

**B.C.A. Second Year**  
**(Effective from session 2019-21)**

**BCA 201: Computer Communications and Networks**

**UNIT-I**

**Protocol Architecture:** Overview: Communication model, Data, Protocol and protocol architecture, Protocol functions, Design Issues for the layers, interfaces & Services, Connection oriented and connectionless services, service primitives, relationship of services to protocols , OSI Models, TCP/IP Model.

**Communication Networking:** Networks fundamentals, types of networks( LAN, MAN, WAN, Wireless Networks),

Internetworking and networking devices: Switch/Hub, Bridge, Router, Gateways and firewalls.

**UNIT-II**

**Data Communications:** Channel capacity Nyquist bandwidth, Shannon capacity formula,  
**Transmission media:** Coaxial, twisted pair, Comparative study of Categories of cables, Coaxial, Optical Fibers, Wireless transmission: radio, microwave, infrared.

**Data Encoding:** Encoding Standards (NRZ, Bipolar, ASK, FSK, PSK, PCM, AM, FM, PM), Spread Spectrum, Asynchronous and Synchronous transmission, Full and Half duplex communication.

**UNIT-III**

LAN Technology: LAN architecture, IEEE 802 standards, Ethernet ( CSMA/CD): Medium Access Control, 10Mbps, 100Mbps, Gigabit Ethernet. Brief survey of other LAN systems (Token ring,FDDI,ATM, Fiber channel). Latest trends in LAN technologies

**UNIT-IV**

**Data Link Control:** Flow control: Stop and Wait, Sliding window, Error detection: Parity Check, CRC. Error control: Stop and Wait ARQ, Go back-N ARQ, Selective-Reject ARQ, Bit and byte oriented protocols: HDLC and PPP)

**Circuit and packet Switching Concepts:** Circuit Switching Networks, Space Division switching, Time Division Multiplexing, Brief idea of SS7, Packet switching principles, virtual circuits and datagram's, brief idea of X.25

**UNIT-V**

IP addressing and subnetting: IP address Classes, subnets, Classful and classless addressing, Introduction to ARP and RARP, header formats of IPv4 IPv6.

**Recommended Books**

1. Data & Communications, William Stallings:
2. ComputerNetworks, A. S. Tanenbaum
3. Data Communications and Networking, Behrouz A Forouzan, Mcgraw Higher Ed
4. Computer Networking: A Top-Down Approach, James F. kurose, Keith W. Ross, Pearson Education

# BCA- 202: Database Management Systems

## UNIT-I

**Introduction** : Purpose of the data base system, data abstraction, data model, data independence, data definition language, data manipulation language, data base administrator, data base users, overall structure.

**ER Model** : entities, mapping constrains, keys, E-R diagram, reduction E-R diagrams to tables, generatio, aggregation, design of an E-R database scheme.

## UNIT-II

**Relational Model** : The catalog, base tables and views. Relational Data Objects - Domains and Relations: Domains, relations, kinds of relations, relations and predicates, relational databases.

**Relational Data Integrity** - Candidate keys and related matters: Candidate keys.

Primary and alternate keys. Foreign keys, foreign key rules, nulls. Candidate keys and nulls, foreign key and nulls.

## UNIT-III

**The SQL Language**: Data definition, retrieval and update operations. Table expressions conditional expressions, embedded SQL.

**Views**: Introduction, what are views for, data definition, data manipulation, SQL support.

## UNIT-IV

**Network model** : Basic concepts, data structure diagrams, DBTG CODASYL model, DBTG data retrieval facility, DBTG update facility, DBTG set processing facility, mapping networks to file, networks system.

**Hierarchical model** : basic concepts, tree structure diagrams, data retrieval facility, update facility, virtual records, mapping hierarchical to files, hierarchical system.

## UNIT-V

**File and system structure** : overall system structure, file organization, logical and physical file organization, sequential and random, hierarchical, inverted, nulllist, indexing and hashing, B-tree index files.

### Recommended Books

1. Fundamentals of Database System, Shamkant B. Navathe, Ramez Elmasri, Pearson.
2. Korth, Database Systems Concepts, McGrawHill.
3. Date C.J., Database Systems, AddisonWesley

# BCA 203: Fundamentals of Operating Systems

## UNIT-I

**Introduction:** What is an operating system? Mainframe, desktop, multiprocessor, distributed, clustered, real-time and handheld systems.

