Syllabus for BCA

Session –w.e.f. 2017-2018
**BACHELOR OF COMPUTER APPLICATIONS (BCA) Regular**

**SYLLABUS AND SCHEME OF EXAMINATION – 1st YEAR( 1st and 2nd SEMESTERS)**

w.e.f. 2017-18

Period per week: 6 for each theory paper and 6 for each practical group in each semester.

<table>
<thead>
<tr>
<th>Paper No.</th>
<th>Title of Paper</th>
<th>Max. Marks</th>
<th>Exam Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCA-101</td>
<td>Computer &amp; Programming Fundamentals</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-102</td>
<td>PC Software</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-103</td>
<td>Mathematics</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-104</td>
<td>Logical Organization of Computer-I</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-105</td>
<td>Practical software Lab – Based on paper BCA-102 i.e Word, Excel and Power point</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-106</td>
<td>‘C’ Programming</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-107</td>
<td>Logical Organization of Computer-II</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-108</td>
<td>Mathematical Foundations of Computer Science</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-109</td>
<td>Structured System Analysis and Design</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-110</td>
<td>Practical software Lab – Based on paper BCA-106, i.e. ‘C’ Programming</td>
<td>80</td>
<td>3 Hours</td>
</tr>
</tbody>
</table>
BCA-101: COMPUTER & PROGRAMMING FUNDAMENTALS

External Marks: 80
Internal Marks: 20
Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I

Computer Fundamentals: Generations of Computers, Definition, Block Diagram along with its components, characteristics & classification of computers, Limitations of Computers, Human-Being VS Computer, Applications of computers in various fields.
Memory: Concept of primary & secondary memory, RAM, ROM, types of ROM, Cache Memory, flash memory. Secondary storage devices: Sequential & direct access devices viz. magnetic tape, magnetic disk, optical disks i.e. CD, DVD, virtual memory.

UNIT-II

Computer hardware & software: I/O devices, definition of software, relationship between hardware and software, types of software.
Overview of operating system: Definition, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, time-sharing, real time, single-user & multi-user operating system.
Computer Virus: Definition, types of viruses, Characteristics of viruses, anti-virus software.

UNIT-III

Computer Languages: Analogy with natural language, machine language, assembly language, high-level languages, forth generation languages, compiler, interpreter, assembler, Linker, Loader, characteristics of a good programming language, Planning the Computer Program:
Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.
Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming, Advantages and disadvantages of Structured programming.

UNIT-IV

Overview of Networking: An introduction to computer networking, Network types (LAN, WAN, MAN), Network topologies, Modes of data transmission, Forms of data transmission, Transmission channels(media), Introduction to internet and its uses, Applications of internet, Hardware and Software requirements for internet, Intranet, Applications of intranet.

SUGGESTED READINGS

4) Rajaraman, V., Fundamentals of Computers, PHI
5) Ram, B., Computer Fundamentals, Architecture & Organization, New Age International (P) Ltd.
BCA-102: PC SOFTWARE

External Marks: 80
Internal Marks: 20
Time: 3 hours

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UNIT - I
MS-Windows: Operating system-Definition & functions, basics of Windows. Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance. Using windows accessories.

UNIT - II

UNIT - III

UNIT - IV
Presentation using MS-PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.

SUGGESTED READINGS
1) Microsoft Office – Complete Reference – BPB Publication
2) Satinder Bal Gupta, Introductory Concepts of Information Technology, Shree Mahavir Book(Publishers), Delhi
3) Learn Microsoft Office – Russell A. Stultz – BPB Publication
BCA-103: MATHEMATICS

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT I

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

DETERMINANTS: Definition, Minors, Cofactors, Properties of Determinants, Applications of determinants in finding area of triangle, Solving a system of linear equations.

MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, solving system of linear equation Cramer’s Rule.

UNIT II

RELATIONS AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.

LIMITS & CONTINUITY: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity of a function at a Point, Continuity Over an Interval, Sum, product and quotient of continuous functions, Intermediate Value Theorem, Type of Discontinuities.

