Scheme of Examination

BCA (REGULAR)
(Semester Scheme)

Paper Code	Title of Paper	Period Per Week	Max. Marks	Internal Assessment	Exam Duration Hours.
FIRST SEMESTER					
BCA-101	Computer Fundamentals and Programming	4	80	20	3
BCA-102	Mathematics-I	4	80	20	3
BCA-103	Mathematics-II	4	80	20	3
BCA-104	Business Practices	4	80	20	3
BCA-105	Practical	8	80	20	6
	Software Lab Per week (Two sitting) (Based on BCA Paper 101and software tools)				
SECOND SEMESTER					
BCA-106	Data and File Structure	4	80	20	3
BCA-107	Structured Systems Analysis	4	80	20	3
BCA-108	Mathematical Foundations of Computer Science	4	80	20	3
BCA-109	Digital Electronics	4	80	20	3
BCA-110	Practical	8	80	20	6
	Software Lab Per week (Two sitting) (Based on BCA Paper 106 and software tools)				
THIRD SEMESTER					
BCA-201	Computer System Architecture	4	80	20	3
BCA-202	Algorithms & Advanced Data Structure	4	80	20	3
BCA-203	Micro-Processors & Assembly Language	4	80	20	3
BCA-204	Data Base Systems	4	80	20	3
BCA-205	Practical	8	80	20	6
	Software Lab Per week (Two sitting) (based on paper BCA-202 and BCA-204)				

FOURTH SEMESTER

BCA-206	Operating Systems Organization and UNIX	4	80	20	3
BCA-207	Software Engineering	4	80	20	3
BCA-208	Object Oriented Design and Programming	4	80	20	3
BCA-209	Financial Accounting	4	80	20	3
BCA-210	Practical	8	80	20	6

Software Lab   Per week   (two sitting)
 (Based on Paper BCA- 206 & 207)

FIFTH SEMESTER

BCA-301	Data Communication and Networks	4	80	20	3
BCA-302	Computer Graphics	4	80	20	3
BCA-303	Principles of Visual and Windows Programming	4	80	20	3
BCA-304	Java Programming & Internet Applications	4	80	20	3
BCA-305	Practical	8	80	20	6

 Software Lab Per week   (two sitting)
(based on paper BCA-301, 302, 303 & 304)

SIXTH SEMESTER

BCA-306	Network & Internet Technologies and Applications	4	80	20	3
BCA-307	Scientific and Statistical Computing.	4	80	20	3
BCA-308	Multimedia Information Systems	4	80	20	3
BCA-309	Management Information System	4	80	20	3
BCA-310	Practical	8	80	20	6

Software Lab Per week   (two sitting)
(based on paper BCA-306, 307 & 308)

FIRST SEMESTER

BCA - 101 Computer Fundamentals and Programming

External Marks : 80
Internal Assessment : 20
Time : 3 hrs.

Computer Fundamentals :

Number system: decimal, octal, binary and hexadecimal; Representation of integers, fixed and floating points, character representation; ASCII, EBSDIC; Functional units of computer, I/O devices, primary and secondary memories; Pogramming Fundamentals.

Algorithm development, Techniques of problem solving, Flow-charting, Step-wise refinement, Algorithms for searching, sorting (exchange and insertion), merging of ordered lists.

Programming :

Representation of integers, characters, real Data types : constants and variables; Arithmetic Expressions, Assignment statement, Logical expression, Sequencing, Alteration and iteration; ring processing; Sub programs, Recursion, Files and pointers; Structured programming concepts; Top down Design, Development of efficient program; program correctness; Debugging and testing of Programs.

Note : The examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

BCA - 102 Mathematics-1

External Marks : 80
Internal Assessment : 20
Time : 03 hrs.

Trignometry

System of measuring angles, Trigonometric functions, identities and signs, values of t-ratio for T-ratios of allied angles, Addition and substraction formulae, transformation of products into sum or difference of t-ratios, transformation of sum or difference into product of t-ratios, Trigonometric equations and graphs, inverse trigonometric functions.

Differentiation

Elementary results on limits and continuity (without proof). Derivative of functions, differentiation of implicit functions and parametric forms.

