Unified Syllabus by

Department of Computer Science, University of Lucknow

Bachelors of Computer Application

Semester-wise breakup of course

Semester-I[st]

Course Code	Course Name	L	T	P	C
BCA-S101T	Computer Fundamental & Office Automation	3	0	0	3
BCA-S102T	Programming Principle & Algorithm	3	0	0	3
BCA-S103T	Principle of Management	4	0	0	4
BCA-S104T	Business Communication	3	1	0	4
BCA-S105T	Mathematics –I	4	0	0	4
BCA-S101P	Computer Laboratory and Practical Work of Office	0	0	3	2
	Computer Laboratory and Practical Work of Programming Principle & Algorithm	0	0	3	2
					22

Semester-II[nd]

Course Code	Course Name	L	T	P	C
BCA-S106T	C Programming	3	0	0	3
BCA-S107	Digital Electronics & Computer Organization	3	1	0	4
BCA-S108	MIS (Management Information system)	4	0	0	4
BCA-S109	Financial Accounting & Management	3	1	0	4
BCA-S110	Mathematics II	4	0	0	4
BCA-S106P	Computer Laboratory and Practical Work of C Programming	0	0	6	3
					22

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Bachelors of Computer Application

Semester-wise breakup of course

Semester-III[rd]

Course Code	Course Name	L	T	P	C
BCA-S201T	Object Oriented Programming Using C++	3	0	0	3
BCA-S202T	Data Structure Using C & C++	3	0	0	3
BCA-S203	Computer Architecture & Assembly Language	3	1	0	4
BCA-S204	Business Economics	3	1	0	4
BCA-S205	Elements of Statistics	3	1	0	4
BCA-S201P	Computer Laboratory and Practical Work of OOPS	0	0	3	2
	Computer Laboratory and Practical Work of DS	0	0	3	2
					22

Semester-IV[th]

Course Code	Course Name	L	T	P	C
BCA-S206T	Computer Graphics & Multimedia Application	3	0	0	3
BCA-S207	Operating System	3	1	0	4
BCA-S208	Software Engineering	3	1	0	4
BCA-S209	Optimization Techniques	3	1	0	4
BCA-S210	Graph Theory	4	0	0	4
BCA-S206P	Computer Laboratory and Practical Work of Computer Graphics & Multimedia Application	0	0	6	3
					22

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Semester-wise breakup of course

Semester-Vth

Course Code	Course Name	L	T	P	C
BCA-S301T	Introduction to DBMS	3	0	0	3
BCA-S302T	Java Programming and Dynamic We page Design	3	0	0	3
BCA-S303	Data communication & Computer Network	3	1	0	4
BCA-S304	Numerical Methods	3	1	0	4
BCA-S305	Minor Project	0	1	2	2
BCA-S306	Viva-Voice on Summer Training	0	0	2	1
BCA-S301P	Computer Laboratory and Practical W ork of DBMS	0	0	3	2
	Computer Laboratory and Practical W ork of Java Programming & Dynamic Webpage Design	0	0	3	2
					21

Semester-VIth

Course Code	Course Name	L	T	P	C
BCA-S307	Computer Network Security and Management	4	0	0	4
BCA-S308	Information System: Analysis Design & Implementation	3	1	0	4
BCA-S309	E-Commerce	4	0	0	4
BCA-S310	Knowledge Management	3	1	0	4
BCA-S311	Major Project	0	3	6	5
BCA-S312	Presentation/Seminar based on Major Project				1
					22

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Semester-wise breakup of course

Semester-I[st]

Code	Course Name	Total	L	T	P	C
BCA-S101T	Computer Fundamental& Office Automation	100	3	0	0	3
BCA-S102T	Programming Principle & Algorithm	100	3	0	0	3
BCA-S103	Principle of Management	100	4	0	0	4
BCA-S104	Business Communication	100	3	1	0	4
BCA-S105	Mathematics -I	100	4	0	0	4
BCA-S101P	Computer Laboratory and Practical Work of Office Automation	100	0	0	3	2
	Computer Laboratory and Practical Work of Programming Principle & Algorithm		0	0	3	2
		600				22

Semester-II[nd]

Code	Course Name	Total	L	T	P	C
BCA-S106T	C Programming	100	3	0	0	3
BCA-S107	Digital Electronics & Computer Organization	100	3	1	0	4
BCA-S108	MIS (Management Information System)	100	4	0	0	4
BCA-S109	Financial Accounting & Management	100	3	1	0	4
BCA-S110	Mathematics II	100	4	0	0	4
BCA-S106P	Computer Laboratory andPractical Work of C Programming	100	0	0	6	3
		600				22

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Semester-wise breakup of course

Semester-III[rd]

Code	Course Name	Total	L	T	P	C
BCA-S201T	Object Oriented Programming Using C++	100	3	0	0	3
BCA-S202T	Data Structure Using C & C++	100	3	0	0	3
BCA-S203	Computer Architecture & Assembly Language	100	3	1	0	4
BCA-S204	Business Economics	100	3	1	0	4
BCA-S205	Elements of Statistics	100	3	1	0	4
BCA-S201P	Computer Laboratory and Practical Work of OOPS	100	0	0	3	2
	Computer Laboratory and Practical Work of DS		0	0	3	2
		600				22

Semester-IV[th]

Code	Course Name	Total	L	T	P	C
BCA-S206T	Computer Graphics & Multimedia Application	100	3	0	0	3
BCA-S207	Operating System	100	3	1	0	4
BCA-S208	Software Engineering	100	3	1	0	4
BCA-S209	Optimization Techniques	100	3	1	0	4
BCA-S210	Graph Theory	100	4	0	0	4
BCA-S206P	Computer Laboratory and Practical Work of Computer Graphics & Multimedia Application	100	0	0	6	3
		600				22

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Semester-wise breakup of course

Semester-Vth

Code	Course Name	Total	L	T	P	C
BCA-S301T	Introduction to DBMS	100	3	0	0	3
BCA-S302T	Java Programming and Dynamic Webpage Design	100	3	0	0	3
BCA-S303	Data Communication & Computer Network	100	3	1	0	4
BCA-S304	Numerical Methods	100	3	1	0	4
BCA-S305	Minor Project	50	3	1	2	2
BCA-S306	Viva-Voice on Summer Training	50	0	0	2	1
BCA-S301P	Computer Laboratory and Practical Work of DBMS	100	0	0	3	2
	Computer Laboratory and Practical Work of Java Programming & Dynamic Webpage Design		0	0	3	2
		600				21

Semester-VIth

Code	Course Name	Total	L	T	P	C
BCA-S307	Network Security and Management	100	4	0	0	4
BCA-S308	Information System: Analysis Design & Implementation	100	3	1	0	4
BCA-S309	E-Commerce	100	4	0	0	4
BCA-S310	Knowledge Management	100	3	1	0	4
BCA-S311	Major Project	150	0	3	6	5
BCA-S312	Presentation/Seminar based on Major Project	50				1
		600				22

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S101T	Computer Fundamental & Office Automation	3	0	0	3

UNIT-I

Introduction to Computers

Introduction, Characteristics of Computers, Block diagram of computer. Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages).

Data Organization, Drives, Files, Directories. Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive)I/O Devices (Scanners, Plotters, LCD, Plasma Display) Number Systems Introduction to Binary, Octal, Hexadecimal system Conversion, Simple Addition, Subtraction, Multiplication.

UNIT-II

Algorithm and Flowcharts

Algorithm: Definition, Characteristics, Advantages and disadvantages, Examples Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples.

UNIT-III

Operating System and Services in O.S.

Dos – History, Files and Directories, Internal and External Commands, Batch Files, Types of O.S.

Windows Operating Environment Features of MS – Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush.

UNIT-IV

Editors and Word Processors

Basic Concepts, Examples: MS-Word, Introduction to desktop publishing. **Spreadsheets and Database packages** Purpose, usage, command, MS-Excel, Creation of files in MS-Access, Switching between application, MS-PowerPoint.

Text Books :

1. Fundamental of Computers – By V.Rajaraman B.P.B. Publications
2. Fundamental of Computers – By P.K. Sinha
3. MS-Office 2000(For Windows) – By Steve Sagman

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S102T	Programming Principle & Algorithm	3	0	0	4

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UNIT-I

Introduction to 'C' Language

History, Structures of 'C' Programming, Function as building blocks. **Language Fundamentals** Character set, C Tokens, Keywords, Identifiers, Variables, Constant, Data Types, Comments.

UNIT-II

Operators

Types of operators, Precedence and Associatively, Expression, Statement and types of statements

Build in Operators and function Console based I/O and related built in I/O function: printf(), scanf(), getch(), getchar(), putchar(); Concept of header files, Preprocessor directives: #include, #define.

UNIT-III

Control structures

Decision making structures: If, If-else, Nested If-else, Switch; Loop Control structures: While, Do-while, for, Nested for loop; Other statements: break, continue, goto, exit. **Introduction to problem solving** Concept: problem solving, Problem solving techniques (Trail & Error, Brain Stroming, Divide & Conquer) Steps in problem solving (Define Problem, Analyze Problem, Explore Solution) Algorithms and Flowcharts (Definitions, Symbols), Characteristics of an algorithm Conditionals in pseudo-code, Loops in pseudo code. Time complexity: Big-Oh notation, efficiency Simple Examples: Algorithms and flowcharts (Real Life Examples).

UNIT-IV

Simple Arithmetic Problems

Addition / Multiplication of integers, Determining if a number is +ve / -ve / even / odd, Maximum of 2 numbers, 3 numbers, Sum of first n numbers, given n numbers, Integer division, Digit reversing, Table generation for n, a^b, Factorial, sine series, cosine series, ${}^nC_r$, Pascal Triangle, Prime number, Factors of a number, Other problems such as Perfect number, GCD numbers etc (Write algorithms and draw flowchart), Swapping. **Functions** Basic types of function, Declaration and definition, Function call, Types of function, Parameter passing, Call by value, Call by reference, Scope of variable, Storage classes, Recursion.

Referential Books :

1. Programming in C-Balguruswamy
2. The C programming Lang., Pearson Ecl - Dennis Ritchie
3. Structured programming approach using C- Forouzah & Ceilber Thomson learning publication.

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S103	Principle of Management	4	0	0	4

UNIT-I

Nature of Management: Meaning, Defination, it's nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization, Management Skills, Levels of Management. **Evolution of Management Thought:** Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Chester Barhard & Peter Drucker to the management thought. Business Ethics & Social Responsibility: Concept, Shift to Ethics, Tools of Ethics.

UNIT-II

Functions of Management: Part-I Planning – Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning, levels – advantages & limitations. Forecasting- Need & Techniques Decision making-Types - Process of rational decision making & techniques of decision making Organizing – Elements of organizing & processes: Types of organizations, Delegation of authority – Need, difficulties Delegation – Decentralization Staffing – Meaning & Importance Direction – Nature – Principles Communication – Types & Importance. **Functions of Management: Part-II** Motivation – Importance – theories Leadership – Meaning – styles, qualities & function of leader Controlling - Need, Nature, importance, Process & Techniques, Total Quality Management Coordination – Need – Importance. Management of Change: Models for Change, Force for Change, Need for Change, Alternative Change Techniques, New Trends in Organization Change, Stress Management. **Strategic Management** Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India

UNIT-III

Fundamentals of Organizational Behaviour Nature, Scope, Definition and Goals of Organizational Behaviour; Fundamental Concepts of Organizational Behavior; Models of Organizational Behaviour;

Emerging aspects of Organizational Behaviour: Meaning Cultural Diversity, Managing the Perception Process.**Perception, Attitude, Values and Motivation** Concept, Nature, Process, Importance, Management Behavioural aspect of Perception. Effects of employee attitudes; Personal and Organizational Values; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive; Theories of Work Motivation: Maslow's Need Hierarchy Theory McGregcrs's Theory 'X' and Theory 'Y'.

UNIT-IV

Personality Definition of Personality, Determinants of Personality; Theories of Personality- Trait and Type Theories, The Big Five Traites, Mytes-Briggs Indicator; Locus of Control, SType A and Type B Assessment of Personality. **Work Stress** Meaning and definition of Stress, Symptoms of Stress; Sources of Stress: Individual Level, Group Level, Organizational Level; Stressors, Extra Oganizational Stressors; Effect of Stress – Burnouts; Stress Management – Individual Strategies, Oganizational Strategies; Employee Counselling **Group Behavior and Leadership** Nature of Group, Types of Groups; Nature and Characteristics of team; Team Building, Effective Teamwork; Nature of Leadership, Leadership Styles; Traits of Effective Leaders. **Conflict in Organizations** Nature of Conflict, Process of Conflict; Levels of Conflict – Intrapersonal, Interpersonal; Sources of Conflict; Effect of Conflict; Conflict Resolution, Meaning and types of Grievances & Process of Grievances Handling.