**Operating System Structures:** System components, operating system services, system calls, systems programs, system structure, virtual machines.

## UNIT-II

**Process:** Process concept, process scheduling, operations on processes, cooperating processes. Inter process communication.

**CPU Scheduling:** Basic concepts, scheduling criteria, scheduling algorithms, algorithm evaluation.

## UNIT-III

**Process Synchronization:** The critical section problem, semaphores, classical problems of synchronization.

**Deadlocks:** Deadlock characterization, methods for handling deadlocks. Deadlock prevention, avoidance and detection. Recovery from deadlocks.

## UNIT-IV

**Memory Management:** Swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

**Virtual Memory:** Demand paging, page replacement, allocation of frames, thrashing.

## UNIT-V

**Linux:** History, design principles, kernel modules, process management, scheduling, memory management, file systems, input and output, inter process communication, network structure, security..

## Recommended Books

1. Silberschatz G.G., Operating System Concepts, John Wiley & Sons Inc.
2. Modern Operating Systems, Andrew S. Tanenbaum, Pearson Prentice Hall,
3. Advanced Concepts in Operating Systems Distributed, Database, and Multiprocessor Operating Systems, Mukesh Singhal and Niranjan G. Shivaratri, Tata McGraw-Hill
4. Operating Systems: A Concept-based Approach, Dhananjay M. Dhamdhere, Tata McGraw-Hill Education,

## BCA 204: Data Structures

### UNIT-I

**Linear Structure:** Arrays, records, stack, operation on stack, implementation of stack as an array, queue, operations on queue, implementation of queue.

### UNIT-II

**Linked Structure :** List representation, operations on linked list - get node and free node operation, implementing the list operation, inserting into an ordered linked list, deleting, circular linked list, doubly linked list.

### UNIT-III

**Tree Structure :** Binary search tree, inserting, deleting and searching into binary search tree, implementing the insert, search and delete algorithms, tree traversals

### UNIT-IV

**Graph Structure :** Graph representation - Adjacency matrix, adjacency list, adjacency multilist representation. Orthogonal representation of graph . Graph traversals - BFS and DFS. Shortest path, all pairs of shortest paths, transitive closure, reflexive transitive closure.

### UNIT-V

**Searching and sorting :** Searching - sequential searching, binary searching, hashing. Sorting - selection sort, bubble sort, quick sort, heap sort, merge sort, and insertion sort, efficiency considerations.

### Recommended Books

1. Horowitz E Sartaj Sahni, Fundamentals of Data Structure, Galgotia Publication Private Limited., New Delhi.
2. Data Structure Using C & C++, Tannenbaum, PHI
3. DATA STRUCTURE , LIPSCHUTZ, Tata Mcgraw Hill Education Private Limited

# **BCA 205: System Analysis and Design**

## **UNIT-I**

Introduction: System Concept and the need for system approach, Definition of system and system analysis, Factoring into subsystems, Black box system, Introduction to the basic elements of the system, Different types and behaviour of the system.

## **UNIT-II**

The System Development Life Cycle and System Analyst: Source and inspiration of a new system development, Recognition and need, Linear approach and prototype approach, Different phases in SDLC, Role of System Analyst.

## **UNIT-III**

System Analysis: Importance of planning and control, Information Gathering: Various Methods, Tools of Structured Analysis: DFD, Decision Tree, Structured English, Decision Tables, Data Dictionary, Feasibility study. System Design: The Process of Design: Logical and Physical design, Methodologies: Structured, Form-Driven, IPO Charts etc., Input Output Form Design, File Organization: Sequential Indexed, inverted list, Database Design, Logical and Physical View of Data.

## **UNIT-IV**

System Implementation: Need of Testing, Test Plan, Quality Assurance, Trends in Testing, Audit Trail, Post Implementation Review, Project Scheduling, Selection of Hardware and Software

## **UNIT-V**

Security and Recovery in System Development: System Security: Definition, Threats to system security, Control measures, Disaster/ Recovery Planning, Ethics in System Development. Case Study.