Co-ordinate Geometry

Distance formulae, section formulae, Slope of non-vertical line, equation of line in slope intercept form, normal form, distance of a point from a line, angle between two lines.

Quadratic Equations

Solution of Quadratic Equations by factor method, complete square method, and Discriminant method, Relation of the roots.

Complex Numbers

Definition, Representation of Complex Numbers, Argand plane, Sum, subtraction, product and division of complex numbers, Magnitude, argument and square root of complex numbers.

Note : Emphasis should be on computer applications. The examiner is requested to set 8 question covering whole syllabus in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-103 Mathematics -II

External Marks : 80
Internal Assessment : 20
Time : 03 hrs.

Sets :

Set Operations, application of set theory, Cartesian product, relations.

Functions :

Functions and classification of function, Boolean algebra

Induction :

Pigeon hole principle, Principles of Mathematical induction, Fermat's theorem (without proof).

Algebra :

Matrices and Determinant : Properties of determinants, Cramer rule, matrix method, Elementary operations, Sequence, Arithmetic, Progression and Geometric Progression, Permutation and combination, Binomial Theorem.

Vectors :

Derivative of sum, dot and cross product of two vectors, gradient, divergence and curl.

Note : Emphasis should be on computer applications. The examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-104 Business Practice

External Marks : 80
Internal Assessment : 20
Time : 03 hrs.

1.   Introduction to Modern Business : What are management function, planning, organization, directing and control.

2.   Introduction to Organization Behaviour : Individual in an organization, Group in an Organization, Organization as a system.

3.   Introduction to Human Resource management. Human resource Planning-Job analysis, Recruitment and training compensation management-Payroll and incentives. Human Resource information system. Computer based employee information system. Software package to be used for building an information system for employees, training, recruitment & job analysis A payroll package to be used. Decision analysis : Investment analysis, annuity analysis, compounding analysis, Inventory Theory-EQQ, JIT, Production Scheduling PERT and

CPM.

Note : The examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

BCA-105 Practical- Software Lab

(Based on Paper BCA-101 and Software tools)

SECOND SEMESTER

BCA-106   Data and File Structure

External Marks : 80
Internal Assessment : 20
Time : 3 hrs.

Data Structure

Linear and list structures : Arrays, stacks, queues, and lists; Sequential and linked structure; Simple lists, circular lists, doubly linked lists, inverted lists, threaded lists, operations on all these structures and applications : Arrays; Multi-dimensional arrays, sequential allocation, address calculations, sparse arrays, Tree structures : Trees, binary trees. Tree traversal algorithms, threaded trees, binary search trees, trees in search algorithms. B-tree. B + tree and applications.

File Structure

Physical storage devices and their characteristics, constituents of a file viz.Fields, records, fixed and variable length records, primary and secondary keys; File operations, Basic file system operations, File

Organizations serial sequential, Indexed sequential, Direct, inverted,multilist. Hashing functions and collision handling methods.

Note : The examiner is requested to set 8 questions covering whole syllabus in each paper, out of which the candidate will be required to attempt any 5 questions.

BCA-107   Structured Systems Analysis and Design

External Marks : 80
Internal Assessment : 20
Time : 03 hrs.

Introduction to system and contemporary systems Analysis : Effective communication in systems analysis: Tools of the systems Analysis : problem definition, classification data collection and analysis.

System planning and alternative, Feasibility and proposal; Use and Management involvement. Planning alternative, design consideration, systems feasibility, selection of a system plan, the system proposal.

System Cost Determination

System costs and system benefits, comparative cost analysis, data processing costs, DP cost centre concept.

A structured Approach to System Design

Structured Top-down design, Logical design requirements, data administration and data dictionaries, auditable systems; Forms requirements design, CRT screen design; Program specification, development completion schedule, Structured Walk Throughs.

Project Management and Control

Development of standards, project control, Gantt Charts, PERT & CPM.

Systems Conversion and Implementation

Planning considerations, Conversoin methods, systems follow-up quality assurance of new systems.