Text Books :

1. Essential of Management – Horold Koontz and Iteinz Weibrich- McGrawhills International
2. Management Theory & Practice – J.N.Chandan
3. Organizational Behavior Text, Cases and Games- By K.Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)
4. Organizational Behavior – Anjali Ghanekar

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S104	Business Communication	3	1	0	4

UNIT-I

Means of Communication:
Meaning and Definition – Process – Functions – Objectives – Importance – Essentials of good communication – Communication barriers, 7C's of Communication.

UNIT-II

Types of Communication:
Oral Communication:
Meaning, nature and scope – Principle of effective oral communication – Techniques of effective speech – Media of oral communication (Face-to-face conversation – Teleconferences – Press Conference – Demonstration – Radio Recording – Dictaphone – Meetings – Rumour – Demonstration and Dramatisation – Public address system – Grapevine – Group Discussion – Oral report – Closed circuit TV). The art of listening – Principles of good listening.

UNIT-III

Written Communication
Purpose of writing, Clarity in Writing, Pricinciple of Effective writing, Writing Techniques, Electronic Writing Process. **Business Letters & Reports**:
Need and functions of business letters – Planning & layout of business letter – Kinds of business letters – Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports. **Drafting of business letters:** Enquiries and replies – Placing and fulfilling orders – Complaints and follow-up Sales letters –Circular letters Application for employment and resume

UNIT-IV

Information Technology for Communication:
Word Processor – Telex – Facsimile(Fax) – E-mail – Voice mail –Internet – Multimedia – Teleconferencing – Mobile Phone Conversation – Video Conferencing –SMS – Telephone Answering Machine – Advantages and limitations of these types. **Topics Prescribed for workshop/skill lab** Group Discussion, Mock Interview, Decision Making in a Group

Text Books :

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

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S105	Mathematics -I	4	0	0	4

UNIT-I

DETERMINANTS:
Definition, Minors, Cofactors, Properties of Determinants MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, Rank of Matrix Dependence of Vectors, Eigen Vectors of a Matrix, Caley-Hamilton Theorem (without proof).

UNIT-II

LIMITS & CONTINUITY:
Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities

UNIT-III

DIFFERENTIATION:
Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Rolle's Theorem, Mean Value Theorem, Expansion of Functions (Maclaurin's & Taylor's), Indeterminate Forms, L' Hospitals Rule, Maxima & Minima, Curve Tracing, Successive Differentiation & Liebnitz Theorem. **INTEGRATION:** Integral as Limit of Sum, Fundamental Theorem of Calculus(without proof.), Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Reduction Formulae for Trigonometric Functions, Gamma and Beta Functions(definition).

UNIT-IV

VECTOR ALGEBRA:
Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product and physical interpretation of area and volume.

Text Books :

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.
2. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999
3. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001.

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S101P	**Computer Laboratory and Practical Work of Office Automation** Practical will be based on Paper Office Automation: Covers UNIT-III, UNIT-IV, UNIT-V, UNIT-VI of Syllabus.	**0**	**0**	**3**	**2**
	Computer Laboratory and Practical Work of Programming Principle & Algorithm Practical will be based on Paper Programming Principle & Algorithm: Covers UNIT-III, UNIT-IV, UNIT-V, UNIT-VI of Syllabus	**L** **0**	**T** **0**	**P** **3**	**C** **2**

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S106T	C Programming	3	0	0	3

UNIT-I

Arrays

Definition, declaration and initialization of one dimensional array; Accessing array elements; Displaying array elements; Sorting arrays; Arrays and function; Two-
Dimensional array: Declaration and Initialization, Accessing and Displaying, Memory representation of array [Row Major, Column Major]; Multidimensional array

UNIT-II

Pointers

Definition and declaration, Initialization; Indirection operator, address of operator; pointer arithmetic; dynamic memory allocation; arrays and pointers; function and pointers

UNIT-III

Strings

Definition, declaration and initialization of strings; standard library function: strlen(), strcpy(), strcat(), strcmp(); Implementation without using standard library functions. **Structures** Definition and declaration; Variables initialization; Accessing fields and structure operations; Nested structures; Union: Definition and declaration; Differentiate between Union and structure.

UNIT-IV

Introduction C Preprocessor

Definition of Preprocessor; Macro substitution directives; File inclusion directives; Conditional compilation. **Bitwise Operators** Bitwise operators; Shift operators; Masks; Bit field. **File handling** Definition of Files, Opening modes of files; Standard function: fopen(), fclose(), feof(), fseek(), fewind();Using text files: fgetc(), fputc(), fscanf() **Command line arguments.**

Text Books:

1. Programming in C-Balguruswamy
2. The C programming Lang., Person Ecl – Dennis Ritchie
3. Structured programming approach using C-Forouzah & Ceilberg Thomson learning publication.

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S107	Digital Electronics & Computer Organization	3	1	0	4

UNIT-I

Logic gates and circuit
Gates (OR, AND, NOR, NAND, XOR & XNOR); Demogran's laws; Boolean laws, Circuit designing techniques (SOP, POS, K-Map).

UNIT-II

Combinational Building Blocks
Multiplexes; Decoder; Encoder; Adder and Subtracter.

UNIT-III

Memories
ROMs, PROMs, EPROMs, RAMs, Hard Disk, Floppy Disk and CD-ROM.

UNIT-IV

Sequential Building Blocks
Flip-Flop (RS, D, JK, Master-slave & & T flip-flops); Registers & Shift registers; Counters; Synchronous and Asynchronous Designing method. **Memory Organization:** Basic cell of static and dynamic RAM; Building large memories using chips; Associative memory; Cache memory organization and Virtual memory organization.

Text Books:

1. Computer Architecture (PHI) 1998 : M.M. Mano
2. Digital Electronics (TMH) 1998 : Malvino and Leach
3. Computer Organization and Architecture : William Stallings

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S108	Management Information Systems	3	1	0	4

UNIT I

Introduction, Meaning and role of MIS, Definition of MIS, and System approach to MIS, MIS Organization, Development of Organizational Theory, Management and Organizational Behavior.

UNIT II

Evolution of Information system/ Basic Information Systems/ Decision Making and MIS, MIS as a technique for making Programmed Decisions, Appropriate MIS response, MIS planning, General Business planning, Derivation of MIS plan, Prioritization and development strategies.

UNIT III

Conceptual design of MIS, Definition of problem, System Objective and constraints, Analysis of info source, alternate system deigns and selection, conceptual system design and document.

UNIT IV

Detailed system design and implementation, application of basic system design concept to MIS, Involvement of ND user and role of MIS department and system analyst, role of top management during design and implementation, system evaluation, review and update, Pit falls in MIS development

Text Books:

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S109	Financial Accounting & Management	3	1	0	4

UNIT-I

Overview - Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting & Management Accounting, Accounting concepts & convention, Accounting standards in India.

UNIT-II

Basics of accounting – Capital & Revenue items, Application of Computer in Accounting Double Entry System, Introduction to Journal, Ledger and Procedure for Recording and Posting, Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept.

UNIT-III

Financial statement analysis: Ratio analysis, Funds flow analysis, concepts, uses, Preparation of funds flow statement, simple problem, Cash flow analysis, Concepts, uses, preparation of cash flow statement, simple problem, Break – even analysis. Definition nature and Objective of Financial Management, Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure, Concept of Cost of Capital, introduction, importance, explicit & implicit cost, Measurement of cost of capital, cost of debt.

UNIT-IV

Concept & Components of working Capital. Factors Influencing the Composition of working Capital, Objectives of working Capital Management – Liquidity Vs. Profitability and working capital policies. Theory of working capital: Nature and concepts. Cash Management, Inventory Management and Receivables Management.

Text Books:

1. Maheshwari & Maheshwari, "An Introduction to Accountancy", 8th Edition, Vikas Publishing House, 2003
2. Gupta R.L., Gupta V.K., "Principles & Practice of Accountancy", Sultan Chand & Sons, 1999.
3. Khan & Jain, "Financial Accounting"

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S110	Mathematics II	4	0	0	4

UNIT-I

SETS

Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

UNIT-II

RELATIONS AND FUNCTIONS

Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions, Introduction of Trignometric, Logarithmic and Exponential Functions.

UNIT-III

PARTIAL ORDER RELATIONS AND LATTICES

Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebric Systems, Principle of Duality, Basic Properties, Sublattices, Distributed & Complemented Lattics.

UNIT-IV

FUNCTIONS OF SEVERAL VARIABLES Partial Differentiation, Change of Variables, Chain Rule, Extrema of Functions of 2 Variabes, Euler's Theorem.

Text Books:

1. Kolman, Busby and Ross, "Discrete Mathematical Structure", PHI, 1996.
2. S.K. Sarkar, "Discrete Maths"; S. Chand & Co., 2000

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S106P	**Computer Laboratory and Practical Work of C Programming**	**0**	**0**	**6**	**3**

Practical will be based on Paper Programming Principle & Algorithm: Covers UNIT-III, UNIT-IV, UNIT-V, UNIT-VI of Syllabus.

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S201T	Object Oriented Programming Using C++	3	0	0	3

UNIT-I

Introduction
Introducing Object – Oriented Approach, Relating to other paradigms {Functional, Data decomposition}.
Basic terms and ideas
Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++ - cin, cout, new, delete, operators.

UNIT-II

Classes and Objects
Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State idendity and behaviour of an object, Constructors and destructors, instantiation of objects, Default parameter value, object types, C++ garbage collection, dynamic memory allocation, Metaclass / abstract classes.

UNIT-III

Inheritance and Polymorphism
Inheritance, Class hierarchy, derivation – public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading, Parameteric Polymorphism. **Generic function** Template function, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance.

UNIT-IV

Files and Exception Handling
Streams and files, Namespaces, Exception handling, Generic Classes

Text Books:

1. A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997**.**
2. S.B.Lippman & J.Lajoie, " C++ Primer", 3rd Edition, Addison Wesley, 2000.The C programming Lang., Person Ecl – Dennis Ritchie
3. R.Lafore, "Object Oriented Programming using C++", Galgotia Publications, 2004

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S202T	Data Structure Using C & C++	3	0	0	3

UNIT-I

Introduction to Data Structure and its Characteristics
Array
Representation of single and multidimensional arrays; Sprase arrays – lower and upper triangular matrices and Tridiagonal matrices with Vector Representation also.

UNIT-II

Stacks and Queues
Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.

UNIT-III

Lists
Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers. **Trees** Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree.

UNIT-IV

B-Trees
Introduction, The invention of B-Tree; Statement of the problem; Indexing with binary search trees; a better approach to tree indexes; B-Trees; working up from the bottom; Example for creating a B-Tree. Sorting Techniques; Insertion sort, selection sort, merge sort, heap sort, searching Techniques: linear. search, binary search and hashing

Text Books:

1. E.Horowiz and S.Sahani, " Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
2. R.S.Salaria, " Data Structures & Algorithms" , Khanna Book Pblishing Co. (P) Ltd..,2002
3. Y.Langsam et. Al., " Data Structures using C and C++" , PHI, 1999

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S203	Computer Architecture & Assembly Language	3	1	0	4

UNIT-I

Basic computer organization and design, Instructions and instruction codes, Timing and control/ instruction cycle, Register/ Types of register/ general purpose & special purpose registers/ index registers, Register transfer and micro operations/ register transfer instructions, Memory and memory function, Bus/ Data transfer instructions, Arithmetic logic micro-operations/ shift micro-operations, Input/ Output and interrupts, Memory reference instructions, Memory interfacing memory/ Cache memory.

UNIT-II

Central Processing Unit

General Register Organization/ stacks organizations instruction formats, addressing modes, Data transfer and manipulation. Program control reduced computer, pipeline/ RISC/ CISC pipeline vector processing/ array processing.

Arithmetic Algorithms: Integer multiplication using shift and add, Booth's algorithm,
Integer division, Floating-point representations.

UNIT-III

Computer Arithmetic

Addition, subtraction and multiplication algorithms, divisor algorithms. Floating point, arithmetic operations, decimal arithmetic operations, decimal arithmetic operations. **Input – Output Organization** Peripheral devices, Input/output interface, ALU Asynchronous Data transfer, mode of transfer, priority interrupts, Direct memory Address (DMA), Input/ Output processor (IOP), serial communication.