### **Recommended books**

1. System Analysis and Design -E.M.Awad
2. System Analysis and Design - Dennis Wixom

# **BCA 206: Object Oriented Programming using C++**

## **UNIT – I**

Different paradigms for problem solving, need for OOP, differences between OOP and procedure oriented programming, abstraction, overview of OOP principles- encapsulation, inheritance and data binding polymorphism, abstraction.

C++ basics: structure of a C++ program, data types, declaration of variables, expressions, operators, type conversions, pointers and arrays, strings, structures, references, flow control statement, functions-scope of variables, parameter passing, recursive functions, default arguments, inline functions, dynamic memory allocation and deallocation operators.

## **UNIT – II**

C++ classes and data abstraction: class definition, class structure, class objects, class scope, this pointer, static class members, constant member functions, constructors and destructors, dynamic creation and destruction of objects, friend function and class, static class member.

Overloading : function overloading, operator overloading – unary, binary operators.

## **UNIT - III**

Inheritance: defining a class hierarchy, different forms of inheritance, defining the base and derived classes, access to the base class members, base and derived class construction, destructors, virtual base class.

Polymorphism: static and dynamic bindings, base and derived class virtual functions, dynamic binding through virtual functions, virtual function call mechanism, pure virtual functions, abstract classes, implications of polymorphic use of classes, virtual destructors.

## **UNIT - IV**

Templates - function templates and class templates, overloading of function template, static class member in class template.

Exception handling: benefits of exception handling, throwing an exception, the try block, catching an exception, exception objects, exception specifications, rethrowing an exception, catching all exceptions.

## **UNIT-V**

File handling : stream classes hierarchy, stream I/O, file streams, opening and closing data file, creating a data file, read and write functions, error handling during file operations, formatted I/O, sequential and random file processing.

Standard template library (STL): component of STL, containers, iterators, algorithms, application of container classes.

### **Recommended books**

1. Object Oriented Programming with C++ : E. Balagurusamy
2. C++: The Complete Reference, Herbert Schildt, McGraw Hill .
3. Let Us C++ , Yashwant Kanetkar, Bpb Publisher.
4. C++ Programming Concepts Black Book, Dasgupta, Chakrabarti, Dreamtech Press

## **BCA 207: Practical I: Database Management**

Experiments based on the paper BCA 202.

## **BCA 208: Practical II : Data Structure Lab.**

Experiments based on the paper BCA 204 and 206.

## PAPER CODE 1705

### सामान्य हिन्दी

पाठ्य पुस्तकें:

1. गद्य-वीथी- संपादक : डॉ. ओम प्रकाश भार्मा, प्रकाशक: माया प्रकाशन मंदिर
  2. कथा दशक - संपादक : डॉ. परमानंद पांचाल, प्रकाशक: राजस्थान प्रकाशन
  3. हिन्दी भाषा ज्ञान - संपादक: डॉ. हरिचरण भार्मा, प्रकाशक: अनुभा प्रकाशन
- पाठ्य विशय : पाँच इकाइयों में विभक्त होगा।

इकाई-1

- गद्य-वीथी पुस्तक से संक्षेपण एवं कथादशक पुस्तक से पल्लवन संबंधी ज्ञान।
- दोनो पुस्तकों से सामान्य तथ्यात्मक प्रश्नों का ज्ञान।

इकाई-2

- भाब्द ज्ञान।
- भाब्द पर्याय और विलोम भाब्दों का ज्ञान।
- अनेकार्थी एवं समश्रुत भाब्दों का ज्ञान।

इकाई-3

- पत्र लेखन और पत्रों के प्रकार सम्बन्धी ज्ञान।
- अंग्रेजी से हिन्दी अनुवाद का ज्ञान।
- हिन्दी में पद नाम संबंधी ज्ञान (अंग्रेजी से हिन्दी पदनाम)।

इकाई-4

- मुहावरे - लोकोक्तियाँ।
- भाब्द-सुद्धि और वाक्य सुद्धि।
- पारिभाषिक भाब्दावली।
- अनेक भाब्दों के लिए एक भाब्द।

इकाई-5

- देवनागरी लिपि की विशेषताएँ।
- देवनागरी लिपि एवं वर्तनी का मानक रूप।
- कम्प्यूटर में हिन्दी का अनुप्रयोग : प्रारंभिक परिचय।