

# The University of Burdwan



## Syllabus for Bachelor of Computer Application (2014)

[At least Seventy (70) Hours should be devoted for each paper]

### Part-I

Theoretical	University Exam	Sessional
• BCA-101 : Communicative English	80	20
• BCA-102 : Mathematics-I	80	20
• BCA-103 : Digital Logic	80	20
• BCA-104 : Data Structure	80	20
• BCA-105 : Programming in C	80	20
• BCA-106 : Introduction to Accounting and Costing	80	20

  

Practical	University Examination
• BCA-107 : Hardware Lab [Digital Logic]	100
• BCA-108 : Software Lab-I [C and Data Structure]	100
• BCA-109 : Software Lab-II [IT Tools Lab]	100

### Part-II

Theoretical	University Exam	Sessional
• BCA-201 : Mathematics-II	80	20
• BCA-202 : Operating Systems	80	20
• BCA-203 : Database Management	80	20
• BCA-204 : Data Communication.& Computer Networks	80	20
• BCA-205 : Computer Organization & Microprocessors	80	20
• BCA-206 : Object Oriented Programming in C++	80	20

  

Practical	University Examination
• BCA-207 : Software Lab-III [Programming in C++]	100
• BCA-208 : Software Lab-IV [UNIX /LINUX and Assembly Language]	100
• BCA-209 : Software Lab-V [SQL and PL/SQL]	100

### Part-III

Theoretical	University Exam	Sessional
• BCA-301 : Mathematics –III	80	20
• BCA-302 : Internet and E-commerce	80	20
• BCA-303 : Software Engineering	80	20
• BCA-304 : Theory of Computation	80	20
• BCA-305 : Programming in Java	80	20
• BCA-306 : Computer Graphics	80	20

  

Practical	University Examination
• BCA-307 : Software Lab-VI [Java and Web Technology lab]	100
• BCA-308 : Software Lab-VII [VB and Graphics lab]	100
• BCA-309 : Project [Project Report 50, Viva 50]	100

## Bachelor of Computer Applications

### PART-I

#### BCA-101: Communicative English

University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)

#### Objectives:

- i) To develop the learners' language skills in English- Listening, Speaking, Reading and Writing (LSRW)
- ii) To develop the learners' specific skills for communication in the fields of Science, Technology and Computer Applications

#### Course Content:

Communication and communicative activities the notions of encoder and decoder and the message and the medium.

[30%]

Communicative competence

- Concise grammatical structures and key vocabulary for general as well as specific purposes accuracy and appropriateness in the use of English.
- English speech sounds and sound combinations.
- Elements of spoken English-Topic of discourse, mode of discourse and style of discourse with special reference to scientific discourse. [30%]
- Writing notes, reports, proceedings
- Narrating and describing [30%]

Practicum on all language activities and communicative tasks-group discussion – seminar.

[10%]

#### BCA-102: Mathematics-I

University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)

**Algebra:** Sets, Union and Intersection, Complement, Mapping, Composition, notion of a Group, Ring, Field with simple examples. [20%]

Complex Number: Modulus and amplitude, De Moivre's theorem [5%]

Polynomials, Division algorithm, Fundamental theorem of classical algebra (Proof not required), Descartes rule of sign and their application, Relation between roots and coefficients; symmetric function of roots, Transformation of polynomial equation, Cardon's solution of cubic equation, Determinants, Addition and Multiplication of Matrices, Inverse of a Matrix; Solution of linear equations in three variables by Cramer's rule and solution of three line linear equations by matrix inversion methods. [30%]

Vector spaces, Subspaces, Bases and Dimensions, Co-ordinates, Linear Transformation, The Algebra of Linear Transformations.

**Vector Algebra:** Scalars & vectors, vector addition, linear combination of vectors, condition of colinearity of three points, scalar and vector products, scalar triple product and vector triple product. [15%]

**Analytical Geometry:** Translation and rotation of rectangular axes, invariants, general equation of second degree-reduction to standard forms and classification. Plane polar equation of a straight line, circle, ellipse, parabola and hyperbola. [30%]

#### Books:

1. A Text book of Algebra- B.K. Lahiri & K. C. Roy
2. Linear Algebra- Das & Roy
3. Co-ordinate Geometry- S. L. Loney
4. Differential Calculus- Das and Mukherjee
5. Integral Calculus - Das and Mukherjee