Note : The examiner is requested to set 8 questions covering the whole syllabus, out of which the candidates will be required to attempt any 5 questions

BCA-108 : Mathematical Foundations of Computer Science

External Marks : 80

Internal Assessment : 20

Time : 03 hrs.

Algorithm :

Algorithms, merits and demerits, Exponentiation, How to compute fast exponentiation. Linear Search, Binary Search, "Big Oh" notation. Worst case, Advantage of logarithmic algorithms over linear algorithms, complexity.

Graph Theory :

Graphs, Types of graphs, degree of vertex, sub graph, isomorphic and homeomorphic graphs, Adjacent and incidence matrices, Path Circuit ; Eulerian, Hamiltonian path circuit.

Tree :

Trees, Minimum distance trees, Minimum weight and Minimum distance spanning trees.

Recursion :

Merge sort, Insertion sort, Bubble sort, and Decimal to Binary. Recurrence Relations : LHRR, LHRRWCCs, DCRR. recursive procedures.

Number Theory :

GCD, Euclidean algorithm, Fibonacci numbers, congruences and equivalence relations, public key encryption schemes.

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-109   Digital Eletronics

External Marks : 80

Internal Assessment : 20

Time : 03 hrs.

Fundamentals of electronics devices : Overview of semi-conductors physics, diode and transistor characteristics, diode and transistor as a switch.

Saturated and non-saturated logic, TTL, ECL, MCS, CMCS logic circuits; OR, AND, NOT, EX-OR logic, Positive and negative logic; De Morgan's theorem, Universal building blocks, laws, and theorems of boolean algebra, TTL NAND gates, open collector TTL; wire-or; three state logic; simplifying logic circuits -sum of product and product of sum form, algebraic simplification, karnaugh simplification; arithmetic circuits;l flip-flops and multi-vibrator circuits, counter design

techniques; counter design techniques; shift registers; encoder, decoder, multiplexer, demulti-plexer circuits; D/A and A/D conversion.

Note : Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

BCA-110   Practical- Software Lab
(Based on paper BCA-106 and Software Tools)

Environmental Studies

External Marks : 80
Field Work (Practical) :20
Time : 03 hrs.

Unit-1 : The Multidisciplinary nature of environmental studies. Definition, scope and importance. Need for Public awareness   (2 lectures)

Unit-2 :   Natural Resources :

Renewable and non-renewable resources : Natural resources and associated problems.

a)   Forest resources : Use and over-exploitation : deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people.

b)   Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c)   Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d)   Food resources : World food problems, changes caused by overgeazing and effects of modern agriculture fertilizer-pesticide problems, water logging, salinity, case studies.

e)   Energy resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

   *   Role of an individual in conservation of natural resources .

   *   Equitable use of resources for sustainable lifestyle.   (8 lectures)

Unit-3   Ecosystems :

   *   Concept of an ecosystem.

   *   Structure and function of an ecosystem.

   *   Producers, consumers and decomposer.

   *   Energy flow in the ecosystem.

   *   Ecological succession.

   *   Food chains and ecological pyramids.

   *   Introduction, types, characteristic features, structure and function of the following eco-system :

   a)   Forest ecosystem.

   b)   Grassland ecosystem.

   c)   Desert ecosystem

d)   Aquatic ecosystems (Ponds, streams, lakes, rivers, ocean, estuaries).   (6 lectures)

Unit-4 :   Biodiversity and its conservation.

*   Introduction-Definition : Genetic, species and ecosystem diversity.

*   Biogeographical classification of India.

*   Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.

*   Biodiversity at global, National and local levels.

*   India as a mega-diversity nation.

*   Hot-spots of biodiversity.

*   Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

*   Endangered and endemic species of India.

*   Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.   (8 lectures)

Unit-5 : Environmental Pollution :

Definition, Causes, effects and control measures of :

a)   Air pollution.

b)   Water pollution.

c)   Soil pollutoin.

d)   Marine pollution.

e)   Noise pollution.

f)   Thermal pollution.

g)   Nuclear hazards.

*   Solid wastes management : Causes, effects and control measures of urban and industrial wastes.

*   Role of an individual in prevention of pollution.

*   Pollution case studies.