UNIT III

DIFFERENTIATION: Derivative of a function, Derivatives of Sum, Differences, Product & Quotient of functions, Derivatives of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Chain Rule and differentiation by substitution.

UNIT IV

INTEGRATION: Indefinite Integrals, Methods of Integration by Substitution, By Parts, Partial Fractions, Integration of Algebraic and Transcendental Functions, Reduction Formulae for simple and Trigonometric Functions, Definite Integral as Limit of Sum, Fundamental Theorem of Integral Calculus, Evaluation of definite integrals by substitution, using properties of definite integral.

SUGGESTED READINGS

1) Satinder Bal Gupta: Discrete Mathematics and Structures, University Science Press, Delhi.
3) Lipschutz, Seymour: Discrete Mathematics, Schaum’s Series
4) Trembley, J.P & R. Manohar: Discrete Mathematical Structure with Application to Computer Science, TMH.
5) Kenneth H. Rosen: Discrete Mathematics and its applications, TMH.
Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT - I
Information Representation: Number Systems, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Unicode

UNIT - II
Binary Logic: Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.

UNIT - III

UNIT - IV

SUGGESTED READINGS
5) Nicholas Carter, Schaum’s Outlines Computer Architecture, Tata McGraw-Hill

BCA-105 : Practical- Software lab
(Based on paper BCA-102, PC Software)
BCA-106 : ‘C’ PROGRAMMING

External Marks: 80
Internal Marks: 20
Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I
Overview of C: History of C, Importance of C, Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant, Structure of a C Program, printf(), scanf() Functions, Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, shorthand assignment operators, conditional operators and increment and decrement operators, Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity.

UNIT-II
Decision making & branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement.
Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement, Nested loops.

UNIT-III
User defined functions: Introduction/Definition, prototype, Local and global variables, passing parameters, recursion.

UNIT-IV
Arrays, strings and pointers: Definition, types, initialization, processing an array, passing arrays to functions, Array of Strings. String constant and variables, Declaration and initialization of string, Input/output of string data, Introduction to pointers.
Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.
Algorithm development, Flowcharting and Development of efficient program in C.

SUGGESTED READINGS
2) Gottfried, Byron S., Programming with C, Tata McGraw Hill
4) Yashwant Kanetker, Let us C, BPB.
5) Rajaraman, V., Computer Programming in C, PHI.
6) Yashwant Kanetker, Working with C, BPB.
Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT - I
Sequential Logic: Characteristics, Flip-Flops, Clocked RS, D type, JK, T type and Master-Slave flip-flops. State table, state diagram and state equations. Flip-flop excitation tables

UNIT - II
Sequential Circuits: Designing registers – Serial Input Serial Output (SISO), Serial Input Parallel Output (SIPO), Parallel Input Serial Output (PISO), Parallel Input Parallel Output (PIPO) and shift registers. Designing counters – Asynchronous and Synchronous Binary Counters, Modulo-N Counters and Up-Down Counters

UNIT - III
Memory & I/O Devices: Memory Parameters, Semiconductor RAM, ROM, Magnetic and Optical Storage devices, Flash memory, I/O Devices and their controllers.

UNIT - IV

SUGGESTED READINGS
5) Nicholas Carter, Schaum’s Outlines Computer Architecture, Tata McGraw-Hill
Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I
Basic Statistics: Measure of Central Tendency, Preparing frequency distribution table, Mean, Mode, Median, Measure of Dispersion: Range, Variance and Standard Deviations, Correlation and Regression.

UNIT-II
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.

UNIT-III
Tree: Trees, Minimum distance trees, Minimum weight and Minimum distance spanning trees.
Recursion: Recursively defined function.
Merge sort, Insertion sort, Bubble sort, and Decimal to Binary.

UNIT-IV
Recurrence Relations: LHRR, LHRRWCCs, DCRR. Recursive procedures.
Number Theory: Principle of Mathematical induction, GCD, Euclidean algorithm, Fibonacci numbers, congruences and equivalence relations, public key encryption schemes.