### BCA-103: Digital Logic

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

**Number systems:** Positional number systems; Binary, Octal , Hexadecimal and Decimal number systems; conversion of a number in one system to the other; Representation of signed numbers- signed magnitude, one's complement, 2's complement representation techniques, Merits of 2's complement representation scheme; Various binary codes- BCD, excess -3, Gray code; Binary arithmetic- addition, subtraction, multiplication and division of unsigned binary numbers. [20%]

**Logic gates:** Basic logic operations- logical sum(or), logical product (AND), complementation (not), Anti coincidence (EX-OR)and coincidence (EX-NOR) operations: Truth tables of Basic gates; Boolean Variables and Expressions; Demorgan's theorem; Universal gates- NAND and NOR; Boolean expressions Simplification- Algebraic technique, Karnaugh map technique, 3 variable and 4 variable Karnaugh map. [25%]

**Combinational Circuits:** Half adder, full adder, binary magnitude comparator, adder /subtractor circuits, multiplexer and demultiplexer circuits, BCD adder/ subtractor; ALU; parity generators, code converters, priority encoders, PLAs. [15%]

**Sequential circuits:** flip- flops, - RS, clocked RS, D, JK, T flipflops,: Race condition, Master Slave JK: Registers-universal shift registers; Counters- Binary, decade; modulo-r divider; Practical IC's; Sequential Machine design. [20%]

**Memory Circuits-** Qualitative discussion of memory circuits; Classification- Read only, read write, Sequential access, random access; ROM- PROM, EPROM; Static and Dynamic RAM (qualitative) ; Basic idea on CCD memory and magnetic memory: CD-ROM: Structure and use. [10%]

Associative memory, cache memory organization, Virtual memory organization. [10%]

#### Books:

1. Digital Principles and Applications: Malvino and Leach
2. Modern Digital Electronics : R.P. Jain

### BCA-104: Data Structure

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

**Introduction:** Introduction to algorithm, analysis for space and time requirements. [10%]

**Linear data structures and their sequential representation:** Array, Stack, queue, circular queue, dequeue and their operation's and applications. [30%]

**Linear data structures and their linked representation:** linear linked list, doubly linked list, linked stack and linked queue and their operation's and applications. [20%]

**Nonlinear data structure:** Binary trees, binary search trees, representations and operations. Thread representations, sequential representations, graphs, and their representation. [20%]

**Searching:** linear search and binary search [4%]

**Sorting:** bubble, insertion, selection, quick and merge sort. [16%]

#### Books

1. Data Structure using C- A.M. Tanenbaum ( PHI)

### BCA-105: Programming in C

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

#### Programming in C:

Introduction to computers and operating environment [4%]

program development cycle [2%]

Algorithm - Representation of Algorithms [4%]

Pseudocode [2%]

Flowchart & Decision tables [2%]

Structured Programming and Modular Programming [4%]

Introduction to C [10%]

Data Types and sizes, variable declaration, operators, type conversion, conditional expressions, special operators, precedence rule.	[12%]
Control Structures- statements and blocks, if, switch, while, for, do-while, break, continue, goto and labels.	[20%]
Functions & Program structure ,recursion, arrays and pointers, structures and unions, standard I/O, formatted I/O, standard library functions.	[20%]
Files handling and pre-processing.	[10%]
String processing in C.	[10%]

**Books:**

1. Programming in C-B.S. Gottfried ( Sahaum Series)
2. Programming in ANSI C- E. Balaguruswami ( TMH )

**BCA-106: Introduction to Accounting and Costing**

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

Basic Accounting and Conventions underlying preparation of Financial statements (balance sheet highlighting accounting process, basic accounts, trial balance and financial statements, issue such as provisions for bat debts tax, dividends, losses such as bad debts, missing information, classification effects, cost of assets, rentals etc.), income measurement (revenue; recognition and matching costs and revenues; inventory valuation);depreciation accounting; intangible assets accounting; understanding published annual accounts including fund flow statements. [50%]

Basic Cost Concepts (Introduction; Cost Classification; Allocation, Appointment and Absorption; Cost Centres); Cost Analysis for Managerial Decisions (Direct Costing, Break-Even Analysis; Relevant Fixed Costs and Sunk Costs). Cost Analysis for Control (Standard Costing; Variences; Material, Labour; Overhead, Sales and Profit) [25%]

Standard Cost accounting (Budgeting and Control; Elements of Budgeting; Control of Manufacturing and Manufacturing Expenses; Performances Appraisal, Evaluation of Cost Control Systems). [25%]

**BCA-107: Hardware Laboratory [Digital Logic]**

**University Examination Time: 4 Hrs**

**Full Marks: 100**

Study on the characteristic of AND, OR, NAND, NOR, EX-OR, EX-NOR gates

Design of different combinational circuit such as half adder/subtractor, full adder/subtractor, decoder/encoder, priority encoder, multiplexer, demultiplexer, magnitude comparator etc.