*   Disaster management: floods, earthquake, cyclone and landslides.

                                                                                    (8 lectures)

Unit-6 : Social issues and the Environment :

*   From unsustainable to sustainable development.

*   Urban problems related to energy.

*   Water conservation, rain water harvesting, watershed management.

*   Resettlement and rehabilitation of people : its problems and concerns. Case studies.

*   Environmental ethics : Issues and possible solutions.

*   Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

*   Wasteland reclamation.

*   Consumerism and waste products.

* Environment Protection Act.
* Air (Preventation and Control of Pollution) Act.
* Water (Preventation and Control of Pollution) Act.
* Wildlife Protection Act.
* Forest conservation Act.
* Issues involved in enforcement of environmental legislation.
* Public awareness.

(7 lectures)

Unit-7   Human populatoin and the Environment.

Population growth, variation among nations.

Populatoin explosion- Family Welfare programme.

Environment and human health.

Human Rights.

Value Education.

HIV/AIDS.

Woman and Child Welfare

Role of Information Technology in Environment and human health.

Case Studies.

(6 lectures)

Unit-8 Field Work :
* Visit to a local area to document environmental assest-river/ forest/grassland/hill/mountain.
* Visit to a local polluted site - Urban/Rural/Industrial/Agricultural.
* Study of common plants, insects, birds.
* Study of simple ecosystems - pond, river, hill slopes, etc. (field work equal to 5 lecture hours).

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(M) Magzine, (R) Reference, (TB) Textbook

BCA - 201   Computer System Architecture

Register transfer and Micro-operations, Register Transfer Language, Bus and Memory. Transfers, Artihmetic, Logic Micro-operations, Shift Micro-operations.

Basic Computer Organization and Design :

Instrcution and instructions Codes, Computer instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-output and Interrupts; Complete Computer Description.

Programming the Basic Computer

Machine Language, Assembly Language, The assembler, program loops, programming Artihmetic and Logic, Subroutine, Inputs-Outputs programming. Micro-programmed Control; Control Memory, Address Sequencing, Micro-programme Example, Design of Control Unit.

Central Pocessing Unit

General Register Organization Stack Organization Instruction Formats, Addressing Modes, Data and Transfer Manipulation, Program Control, Reduced Instruction Set Computer, Pipeline and Vector

Processing parallel processing pipelining, Arithmetic Pipeline, RISC Quoekubem Vector Processing, Arrays Processors.

Computer Arithmetic

Addition and Subtraction, Multiplication Algorithms, Division algorithm, Floating-Point Arithmetic Operations, Decimal arithmetic Unit, Decimal Arithmetic Operations.

Input-Output Organization

Peripheral Devices, Input-Output interface, Asychronous Data Transfer, Modes of Transfer, Priority interrupt, Direct Memory Access (DMA), input-output processors (IOP), Serial communicatoin multiprocessors, Inter-connection stuctures, Inter-processor ArBC Aration, Inter-processor Communication and Synchronization, Cache Coherence.

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA - 202   Algorithms and Advanced Data Structures

Trees : Search Trees, AVL trees, threading : Storage Management :

Run time storage management, garbage collection and compaction.

Sorting techniques

Insertion sort, quick sort, merge sort, heap sort, selection sort, radix sort, external sort; lower bound for sorting by compression of keys. Selection and adversly argument Traversal : minimum spanning tree. Shortest path, graph component algorithms, String Matching KMP and Boyer Moore algorithms.

Dynamic Programming

Matric multiplication and optional binary search tree algorithms.

NP Complete Problem

Complexity classes P and NP; examples of problems in the NP class.

Parallel Algorithms

Parallelism, PRAM and other models, Parallel algorithms finding maximum element in a list, merging and sorting.

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-203   Micro-Processor & Assembly Language

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Evolution of micro-processor : overview of intel pro-pentium motorola 68000 series, power PC, DEC-Alphacip; CISC architecture.

Basic micro processor architecture and interface : Internal architecture, external system bus architecture, memory and Input/output interface.