UNIT-IV

Evaluation of Microprocessor

Overview of Intel 8085 to Intel Pentium processors Basic microprocessors, architecture and interface, internal architecture, external architecture memory and input/ output interface. Assembly language, Assembler, Assembly level instructions, macro, use of macros in I/C instructions, program loops, programming arithmetic and logic subroutines, Input-Output programming.

Text Books:

1. Leventhal, L.A, "Introduction to Microprocessors", Prentice Hall of India
2. Mathur, A.P., "Introduction to Microprocessors" , Tata McGraw Hill
3. Rao,P.V.S., "Prospective in Computer Architechture" , Prentice Hall of India

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S204	Business Economics	3	1	0	4

UNIT-I

The Scope and Method of Economics, the Economic Problem: Scarity & Choice, The Price Mechanism, Demand & Supply Equilibrium: The Concept of Elasticity and it's Applications.
The Production Process: output decisions – Revenues Costs and Profit Maximisation
Laws of returns & Returns to Scale: Economics and Diseconomies of scale.

UNIT-II

Market Structure: Equilibrium of a firm and Price, Output Determination under Perfect Competition Monopoly, Monoplastic Competition & Oligopoly

UNIT-III

Macro Economic Concerns
Inflalation, Unemployment, Trade-Cycles, Circular Flow upto Four Sector Economy, Government in the Macro Economy: Fiscal Policy, Monetary Policy, Measuring national Income and Output

UNIT-IV

The World Economy – WTO, Globalisation, MNC's, Outsourcing, Foreign Capital in India, Trips, Groups of Twenty (G-20), Issues of dumping, Export-Import Policy 2004-2009

Text Books:

1. Ahuja H.L., "Business Economics",S.Chand & Co., New Delhi, 2001
2. Ferfuson P.R., Rothchild, R and Fergusen G.J."Business Economics" Mac-millan, Hampshire, 1993
3. Karl E.Case & Ray C. fair , "Principles of Economics" , Pearson Education , Asia, 2000

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S205	Elements of Statistics	3	1	0	4

UNIT-I

Population, Sample and Data Condensation
Definition and scope of statistics, concept of population and simple with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.

UNIT-II

Measures of Central Tendency
Concept of central Tendency, requirements of a good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.

UNIT-III

Measures of Dispersion:
Concept of dispersion, Absolute and relative measure of dispersion, range variance, Standard deviation, Coefficient of variation. **Permutations and Combinations** Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions). ${}^{n}P_{r} = n!/(n-r)!$(without proof). Combinations of 'r' objects taken from 'n' objects. ${}^{n}C_{r} = n!/(r!(n-r)!)$ (without proof) . Simple examples, Applications.

UNIT-IV

Sample space, Events and Probability
Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples. Classical definition of probability, Addition theorem of probability without Proof (upto three events are expected). Definition of conditional probability Definition of independence of two events, simple numerical problems. **Statistical Quality Control** Introduction, control limits, specification limits, tolerance limits, process and product control; Control charts for X and R; Control charts for number of defective {n-p chart} ,control charts for number of defects {c - chart}.

Text Books:

1. S.C.Gupta - Fundamentals of statistics - Sultan chand & sons , Delhi.
2. D.N.Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad.
3. Montogomery D.C. – Statistical Quality Control - John Welly and Sons
4. Goon, Gupta And Dasgupta - Fundamentals of statistics - The world press private ltd. , Kolkata.

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S201P	**Computer Laboratory and Practical Work of OOPS** Practical will be based on Paper Object Oriented Programming: Covers UNIT-II, UNIT-III, UNIT-IV, UNIT-V of Syllabus.	0	0	3	2
		L	**T**	**P**	**C**
	Computer Laboratory and Practical Work of DS Practical will be based on Paper Data Structure: Covers UNIT-III, UNIT-IV, UNIT-V, UNIT- VI of Syllabus	0	0	3	2

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S206T	Computer Graphics & Multimedia Application	3	0	0	3

UNIT-I

Introduction: The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Application Development of Hardware and software for computer Graphics, Conceptual Framework for Interactive Graphics, Overview, Scan: Converting Lines, Scan Converting Circles, Scan Converting Ellipses.

UNIT-II

Hardcopy Technologies, Display Technologies, Raster-Scan Display System, Video Controller, Random-Scan Display processor, Input Devices for Operator Interaction, Image Scanners, Working exposure on graphics tools like Dream Weaver, 3D Effects etc, **Clipping** Southland- Cohen Algorithm, Cyrus-Beck Algorithm, Midpoint Subdivision Algorithm.

UNIT-III

Geometrical Transformation
2D Transformation, Homogeneous Coordinates and Matrix Representation of 2D transformations, composition of 2D Transformations, the Window-to-Viewport Transformations, Introduction to 3D Transformations Matrix. **Representing Curves & Surfaces** Polygon meshes parametric, Cubic Curves, Quadric Surface; **Solid Modeling** Representing Solids, Regularized Boolean Set Operation primitive Instancing Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry Comparison of Representations.

UNIT-IV

Introductory Concepts: Multimedia Definition, CD-ROM and the multimedia highway, Computer Animation (Design, types of animation, using different functions) Uses of Multimedia, Introduction to making multimedia – The stage of Project, hardware & software requirements to make good multimedia skills and Training opportunities in Multimedia Motivation for Multimedia usage.

Text Books:

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles& practice,2000.
2. Ralf Skinmeiz and Klana Naharstedt, Multimedia: computing, Communication and Applications, pearson, 2001
3. D.Haran & Baker. Computer Graphics Prentice Hall of India,1986

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S207	Operating System	3	1	0	4

UNIT-I

Introduction, What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time- Sharing Systems, Personal – Computer Systems, Parallel systems, Distributed systems, Real- Time Systems**. Memory Management:** Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation **Virtual Memory:** Demand Paging, Page Replacement, Page- replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations.

UNIT-II

Processes: Process Concept, Process Scheduling, Operation on Processes
CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling.
Process Synchronization: Background, The Critical – Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization

UNIT-III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. **Device Management:** Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering, Secondary Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap- Space Management, Disk Reliability

UNIT-IV

Information Management: Introduction, A Simple File system, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File – System Implementation: File – System Structure, Allocation Methods, Free- Space Management.

Text Books:

1. Silbersachatz and Galvin, " Operating System Concepts", Person, 5th Ed. 2001
2. Madnick E., Donovan J., " Operating Systems:,Tata McGraw Hill,2001
3. Tannenbaum, "Operating Systems", PHI, 4th Edition, 2000

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S208	Software Engineering	3	1	0	4

UNIT-I

Software Engineering: Definition and paradigms, A generic view of software engineering.

UNIT-II

Requirements Analysis: Statement of system scope, isolation of top level processes and entitles and their allocation to physical elements, refinement and review.
Analyzing a problem, creating a software specification document, review for correctness, consistency, and completeness.

UNIT-III

Designing Software Solutions: Refining the software Specification; Application of fundamental design concept for data, architectural and procedural designs using software blue print methodology and object oriented design paradigm; Creating design document: Review of conformance to software requirements and quality. **Software Implementation:** Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style and review of correctness and readability.

UNIT-IV

Software Maintenance: Maintenance as part of software evaluation, reasons for maintenance, types of maintenance (Perceptive, adoptive, corrective), designing for maintainability, techniques for maintenance. Comprehensive examples using available software platforms/case tools, Configuration Management.

Text Books:

1. K.K.Aggarwal & Yogesh Singh "Software engineering", 2nd Ed., New Age International 2005.
2. I.Sommerville, "Software Engineering", Addison Wesley, 2002.
3. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach" John Wiley & Sons.

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S209	Optimization Techniques	3	1	0	4

UNIT-I

Linear programming
Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.

UNIT-II

Queuing Theory
Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory, Generalization of steady state M/M/1 queuing models(Model-I, Model-II).

UNIT-III

Replacement Theory
Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement. **Inventory Theory** Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite.

UNIT-IV

Job Sequencing
Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines

Text Books:

1. Gillet B.E. “Introduction to Operation Research”
2. Taha,H.A. “Operation Research - an introduction”
3. Kanti Swarup “Operation Research”
4. S.D.Sharma “Operation Research”

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S210	Graph Theory	4	0	0	4

UNIT-I

What is graph Application of graphs, Finite and Infinite graphs, Incidence & Degree, Isolated vertex, Pendant Vertex, and Null Graph.

UNIT-II

Isomorphism, Sub graphs, A puzzle with multicolored Cubes, walks, Path, and circuits connected graph, Disconnected graphs and Components, Euler graphs, Operations on graphs more on Euler Graphs, Hamiltonian paths and circles.

UNIT-III

Tree, some properties of trees, pendant Vertices in a tree, Distance and centers in a tree Rooted and Binary trees, Spanning trees, fundamental circuits, Finding all spanning tree of a graph.

UNIT-IV

Cut-Sete, Some Properties of Cut-Set, All Cut-Sets in a graph, Path-Sets, some properties of paths sets in a graph, fundamental Circuits & Cut-Set, Connectively and separability. Directed graph, undirected graph. Matrix representation of graph.

Text Books:

1. Narsingh Deo, "Graph Theory", Prentice Hall of India.

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S206P	Computer Laboratory and Practical Work of Computer Graphics & Multimedia Application	0	0	6	3

Practical will be based on Paper Computer Graphics & Multimedia Application: Covers UNIT- II, UNIT-III, UNIT-V of Syllabus

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S301T	Introduction to DBMS	3	0	0	3

UNIT-I

Introduction: Characteristics of database approach, data models, DBMS architecture and data independence.

UNIT-II

E-R Modeling: Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization.

UNIT-III

File Organization: Indexed sequential access files; implementation using B & B++ trees, hashing, hashing functions, collision resolution, extendible hashing, dynamic hashing approach implementation and performance. **Relational Data Model:** Relational model concepts, relational constraints, relational alzebra **SQL:** SQL queries, programming using SQL.

UNIT-IV

EER and ER to relational mapping: Data base design using EER to relational language. **Data Normalization:** Functional Dependencies, Normal form up to 3rd normal form. Concurrency Control: Transaction processing, locking techniques and associated, database recovery, security and authorization. Recovery Techniques, Database Security.

Text Books:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, "Database Systems Concepts", 4th Edition, McGraw Hill, 1997.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
3. A.K.Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996.
4. Bipin Desai, "An Introduction to database systems", Galgotia Publications, 1991.

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S302T	Java Programming and Dynamic Webpage Design	3	0	0	3

UNIT-I

Java Programming: Data types, control structured, arrays, strings, and vector, classes (inheritance, package, exception handling) multithreaded programming.

UNIT-II

Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu bar) layout manager, string handling (only main functions)

UNIT-III

Networking (datagram socket and TCP/IP based server socket) event handling, JDBC: Introduction, Drivers, Establishing Connection, Connection Pooling.HTML: use of commenting, headers, text styling, images, formatting text with <FONT>, special characters, horizontal rules, line breaks, table, forms, image maps, <META> tags, <FRAMESET> tags, file formats including image formats.

UNIT-IV

Java Servlets: Introduction, HTTP Servlet Basics, The Servlet Lifecycle, Retrieving Information, Sending HTML Information, Session Tracking, Database Connectivity. **Java Server Pages:** Introducing Java Server Pages, JSP Overview, Setting Up the JSP Environment, Generating Dynamic Content, Using Custom Tag Libraries and the JSP Standard Tag Library, Processing Input and Output.

Text Books:

1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference" 199, TMH.
2. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia, 1998.
3. Ivor Horton, "Beginning Java-2" SPD Publication
4. Jason Hunter, "Java Servlet Programming" O'Reilly

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S303	Data Communication & Computer Network	3	1	0	4

UNIT-I

Basic Concepts: Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks.**OSI and TCP/IP Models:** Layers and their functions, comparison of models.Digital Transmission: Interfaces and Modems: DTE-DCE Interface, Modems, Cable modems.

UNIT-II

Transmission Media: Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon capacity, comparison of media

UNIT-III

Telephony: Multiplexing, error detection and correction: Many to one, One to many, WDM, TDM, FDM, Circuit switching, packet switching and message switching.Data link control protocols: Line discipline, flow control, error control, synchronous and asynchronous protocols, character and bit oriented protocols, Link access procedures.**Point to point controls:** Transmission states, PPP layers, LCP, Authentication, NCP.**ISDN:** Services, Historical outline, subscriber's access, ISDN Layers and broadcast ISDN.

UNIT-IV

Devices: Repeaters, bridges, gateways, routers, The Network Layer; Design issues, Routing algorithms, Congestion control Algorithms, Quality of service, Internetworking, Network-Layer in the internet.**Transport and upper layers in OSI Model:** Transport layer functions, connection management, functions of session layers, presentation layer and application layer.