Study on the characteristic of different flip-flops-JK, RS, T, D etc.

Design and implementation of different sequential circuit such as shift register, counter-decimal, ripple

**BCA-108: Software Laboratory - I**

**University Examination Time: 4 Hrs**

**Full Marks: 100**

Program should be developed in C to implement the problems related to BCA-104 & BCA-105

**BCA-109: Software Laboratory - II**

**University Examination Time: 4 Hrs**

**Full Marks: 100**

DOS: Introduction to DOS, internal and external commands, batch files (Autoexec.bat, config.sys), Line editors.

MS Windows: History of windows and Windows 95, Desk top cell user interface action, icon on desktop, closing windows, renaming icons, resizing windows(maximizing and minimizing), control panel.

MS Word: Overview, creating, saving, opening, importing, exporting, and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering. Headings, styles, fonts and font size, editing, positioning, viewing texts, searching and replacing text, inserting page breaks, page numbers, bookmarks, symbols, and dates. Using tabs and tables, header, footer, and printing,

MS Excel: Worksheet overview, entering information, worksheet creation, opening and saving workbook, formatting numbers and texts, protecting cells, producing charts, and printing operations.

MS Access: Introduction, understanding databases, creating tables, queries, forms, reports, adding graphs to your reports.

PowerPoint: Slide creation with PowerPoint.

## **Bachelor of Computer Applications**

### **PART-II**

#### **BCA- 201: Mathematics – II**

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

**Differential Calculus:** Limit of a function and continuity. Fundamental properties of continuous functions (proofs not required); Derivative and Differential-Geometric meaning, Rules of Differentiation. Successive differentiation.

Rolle's theorem, Mean-Value theorems, Taylor's and Maclaurin's theorems with Cauchy's and Lagrange's forms of remainder; Taylor's series. Functions of several variables. Partial Derivatives. Total Differential. Euler's theorem on homogeneous functions of two variables. Application to plane curves. [40%]

Integral Calculus: Rules of Integration of Indefinite Integrals, Solution of Definite Integrals and their elementary properties. Idea of improper integrals. [25%]

Differential Equations: order, degree, solution and formation of a differential equation. Standard techniques of solving a linear differential equation with constant coefficients. Cauchy's and Ligendre's Liner Differential Equations with variable coefficients. [20%]

Sequence and Series: Bounded and unbounded sequences, Convergence or divergence of a sequence, Behavior of monotone sequences, Algebra of convergent sequences, Cauchy sequence, Cauchy's general principle of convergence, Infinite series, it's convergence and sum, series with positive terms and standard tests of convergence (without proofs), Alternating Series, Leibniz Test, Absolute convergence, Rearrangement of absolutely convergent series, Test of convergence of Abel and Dirichlet (without proofs) [15%]

#### **Books:**

1. Differential Equations - Shepley I. ( John Wiley & Sons, Inc )
2. Linear Algebra - Kenneth Hoffman & Ray Kunze ( PHI )
3. Mathematical Analysis - S. C. Malic ( Wiley Eastern Limited )
4. Differential Calculus – Das and Mukherjee
5. Integral Calculus – Das and Mukherjee

#### **BCA- 202: Operating Systems**

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

Operating system as an extended machine and a resource manager, operating system concepts- process, files, shell, Operating system structure: monolithic system, layered systems, virtual machines, client server model. Idea of multiprogramming, multiprocessing, batch processing and time sharing. Real time systems [30%]

Concurrent processes: Critical section problem, Semaphores & Synchronization. [10%]

CPU scheduling: Scheduling concepts and algorithms [15%]

Memory management: Static & dynamic partitioning, Dynamic relocation, Paging & demand paging memory management, Virtual memory, Replacement algorithm, Segmented memory management, Thrashing. [15%]