SUGGESTED READINGS
1) Satinder Bal Gupta: Discrete mathematics and Structures, University Science Press, Delhi.
6) Babu Ram: Discrete Mathematics
BCA-109 : Structured Systems Analysis and Design

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I
Introduction to system, Definition and characteristics of a system, Elements of system, Types of system, System development life cycle, Role of system analyst, Analyst/user interface, System planning and initial investigation: Introduction, Bases for planning in system analysis, Sources of project requests, Initial investigation, Fact finding, Information gathering, Information gathering tools, Fact analysis, Determination of feasibility.

UNIT-II
Structured analysis, Tools of structured analysis: DFD, Data dictionary, Flow charts, Gantt charts, decision tree, decision table, structured English, Pros and cons of each tool, Feasibility study: Introduction, Objective, Types, Steps in feasibility analysis, Feasibility report, Oral presentation, Cost and benefit analysis: Identification of costs and benefits, classification of costs and benefits, Methods of determining costs and benefits, Interpret results of analysis and take final action.

UNIT-III
System Design: System design objective, Logical and physical design, Design Methodologies, structured design, Form-Driven methodology(IPO charts), structured walkthrough, Input/Output and form design: Input design, Objectives of input design, Output design, Objectives of output design, Form design, Classification of forms, requirements of form design, Types of forms, Layout considerations, Form control.

UNIT-IV
System testing: Introduction, Objectives of testing, Test plan, testing techniques/Types of system tests, Quality assurance goals in system life cycle, System implementation, Process of implementation, System evaluation, System maintenance and its types, System documentation, Forms of documentation.

SUGGESTED READINGS
1) Systems Analysis and design, E.M. AWAD Galgotia Pub.(P) Ltd.
2) Data Management and Data Structures, Loomis (PHI)
3) System Analysis and Design, Elias Awad.
4) Introductory System analysis and Design, Lee Vol. I & II
**BACHELOR OF COMPUTER APPLICATIONS (BCA) Regular**  
**SYLLABUS AND SCHEME OF EXAMINATION – 2nd YEAR (IIIrd and IVth SEMESTERS)**  
**w.e.f. 2018-19**  
Period per week: 6 for each theory paper and 6 for each practical group in each semester.

### IIIrd Semester

<table>
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<th>Paper No.</th>
<th>Title of Paper</th>
<th>Max. Marks</th>
<th>Exam Duration</th>
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<tbody>
<tr>
<td>BCA-201</td>
<td>Introduction to Operating System</td>
<td>80</td>
<td>3 Hours</td>
</tr>
<tr>
<td>BCA-202</td>
<td>Data structures – i</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-203</td>
<td>Introduction to database system</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-204</td>
<td>Communication skills (English)</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-205</td>
<td>Practical software Lab – Based on paper BCA-202 &amp; 203 using C Language and SQL</td>
<td>80</td>
<td>3 Hours</td>
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### IVth Semester

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<th>Paper No.</th>
<th>Title of Paper</th>
<th>Max. Marks</th>
<th>Exam Duration</th>
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<tbody>
<tr>
<td>BCA-206</td>
<td>Web Designing</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-207</td>
<td>Data Structures – II</td>
<td>80</td>
<td>3 Hours</td>
</tr>
<tr>
<td>BCA-208</td>
<td>Object Oriented Programming Using C++</td>
<td>80</td>
<td>3 Hours</td>
</tr>
<tr>
<td>BCA-209</td>
<td>Software Engineering</td>
<td>80</td>
<td>3 Hours</td>
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<tr>
<td>BCA-210</td>
<td>Practical software Lab- Based on paper BCA– 206 &amp; 208, i.e.HTML and C++ Programming</td>
<td>80</td>
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</tr>
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BCA-201 : Introduction to Operating System

Time: 3 hours       External Marks: 80
Internal Marks: 20

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UNIT – I


UNIT-II

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms : FCFS, SJF, Round Robin & Queue Algorithms.
Deadlocks: Deadlock characterization, Methods for handling deadlocks, Banker's Algorithm.