Programming mode

General-purpose registers; pointer and index registers; flag; segment registers, program invisible registers; memory addressing and addressing modes. Memory interfacing; memory address decoding; cache memory and cache controllers.

Basic I/O inteface; I/O mapped I/O memory mapped I/O; basic input/ output and handshaking input/output port address decoding; 8255 progrmmable peripheral interface; 8279 programmable keyboard and display interface; 8254 pragrammable time; 8251 programmable/ communication interface; interrupts-interrupt vector, vector tables, hardware and software Interrupts, 8259 programmable Interrupts

controller; real-time clock; direct memory access, 8237/ 8257 DMA controller; video controllers; shared bus operation. (The course should be taught in the context of 8085 to intel-pro pentium micro-processor and its assembly languages).

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-204   Database Systems

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Data Modelling for a database : records and files, abstraction and data integration. Database Management System : Relational, Network; Hierarchieal.

Relational Data Manipulations : Rlational Algebra, Relational Calculus, SQL, Relational Database Design : Functional Dependencies, Finding Keys : 1st to 3rd NFs, BCNF, Lossess Join and Dependency preserving decomposition, computing clousres of set FDs, Finding Keys.

Query Processing : General Strategies for query processing, query optimization, query processor, concepts of security, concurrency and recovery;

Database Design Project : Definition and analysis of existing systesm, Preliminary and final design, Testing and implementation Operation and tunning.

Use of Relational DBMS package for class project.

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-205 Practical- Software Lab

(based on paper BCA-202 and BCA-204)

FOURTH SEMESTER
BCA-206   Operating System Organization and Unix

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Operating systems overview : Operating systems as an extended   machine & resource manager, operating systems classification; Operating systems and system calls; Operating systems architecture.Process on Management functions : process model, hierarchies, and   implementation; process states and transitions; multi-programming,multi-tasking, multi-threading; level of schedulers and scheduling   algorithms, micro-kernel architecture.Memory Management Functions : memory management of single user   operating systems partition, swapping, paging, segmentation, virtual memory.

Device Management function : I/O devices and controllers, interrupt handlers, device independent I/O software, user-space I/O software; disk scheduling; clock hardware software; terminal input/output software. File Management functions; file naming, structure, types, access machanisms, attributes and operations; hierarchiecal directory systems, directory structures and directory operations; file space allocations; file sharing, file locking, symbolic links; file protection and security : distributed file systems. Concurrent programming : sequential and concurrent process; precedence graph, Bernsterins condition; time problem, classical process co-ordination problems, deadlock handling, Inter-process communication.

(This course should be taught in the context of UNIX operating system).

Note : Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

BCA-207   Software Engineering

Software engineering definition and paradigms, A generic view of Software Engineering, Requirements analysis, Statement of system scope, isolation of top level processes and entities and their allocation to physical elements, refinement and review. Analyzing a problem, creating a software specification document, review for correctness, consistency and completeness.

Designing software solutions : Refining the software specifications : Application of fundamental Design concept for data, architectural and procedural designs using software blue print methodology and object oriented design paradigm; creating a 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.

Software testing : Role of testing and its relationship to quality assurance; Nature and limitation of software testing, Software testing methods.

Software maintenance : Maintenance as part of software evaluation, reason for maintenance, types of maintenance (Perfective, adoptive, corrective), designing for maintanability, teachniques for maintenance, Configuration management. Comprehensive examples using available software platform/case tools.

Note : Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

BCA-208   Object Oriented Design and Programming

Introduction to Object Oriented Modeling, modelling techniques, Object Oriented Design, Object design, comparison of methodologies (SA/SD, OMT, JSD) design implementation, Object Oriented Languages, Programming in C++, Applications in database, compilers, animation and Business.

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-209   Financial Accounting

Conceptual Framework of Accounting : Nature and Scope of Accounting information, Identifying and :

1 .   Recording accounting transaction using traditional and accounting equations approach, Generally accepted accounting principles, Accounting Standards in India. Bases of accounting- Cash and accrued. Capital and Revenue item.

2. Fundamentals of Computerised Accounting System : Concept of grouping the accounting heads, schemes of assigning the codes to accounting heads, Maintaining the hierarchy of Ledger accounts for perparing control accounts.