Text Books:

1. Brijendra Singh, "Data Communication and Computer Networks",PHI,Second Ed. 2006
2. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4th Ed. 2003.
3. Behrouz A.Forouzan, "Data Communication and Networking", 3rd Ed. Tata MCGraw Hill, 2004.

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S304	Numerical Methods	3	1	0	4

UNIT-I

Roots of Equations: Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.

UNIT-II

Interpolation and Extrapolation : Finite Differences, The operator E, Newton's Forward and Backward Differences, Newton's dividend differences formulae, Lagrange's Interpolation formula for unequal Intervals, Gauss's Interpolation formula, Starling formula, Bessel's formula, Laplace-Everett formula.

UNIT-III

Numerical Differentiation Numerical Integration : Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula, Trapezoidal rule, Simpson's One third rule, Simpson's three- eight rule.

UNIT-IV

Solution of Linear Equation: Gauss's Elimination method and Gauss's Siedel iterative method.
Solution of Differential Equations: Euler's method, Picard's method, Fourth-order Ranga – Kutta method.

Text Books:

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

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S305	Minor Project	0	1	2	2

Evaluation will be based on Summer Training held after fourth semester in following organization: R & D organization, Govt. Sector, BSNL, ITI, RDSO, NIC, PNB and it will be by super wised & Evaluated by Department teacher / Examiner appointed by the concerned University only.

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S306	Viva-Voice on Summer Training	0	0	2	1

The viva will be conducted based on summer training of four weeks after the end of fourth Semester and will be Conducted by the Examiner appointed by the concerned University only.

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S301P	**Computer Laboratory and Practical Work of DBMS**	**0**	**0**	**3**	**2**

Practical will be based on Paper Data Base Management System : on UINT-IV converging the concept from UNIT-II to UNIT-VI of Syllabus.

	L	T	P	C
Computer Laboratory and Practical Work of Java Programming and Dynamic Webpage Design	**0**	**0**	**3**	**2**

Practical will be based on Paper Java Programming & Website Design: on Whole Syllabus

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S307	Network Security and Management	4	0	0	4

UNIT-I

Introduction: Attack, Services and Mechanism, Model for Internetwork Security.
Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

UNIT-II

Network Security:
Authentication Application: Kerveros, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.

UNIT-III

IP security Architecture: Overview, Authentication header, Encapsulating Security Pay Load combining Security Associations, Key Management. **Web Security:** Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

UNIT-IV

Network Management Security: Overview of SNMP Architecutre-SMMPVI1 Communication Facility, SNMPV3. **System Security:** Intruders, Viruses and Relate Threats, Firewall Design Principles. Comprehensive examples using available software platforms/case tools, Configuration Management.

Text Books:

1. Brijendra Singh, "Network Security and Management", PHI, Second Ed. 2009
2. W. Stallings, Networks Security Essentials: Application & Standards, Pearson Education, 2000.
3. W.Stallings, Cryptography and Network Security, Principles and Practice, Pearson Education, 2000.

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S308	Information System: Analysis Design & Implementation	3	1	0	4

UNIT-I

Overview of System Analysis and Design: Systems Development Life Cycle; concept and Models: requirements determination, logical design, physical design, test planning, plementation, planning and performance evaluation, communication, interviewing, presentation skills; group dynamics; risk and feasibility analysis; group based approaches, JAD, structures walkthroughs, and design and code reviews; prototyping; database design software quality metrics; application categories software package evaluation and acquisition.

UNIT-II

Information Requirement Analysis: Process modeling with physical logical data flow diagrams, data modeling with logical entity relationship diagrams.

UNIT-III

Developing a Proposal: Feasibility study and cost estimation. **System Design:** Design of input and control, design of output and control, file design/database design, process, user interface design, prototyping; software constructors; documentation. **Application Development Methodologies and CASE tools**: Information engineering structured system analysis and design, and object oriented methodologies for application development data modeling, process modeling, user interface design, and prototyping, use of computer aided software engineering (CASE) tools in the analysis design and implementation of information systems.

UNIT-IV

Design and Implementation on OO Platform: Object oriented analysis and design through object modeling technique, object modeling, dynamic modeling and functional object oriented design and object oriented programming systems for implementation, object oriented data bases. **Managerial issues in Software Projects:** Introduction to software markets; planning of software projects, size and cost estimates; project scheduling; measurement of software quality and productivity, ISO and capability maturity models for organizational growth.

Text Books:

1. I.T.Haryszkiewycz, Introduction of System Analysis and Design, Pearson Education, (PHI) 1998.
2. V.Rajaraman, Analysis and Design of Information System, Pearson Education, 1991.
3. J.A.Senn, "Analysis and Design of Information Systems"

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Semester–wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S309	E-Commerce	4	0	0	4

UNIT-I

Introduction to E-Commerce: The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic E-commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective **Business Strategy in an Electronic Age:** Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Strategy, Porter's Model, First Mover Advantage Sustainable Competitive Advantage, Competitive Advantage using E-Commerce, Business Strategy, Introduction to Business Strategy, Strategic Implications of IT, Technology, Business Environment, Business Capability, Exiting Business Strategy, Strategy Formulation & Implementation Planning, E-Commerce Implementation, E-Commerce Evaluation.

UNIT-II

Business-to-Business Electronic Commerce: Characteristics of B2B EC, Models of B2B Ec, Procurement Management Using the Buyer's Internal Marketplace, Just in Time Delivery, Other B2B Models, Auctions and Services from Traditional to Internet Based EDI, Intergration with Back-end Information System, The Role of Software Agents for B2B EC, Electronic marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.

UNIT-III

Internet and Extranet : Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet and Extranet, Intranet software, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment, The Extranets, The structures of Extranets, Extranet products & services, Applications of Extranets, Business Models of Extranet Applications, Managerial Issues. **Electronic Payment Systems :** Is SET a failure, Electronic Payments & Protocols, Security Schemes in Electronic payment systems, Electronic Credit card system on the Internet, Electronic Fund transfer and Debit cards on the Internet, Stored – value Cards and E- Cash, Electronic Check Systems, Prospect of Electronic Payment Systems, Managerial Issues.

UNIT-IV

Public Policy: From Legal Issues to Privacy : EC- Related Legal Incidents, Legal Incidents, Ethical & Other Public Policy Issues, Protecting Privacy, Protecting Intellectual Property, Free speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection In EC.Infrastructure For EC : It takes more than Technology, A Network OfNetworks, Internet Protocols, Web- Based client/ Server, Internet Security, selling on the web, Chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial Issues.

Text Books:

1. David Whiteley, " E-Commerce", Tata McGraw Hill, 2000
2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson Education, 2000

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Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S310	Knowledge Management	3	1	0	4

UNIT-I

Business Intelligence and Business Decisions: Modeling Decision Process; Decision support systems; Group decision support and Groupware Technologies.

UNIT-II

Executive Information and support Systems: Business Expert System and AI, OLTO & OLAP; Data Warehousing; Data Marts, Data Warehouse architecture; Tools for data warehousing.

UNIT-III

Multi- Dimensional analysis: Data mining and knowledge discovery; Data mining and Techniques; Data mining of Advance Databases.

UNIT-IV

Knowledge Management Systems: Concept and Structure KM systems, techniques of knowledge management appreciation & limitation.

Text Books:

1. Decision support system, EIS, 2000
2. W.H.Inmon, "Building Data Warehousing", Willey, 1998.
3. Han, Jiawei, Kamber, Michelinal, " Data Mining Concepts & Techniques", Harcourt India, 2001

Unified Syllabus by

Department of Computer Science, University of Lucknow

Bachelors of Computer Application

Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S311	Major Project	0	3	6	5

The allotment of the project will be held after fifth semester. The major project will be in the following organization: R & D organization, Govt. Sector, BSNL, ITI, RDSO, NIC, PNB and it will be by superwised & Evaluated by Department teacher / Examiner appointed by the concerned University only.

Unified Syllabus by

Department of Computer Science, University of Lucknow

Bachelors of Computer Application

Semester-wise breakup of course

Course Code	Course Name	L	T	P	C
BCA-S312	**Presentation/Seminar based on Major Project**				**1**

Presentation/Seminar based on Major Project will be evaluated by external examiner appointed by the concerned University.

UNIVERSITY OF LUCKNOW

STUDY AND EVALUATION SCHEME

BACHELOR OF COMPUTER APPLICATION

SEMESTER –III

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	**BCA-301**	Computer Based Numerical and Statistical Techniques	3	0	0	20	10	30	70	100	**3**
2	**BCA-302**	Object Oriented Programming using Java	3	1	0	20	10	30	70	100	**4**
3	**BCA-303**	Operating System	3	1	0	20	10	30	70	100	**4**
4	**BCA-304**	Management information System	3	0	0	20	10	30	70	100	**3**
5	**BCA-305**	Computer Architecture	3	1	0	20	10	30	70	100	**4**
PRACTICALS											
6	**BCA-306P**	Computer Based Numerical and Statistical Techniques Lab	0	0	2	10	10	20	30	50	**1**
7	**BCA-307P**	Object Oriented Programming & Java Lab	0	0	3	10	10	20	30	50	**2**
8	**BCA-308P**	Operating System Lab	0	0	2	10	10	20	30	50	**1**
9	**BCA-GP**	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	**15**	**3**	**7**					**700**	**22**

Abbreviations:
CT: Class Test
TA: Teacher's Assessment
ESE: End Semester Examination

UNIVERSITY OF LUCKNOW

STUDY AND EVALUATION SCHEME

BACHELOR OF COMPUTER APPLICATION

SEMESTER –IV

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	**BCA-401**	Discrete Mathematics	3	1	0	20	10	30	70	100	**4**
2	**BCA-402**	Business Economics	3	0	0	20	10	30	70	100	**3**
3	**BCA-403**	Computer Graphics and Multimedia systems	3	1	0	20	10	30	70	100	**4**
4	**BCA-404**	Data Base Management System	3	1	0	20	10	30	70	100	**4**
5	**BCA-405**	Software Engineering	3	0	0	20	10	30	70	100	**3**
PRACTICALS											
6	**BCA-406P**	Graphics and Multimedia System Lab	0	0	2	10	10	20	30	50	**1**
7	**BCA-407P**	Data Base Management System Lab	0	0	3	10	10	20	30	50	**2**
8	**BCA-408P**	Software Engineering Lab	0	0	2	10	10	20	30	50	**1**
9	**BCA-GP**	General Proficiency	-	-	-	-	-	-	-	50	**-**
		Total	**15**	**3**	**7**					**700**	**22**

Abbreviations:
CT: Class Test
TA: Teacher's Assessment
ESE: End Semester Examination

BCA-301

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

L T P
3 0 0

Unit-I **(08)**

Error and Computer Arithmetic: Error and their analysis, Normalized Floating point arithmetic.

Algebraic and Transcendental equations: Bisection method, Iteration method, False position method, Newton-Raphson method, Rate of convergence methods, Solutions of simultaneous equations by Gauss Seidel method.

Unit-II **(12)**

Finite Differences: Difference operators, Difference tables, Relation between operators, Missing term techniques, Factorial polynomials.

Interpolation for Equal Intervals: Newton's forward and backward formula, Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Interpolation for Unequal Intervals: Divided difference, Newton's divided difference formula, Lagrange's Interpolation formula.

Unit-III **(10)**

Numerical Differentiation and Integration: Numerical differentiation, Numerical integration by Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Boole's rule, Weddle's rule, Euler-Maclaurin's formula.

Solution of Differential Equations: Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta Method.

Unit-IV **(10)**

Curve Fitting: Method of least squares, Fitting of straight lines, Second degree parabola.

Time Series and Forecasting: Moving average, Forecasting models and methods.

Testing of Hypothesis: Test of significance, T-test, F-test, Chi-square test, Analysis of Variance.

Text Books:

1. Q.S. Ahmad, Zubair Khan and S.A. Khan, “Numerical and Statistical Techniques”, Ane Books Pvt. Ltd., New Delhi.
2. S.S. Sastry, “Introductory Method of Numerical Analysis”, PHI, New Delhi.

Reference Books:

1. P. Kandasamy, “Numerical Methods”, S. Chand and Company, New Delhi.
2. Balaguruswamy, “Numerical Methods”, T.M.H., New Delhi.
3. Qazi Shoeb Ahmad, M. V. Ismail and S.A.Khan, “Business Mathematics and Statistics”, Laxmi Publication, Meerut.