UNIT-III

Memory Management: Logical versus Physical address space, Swapping, Contiguous allocation, Paging, Segmentation.
Virtual Memory: Demand paging, Performance of demand paging, Page replacement, Page replacement algorithms, Thrashing.

UNIT-IV

Device Management: Disk structure, Disk scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK.

Suggested Readings

BCA – 202 : DATA STRUCTURES – I

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I
Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures, Algorithms complexity and time-space tradeoff, Big-O notation.
Strings: Introduction, Storing strings, String operations, Pattern matching algorithms.

UNIT – II
Arrays: Introduction, Linear arrays, Representation of linear array in memory, address calculations, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, Sparse arrays.
Linked List: Introduction, Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Threaded lists, Garbage collection, Applications of linked lists.

UNIT – III
Stack: Introduction, Array and linked representation of stacks, Operations on stacks, Applications of stacks: Polish notation, Recursion.
Queues: Introduction, Array and linked representation of queues, Operations on queues, Deques, Priority Queues, Applications of queues.

UNIT – IV
Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees, Traversal algorithms using stacks.
Graph: Introduction, Graph theory terminology, Sequential and linked representation of graphs.

SUGGESTED READINGS
BCA – 203 :   INTRODUCTION TO DATABASE SYSTEM

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I
Roles in the Database Environment - Data and Database Administrator, Database Designers, Applications Developers and Users .

UNIT – II
Database System Architecture – Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances .
Data Independence – Logical and Physical Data Independence .
Classification of Database Management System, Centralized and Client Server architecture to DBMS .

UNIT – III
Entity-Relationship Model – Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams, abstraction and integration.
Basic Concepts of Hierarchical and Network Data Model, Relational Data Model:-Brief History, Relational Model Terminology-Relational Data Structure, Database Relations, Properties of Relations, Keys, Domains, Integrity Constraints over Relations, .

UNIT – IV
Relational algebra, Relational calculus, Relational database design: Functional dependencies, Modification anomalies, Ist to 3rd NFs, BCNF, 4th and 5th NFs, computing closures of set FDs, SQL: Data types, Basic Queries in SQL, Insert, Delete and Update Statements, Views, Query processing: General strategies of query processing, query optimization, query processor, concept of security, concurrency and recovery.

SUGGESTED READINGS
BCA-204 : COMMUNICATION SKILLS (ENGLISH)

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I
Introduction to Basics of Communication: Communication and its various definition, features/characteristics of the communication, process of communication, communication model and theories, barrier to effective communication.

UNIT-II
Improving LSRW: introduction, verbal and nonverbal communication, listening process, group discussion, forms of oral presentation, self-presentation, dyadic communication, 5C’s of communication, Developing dialogues, soft skill.

UNIT-III
Basic vocabulary: how to improve vocabulary, prefix/suffix, synonyms/antonyms, one word substitution, spellings
Developing fluency: grammar (conjunction, auxiliaries, prepositions, articles, tenses…….), language games.

UNIT-IV

Effective self-presentation & facing interview: The interview process & preparing for it, The presentation skills.

SUGGESTED READINGS
4. Mohan, Banerjee, Business Communication, Mac million
5. Raman, Singh – Business communication – Oxford Press

BCA-205 : PRACTICAL- SOFTWARE LAB
PRACTICAL BASED ON PAPER BCA-202 & 203 USING C LANGUAGE AND SQL.
BCA – 206: WEB DESIGNING

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I
Introduction to Internet and World Wide Web; Evolution and History of World Wide Web; Basic features; Web Browsers; Web Servers; Hypertext Transfer Protocol, Overview of TCP/IP and its services; URLs; Searching and Web-Casting Techniques; Search Engines and Search Tools;

UNIT – II
Web Publishing: Hosting your Site; Internet Service Provider; Web terminologies, Phases of Planning and designing your Web Site; Steps for developing your Site; Choosing the contents; Home Page; Domain Names, Front page views, Adding pictures, Links, Backgrounds, Relating Front Page to DHTML. Creating a Website and the Markup Languages (HTML, DHTML);

UNIT – III
Web Development: Introduction to HTML; Hypertext and HTML; HTML Document Features; HTML command Tags; Creating Links; Headers; Text styles; Text Structuring; Text colors and Background; Formatting text; Page layouts;

UNIT – IV
Images; Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; Working with Radio Buttons; Check Boxes; Text Boxes; DHTML: Dynamic HTML, Features of DHTML, CSSP(cascading style sheet positioning) and JSSS(JavaScript assisted style sheet), Layers of netscape, The ID attributes, DHTML events.

