Scheme of Examination
of Bachelor of Computer Applications (BCA) through Distance Education

Paper Code	Title of Paper	Max. Marks	Internal Assess-ment.	Exam duration Hours.
	FIRST SEMESTER			
BCA-101	Computer Funda-mental and Programming	75	25	3
BCA-102	Mathematics-I	75	25	3
BCA-103	Mathematics-II	75	25	3
BCA-104	Business Practices	75	25	3
BCA-105	Practical Software Lab. (based on Paper BCA-101 and Software Tools)	75	25 (Two sittings)	6
	SECOND SEMESTER			
BCA-106	Data and File Structure	75	25	3
BCA-107	Structured Systems Analysis	75	25	3
BCA-108	Mathematical Founda-tions of Computer Science	75	25	3
BCA-109	Digital Electronics	75	25	3
BCA-110	Practical Software Lab. (based on Paper BCA-106 and Software Tools)	75	25 (Two sittings)	6
	THIRD SEMESTER			
BCA-201	Computer System Architecture	75	25	3
BCA-202	Algorithms and Advance Data Structure	75	25	3
BCA-203	Micro-processors and Assembly Language	75	25	3
BCA-204	Data Base Systems	75	25	3
BCA-205	Practical-Software Lab Lab(based on paper BCA-202 and BCA-204)	75	25 (Two sittings)	6

FOURTH SEMESTER

BCA-206	Operating Systems Organisation and UNIX	75	25	3
BCA-207	Software Engineering	75	25	3
BCA-208	Object Oriented Design and programming	75	25	3
BCA-209	Financial Accounting	75	25	3
BCA-210	Practical-Software Lab Lab(based on paper BCA-206 and BCA-207)	75 (Two sittings)	25	6

FIFTH SEMESTER

BCA-301	Data Communication And Networks	75	25	3
BCA-302	Computer Graphics	75	25	3
BCA-303	Principles of Visual And Windows Programming	75	25	3
BCA-304	On the job training	75	25	3
BCA-305	Practical-Software Lab Lab(based on paper BCA-301,302 and 303)	75 (Two sittings)	25	6

SIXTH SEMESTER

BCA-306	Internet Technologies and applications	75	25	3
BCA-307	Scientific and Statistical Computing.	75	25	3
BCA-308	Multimedia Information Systems	75	25	3
BCA-309	Management Information Systems	75	25	3
BCA-310	Practical-Software Lab Lab(based on paper BCA-306 ,307 & 308)	75 (Two sittings)	25	6

BCA FIRST SEMESTER

BCA-101 Computer Fundamentals and Programming

External Marks: 75
Internal Marks: 25
Time: 03 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;

Programming 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 programs; 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 –I

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Differentiation and partial differentiation of vector functions, derivative of sum, dot product and cross product of two vectors, gradient, divergance and curl. System of circles, standard equations and properties of parabola, Ellipse and Hyperbola, Successive differentiation Leibnitz theorem, Partial differentiation curvature, Asymptotes, Singular points, Concavity, Points of inflexation and tracing of cartesian curvos.

General equation of second degree in two variables, tracing of conic sections Sphere.

Integration of irrational functions, Reduction formulae, Rectification, Quadrature, Volumes and surface of resolution, Differential equation of first order. Groups, Rings, fields, Vector, spaces.

Note: 1. Emphasis should be on computer applications
2. 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-103 Mathematics – II

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

The real number system as a complete ordered field, Neighbourhood, open and closed sets, limit points of sets, Bolzano-Weierstrass theorem

Limits, continuity, sequential continuity, algebra of continuous functions, continuity of composite functions, continuity on (a,b) implying boundedness, Intermediate value theorem, Inverse function theorem, Uniform continuity. Sequence, convergent sequence, Cauchy sequence, Monotonic sequence, Subsequence, Limit superior, and limit inferior of sequence.