BCA-302

OBJECT ORIENTED PROGRAMMING USING JAVA

L T P
3 1 0

Unit-I **(10)**

Object-Oriented Analysis: Introduction to Object Oriented Concepts, Object Oriented Analysis Modeling, Data Modeling, Origin of Object-Oriented Design, Object Oriented Design Concepts, Object Oriented Design methods, Class and object definition, Refining operations, Program Components and Interfaces, Annotation for Object-Oriented Design, Implementation of Detail Design.

Unit-II **(10)**

Java Basic : JAVA environment, JAVA program structure, Tokens, Statements, JVM, Constant and Variables, Data Types, Declaration of variables, Scope of variables, Symbolic constants, Type Casting.
Operators: Arithmetic, Relational, Logical assignments, Increment and Decrement, Conditional, Bitwise, Special, Expressions and its evaluation.
Object and Class Concept: Defining a Class, Adding variables and Methods to classes, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, and Nesting of Methods.

Unit-III **(10)**

Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control.
Arrays: One Dimensional and Two Dimensional, Strings, Vectors, Wrapper Classes.
Interface: Defining Interface, Extending Interface, Implementing Interface, Accessing Interface Variable.

Unit-IV **(10)**

Exception Handling: Concepts of Exceptions, Types of Exception, Try and Catch keyword, Nested Try and Catch.
Threads: Creating Threads, Extending Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization.
Package: System Packages, Using System Package, Adding a Class to a Package, Hiding Classes.

Text Books:

1. E. Balagurusamy, "Programming in Java", TMH Publications.

Reference Books:

1. Peter Norton, "Peter Norton Guide to Java Programming", Techmedia Publications.
2. Naughton, Schildt, "The Complete Reference JAVA 2", TMH.

BCA-303

OPERATING SYSTEM

L T P
3 1 0

Unit-I **(10)**

Introduction: Definition and types, Structure, Components and Services, System Calls, System Programs.

Process Management: Process Concept, Process Scheduling, Cooperating Processes, Threads, Interprocess Communication, CPU Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling and Algorithm evaluation.

Unit-II **(12)**

Process Synchronization and Deadlocks: The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Deadlock-System Model, Characterization, Deadlock Prevention, Avoidance and Detection, Recovery from Deadlock, Combined approach to Deadlock Handling.

Unit-III **(10)**

Memory Management: Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with Paging, Virtual Memory, Demand Paging and its performance, Page Replacement Algorithms, Allocation of Frames, Thrashing, Page Size and other considerations, Demand Segmentation.

Unit-IV **(08)**

File Management: File Systems, Secondary Storage Structure, File concept, Access methods, Directory implementation, Efficiency and performance, Recovery.

Disk Management: Disk Structure, Disk scheduling, Disk management, Recovery, Swap-Space Management, Disk Reliability.

Text Books

1. Abraham Siberschatz and Peter Galvin “Operating System Concepts”, Wiley.
2. Tannenbaum, “Operating System”, TMH.

Reference Books

1. Milan Milankovic, “Operating Systems, Concept and Design”, McGraw Hill.
2. Harvey M Deital, “Operating System”, Addison Wesley.

BCA-304

MANAGEMENT INFORMATION SYSTEM

L T P
3 0 0

Unit-I **(12)**

Foundation of Information System: Introduction to Information System in Business, Fundamentals of Information System, Solving Business Problems with Information System, Types of Information System, Effectiveness and Efficiency Criteria in Information System.

MIS Overview: Definition and Concept of a Management Information System, MIS versus Data Processing, MIS & Decision Support System, MIS & Information Resources Management, End User Computing, Structure of a Management Information system.

Unit-II **(08)**

Concepts of Planning and Control: Concept of Organizational Planning, The Planning Process, Computational Support for Planning, Characteristics of Control Process, The Nature of Control in an Organization.

Unit-III **(10)**

Business Applications of Information Technology: Internet and Electronic Commerce, Intranet, Extranet and Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.

Unit-IV **(10)**

Managing Information Technology: Enterprise and Global Management, Security and Ethical Challenges, Planning and Implementing Changes.

Advanced Concepts in Information System: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, and Procurement Management.

Text Books:

1. Brian, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
2. Gordon B. Davis & Margrethe H. Olson, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.

Reference Books:

1. Brian, "Introduction to Information System", Tata Mcgraw-hill Education Pvt. Ltd.
2. Murdick, "Information System for Modern Management", PHI Learning Private Limited, Delhi India.
3. Jawadekar, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.

BCA-305

COMPUTER ARCHITECTURE

L T P
3 1 0

Unit-I **(09)**

Introduction: Classification of computers and their instruction: general register organization, stack organization, addressing modes. Computer instruction types: formats, instruction cycles & sub-cycles, micro operations and execution of complete instruction. Introduction to RISC and CISC architecture.

Unit-II **(09)**

Basic Concepts of Parallel Processing: concept of programme, process, threads, concurrent and parallel execution. Classifications of Parallel architecture: Flynn's & Feng's Classification. Basic Pipelining Concepts: Performance metrics & measures and speed up performance laws.

Unit-III **(11)**

Pipeline Processing: principle of pipelining, general structure of pipelines, classification of pipeline processors, general pipeline and reservation tables. Principle of Designing pipelined Processor: pipeline instruction execution, pre-fetched buffer, internal forwarding and register tagging, hazard detection & resolution. Pipeline Scheduling Theory: scheduling problem, collision vector, state diagram, pipeline scheduling optimization, multiple vector task dispatching.

Unit-IV **(11)**

Programme Partitioning & Scheduling: grain size & latency, grain packing & scheduling and static multiprocessor scheduling. Programme Flow Mechanism: control flow vs data flow, demand driven mechanism and comparison of flow mechanism. SIMD Interconnection Network: static & dynamic network, mesh connected illiac network, cube interconnection network and omega network.

Text Books:

1. John P Hayes "Computer Architecture and organization" McGraw Hill
2. Dezso Sima,Terence Fountain and Peter Kacsuk " Advanced Computer Architecture" Pearson Education
3. Kai Hwang " Advanced Computer Architecture" TMH

Reference Books:

1. Linda Null, Julia Lobur- The Essentials of Computer Organization and Architecture, 2014, 4th Edition.
2. Rao, P.V.S. Prospective in Computer Architecture" Prentice Hall of India
3. William Stallings "Computer Organization and Architecture" Pearson
4. Carl Hamacher, ZvonkoVranesic and Safwat Zaky, "Computer Organization" Mcgraw Hill Fifth International Edition

BCA-306P

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES LAB

L	T	P
0	0	2

Note: - At least ten experiments are to be conducted.

1. WAP to find the eigen values and eigenvectors of a given square matrix.

2. WAP to find the root of the Algebraic equations using Bisection Method.

3. WAP to findthe root of the Algebraic equations using Regula - falsi Method.

4. WAP to find the root of the Algebraic equations using Newton Raphson Method.

5. WAP to implement Newton‟s Forward Interpolation formula.

6. WAP to implement Newton‟s Divided Difference Interpolation formula.

7. WAP to implement Langranges Interpolation formula.

8. WAP to implement Numerical Integration using Trapezoidal rule.

9. WAP to implement Numerical Integration using Simpson 1/3 rule.

10. WAP to implement Numerical Integration using Simpson 3/8 rule.

11. WAP to implement Numerical Differentiations.

BCA-307P

OBJECT ORIENTED PROGRAMMING & JAVA LAB

L T P
0 0 3

Note: - At least ten experiments are to be conducted. Perform practical using JAVA language.

1. Write a program in java which prints your name using command line arguments.

2. Write a program in java which enters three number using command line arguments and print sum and average of the number

3. Write a program to swap the value of 2 variables without using 3rd variable

4. Write a program to calculate the sum of digits of a given integer no.

5. Write a program to compute the sum of the first and last digit of a given number.

6. Write a program in java which enter the number using Data Input Stream and check whether the entered number is even or odd.

7. Write an application that reads a string and determines whether it is a palindrome.

8. Write a program to enter a sentence form keyboard and also find all the words in that sentence with starting character as vowel.

9. Write a Program in java which creates the array of size 5; find the sum and average of the five numbers.

10. Create a java program that has three version of add method which can add two, three, and four integers.

11. Program illustrating Classes and Objects.

12. Program illustrating Method Overloading and Method Overriding.

13. Program illustrating concept of Interface.

14. Program illustrating use of Final and Super keyword.

15. Program that illustrates the Creation of simple package.

16. Program that illustrates the Accessing of a package.

17. Program that illustrates the Handling of predefined exceptions.

18. Program that illustrates the Handling of user defined exceptions.

BCA-308P

OPERATING SYSTEM LAB

L	T	P
0	0	2

Note: - At least ten experiments are to be conducted. Perform practical using C language.

1. FCFS(First Come First Served)
2. RR(Round Robin) Scheduling
3. SJF(Shortest Job First)
4. Priority Scheduling
5. FIFO(First In First Out) Page Replacement
6. LRU(Least Recent Used) Page Replacement
7. Optimal Page Replacement
8. Banker's Algorithm for Dead Lock Avoidance
9. Sequential File Allocation
10. Indexed File Allocation
11. Linked File Allocation
12. Paging Memory Allocation Technique

BCA-401

DISCRETE MATHEMATICS

L T P
3 1 0

Unit-I **(12)**

Set Theory: Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets.

Relation: Relations on sets, Types of relations in a set, Properties of relations, Composition of relations, Representation of relations, Closures of relations.

Function: Types of functions, Composition of functions, Recursively defined function.

Unit-II **(08)**

Algebraic Structures: Properties, Semi group, Monoid, Group, Abelian group, Properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Auto-morphism of groups.

Unit-III **(10)**

Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram.

Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra ,Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

Unit-IV **(10)**

Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction ,Algebra of proposition, Theory of Inference. Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

Text Books:

1. Liptschutz, Seymour, "Discrete Mathematics", TMH.
2. Trembley, J.P and R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", TMH.

Reference Books:

1. C.L.Liu, "Elements of Discrete Mathematics", McGraw Hill.

BCA-402

BUSINESS ECONOMICS

L T P
3 0 0

Unit-I **(08)**

Introduction: Meaning, Nature and Scope; Economic Problem: Scarcity & Choice; Application of Business Economics in Business Decisions; Objectives of Business Firms; Accounting Profit Vs Economics Profit; Optimization Rules: Revenue, Cost and Profit.

Unit-II **(10)**

Demand Analysis: Meaning, Basis of Demand, Types of Demand, Law of Demand, Elasticity's of Demand: Price Elasticity, Income Elasticity and Cross Elasticity; Consumer Equilibrium: Indifference Curve, Properties of Indifference Curve; Demand Forecasting Techniques.
Supply Analysis: Meaning, Law of Supply, Elasticity's of Supply.

Unit-III **(12)**

Production Analysis: Meaning, Production Function, Law of Production: Short run and Long run. **Cost Analysis:** Concept of Cost, Theory of Cost: Short run and Long run; Economies and Diseconomies of Scale. **Pricing Strategy:** Process of Price Determination, Methods of Pricing, Pricing at different stages of PLC.

Unit-IV **(10)**

Market Structure Analysis: Meaning, Types of Market Structure, Price and Output Determination under Perfect Competition, Monopolistic Competition, Oligopoly and Monopoly Market.
Macro-Economics Concerns-National Income: Meaning, Measures of National Incomes, Methods of Measuring National Incomes (in brief); Business Cycle: Meaning and Phases of Business Cycle; Inflation: Meaning, Causes and Types; Monetary Policy: Meaning and Instrument of Monetary policy.

Text Books:

1. D.N. Dwivedi. "Managerial Economics", Vikas Publishing House
2. Ahuja H.L., "Business Economics",S.Chand & Co., New Delhi, 2001

Reference Books:

1. Ferfuson P.R., Rothchild, R and Fergusen G.J."Business Economics" Mac-millan, Hampshire, 1993
2. Karl E.Case & Ray C. fair , "Principles of Economics" , Pearson Education , Asia, 2000

BCA-403

COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS

L T P
3 1 0

Unit-I **(08)**

Introduction: The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Hardware and software for Computer Graphics, Conceptual Framework for Interactive Graphics, Overview, Scan: Converting Lines, Converting Circles, Converting Ellipses.

Unit-II **(10)**

Display Technologies: Raster-Scan Display System, Video Controller, Random-Scan Display Processor, Input Devices for Operator Interaction, Image Scanners, Working Exposure on Graphics Tools like Dream Weaver, 3D Effects.

Clipping: Sutherland- Cohen Algorithm, Cyrus-Beck Algorithm, Midpoint Subdivision Algorithm.

Unit-III **(12)**

Geometrical Transformation: 2D Transformation, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, Window-to-Viewport Transformations.