SUGGESTED READINGS
6. Deitel and Goldberg, “Internet and World Wide Web, How to Program”, PHI.
BCA – 207: DATA STRUCTURE – II

External Marks: 80
Internal Marks: 20

Time: 3 hours

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UNIT – I
Tree: Header nodes, Threads, Binary search trees, Searching, Insertion and deletion in a Binary search tree, AVL search trees, Insertion and deletion in AVL search tree, m-way search tree, Searching, Insertion and deletion in an m-way search tree, B-trees, Searching, Insertion and deletion in a B-tree, B+tree, Huffman’s algorithm, General trees.

UNIT – II

UNIT – III
Sorting: Internal & external sorting, Radix sort, Quick sort, Heap sort, Merge sort, Tournament sort, Searching: Linear search, binary search, merging, Comparison of various sorting and searching algorithms on the basis of their complexity.

UNIT – IV
Files: Physical storage devices and their characteristics, Attributes of a file viz fields, records, Fixed and variable length records, Primary and secondary keys, Classification of files, File operations, Comparison of various types of files, File organization: Serial, Sequential, Indexed-sequential, Random-access/Direct, Inverted, Multilist file organization.
Hashing: Introduction, Hashing functions and Collision resolution methods.

SUGGESTED READINGS
BCA-208: Object Oriented Programming Using C++

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I
Object Oriented Programming Concepts: Procedural Language and Object Oriented approach, Characteristics of OOP, user defined types, polymorphism and encapsulation. Getting started with C++: syntax, data types, variables, string, function, namespace and exception, operators, flow control, recursion, array and pointer, structure.

UNIT-II
Abstracting Mechanism: classes, private and public, Constructor and Destructor, member function, static members, references;
Memory Management: new, delete, object copying, copy constructor, assignment operator, this input/output

UNIT-III
Inheritance and Polymorphism: Derived Class and Base Class, Different types of Inheritance, Overriding member function, Abstract Class, Public and Private Inheritance, Ambiguity in Multiple inheritance, Virtual function, Friend function, Static function.

UNIT-IV
Exception Handling: Exception and derived class, function exception declaration, unexpected exception, exception when handling exception, resource capture and release.
Template and Standard Template Library: Template classes, declaration, template functions, namespace, string, iterators, hashes, iostreams and other types.

SUGGESTED READINGS
4. Shah & Thakker: Programming in C++, ISTE/EXCEL.
5. Johnston: C++ Programming Today, PHI.
7. Samanta: Object Oriented Programming with C++ & JAVA, PHI.
BCA-209 : Software Engineering

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I
Software Requirements Analysis & Specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

UNIT – II

UNIT – III
Software Implementation: Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style.

UNIT – IV

Suggested Readings
3. Pressman : Software Engineering, TMH.
BCA-210 : PRACTICAL- SOFTWARE LAB
PRACTICAL BASED ON PAPER BCA-206 & BCA-208 USING HTML AND C++ LANGUAGE
BACHELOR OF COMPUTER APPLICATIONS (BCA) Regular  
SYLLABUS AND SCHEME OF EXAMINATION – 3rd YEAR (Vth and VIth SEMESTERS)  
w.e.f. 2019-20  
Period per week: 6 for each theory paper and 6 for each practical group in each semester.