Device management: Scheduling concept and algorithm, spooling. [10%]

Deadlock detection, prevention and avoidance. [10%]

File management: File concept, access methods, allocation methods, Directory concept.[10%]

#### **Books:**

1. Modern Operating Systems- A.S. Tanenbaum (PHI)
2. UNIX – S.Das, TMH

#### **BCA-203: Database Management**

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

Concepts of Data Base System. [5%]

Data Base Models: Entity Relationship Model, Record based logical Models (Hierarchical, Network & Relational). [5%]

Relational Model - Definition & Properties [5%]

Relational Algebra [5%]

SQL [25%]

Functional Dependency, Multivalued Dependency, Join dependency [5%]

Normalization [8%]

Database storage structure, Indexing, Hashing. [12%]

Security, Integrity, Recovery [5%]  
Introductory concepts of Distributed Database [5%]

Study and use of any one relational database system (ORACLE / MS-SQL SERVER) [20%]

**Books:**

1. An Introduction to Database Systems, Vol.I & II – C.J. Date, Addison Wesley.
2. Database system Concepts, 3<sup>rd</sup> edn. – Corth & Siberschatz, T.M.H
3. Principles of Database Systems, 2<sup>nd</sup> edn. – J.D. Ullman, Galgotia

**BCA-204: Data Communication and Computer Networks**

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

**Introduction:** Communication systems, Analogue data, digital data, Communication channels, Synchronous data, Asynchronous data. [5%]

**Transmission media:** Twin wire, Coaxial cable, Radio, VHF and microwaves, satellite links, Optical fiber. [5%]

**Data Modems:** Concepts of modulation, ASK, FSK, PSK, Quadrature PSK, Differential PSK. [10%]

Introduction to computer network: Network operating systems, Private, public and value added networks. Difference between computer networks and distributed networks.

Structure of computer network, point-to-point multidrop circuits, Data flow and physical circuits, network topologies, topologies and design goals. Hierarchical topology, horizontal topology, star topology, ring topology, mess topology. Telephone network, switched and non switched options, fundamentals of communication theory, channel speed and bit rate. Voice communication and analogue waveforms, bandwidth and frequency spectrum, connecting the analogue and digital world, digital signals, the modem, asynchronous and synchronous transmission.

Local area networks and wide area networks, connection oriented and connectionless networks, classifications of communication protocols, time division multiple access (TDMA), time division multiplexing (TDM), carrier sense system(collison), token passing, peer-to-peer priority systems, priority slot, carrier sense systems(collison free).

Token passing (priority) systems.

Layered Protocols and the OSI model

Goals of layered protocols, network design problems, communication between layers, introduction to standard organizations and the OSI model, standards organizations, Layers of OSI, OSI status. [25%]

**Polling/Selection Protocols:** Character and bit protocols, binary synchronous control (BSC), HDLC, HDLC options HDLC frame format, code transparency and synchronization, HDLC transmission process, HDLC subsets, SDLC, protocol conversion. [15%]

**Local Area Networks:** Primary attributes of a LAN, Broadband and baseband and base LANs, IEEE LAN standards, relationship of the 802 standards to the ISI/CCITT model, connection options with LANs, LLC and MAC protocol data units, LAN topologies and protocols, CSMA/CD and IEEE 802.3, token ring (priority), token bus and IEEE 802.4, Metropolitan Area Networks (MANs), ANSI fiber distributed data interface. [20%]

**Switching and Routing in Networks:** Message switching, packet switching, when and when not to use packet switching, packet routing, packet switching support to circuit switching networks. [10%]

**The X.25 and supporting protocols:** Features of X.25, Layers of X.25 and the physical layer, X.25 and the data link layer, X.25 standards, X.25 channel options, flow control principles. [5%]

**TCP/IP:** TCP/IP Reference Model and internetworking, example of TCP/IP operations, related protocols, Concept of ports and sockets. [5%]

**Books:**

1. Black , U., “ Computer Networks- protocols, standards and Interfaces” , P.H.I.
2. Stallings, W ., “ Computer Communication Networks”,P.H.I.
3. Tannembaum , A.S., “ Computer Networks”, P.H.I.