Representing Curves & Surfaces: Polygon Meshes Parametric, Cubic Curves, Quadric Surface, Solid Modeling: Representing Solids, Regularized Boolean Set, Operation Primitive Instancing, Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry, Comparison of Representations.

Unit-IV **(10)**

Introductory Concepts: Multimedia Definition, CD-ROM and the Multimedia Highway, Computer Animation Design, Types of Animation, Different Graphical Functions.

Multimedia: Uses of Multimedia, Making a Multimedia; The Stage of Project, Hardware and Software Requirements to make Good Multimedia, Skills and Training Opportunities in Multimedia, Motivation for Multimedia Usage.

Text Books:

1. Foley, Van Dam, Feiner, Hughes, "Computer Graphics Principles& Practice".
2. Tay Vaughan, "Multimedia, Making IT Work", Osborne McGraw Hill.
3. Buford, "Multimedia Systems", Addison Wesley.

Reference Books:

1. Sleinreitz, "Multimedia System", Addison Wesley.
2. David Hillman, "Multimedia technology and Applications", Galgotia Publications.
3. D.J. Gibbs & D.C. Tsichritzs, "Multimedia programming Object Environment& Frame work", LNCS Tutorial.
4. D. Haran & Baker, "Computer Graphics", Prentice Hall of India.

BCA-404

DATA BASE MANAGEMENT SYSTEM

L T P
3 1 0

Unit-I **(08)**

Introduction to Databases: Advantage of Database System, Database System versus File System, View of Data, Database System Concepts and Architecture: Data Models, Schemas and Instances, Three schema architecture and Data Independence, Database Languages and Interfaces, Classification of Database Management Systems.

Unit-II **(10)**

Entity-Relationship Model: Basic Concepts, Constraints, Keys: Primary Key, Super key, Candidate key, Entity Types, Entity Sets, Design issues, Entity-Relationship Diagram, Relations, Relationship types, Roles and Structural Constraints, Weak Entity sets, Extended ER Features, Design of E-R Database Schema, Reduction of an E-R Schema to tables.

Unit-III **(12)**

Relational Model and Constraints: Relational model Concepts, Structure of Relational Databases, Constraints: Entity integrity, Referential Integrity, Domain Constraints, Assertions, Triggers, Security and Authorization, Authentication and Encryption.

SQL: Data Definition, Constraints, Schema Changes in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Views (in SQL).

Unit-IV **(10)**

The Relational Algebra: Tuple Relational Calculus, Data Normalization: Functional dependencies, Normal form concepts upto 3rd Normal form.

Transaction Management and Recovery Techniques: Introduction to Transaction Processing, Transaction Concepts and Properties, Schedules, Serializability of Schedules, Conflict and view serializable schedules, Recovery Concepts, Recovery from Transactions, Introduction to Concurrency Control Techniques.

Text Books

1. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley.
2. Silberschatz, Korth, Sudarshan , "Database System Concepts", McGrawHill.

Reference Books

1. Date C J, "An Introduction to Database System", Addision Wesley
2. Leon & Leon, "Database Management System", Vikas Publishing House
3. Bipin C. Desai, "An Introduction to Database Systems", Galgotia Publications
4. Majumdar & Bhattacharya, "Database Management System", TMH
5. Ramkrishnan, Gehrke, "database Management System", McGraw Hill

BCA-405

SOFTWARE ENGINEERING

L T P
3 0 0

Unit-I **(10)**

Software Product and SDLC: Software Engineering Fundamentals, Definition of Software Products, Phases of Software Development Life Cycle, Software Development Paradigm, Software Life Cycles Models: Build and Fix Model, Waterfall Model, Prototype Model, Iterative Model, Evolutionary Model, Spiral Model.

Unit-II **(10)**

Software Requirement Specification (SRS): Need for SRS-Requirement process, Problem Analysis using UML (Unified Modelling Language) and Data dictionary, Characteristics of SRS, Components of an SRS. IEEE standard for SRS.

Unit-III **(10)**

Software Design Principles: Software Design, Design Process, Design Principles: Abstraction, Refinement, Modularity, Information Hiding, Modular Design: Effective Modular Design and Functional Independence, Cohesion, Coupling, Top down and Bottom up Strategies, Coding: Coding Standard and Guidelines, Testing: Black Box Testing and White Box Testing.

Unit-IV **(10)**

CASE Tools: Relevance of CASE Tool**,** Building block for CASE Tools, Integrated Case Tool Environment, Generation of CASE Tool, High End and Low End CASE Tools.

Project Management Fundamentals: Definition of Project, Project Specification and Parameters, COCOMO model, Principles of Project Management, Project Management Life Cycle, Program Management Plan: Concept, Elements, Planning Issues, Benefits of Program Management.

Text Books:

1. Rajib Mall, "Fundamental of Software Engineering", PHI.

Reference Books:

1. R. Pressman, "Software Engineering", TMH.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa.
3. Pankaj Jalote, "Software Project Management in Practice", Person Education.

BCA-406P

GRAPHICS AND MULTIMEDIA SYSTEM LAB

L	T	P
0	0	2

Note: - At least ten experiments are to be conducted.

1. Write a program for 2D line drawing using DDA algorithm.

2. Write a program to draw a line using Bresenham's Algo.

3. Write a program for circle drawing as Raster Graphics Display.

4. Write a program to draw a circle using Midpoint algorithm.

5. Write a program to rotate a point about origin.

6. Write a program to rotate a triangle about origin.

7. Write a program to scale the triangle.

8. Write a program to translate the triangle.

9. Write a program to reflect the triangle.

10. Write a program for line clipping.

11. Write a program for polygon clipping.

12. Write a Program to implement 2D-transforrnation.

13. Introduction to Flash 5.0 creating a small animation using Flash 5.0.

BCA-407P

DATA BASE MANAGEMENT SYSTEM LAB

L T P
0 0 3

Part I: Getting familiar with SQL (Maximum number of turns allotted: 3)

1) Creating tables.

2) Insertion, Deletion, Updation and Retrieval of data.

3) Arithmetic operations, Logical operations and Pattern matching.

4) Concept of Grouping (Group by clause, Having Clause).

5) Use Aggregate function in query.

6) Write commands for Joins, Union and Intersection.

7) Concept of Sub-query.

8) Concept of Data constraints (Unique Key, Primary Key, Foreign Key).

9) Creating Views and Indexes.

Part II: Relational Database Implementation

Implement the following mini-project's database schemas and give an expression in SQL for each of the queries.

Project 1. Library Management System:

Create the following schema, enter at least 5 records in each table and answer the queries given below.

LibraryBooks (Accession number, Title, Author, Department, PurchaseDate, Price**)**

IssuedBooks (Accession number, Borrower**)**

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.

b) Delete the record of book titled "Database System Concepts".

c) Change the Department of the book titled "Discrete Mathematics" to "CSE".

d) List all books that belong to "CSE" department.

e) List all books that belong to "CSE" department and are written by author "Navathe".

f) List all computer (Department="CSE") that have been issued.

g) List all books which have a price less than 500 or purchased between "01/01/2015" and "01/01/2019".

Project 2. Student Management System:

Create the following schema, enter at least 5 records in each table and answer the queries given below.

Student (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phone number)

Paper Details (Paper code, Name of the Paper)

Academic_details (College roll number, Paper code, Attendance, Marks in home examination)

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.

b) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75% attendance and more than 60% marks in paper 2.

c) List all students who live in "Lucknow" and have marks greater than 60 in paper 1.

d) Find the total attendance and total marks obtained by each student.

e) List the name of student who has got the highest marks in paper 2.

Project 3. Customer Management System:

Create the following schema, enter at least 5 records in each table and answer the queries given below.

Customer (CustID, email, Name, Phone, ReferrerID)

Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo)

BicycleModel (ModelNo, Manufacturer, Style)

Service (StartDate, BicycleID, EndDate)

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.

b) List all the customers who have the bicycles manufactured by manufacturer "Honda".

c) List the bicycles purchased by the customers who have been referred by customer "C1".

d) List the manufacturer of red colored bicycles.

e) List the models of the bicycles given for service.

Project 4. Human Resource Management System:

Create the following tables, enter at least 5 records in each table and answer the queries given below.

EMPLOYEE (Person_Name, Street, City)

WORKS (Person_Name, Company_Name, Salary)

COMPANY (Company_Name, City)

MANAGES (Person_Name, Manager_Name)

a) Identify primary and foreign keys.

b) Alter table employee, add a column "email" of type varchar(20).

c) Find the name of all managers who work for both Samba Bank and NCB Bank.

d) Find the names, street address and cities of residence and salary of all employees who work for "Samba Bank" and earn more than $10,000.

e) Find the names of all employees who live in the same city as the company for which they work.

f) Find the highest salary, lowest salary and average salary paid by each company.

g) Find the sum of salary and number of employees in each company.

h) Find the name of the company that pays highest salary.

Project 5. Supplier Management System:

Create the following tables, enter at least 5 records in each table and answer the queries given below.

Suppliers (SNo, Sname, Status, SCity)

Parts (PNo, Pname, Colour, Weight, City)

Project (JNo, Jname, Jcity)

Shipment (Sno, Pno, Jno, Qunatity)

a) Identify primary and foreign keys.

b) Get supplier numbers for suppliers in Paris with status>20.

c) Get suppliers names for suppliers who do not supply part P2.

d) For each shipment get full shipment details, including total shipment weights.

e) Get all the shipments where the quantity is in the range 300 to 750 inclusive.

f) Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.

g) Get the names of cities that store more than five red parts.

h) Get full details of parts supplied by a supplier in Delhi.

BCA-408P

SOFTWARE ENGINEERING LAB

L T P
0 0 2

Note: - At least 6 mini-projects are to be implemented from Part II.

Part I – To Familiarize with CASE tools using ATM system as specification. (Maximum number of turns allotted: 3)

1. Introduction and project definition
2. Software process overview
3. Project planning
4. Software requirements
5. Introduction to UML and use case diagrams
6. System modeling (DFD and ER)
7. Flow of events and activity diagram
8. OO analysis: discovering classes
9. Interaction diagrams: sequence and collaboration diagrams
10. Software Design: software architecture and object-oriented design
11. State Transition Diagram
12. Component and deployment diagrams
13. Software testing
14. Presentations.

Part II- Design a mini-project using CASE tools

Students are divided into batches of 5 each and each batch has to draw the following diagrams using UML for given different case studies for each batch. UML diagrams to be developed are:

1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.
4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.

7. Component Diagram
8. Deployment Diagram.

Projects:

1. Patient Appointment and Prescription Management System
2. Organized Retail Shopping Management Software
3. Online Hotel Reservation Service System
4. Examination and Result computation system
5. Automatic Internal Assessment System
6. Parking Allocation System
7. Wholesale Management System
8. Criminal Record Management : Implement a criminal record management system for jailers, police officers and CBI officers
9. DTC Route Information: Online information about the bus routes and their frequency and fares
10. Car Pooling: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.

UNIVERSITY OF LUCKNOW

STUDY AND EVALUATION SCHEME

BACHELOR OF COMPUTER APPLICATION

YEAR: THIRD, SEMESTER –V

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	**BCA-501**	Data Communication and Computer Network	3	1	0	20	10	30	70	100	**4**
2	**BCA-502**	Design and Analysis of Algorithm	3	1	0	20	10	30	70	100	**4**
3	**BCA-503**	Web design Concept	3	0	0	20	10	30	70	100	**3**
4	**BCA-504**	UNIX and Shell Programming	3	1	0	20	10	30	70	100	**4**
5	**BCA-505X**	Elective-I	3	0	0	20	10	30	70	100	**3**
PRACTICALS											
6	**BCA-506P**	UNIX Lab	0	0	2	10	10	20	30	50	**1**
7	**BCA-507P**	Web Design lab	0	0	3	10	10	20	30	50	**2**
8	**BCA-508P**	Viva-Voce on Summer Training	0	0	2	10	10	20	30	50	**1**
9	**BCA-GP**	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	**15**	**3**	**7**					**700**	**22**

Elective-I

1. BCA-5051 Data Mining and Ware Housing
2. BCA-5052 Software Testing Methodology
3. BCA-5053 Open Source Software
4. BCA-5054 Information System: Analysis, Design & Implementation

UNIVERSITY OF LUCKNOW

STUDY AND EVALUATION SCHEME

BACHELOR OF COMPUTER APPLICATION

YEAR: THIRD, SEMESTER –VI

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	**BCA-601**	E-Commerce	3	1	0	20	10	30	70	100	**4**
2	**BCA-602**	Cyber Law and Internet Security	3	1	0	20	10	30	70	100	**4**
3	**BCA-603**	Mobile Computing	3	0	0	20	10	30	70	100	**3**
4	**BCA-604X**	Elective-II	3	1	0	20	10	30	70	100	**4**
PRACTICAL/PROJECT											
5	**BCA-605P**	Advanced Technology (Dot Net) Lab	0	0	3	10	10	20	30	50	**2**
6	**BCA-Pro**	Project	0	0	6	-	50	50	150	200	**5**
7	**BCA-GP**	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	**12**	**3**	**9**					**700**	**22**

Elective-II

1. BCA-6041 Optimization Techniques
2. BCA-6042 Microprocessor
3. BCA-6043 Data Compression
4. BCA-6044 Cryptography

BCA-501
Data Communication and Computer Network

L	T	P
3	1	0

Unit-1 **08**

Introduction Concepts: Goals and applications of networks, network structure and architecture, the OSI reference model, services, network topology design, delay analysis, back bone design, local access network design, physical layer transmission media, switching methods, ISDN, and terminal handling.