### Vth Semester

<table>
<thead>
<tr>
<th>Paper No.</th>
<th>Title of Paper</th>
<th>Max. Marks</th>
<th>Exam Duration</th>
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</thead>
<tbody>
<tr>
<td>BCA-301</td>
<td>Management information system</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>BCA-302</td>
<td>Computer Graphics</td>
<td>80</td>
<td>20</td>
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<tr>
<td>BCA-303</td>
<td>Data Communication and Networking</td>
<td>80</td>
<td>20</td>
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<tr>
<td>BCA-304</td>
<td>Visual Basic</td>
<td>80</td>
<td>20</td>
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<tr>
<td>BCA-305</td>
<td>Practical software Lab –Based on paper BCA- 304 i.e. Visual Basic</td>
<td>80</td>
<td>20</td>
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### VIth Semester

<table>
<thead>
<tr>
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<th>Title of Paper</th>
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</thead>
<tbody>
<tr>
<td>BCA-306</td>
<td>E-Commerce</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>BCA-307</td>
<td>Object Technologies &amp; Programming using Java</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>BCA-308</td>
<td>Artificial Intelligence</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>BCA-309</td>
<td>Introduction to .net</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>BCA-310</td>
<td>Practical software Lab – Based on paper-BCA-307 &amp; 309 using java &amp; .net</td>
<td>80</td>
<td>20</td>
</tr>
</tbody>
</table>
BCA – 301: MANAGEMENT INFORMATION SYSTEM

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV
Functional MIS: A Study of Personnel, Financial and production MIS, Introduction to e-business systems, e-commerce – technologies, applications, Decision support systems – support systems for planning, control and decision-making

SUGGESTED READINGS
BCA-302: Computer Graphics

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I


Output Primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary fill and flood-fill algorithms.

UNIT-II

2-D Geometrical Transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT-III

3-D Object Representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon-rendering methods.

UNIT-IV

3-D Geometric Transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D Viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

SUGGESTED READINGS
BCA – 303 : Data Communication and Networking

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I

UNIT – II
Analog and Digital Communications Concepts: Concept of data, signal, channel, bid-rate, maximum data-rate of channel, Representing Data as Analog Signals, Representing Data as Digital Signals, Data Rate and Bandwidth, Capacity, Baud Rate; Asynchronous and synchronous transmission, data encoding techniques, Modulation techniques, Digital Carrier Systems; Guided and Wireless Transmission Media; Communication Satellites; Switching and Multiplexing; Dialup Networking; Analog Modem Concepts; DSL Service.

UNIT - III
Data Link Layer: Framing, Flow Control, Error Control; Error Detection and Correction; Sliding Window Protocols; Media Access Control: Random Access Protocols, Token Passing Protocols; Token Ring; Introduction to LAN technologies: Ethernet, switched Ethernet, VLAN, fast Ethernet, gigabit Ethernet, token ring, FDDI, Wireless LANs; Bluetooth; Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways.

UNIT – IV

SUGGESTED READINGS
BCA – 304 : Visual Basic

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I


UNIT – II


UNIT – III


UNIT – IV

Programming with VB: Procedures: General & event procedures, Subroutines, Functions, Calling procedures, Arguments- passing mechanisms, Optional arguments, Named arguments, Functions returning custom data types, Functions returning arrays. Working with forms and menus: Adding multiple forms in VB, Hiding & showing forms, Load & unload statements, creating menu, submenu, popup menus, Activate & deactivate events, Form-load event, menu designing in VB Simple programs in VB.

SUGGESTED READINGS


BCA-305 : PRACTICAL- SOFTWARE LAB

PRACTICAL BASED ON PAPER BCA-304 (VB LANGUAGE) AND BCA-302
BCA – 306: E-Commerce

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

Unit I


Unit II

Advertisements: Introduction, Web Based Advertising, Types of Web-Based Advertising, Search Engine Advertisements, SEO, SEO Techniques, Advantages, Online share market operations, Online Marketing-Introduction, Definition, Importance, types

