaning, subdivision, Mechanics of Posting, balancing of Ledger accounts
Trial Balance: Objectives, Defects of trial balance, Errors disclosed by trial balance, preparation and locating errors.
Cash Book and Subsidiary books of Accounting: Kinds of cashbook, Purchase daybook, Sales daybook, Bills receivable book, Bills payable book.
Finance Accounts: Trading account, Profit & Loss account, Adjustments, Balance Sheet, Forms of balance Sheet, Assets and their classification, liabilities and their classification, uses and limitations.
Capital & Revenue Expenditure & Receipts: Rules for determining capital expenditure, Deferred Revenue expenditure, Capital & Revenue receipts, Capital & Revenue Profits, Capital & Revenue Loss.
Statement of Changes of financial position: definition of funds, fund flow statement, cash flow statement.
Text Books:
1. Management Accounting – Manmohan Singh and Goel
2. Financial management- Pandey I. M.
Reference Books:
1. Hanif& Mukherjee-Modern Accountancy, TMH, New Delhi.
2. Maheshwari&Maheshwari- An Introduction to Accountancy, Vikas Publishing House Pvt.Ltd. New Delhi.