Unit-2 **12**

Medium Access Sub Layer: Medium access sub layer - channel allocations, LAN protocols - aloha protocols - overview of IEEE standards - FDDI.
Data Link Layer: Elementary data link protocols, sliding window protocols, and error handling.

Unit-3 **12**

Network Layer: Point - to point Networks, routing, congestion control Internetworking -TCP /IP, IP packet, IP address, and IPv6.
Transport Layer: Transport layer - design issues, and connection management.

Unit-4 **08**

Session Layer: Design issues and remote procedure call.
Presentation Layer: Design issues.
Application Layer: File transfer, access and management, electronic mail, virtual terminals, other application. Example networks - internet and public networks.

Text Books:

1. Forouzen, "Data Communication and Networking", TMH.
2. A.S. Tanenbaum, "Computer Networks", Pearson Education.
3. W. Stallings, "Data and Computer Communication", Macmillan Press.

Reference Books:

1. Anuranjan Misra, "Computer Networks", Acme Learning
2. G. Shanmugarathinam, "Essential of TCP/ IP", Firewall Media.
3. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Mc Graw Hill Publisher.

BCA-502
Design and Analysis of Algorithm

L	T	P
3	1	0

Unit-1 **08**

Introduction: Algorithms, analyzing algorithms, complexity of algorithms, growth of functions, performance measurements, sorting and order statistics - shell sort, quick sort, merge sort, heap sort, comparison of sorting algorithms, and sorting in linear time.

Unit-2 **12**

Advanced Data Structures: Red-Black trees, B – trees, Binomial Heaps, Fibonacci Heaps.
Divide and Conquer Sorting, Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.

Unit-3 **12**

Dynamic Programming: Knapsack, all pair shortest paths – Warshal's and Floyd's algorithms, resource allocation problem. Backtracking, branch and bound, graph coloring, n-queen problem, Hamiltonian cycles, and sum of subsets.

Unit-4 **08**

Selected Topics: Algebraic computation, fast Fourier transform, string matching, theory of NP-completeness, approximation algorithms, and randomized algorithms.

Text Books:

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.
2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", Galgotia Press.
3. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education.

Reference Books:

1. Jon Kleinberg and Éva Tardos, "Algorithm Design", Pearson.
2. Michael T Goodrich and Roberto Tamassia, "Algorithm Design: Foundations, Analysis, and Internet Examples", Wiley.
3. Harry R. Lewis and Larry Denenberg, "Data Structures and Their Algorithms", Harper Collins.

BCA–503
Web Design Concept

L	T	P
3	0	0

Unit-1 **12**

Introduction: Introduction and web development strategies, history of web and internet, protocols governing web, introduction to client-server computing, web applications, web project, and web team.

Unit-2 **08**

Web Page Designing: HTML: List, table, images, frames, forms, CSS, document type definition, object Models, presenting and using XML, **XML Processors**: DOM and SAX, and dynamic HTML.

Unit-3 **10**

Java script: Introduction, documents, forms, statements, functions, objects, introduction to AJAX, and VB script.

Unit-4 **10**

Server Site Programming: Introduction to active server pages (ASP), introduction to Java Server Page (JSP), JSP application design, JSP objects, conditional processing, declaring variables and methods, sharing data between JSP pages.

Text Books:

1. Burdman, Jessica, "Collaborative Web Development" Addison Wesley.
2. Xavier, "Web Technology and Design", New Age International.
3. Ivan Bayross, "HTML, DHTML, Java Script, Perl & CGI", BPB Publication.

Reference Books:

1. Ramesh Bangia, "Internet and Web Design", New Age International.
2. Deitel, "Java for programmers", Pearson Education.
3. Uttam k. Roy, "Web Technologies", Oxford.

BCA-504
UNIX and Shell Programming

L	T	P
3	1	0

Unit-1 **08**

UNIX Architecture: The UNIX operating system, LINUX and gnu. The UNIX architecture, features of UNIX, POSIX and single UNIX specification, internal and external commands, command structure, man browsing and manual pages on-line.

The file system: The parent – child relationship, the home variable, pwd, cd, mkdir, absolute pathname, and relative pathname.

Unit-2 **10**

Basic File Attributes: Listing directory contents, the UNIX file system, ls –l, -d option, file ownership, file permissions, chmod, directory permissions, changing file ownership, file attributes.

The Process: Process basics, process status, system processes (-e or –a), mechanism of process creation, process states and zombies, and running jobs in background.

Unit-3 **10**

Simple Filters: pr, head, tail, cut, paste, sort, uniq, tr.

Filters using regular expressions – grep and sed: grep, Basic Regular Expressions (BRE), Extended Regular Expressions (ERE) and egrep, the stream editor, and line addressing using multiple instructions (-E and -F) context addressing.

Unit-4 **12**

The Shell: The shell's interpretive cycle, shell offerings, pattern matching, escaping and quoting, redirection, pipes, tee, command substitution, shell variables, and essential shell programming.

Text Books:

1. Sumitabha Das, "UNIX – Concepts and Applications", Tata McGraw Hill.
2. Behrouz A. Forouzan, Richard F. Gilberg, "Unix and shell Programming", Thomson Learning.
3. Neil Matthew and Richard Stones, "Beginning Linux Programming", Wrox.

Reference Books:

1. Kernighan and Pike, "Unix programming environment", Pearson Education.
2. Rosen, Host, Klee, Farber, Rosinski, "The Complete Reference Unix", TMH.
3. Yashavant P. Kanetkar, "Unix Shell Programming", BPB Publications.

BCA-5051
Data Mining and Data Warehousing

L	T	P
3	0	0

Unit-1 **08**

Introduction: Data mining-definition & functionalities, data processing, form of data pre-processing, data cleaning: missing values, noisy data, binning, clustering, regression, inconsistent data, data integration and transformation, and data reduction.

Unit-2 **12**

Concept Description: Association rule mining, mining single-dimensional Boolean association rules from transactional databases, Apriori Algorithm, **Classification and Predictions:** Decision tree, Bayesian Classification, and K-nearest neighbour classifiers.

Unit-3 **08**

Data Warehousing: Overview, definition, delivery process, difference between database system and data warehouse, multi-dimensional data model, data cubes, stars, snowflakes, fact constellations, concept hierarchy, process architecture, 3 tier architecture, and data marting.

Unit-4 **12**

OLAP: Aggregation, historical information, query facility, OLAP function and tools. OLAP servers, ROLAP, MOLAP, HOLAP, data mining interface, security, backup and recovery.

Text Books:

1. M. H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education.
2. Jiawei Han, Micheline Kamber, “Data Mining Concepts & Techniques”, Elsevier.
3. Ian H. Witten, “Data Mining: Practical Machine Learning Tools and Techniques”, Morgan Kaufmann

Reference Books:

1. Sam Anahory, Dennis Murray, “Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems”, Pearson Education.
2. Mallach, “Data Warehousing System”, McGraw –Hill.
3. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining, & OLAP", Tata McGraw-Hill Education.

BCA-5052
Software Testing Methodology

L	T	P
3	0	0

Unit-1 **10**

Introduction: Principles of software testing, error, fault, failure, incident, error and fault taxonomies, test cases, limitations of testing, code inspections, desk checking, group walkthroughs and peer reviews and overview of graph theory for testers.

Unit-2 **10**

Functional Testing: Boundary value analysis, equivalence class testing, decision table-based testing, cause effect graphing technique.

Structural Testing: Path testing, DD-paths, cyclomatic complexity, graph metrics, data flow testing and slice-based testing.

Unit-3 **08**

Testing Activities: Unit testing, levels of testing, integration testing, system testing, debugging, regression testing and extreme testing.

Unit-4 **12**

Object Oriented Testing: Issues in object-oriented testing, class testing, GUI testing, object-oriented integration and system testing. Testing internet applications: overview and challenges and strategies of testing internet applications.

Text Books:

1. Paul Ammann and Jeff Offutt, "Introduction to Software Testing", Cambridge University Press, Cambridge, UK.
2. Mauro Pezze, Michal Young, "Software Testing and Analysis: Process, Principles and Techniques", Wiley India.
3. Yogesh Singh, "Software Testing", Cambridge University Press, New York.

Reference Books:

1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York.
2. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Van Nostrand Reinhold, New York.
3. Boris Beizer, "Software Testing Techniques", Van Nostrand Reinhold, New York.

BCA-5053
Open Source Software

L	T	P
3	0	0

Unit-1 **08**

Introduction- Introduction to open sources, need of open sources, advantages of open sources and application of open sources.

Unit-2 **12**

Open Source Operating Systems: LINUX- Introduction, general overview, kernel mode and user mode, process, advanced concepts, scheduling, personalities, cloning and signals.

Unit-3 **08**

Open Source Database: MySQL- Introduction - setting up account-starting, terminating and writing your own SQI programs, record selection technology, working with strings - date and time, sorting query results.

Unit-4 **12**

Open Source Programming Languages: PHP- Introduction - programming in web environment, variables, constants, datatypes, operators, statements, functions, arrays and OOP - string manipulation and regular expression.

Perl: Perl backgrounder, Perl overview, Perl parsing rules, variables and data -statements and control structures, subroutines, packages, and modules- working with files and data manipulation.

Text Books:

1. Martin C. Brown, “Perl: The Complete Reference", Tata McGraw-Hill Publishing Company Limited, Indian Reprint
2. Vikram Vaswani, "MYSQL: The Complete Reference", Tata McGraw -Hill Publishing Company Limited, Indian Reprint.
3. Paul Kavanagh, "Open Source Software: Implementation and Management", Elsevier.

Reference Books:

1. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly.
2. Wesley J. Chun, "Core Phython Programming", Prentice Hall.
3. Steven Holzner, "PHP: The Complete Reference", Tata McGraw-Hill Publishing Company Limited, Indian Reprint.

BCA-5054
Information System: Analysis and Design & Implementation

L	T	P
3	0	0

Unit-1 **12**

Basic Concept of Systems: The system: definition and concepts, elements of a system: input, output processor, control, feedback, environment, boundaries and interface, characteristics of a system, types of systems -physical and abstract system, open and closed systems, man-made systems, information and its categories.

Information systems: TPS, OAS, MIS, DSS, ESS; System analyst: role and need of system analyst and system analyst as an agent of change.

Unit-2 **08**

System Development Life Cycle: Introduction to SDLC. Various phases: study, analysis, design, development, testing, implementation, and maintenance.

System documentation: Types of documentation and their importance.

Unit-3 **10**

Tools for System Analysis: Data flow diagram (DFD), logical and physical DFDs, developing DFD, system flowcharts and structured charts, structured English, decision trees and decision tables.

System design module specifications: Module coupling and cohesion, top-down and bottom-up design, logical and physical design and structured design.

Unit-4 **10**

System Implementation and Maintenance: Need of system testing, types of system testing, quality assurance; system conversion, conversion methods, procedures and controls, system evaluation and performance.

Text Books:

1. Perry Edwards, “System Analysis & design”, Mc Graw Hill Publication.
2. Jeffrey A. Hofer Joey F. George Joseph S. Valacich, “Modern System Analysis and Design”, Addison Weseley.
3. Shouhong Wang, “Information Systems Analysis and Design”, Universal-Publisher Boca Raton.

Reference Books:

1. Elias m. Awad, “System Analysis and Design”, Galgotia Publications Pvt. Ltd.
2. Henry C. Lucas, “Analysis, Design and Implementation of Information Systems”, McGraw-Hill Education.
3. Whitten, Bentaly and Barlow, “System Analysis and Design Methods”, Galgotia Publication.