3. Applications of computers in accounts :

   a) Accounting procedures used, in practice, for recording Cash, Bank and Journal Transactions using appropriate voucher;

   b) Preparation of Ledger counts, Cash Book, Journal Book and Bank Book;

   c) Preparation of Trial Balance, Profit and Loss Accounts and Balance Sheet.

   d) Accounting for petty cash transactions and preparation of petty cash register.

   e) Lease and Loan accounting;

   f) Accounting system for preparing and maintaining Payrolls;

   g) Inventory Accounting and Control;

   h) Budget and Budgetory Control;

   i) Accounting System for Orders booking, Processing (forwarding and acceptance) and invoicing for a trading Organization;

   j) Accounting for Decision making control : Marginal costing and standard costing.

Note : Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

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BCA-210   Practical - Software Lab.

(based on Papers BCA - 206 & BCA - 207)

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BCA-301 Data Communications & Network

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Data Communications : concepts of data, signal, channel, bandwidth, bid-rate and baud-rate fourier analysis; maximum data-rate of

channel; analog and digital communications, asynchronous and synchronous transmission; data encoding techniques; modulation technique; multiplexingl TI/EI carrier systems; transmission medium; transmission errors, error-detection and correction code.

Network Classification and data-communication services : Local area networks metropolitan area network. Wide area networks, wireless network, internet work, Switched multimega BCA Data Services, X.25, Frame Relay, narrowband and broadband ISDN, Asynchronous Transfer Modes.

Network reference Models : Layered architecture, protocol hierarchies, interface and services; ISO-OSI reference model, TCP/ IP reference model; Novel Netware, Internet protocol stacks.

Datalink layer functions and protocols : framing, error-control flow control, sliding window protocol, DHCL SLIP and PPP protocol.

Medium access sublayer : CSMA/CD & ethernet, token ring, FDDI; IEEE standards for LAN and WAN; satelite networks TDMA and VSAT.

Note : Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

BCA-302   Computer Graphics

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Development of Computer graphics; basic graphics system and standards; Raster Scan and Randod Scan graphics; continual refresh and storage displays. Display processoes and character generators; colour display techniques; frame buffer and BCA BCA operations concepts in raster graphics. Points, lines and curves; ration; polygon filling; conic-section generation, antiliasing. Two dimenstional viewing; basic transformations; interactive picture construction techniques, Interactive inputs/outputs devices.

Three-dimensional concepts : 3-D representations : and transformations; 3-D viewing; algorithm for 3-D volumes spine curve and surfaces; Fractals; Quadtree and octree data structure. Hidden line and surface, rendering and animation.

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-303   Principles of Visual and Windows Programming

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Diagram understanding : The symbolic description behind the scenes. Generalized icons; generalizations, formal specifications of iconic systems, iconic operations, Syntactic-semantic analysis of iconic sentences, user-interfaces as iconic systems, determination of iconic purity, a visual Language compiler; The icon dictionary ID Physical logical part of icon, structure of ID, operator dictionary CD; The environment of a window application, Basic concepts of windows programming. The programming with the graphics device interface. Displaying Text, Receiving commands and data from user.

Note : Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

BCA-304   Java Programming and Internet Application

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Internet Application : Introduction to Internet : E-mail Architecture & Services, user agent, message format & transfer, SMTP; World

Wide Web (www)- Domain Name System, The Client side, The server side, Creating and locating information on the web, search engines, URL's, HTTP, FTP, Telnet; Web Browsers, Chat & Bulletin Board, USENET & NNTP (Network News Transfer Protocol).

Java and The Internet : The Java programming language and its characteristics; Java run-time environment; Java compiler; Java developer kit; running Java applications and Java applets.

Java programming : Elements of Java : Data types, scalar data types, operators & expressions, control structures. Class, object & methods, constructors, finalizer, visibility controls, array, string & vectors, inheritance, interfaces, package multithreading, applet programming.

Exception Handling-Defining and throwing exceptions, creating your own exceptions.

Input/Output : streams, byte and character stream, the class printstream, data streams, string tokenizer class, stream tokenizers.