## BCA-205: Computer Organization & Microprocessor

University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)

### Computer Organization:

Introduction: Evolution of Computers, Stored program concept and Von-Neumann architecture, Information representation and codes, Building blocks of Computers. [5%]

Register Transfer and micro operations: Concepts of bus, Data movement among registers, A language to represent conditional data transfer, Data movement from/to memory, Arithmetic and logical operations with register transfer, Timing in register transfer. [10%]

CPU Architecture: Instruction format, Addressing mode, Instruction execution, Fetch and execution cycles, CPU organization with large registers, Stacks and handling of interrupts and subroutines, Instruction pipelining: stages, hazards and methods to remove hazards. [10%]

Micro-programmed control unit: Basic organization of micro-programmed controller, Horizontal and vertical formats, Address sequencer. [5%]

I/O Organization: Strobe based and handshake based communication, Vector and Priority interrupt, DMA based transfer. [20%]

**Microprocessors:** 8 bit microprocessor architecture; 8085 pin description [5%]

Programmers model of 8085, addressing modes of 8085; Instruction set of 8085; Assembly language program for 8085 [30%]

Memory interfacing; I/O interfacing; Peripheral ICs; I/O memory Interfacing Chips, Bus structure of microprocessor based systems, bus arbitration,; Interrupt handling and DMA operation. Basic idea about microprogramming. [10%]

Advanced Microprocessors: Functional description of 8086 microprocessor, software model of 8086/8088; Data addressing modes of 8086; 80x86 family of microprocessor [5%]

Comparison of different microprocessors; microprocessors of other families; Assembly language program of 8086 microprocessor.

### Books:

1. Structured Computer Organisation : A.S. Tanenbaum
2. Computer System Architecture – M.M.Mano, PHI
3. Computer Architecture and Organization-Hayes, McGrawHill International edn.
4. Computer Organization, 4<sup>th</sup> Edn.-V.C.Hammacher & Others, TMH
5. Microprocessors: A.P.Mathur
6. Microcomputer systems -8086/8088 family: Liu and Gibson
7. Structured Computer Organisation : A.S. Tanenbaum
8. Programming the 80286,80386 Computers: B.B. Brey
9. Microprocessors and Interfacing: Hall

## BCA-206: Object Oriented Programming Through C++

University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)

Introduction: Principles of Object-Oriented-Programming (OOP), comparison of procedural programming and OOP, Advantages of OOP, Overview of OOP using C++ [10%]

**Classes and Objects:** Declaration of classes and objects, Objects as function arguments, Arrays of objects, returning objects from function, structures and classes. [15%]

**Constructors and Destructors:** Constructors, Basic constructors, parameterized constructors, constructors with default argument, dynamic initialization of objects, copy constructors, dynamic constructors, destructors, constraints on constructors and destructors. [10%]

Operator Overloading: Overloading unary operators, binary operators and arithmetic operators, multiple overloading, comparison operators, conversion between objects and basic types, conversion between objects of difference classes, constraints on type conversion. [10%]

Derived Classes and Inheritance: Derived classes and base classes, defining a derived class, accessing base class member, Protected access specifier, derived class constructors, overriding the member function, class hierarchies, abstract base class, constructors and member function,

Inheritance- public and private, access combinations and usage of access specifiers, classes and structures, Multiple Inheritance	[15%]
Pointers: Pointers to objects, Virtual functions and Polymorphism.	[10%]
Streams: Stream classes , stream class hierarchy, stream manipulators, string streams, character stream classes , object I/O, file streams, Disk I/O with member function	[15%]
Templates: Function templates and class templates	[5%]
Exception handling	[5%]
Outline of Object oriented analysis and design.	[5%]

**Books:**

1. Object Oriented Programming through C++ E.Balagurusamy, TMH

**BCA-207: Software Lab – III**

**University Examination Time: 4 Hrs**

**Full Marks: 100**

Program should be developed in C++ to implement the problems related to BCA-206

**BCA-208: Software Lab – IV**

**University Examination Time: 4 Hrs**

**Full Marks: 100**

UNIX: Program should be developed to implement the problems related to BCA-202. Assembly Language: Simple program development using 8085 assembly language-to add, subtract, multiply and divide two 8 bit numbers as well as 16 bit numbers. Develop some advance program such as

- To sort a set of data
- To generate Fibonacci series
- To find out LCM and HCF of two 8 bit numbers
- To transfer a memory block
- To search an element in look up table