Infinite series, convergence of series, positive term series, comparison tests, Chauchy's nth root test, Dalembert's ratio test, Raabes test Chauchy's integral test, Alternating series, Absolutes and conditional covergence. Taylor's series, and Macaurin's series (for Sin X, Cos X, Log $(I+X)^m$ Applications of Mean value theorem to monotone functions and inequalities, maxima and minima, Indeterminate forms.

Note: 1. The emphasis should be on computer applications
2. 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-I

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

1. **Introduction to Modern Business.**
   What are management function, planning organization, directing and control.
1. **Introduction to Organization Behaviour**.
   Individual in an organization, Group in an organization, Organization as a system.
2. **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 –EOQ, 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: 75
Internal Assessment : 25
Time: 03 hrs

Data Structures

Linear and list structures: Arrays, stacks, queues and lists; Sequential and linked structures; 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: 75
Internal Assessment : 25
Time: 03 hrs

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

Systems 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, Conversion 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: 75
Internal Assessment : 25
Time: 03 hrs

Set: Cardinality, counting, operation.
Functions: Boolean functions, permutation functions.
Induction: Principles of Mathematical induction, Fermat's theorem (without proof).

Exponentiation: (How to compute first exponentiation) Advantage of logarithmic algorithms over linear algorithms. "Big Oh" notation: GCD, Euclidean algorithm, Fibonacci numbers, complexity, congruences and equivalence relations, public key encryption schemes.

Graph Theory: Graphs, trees and LAN, Minimum distance trees, Minimum weight and Minimum distance spanning trees, recursive procedures.

Recursion: Merge sort, Insertion sort, Bubble sort, and Decimal to Binary.

Recurrence relations: LHRR, LHRRWCCs, DCRR
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-109 Digital Electronics

External Marks: 75
Internal Assessment : 25
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; flip-flops and multi-vibrator circuits, counter design techniques; counter design techniques; shift registers; encoder, decoder, multiplexor, demulti-plexor circuits; D/A and A D conversion.

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

THIRD SEMESTER

BCA-201: Computer System Architecture

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Register transfer and Micro-operations, Register Transfer Language, Bus and memory. Transfers, Arithmetic. Logic Micro-operations, Shift Micro-operations.

Basic Computer Organization and Design: Instruction 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 Arithmetic and Logic, Subroutines, Inputs-Outputs programming. Micro-programmed Control; Control Memory, Address Sequencing, Micro-programe Example, Design of Control Unit.
Central Processing 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 Ouoekubem 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, Asynchronous Data Transfer, Modes of transfer, Priority interrupt, Direct Memory Access(DMA), input-output processors(IOP), serial communication multi-processors, characteristics of multi-processors, Inter-connection structures, Inter-processor ArBCAration, Inter-processor Communication and Synchronization, Cache Coherence.

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-202 Algorithms and Advanced Data Structures

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

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

BCA – 203 Micro-processor & Assembly Language

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Evolution of micro-processor: overview of intel pro-pentium motorola 68000 series, power PC, DEC-Alphachip; RISC and 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 interface; I/O mapped I/O, memory mapped I/O; basic input/output and handshaking input/output port address decoding; 8255 programmable peripheral interface; 8279 programmable keyboard and display interface; 8254 programmable 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.

(This course should be taught in the context of 8085 to intel-pro pentium micro-processor and its assembly languages).

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 – 204 Database Systems

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Data Modelling for a database: records and files, abstraction and data integration.
Database Management System: Relational, Network; Hierarchieal.
Relational Data Manipulations: Relational Algebra, Relational Calculus, SQL.
Relational Database Design: Functional Dependencies, Finding Keys; 1st to 3rd NFs, BCNF, Lossess Join and Dependency preserving decomposition, computing closures 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 systems, Preliminary and final design, Testing and implementation Operation and tunning.
Use of Relational DBMS package for class project.

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

BCA – 205 **Practical – Software Lab.**
(based on Papers BCA-202 & BCA 204)

FOURTH SEMESTER

BCA – 206 Operating Systems Organization and Unix

External Marks: 75
Internal Assessment : 25
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 function: 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 mechanisms, 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-dependency and critical code section, mutual exclusion problem; classical process co-ordination problems; deadlock handling, inter-process communication.