Delegation Event Model. AWT classes, AWT control, Layout managers & menus.

Note : Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

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3.   Balagurusamy E.: Programming with Java, Latest Edition, Tata McGraw-Hill.
4.   Schildt H.: The Complete Reference Java 2, Latest Edition, Tata McGraw-Hill.
5.   Mughal K.A., Rasmussen R.W. : A Programmer's Guide to Java Certification, Addition-Wesley.

Note : Latest and good books may be added from time to time.

BCA-305   Practical - Software Lab
(based on Papers BCA-301, 302, 303 and 304)

BCA-306   Internet Technologies & Applications

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Network Layer functions and protocols ; Switching; routing and congestion control; X.25; Internet protocol (IP); Addressing flow control, connection management, multiplexing, Transmission control protocol (TCP) and user datagram protocol (UDP), socket & TLI interface.

Application layer services and Protocols : Domain name services network management protocol, electronic mail and file transfer protocol, world wide webs.

Survey of contemporary Internet Technologies, The Role, use and implementation of current tools. Basic TCP/IP, name, space, correctness, and protocols, worldwide/HTML Techniques for text, images, links and forms.

Indexing method : Gopher, WAIS, Server side programming, CGI scripts, Security issues, Emphasis on understanding, exploring and extending internet technologies using Java or perl.

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-307   Scientific & Statistical Computing

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Numerical methods :

Floating point artihmetic : Basic concept of floating point numbers systems, implications of finite precision, illustrations of errors due to round off.

Interpolation Finite difference calculus, polynomial interpolation. Approximation Uniform, discrete least square, polynomial, fourier.

Numerical Integration & Differentiation Interpolatory numerical integration; numerical differentiation.

Solution of non-linear: Bisection, fixed point iteration, Newton's Rephson's Methods.

Solution of Ordinary differential equation - Taylor series, method, <u>Range-Wulta method</u>, Euler method.

Random variables and their distributions : Random variables (discrete and continuous), probability density and distribution functions, special distributions (Binomial distribution functions, special distributions poiseon, Uniform Exponential), mean and variance, chebychey inequality, independent random variables, functions of random variables and their distribution. Limit Theormes : Poisson and normal approximations, Control limit Theorem Law of large numbers.

Note : Examiner is requested to set 8 questions covering whole syllabus, in each paper, out of which the candidates will be required to attempt any 5 questions.

BCA-308   Multi-media Information Systems

External Marks : 80

Field Work (Practical) :20

Time : 03 hrs

Introduction to multimedia technology-computers, communications and entertainment; framework for multimedia; M/M devices, presentation devices and the user interface; M/M presentation and authoring.

Digital representation of sound and transmission, brief survey of speech recognition and generation; digital video and image compression; JPEG image compression standard; MPEG motion video compression; DVI technology; time-based media representation and delivery.

M/M Software environments; limitations of workstation operating system; M/M system service; OS Support for continuous media applications; media stream protocol; M/M file systems and information representation; data-media for M/M and Hypermedia information. Applications of M/M; intelligent M/M system. Desktop BR; Virtual reality OS; distributed virtual environment system; virtual environment displays and orientation tracking; visually coupled system requirements intelligent VR software systems.

Applications of enviroments, in various fields, such as medical entertainment, manufacturing, business, education etc.

Note : Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions.

BCA-309   Management Information System

OR Programming Languages

External Marks : 80
Field Work (Practical) :20
Time : 03 hrs

Data and Information; forms of data; data generation, capturing, collection, recording, retrieval and processing. Information and Information systems; computer Based Information system-including office Automation Systems forms of information systems; Computer in information system; Computer systems Transaction Processing Systems and decision support Systems; Expert Systems.

Role of VBIS in Government; Society and Business organization. Using information systems as a cost reduction measure in Society. Macros and Micro lelvel information systems. PC based sotware such as MS-Office, as a micro level information processing tool.

Note: Examiner is requested to set 8 questions covering whole syllabus in each paper out of which the candidates will be required to attempt any 5 questions

BCA-310 Practical- Software Labs (Based on Paper BCA-306, 307 and