**BCA-209: Software Lab – V**

**University Examination Time: 4 Hrs**

**Full Marks: 100**

Program should be developed to implement the problems related to BCA-203 using SQL & PL/SQL



## Bachelor of Computer Applications

### PART-III

#### BCA-301: Mathematics - III

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

Probability and Statistics: Permutation and Combinations, Probability, Classical definition of probability. Conditional probability. Statistical independence of events. Random variable and its expectation and variance, joint dispersion of attributes. [15%]

Collection and presentation of data. Frequency distribution. Measures of central tendency. Measures of dispersion. Binomial, Poisson and Normal distribution. [15%]

Bivariate Frequency Distributions (scatter Diagram, Correlation coefficient and its properties, regression lines, correlation index and correlation ratio, rank correlation). [15%]

Multiple linear regression, multiple correlation, partial correlation (for 3 variables only). [7%]

Random sampling, expectations and standard error of sampling mean. Expectation and standard error of sampling proportions. [10%]

Test of significance based on t, F, and CHI square distribution. [8%]

#### **Numerical Methods and Algorithms**

Solution of non-linear equations: Bisection, Newton-Raphson, Regular-Falsi and Secant method.

Interpolation and approximation- Lagrange Interpolation, Newton's Forward Interpolation and Newton's backward Interpolation methods.

Integration: Trapezoidal and Simpson's 1/3 rules.

Solution of linear equations: Gaussian elimination, Gauss Sheidal method

Solution of different equations; Euler's, Taylor's series, Runge-kutta (order-2) [30%]

#### **Books:**

1. C Language and Numerical Methods C Xaviers, New Age International
2. Fundamentals of Statistics – Goon, Gupta, DasGupta

#### BCA-302: Internet and E-Commerce

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

**Introduction to Internet:** Evolution of Internet, concept of Intranet and Internet, Applications of Internet, Types of Connectivity such as dial – up, leased, VSAT. etc., Internet Server and Clients module in various Operating Systems, TCP/IP, Introduction to RFC, Addressing in Internet – IP and Domains, major features of IP, IP datagram, major IP services, IP source routing, value of the transport layer, TCP, major features of TCP, passive and active operation, Internet Service Providers. [15%]

**E-mail and List-servers:** E-mail Networks, E-mail protocols( X.400, SMTP, UUCP), Format of an E- mail message , Description of E-mail Headers, E- mail contents and encoding, E-mail routing, List servers, E-mail clients, POP-3, IMAP-4. [10%]

**File Transfer Protocol :** Introduction to FTP, public domain Software, Types of FTP Servers, FTP clients, Common Commands. [8%]

**Telnet:** Telnet protocol, Server daemon, Telnet clients, Terminal emulation [7%]

**Usenet and Internet Relay Chart Introduction to World Wide Web:** Evolution of WWW, Basics Features, WWW Browsers, WWW servers, HTTP & URL's [7%]

**WWW Browsers:** Basic features, Bookmarks, history. Progress indicators, Personalization of Browsers, Printing displayed pages and forms, Saving Web pages, Netscape Communicators, Internet Explorer, Search and Downloads. [8%]

**Web Publishing:** Technology Overview , Web site planning, Where to host your Web site, Multiple sites on one server, Maintaining a Web site, Publishing tools. [10%]

**HTML:** Document overview, Header elements, Section Headings, Block- oriented elements, Lists, Inline elements, Visual Mark-up, Hypertext links, Uniform Resource Locators,(URL's), Images, Forms, Tables, Special characters [10%]

**Interactivity Tools:** CGI, ActiveX, VB Script, Java Script and java [3%]

**Multimedia and Graphics:** VRML [2%]

**Search Engines:** Technology overview, Popular Search Engines, How to register a Web site on search engines. [5%]

**Internet Security:** Overview of Internet Security threats, Firewalls, Introduction to AAA. [5%]

**E-commerce:** Introduction to E-commerce, Payment Methodology, Security aspects, Standard in electronic payment. E-commerce and Banking, E-commerce and Retailing. [10%]

**Books:**

1. Internetworking with TCP/IP – by D.E.Comer, PHI
2. E-Commerce-Paul A.Murphy, TMH

**BCA-303: Software Engineering**

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

**Software Engineering Fundamentals:** Definition of software product, Software Engineering Paradigms; Software engineering, Knowledge engineering, and End user development approaches. [8%]