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

Note:- The examiner is requested to set 8 questions covering the whole syllabus out of which the candidates will be attempt only 5 questions.

BCA – 207 Software Engineering

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

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, reasons for maintenance, types of maintenance (Perfective, adoptive, corrective), designing for maintenability, techniques for maintenance, Configuration management.
Comprehensive examples using available software platform/case tools.

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 – 208 Object Oriented Design and Programming

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

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:- 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 – 209 Financial Accounting

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

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

BCA – 210 Practical – Software Lab.
(based on Papers BCA-206 & BCA 207)

FIFTH SEMESTER

BCA-301 Data Communications & Network

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Data Communications: concepts of data, signal, channel, band-width, 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; multiplexing; TI/EI carrier systems; transmission medium; transmisison errors, error-detection and correction code.

Network Classification and data-communication services: Local area networks metropolyton area network. Wide area networks, wireless network, internetwork, Switched multimegaBCA Data Services, X.25, Frame Relay, narrowband and broadband ISDN, Asynchranous Transfer Modes.
Network reference Models: Layered architecture, protocol hierarchies, interface and services; ISC-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: The examiner is requested to set 8 questions covering the whole syllabus out of which the candidates will be requested to attempt any 5 questions.

BCA – 302 Computer Graphics

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Development of computer graphics; basic graphics system and standards; Raster Scan and Randod Scan graphics; continual refresh and storages displays; display processors and character generators; colour display techniques; frame buffer and BCABCA operations concepts in raster graphics. Points, lines and curves; ration; ploygon filling; conic-section generation, antiliasing. Two dimentional 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:- The examiner is requested to set 8 questions covering the whole syllabus, out of which the candidates are required to attempt any 5 questions.

BCA – 303 Principles of Visual and Windows Programming

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Diagram understanding: The symbolic descriptions 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 complies; The icon dictionary ID Physical logical part of econ, 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:- 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 – 304 On the job Training

Fundamentals of technical communications, oral and written communication, Preparing oral presentations and supporting materials. Software project documentation of different kinds.

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

SIXTH SEMESTER

BCA – 306 Internet Technologies & Applications

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Network layer functions and protocols: Switching; routing and congestion control; X.25; Internet protocol (IP);

Transport Layer functions and Protocols: addressing flow control, connection management, multiplexing, Transmission control, protocol (TCP) and user datagram protocol (UDP), socket & TLI interface.

Applications 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 methods: gopher, WAIS, Server side programming, CGI scripts, Security issues, Emphasis on understanding, exploring and extending internet technologies using Java or perl.

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 – 307 Scientific & Statistical Computing

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Numerical methods:

Floating point arithmetic: 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-liner: Bisection, fixed point iteration, Newton's Repsons Methods.

Solution of Ordinary differential equation – Taylor series, method, Range-Wulta method, 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 Theorms: Poisson and normal approximations, Control limit Theorm Law of large numbers.

Statistical inference Eimate and sampling, point and interval estimate of hypothesis testing, power of a test, regression.

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 – 308 Multi-media and Applications

External Marks: 75
Internal Assessment : 25
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 environments in various fields, such as medical, entertainment, manufacturing, business, education etc.

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 – 309 **Management Information System**
OR Programming Languages

External Marks: 75
Internal Assessment : 25
Time: 03 hrs

Data and information; forms of data; data generation, capturing, collection, recording, retrieval and processing. Information and Information systems; forms of information systems; Computers in Information systems; Computer Based Information System – including Office Automation systems Transaction Processing Systems and Decision Support Systems; Expert Systems.

Role of VBIS in Government; Society and Business organizations. Using Information Systems as a Cost reduction measure in Society. Macros and Micro level information systems. PC based software such as MS-Office, as a micro level information processing tool.

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 – 310 **Practical – Software Labs**
(based on Papers BCA-306, 307and 308)