Unit-III
Email Marketing- Introduction, Use of Email, social networking-marketing tool, Social Media, Social Media Marketing-objectives, risks, Viral Marketing-Introduction, The Viral Effect, working, E-Retailing: Introduction, Components, Meaning, Customer Relationship Management (CRM)-Introduction, Purpose, Levels, Features, Importance, Goals, relation with IT, e-CRM, difference from CRM, Tools for Online Research-Introduction, Secondary Market Research, Factors, Primary Research-Types, Surveys, Focus Groups, Interviews, Observation, Experiments/Field Trials, Primary vs. Secondary Research, Web survey-Design Guidelines, Online Focus Groups-When Appropriate, Limitations, Data Mining, Social Media-Types of Social Networking Sites, Data Mining from Social Networking Sites,

Unit IV

Suggested Readings:
1. Satinder Bal Gupta, “IT and E-Commerce”, Mahavir Book Publications, Delhi
2. R.Kalakota and A.B.Whinston,Readings in Electronic Commerce, Addison Wesley,
4. E-Commerce An Indian Perspective; P.T.Joseph; S.J.; PHI.
5. E-Commerce; S.Jaiswal – Galgotia.
BCA-307 : Object Technologies & Programming using Java

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT-I
Object Oriented Methodology-1: Paradigms of Programming Languages, Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Benefits of OOPs, Introduction to Common OO Language, Applications of OOPs.
Object Oriented Methodology-2: Classes and Objects, Abstraction and Encapsulation, Inheritance, Method Overriding and Polymorphism.

UNIT-II
Object Oriented Concepts: Class and Objects-- Class Fundamentals, Creating objects, Assigning object reference variables; Introducing Methods, Static methods, Constructors, Overloading constructors; This Keyword; Using Objects as Parameters, Argument passing, Returning objects, Method overloading, Garbage Collection, The Finalize () Method.

UNIT-III
Packages: Defining Package, CLASSPATH, Package naming, Accessibility of Packages, using Package Members.
Interfaces: Implementing Interfaces, Interface and Abstract Classes, Extends and Implements together.
Exceptions Handling: Exception, Handling of Exception, Using try-catch, Catching Multiple Exceptions, Using finally clause, Types of Exceptions, Throwing Exceptions, Writing Exception Subclasses.

UNIT-IV
I/O in Java: I/O Basics, Streams and Stream Classes, The Predefined Streams, Reading from, and Writing to, Console, Reading and Writing Files, The Transient and Volatile Modifiers, Using Instance of Native Methods.

Suggested Readings
1. Programming in Java, E Balagurusamy.
2. The Complete Reference JAVA, TMH Publication.
4. JAVA 2 UNLEASHED, Tech Media Publications.
BCA-308 : Artificial Intelligence

External Marks: 80
Internal Marks: 20

Time: 3 hours

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I


Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem

Heuristic search techniques: Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction

UNIT – II

Knowledge Representation: Definition and importance of knowledge, Knowledge representation, Various approaches used in knowledge representation, Issues in knowledge representation.

Using Predicate Logic: Representing Simple Facts in logic, Representing instances and is_a relationship, Computable function and predicate.

UNIT – III

Natural language processing: Introduction syntactic processing, Semantic processing, Discourse and pragmatic processing.


UNIT - IV


Suggested Readings

BCA – 309 : INTRODUCTION TO .NET

Time: 3 hours        External Marks: 80
Internal Marks: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 8 parts (short-answer type questions) covering the entire syllabus and will carry 16 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 16 marks. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

UNIT – I

UNIT – II

UNIT – III
Operators and expressions: Arithmetic, relational, logical, bitwise, special operators, evolution of expressions, operator precedence & associativity, Control constructs in C#: Decision making, loops, Classes & methods: Class, methods, constructors, destructors, overloading of operators & functions.

UNIT – IV
Inheritance & polymorphism: visibility control, overriding, abstract class & methods, sealed classes & methods, interfaces. Advanced features of C#: Exception handling & error handling, automatic memory management, Input and output (Directories, Files, and streams).

SUGGESTED READINGS
1. Introduction to C# using .NET By Robert J. Oberg, PHI, 2002.