**System Analysis:** An abstraction, Partitioning and projection, Systems specification, Software Requirements Specification (SRS) standards, Formal Specification methods, Specification tools, Flow based, Data based and Object – Oriented Analysis. [15%]

**System Documentation:** Principles of system documentation, types of documentation and their importance [5%]

**System Planning:** Data and fact gathering techniques-Interviewing, communications, presentations and site visit. Feasibility study, feasibility reports, prototyping, cost-benefit analysis-tools and techniques. [8%]

**Systems Design:**

Idealized and constrained design, Process oriented design (Game and Sarson and Yourdon notations), Data oriented design (Warnier–Orr, E-R modelling), Object oriented design (Booch approach), Cohesion and Coupling, Design matrices, Design documentation standard. [25%]

**Role of CASE Tools:** Relevance of CASE Tools, High-end and Low-end CASE Tools.[7%]

**Coding and Programming :** Choice of programming languages, Mixed language programming and cell semantics ,Re-engineering legacy systems, Coding standard. [5%]

**Software Quality and testing:** Software quality assurance .Types of Software Testing (White Box and Black Box Testing, Unit Testing, Integration Testing, Verification and Validation of Software) , Debugging and Software Reliability analysis , Software quality and matrices, Software maturity model and extensions.[10%]

**Software Cost and Time estimation:** Functions points , Issues in software cost estimation : Introduction to the Rayleigh curve, Algorithmic cost models (COCOMO, Putnam- Slim, Watson, and Felix), Other approaches to software cost and Size estimation (software complexity, Delphi , costing by analogy). [10%]

**Software Project Management :** Planning software , projects, Work breakdown structures, Integrating software design and project planning ,Software project teams, Projecting monitoring and control. [7%]

**Books**

1. Software Engineering, A practioner's Approach- R. S. Pressman ( Mc-Graw Hill Inc)
2. An Integrated Approach to Software Engineering-P.Jalote (Narosa Publication House)

**BCA-304: Theory of Computation**

**University Examination Time: 3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

**Concept of Automation:** Definition, concept of sequential circuits, state table & state diagram, concept of synchronous, asynchronous machines. [10%]

**Finite State Machines:** Basic definition, mathematical representation, Moore versus Mealy m/c, capability & limitations of FSM, state equivalence & minimization, machine equivalence, incompletely specified machines, merger graph & compatibility graph, information loss less & inverse machines: testing table & testing graph. [30%]

Finite Automata: Preliminaries (strings, alphabets & languages, graphs & trees, set & relations), definition, recognition of a language by an automata - idea of grammar, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Regular Expressions, Equivalence of DFAs, NFAs, and Regular, Expressions, Non-regular languages, Pumping lemma [30%]

Introduction, definition, derivation trees, simplification, Context-Free Grammar (CFG), Parse Trees, [10%]

Pushdown Automata: Definition, moves, Instantaneous Descriptions, Deterministic & Non-Deterministic Push Down Automata (PDA), Acceptance by final state & Empty stack, Equivalence of CFGs and PDAs. [20%]

**Books:** 1.Hopcroft JE. and Ullman JD., “**Introduction to Automata Theory, Languages & Computation**”, Narosa.  
2.Lewis H. R. and Papadimitrou C. H., “**Elements of the theory of Computation**”, P.H.I.  
3.Kain, “**Theory of Automata & Formal Language**”, McGraw Hill.  
4.Kohavi ZVI, “**Switching & Finite Automata**”, 2<sup>nd</sup> Edn., Tata McGraw Hill.

### **BCA-305: Programming in JAVA**

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

Introduction: JAVA as internet language. A first simple program. Entering the program, Compiling the program, control statements, using blocks of code, lexical issues-white space, identifiers, literals, comments, separators, The Java keyword-The java class libraries, data types, variables and arrays, the simple types, integers-byte, short, int, long, floating point types-float, double, characters, Booleans. A closer look at literals-integer literals, floating point literals, Boolean literals, character literals, string literals, variables – declaring a variable, dynamic initialization, the scope and lifetime of variables, type conversion and casting – java’s automatic conversions, casting incompatible types, automatic type promotion in expressions, the type promotion rules, arrays-one dimensional arrays, multidimensional arrays, alternative array declaration syntax. Operators-assignment operators, increment and decrement, the bitwise operators, relational operators, Boolean logical operators, the assignment operator, the ? operator, operator precedence, using parentheses, control statements-Java’s selection statements, if, switch, interaction statements-while, do-while, for, some for loop variations, nested loops, jump statements-using break, using continue, return. [20%]