BCA-506P
UNIX Lab

L	T	P
0	0	2

1. Execute the following list of basic commands in UNIX:

   (i) pwd (ii) mkdir (iii) cd

2. Execute the following list of basic commands in UNIX:

   (i) who (ii) echo (iii) cat

2. Execute the following list of basic commands in UNIX:

   (i) rm (ii) mv (iii) wc (iv) cp

4. Execute the basic file attributes with all possible options:

   (i) ls (ii) chmod

5. Execute basic commands using vi editor:

   a. input mode commands
   b. saving text and quitting

6. Execute basic commands using vi editor

   a. navigation
   b. editing text
   c. searching pattern

7. Execute the following filters using regular expressions with all possible options:

   (i) grep (ii) sed

8. Write a shell script to display current date and calendar.

BCA-507P
Web Design Lab

L	T	P
0	0	3

1. HTML program to create resume preparation using tables.
2. HTML program for home page creation using frames.
3. HTML program for form creation.
4. Create a web page to embed an image map in a web page using HTML.
5. Create a web page to get the coordinates from an image using java script.
6. Create a web page with all types of cascading style sheets.
7. Write HTML/Java scripts to display your CV in navigator, your institute website, Department website and tutorial website for specific subject.
8. Design HTML form for keeping student record and validate it using Java script.
9. Writing program in XML for creation of DTD, which specifies set of rules.
10. Create a style sheet in CSS/ XSL & display the document in internet explorer.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

BCA-601

E-Commerce

L	T	P
3	1	0

Unit-1 **12**

Introduction: What is E-commerce, forces behind E-commerce industry framework, brief history of ecommerce, inter organizational E-commerce intra organizational E-commerce, and consumer to business electronic commerce, architectural framework.

Unit-2 **08**

Mobile Commerce: Introduction to mobile commerce, mobile computing application, wireless application protocols, WAP technology, mobile information devices, web security introduction to web security, firewalls & transaction security, client server network, emerging client server security threats, firewalls and network security.

Unit-3 **08**

Encryption: World wide web & security, encryption, transaction security, secret key encryption, public key encryption, virtual private network (VPN) and implementation management issues.

Unit-4 **12**

Electronic Payments: Overview of electronics payments, digital token-based electronics payment system, smart cards, credit card I debit card-based EPS, emerging financial instruments, and online banking**.**

Text Books:

1. Greenstein and Feinman, “E-Commerce”, TMH.
2. Ravi Kalakota, Andrew Whinston, “Frontiers of Electronic Commerce”, Addision Wesley.
3. Pete Lohsin , John Vacca “Electronic Commerce”, New Age.

Reference Books:

1. Denieal Amor, “The E-Business Revolution”, Addision Wesley.
2. Diwan, Sharma, “E-Commerce”, Excel.
3. Bajaj & Nag, “E-Commerce: The Cutting Edge of Business”, TMH.

BCA-602
Cyber Law and Internet Security

L	T	P
3	1	0

Unit-1 **12**

Cyber Space Jurisdiction: Jurisdiction issues under IT Act, 2000, traditional principals of jurisdiction, extra-terrestrial jurisdiction and case laws on cyber space jurisdiction.

E–commerce and Laws in India: Digital / Electronic signature in Indian laws, E–commerce; issues and provisions in Indian law, and E –Governance.

Unit-2 **08**

Intellectual Property Rights, Domain Names and Trademark Dispute: Concept of trademarks in internet era, cybersquatting, reverse hijacking, jurisdiction in trademark disputes, copyright in the digital medium, and copyright in computer programs

Unit-3 **10**

Developing Secure Information Systems: Information security governance & risk management, security architecture & design security issues in hardware, data storage & downloadable devices, physical security of IT assets, access control, CCTV and intrusion detection systems and backup security measures.

Unit-4 **10**

Security Policies: Development of policies, WWW policies, email security policies, policy review process-corporate policies-sample security policies, publishing and notification requirement of the policies.

Text Books:

1. Prashant Mali, “Cyber Law & Cyber Crimes”, Snow White publications, Mumbai.
2. Dr. Surya Prakash Tripathi, Ritendra Goyal and Praveen Kumar Shukla, “Introduction to Information Security and Cyber Law”, Willey Dreamtech Press.
3. Sarika Gupta & Gaurav Gupta, “Information Security and Cyber Laws”, Khanna Publishing House.

Reference Books:

1. Farooq Ahmad “Cyber Law in India”, Pioneer Publications.
2. Vakul Sharma, “Information Technology Law and Practice”, Universal Law Publishing Co. Pvt. Ltd.
3. Suresh T. Vishwanathan, “The Indian Cyber Law”, Bharat Law House New Delhi.

BCA-603
Mobile Computing

L	T	P
3	0	0

Unit-1 **10**

Introduction: Issues in mobile computing, characteristics of mobile computing, structure of mobile computing and overview of wireless telephony: cellular concept.

Unit-2 **10**

Evaluation of Mobile System and Wireless Network: GSM, CDMA, FDMA, TDMA; **Wireless networking**: Wireless LAN overview, Bluetooth, wireless multiple access protocols, TCP over wireless, wireless applications, data broadcasting, mobile IP and WAP.

Unit-3 **08**

Data management issues: Management issues, hoarding techniques, data replication for mobile computers, adaptive clustering for mobile wireless networks and file system.

Unit-4 **12**

Mobile Agents and Routing algorithms: Mobile agent, security and fault tolerance, transaction processing in mobile computing environment, Mobile Adhoc Networks (MANETs), Routing protocols, Global State Routing (GSR), Destination Sequenced Distance Vector routing (DSDV) and Dynamic Source Routing (DSR) and Ad Hoc On-demand Distance Vector routing (AODV).

Text Books:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley.
2. Raj Kamal, "Mobile Computing", Oxford University Press.
3. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing, Technology Applications and Service Creation", Mc Graw Hill.

Reference Books:

1. Charles Perkins, "Mobile IP", Addison Wesley.
2. Charles Perkins, "Ad hoc Networks", Addison Wesley.
3. Upadhyaya, "Mobile Computing", Springer.

BCA-6041
Optimization Techniques

L	T	P
3	1	0

Unit-1 **10**

Linear programming: Central problem of linear programming various definitions included statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical method formulation and linear programming problem.

Unit-2 **10**

Queuing Theory: Characteristics of queuing system, classification of queuing model single channel queuing theory and generalization of steady state m/m/1 queuing models (model-I, model-II).

Unit-3 **08**

Replacement Theory: Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement.

Unit-4 **12**

Inventory Theory: Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite. **Job Sequencing:** Introduction, solution of sequencing problem, and Johnson's algorithm for n jobs through two machines.

Text Books:

1. S S Rao, "Enginering Optimization – Theory and Applications", New Age International (P) Ltd.
2. A.M. Natarajan, P. Balasubramani, A. Tamilarasi," Operations Research", Pearson Education.
3. Gupta V.G., "Optimization Theory Techniques of Operations Research", Oxford Book Company.

Reference Books:

1. Abidi Mongi A. "Optimization Techniques in Computer vision", Springer.
2. Falk Heiko, "Source Code Optimization Techniques for Data Flow Dominated Embedded Software", Springer Verlag New York.
3. Evtushenko Yurij G. "Numerical Optimization Techniques", Springer Verlag New York.
4. Prakash Om, "Information Theory and Optimization Techniques in Scientific Research", VDM Verlag.

BCA-6042
Microprocessor

L	T	P
3	1	0

Unit-1 **08**

Microprocessors: Introduction, Advances in semiconductor technology, Organization of microprocessor-based system, and 8085 microprocessor.

Unit-2 **10**

The 8085 MPU architecture: 8085 bus organization, demultiplexing the bus AD7-AD0, generating control signals. ALU, timing and control unit, instruction register and decoder, register array, decoding and executing an instruction.

Unit-3 **10**

8085 Machine: Machine cycles and bus timings opcode fetch machine cycle, memory read machine cycle, memory k machine cycle, IO read machine cycle, IO write machine cycle and execution time of the instruction cycle.

Unit-4 **12**

Counters and time delays: Time delay using single register and register pair, Stack and subroutines, Call and return instructions, Advanced subroutine concept. Assembly language program Hexadecimal counter, Sum of odd and even numbers, Hex to BCD conversion and Interrupts.

Text Books:

1. Gaonkar, Ramesh S., "Microprocessor Architecture, Programming, and Applications with the 8085", Pen Ram International Publishing.
2. Ray, A.K. & Burchandi, "Advanced Microprocessors and Peripherals: Architecture Programming and Interfacing", Tata McGraw Hill.
3. B. Ram, "Fundamentals of microprocessor and microcontroller", Dhanpat Rai Publishing Co Pvt Ltd.

Reference Books:

1. Hall D.V, "Microprocessor and Interfacing", Tata McGraw Hill.
2. B.P. Singh & Renu Singh, "Microprocessors and Microcontrollers", New Age International.
3. Deniel Tabak, "Advance Microprocessor", TMH.
4. Triebel & Singh, "The 8088 and 8086 Microprocessors", Pearson Education.

BCA-6043
Data Compression

L	T	P
3	1	0

Unit-1 **10**

Compression Techniques: Loss less compression, lossy compression, measures of performance, modeling and coding, mathematical preliminaries for lossless compression: A brief introduction to information theory, models: Physical models, probability models, Markov models, composite source model, uniquely decodable codes and prefix codes.

Unit-2 **10**

Huffman coding algorithm: Minimum variance Huffman codes, adaptive Huffman coding, update procedure, encoding procedure, decoding procedure, applications of Huffman coding: loss less image compression, text compression and audio compression.

Unit-3 **12**

Coding a sequence: Generating a binary code, Comparison of Binary and Huffman coding, Applications, Bi-level image compression-The JBIG standard, JBIG2, Image compression, Introduction of Dictionary Techniques, **Static Dictionary:** Diagram Coding, and Adaptive Dictionary.

Unit-4 **08**

Distortion criteria, Models, Scalar Quantization: The Quantization problem, uniform quantizer, adaptive quantization and non-uniform quantization.

Text Books:

1. Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publishers.
2. Peter D. Johnson Jr., Greg A. Harris, D.C. Hankerson, "Introduction to Information Theory and Data Compression", CRC.
3. David Salomon, "Data Compression: The Complete Reference 4th Edition", Springer.

Reference Books:

1. Drozdek, "Elements of Data Compression", Cengage Learning.
2. Timothy C., "Text Compression", Bell Prentice Hall.
3. Nitin Chikani, "The Complete Format of Data Compression & Decompression", Lambert.

BCA-6044
Cryptography

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Unit-1 **10**

Introduction to Security: Introduction to security: Attacks, services & mechanisms, security. Conventional encryption model, classical encryption techniques, steganography, modern techniques: simplified DES, block cipher principles, DES standard, DES strength, differential & linear cryptanalysis, block cipher design principles and block cipher modes of operation.

Unit-2 **08**

Conventional Encryption Algorithms: Conventional Encryption Algorithms: Triples DES, blowfish, International data encryption algorithm, RC5, placement of encryption function and key distribution.

Unit-3 **10**

Public Key Encryption: Public Key Encryption: public, key cryptography: principles of public, key cryptosystems, RSA algorithm, key management, Fermat's & Euler's theorem, primality test and the Chinese remainder theorem.

Unit-4 **12**

Message Authentication & Hash Functions: Message Authentication & Hash Functions: Authentication requirements, authentication functions, message authentication codes, hash function, md5 message digest algorithm, secure hash algorithm (SHA), and digital signatures.

Text Books:

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.
2. Atul Kahate, "Cryptography and Network Security", TMH.
3. Douglas R. Stinson, "Cryptography: Theory and Practice", CRC press.

Reference Books:

1. William Stallings, "Network Security Essentials: Applications and Standards", Prentice Hall.
2. Johannes A. Buchmann, "Introduction to cryptography", Springer, Verlag.
3. Wenbo Mao, "Modern Cryptography: Theory and Practice", Prentice Hall PTR.
4. Simon Rubinstein Salzedo, "Cryptography", Springer.

BCA-605P
Advanced Technology (Dot Net) Lab

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1. Familiarization with IDE.
2. Programming Console applications using VB.NET covering all the aspects of VB.NET fundamentals
3. Object oriented programming using VB.NET covering objects, Inheritance, Polymorphism, Constructors, Static Classes, and Interfaces.
4. Programme to illustrate Exception Handling concepts.
5. Programme to illustrate use of Collections.
6. Programme to perform File I/O Operations.
7. Programming Windows applications using VB.NET covering all major controls and components, Menus, MDI, Event Handling.
8. Creating windows installer.
9. Programme to interact with Database from a Windows Desktop Application.
10. Programming to build web applications using web controls, maintaining state.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.