Introduction Classes: class fundamentals, the general form of a class, a simple class, declaring objects, a closer look at new, assigning object reference variables, introducing methods, adding a method, the box class, returning a value, adding a method to the box class, constructors, parameterized constructors, the this keyword, instance variable hiding, garbage collection, the finalize method, a stack class, a closer look at methods and classes, overloading methods, overloading constructors. Using object as parameters, argument passing, returning objects, introducing access control, understanding static, introducing final, arrays revised., exploring the string class, using command line arguments, inheritance, inheritance basics, a more practical example, a superclass variable can reference a subclass object, using super, using super to call superclass constructors, a second use for super, creating a multilevel hierarchy, when constructor are called, method overriding, dynamic method dispatch, overridden methods, applying methods overriding, using abstract classes, using final with inheritance, using final to prevent overriding, using final to prevent inheritance, the object class. [20%]

Package and interfaces: Defining a package, understanding class path, a short package example, access protection, an access example, importing packages- interface-defining an interface, implementing interfaces, applying interfaces, variables in interfaces, interface can be extended. [7%]

Exception Handling: Exception fundamentals, exception types, uncaught exceptions, using try and catch, displaying a description of an exception, multiple catch clauses, nested try statements, throw, throws, finally, java’s built-in exceptions-creating you own exception subclasses, using exceptions, multithreaded programming. [8%]

Threads: The java’s thread model, thread priorities, synchronization, message, the thread class and the runnable interface, the main thread, creating a thread, implementing runnable, extending thread, closing an approach, creating multiple thread, thread priorities, synchronization, using synchronized methods, the synchronized statement, interthread communication, using multithreading. [10%]

Applets: Concept, and use of applet, I/O basics, streams, applet fundamentals, writing simple applet program. [5%]

Stream classes: The predefined streams, reading console input, writing console output, reading and writing files, the transient and volatile modifiers, using instance of native methods, problem with native methods.[5%]

String handling: The string constructor, string length, special string operations-string literals, string concatenation, string concatenation with other data types, string conversion, character extraction, string comparison, searching strings, modifying a string-data conversion using string buffer constructors. [10%]

Wrappers: Number, double and float, integer and long, character, Boolean, process, runtime, memory management, executing other programs, system-using current time limits to time, program execution, using array copy, environment properties, object, using clone and the cloneable interface, class, class loader, math-transcendental functions, exponential functions, rounding functions, miscellaneous math methods, classes, input stream, output stream file input stream, file output stream. [10%]

Java Database Connectivity (JDBC): Implementation of simple system using JDBC. [5%]

#### **Books:**

1. Programming with JAVA – E.Balagurusamy, TMH

#### **BCA-306: Computer Graphics**

**University Examination Time:3 Hrs. Full Marks:100(University Exam:80, Sessional:20)**

#### **Computer Graphics:**

Display devices: Raster, vector devices; colour display techniques; colour look up tables.

2-D graphics: Line and curve generation algorithm; polygon filling; 2-D transformations; windowing and clipping. [60%]

Interactive graphics: Interactive input devices; Interaction handling.

3-D graphics: 3-D surface modelling; 3-D transformations; Hidden line and surface elimination; Rendering of 3-D objects. [30%]

Graphics Languages: GKS, PHIGS [10%]

**Books:**1. Foley, Vandam, Feiner, Huges, “Computer Graphics: Principles & Practice”, Pearson Education, second edition 2003.

2. Procedural Elements of Computer Graphics – D.F.Rogers McGraw Hill

3. Principles of Interactive Graphics – Newman & Sproull McGraw Hill

#### **BCA-307: Software Lab – VI**

**University Examination Time: 4 Hrs**

**Full Marks: 100**

Program should be developed to implement the problems related to BCA-302 & 305

#### **BCA-308: Software Lab – VII**

**University Examination Time: 4 Hrs**

**Full Marks: 100**

Program should be developed to implement the problems related to BCA-306 & simple applications development in visual basic environment

#### **BCA-309: Project**

**University Examination**

**Full Marks: 100** [Project Report 50, Viva 50]

It is desirable that project report should be done in a Industry/Organization after the theoretical examination of at least two months duration.