Department of Electronics and Communication

J.K. Institute of Applied Physics & Technology

University of Allahabad, Allahabad

B. Sc. (Computer Science) Curtailed Syllabus

For Academic Session 2020-21 Only

B.Sc. (Computer Science)

B.Sc. Part I

Paper I: Basic Electronics

Basic Electronics: Semiconductors, PN junction diode-its characteristics and application as rectifier. Bipolar transistors: NPN and PNP transistors-their working and characteristics.

Boolean Algebra: Number Systems: Decimal, Binary, Octal and Hexadecimal number systems and inter conversion, Boolean expression, SOP and POS forms, Theorems of Boolean algebra and their use in simplification of Boolean functions.

Logic Gates and Logic families: Use of Logic Gates to make various logic circuits, Truth-table representation, Internal circuit diagram and working of standard TTL logic gates, Elementary idea of commonly used Logic families and their comparison based on characteristics.

Combinational circuits: Adders, Subtractors, Encoders-Decoders, Multiplexers-Demultiplexers, Application of Multiplexer in designing combinational circuits.

B.Sc. Part I

Paper II: Computer Fundamentals

Computing History, Generation of computers, Generations of Programming languages, Language Translators: Compiler, Interpreter and Assembler. Source and Object Program. Stored program concept, Functional block diagram of a Digital Computer.

Elements of computer: Hardware and software. Components of Computer: Memory, CPU, Input-output devices. Operating Systems and its functions, System Software and Application software. Single and multi-tasking systems.

Computer Memory: Primary and Secondary memory. Types of Read Only Memory and Read-Write memory. SRAM, DRAM, PROM, EPROM, EEROM, Flash Memory etc. Concept of cache memory, Memory hierarchy, Virtual memory.

Storage Devices: Storage mechanism in Magnetic and optical disks, concepts of tracks and sectors in magnetic and optical disks. Compact disc, DVD and Blue ray technology.

B.Sc. Part I

Paper III: Programming in C

Algorithms: Flowchart representation and pseudo-code development; Stages in program development; Low, middle and high level languages; Language translators; Syntax and logical errors.

Algorithms development: Prime number generation, random number generation**;** Euclid algorithm for gcd finding; Searching-linear and binary search algorithms; Sorting techniques, Insertion Sort, Selection Sort, Bubble Sort.

Features of C language variables; Data type Operators; Expressions; Control flows; Array; Structures, I/O operations; Functions; Storage Classes, files & pointers.

B.Sc. Part II

B.Sc. (Computer Science)

Paper I: Computer Architecture and Organization

Data Representation, Signed numbers, Fixed and Floating point numbers. Normalized floating point numbers. Computer arithmetic: Complements, Radix and diminished radix arithmetic.

Basic Computer Organization: Central Processing Unit, Registers, ALU, System bus-their functions and interconnection. Memory Organization and interleaving, Cache and its mapping, Memory hierarchy.

Microprocessor: 8085 microprocessor, architecture, pin diagrams, interrupts, instructions, addressing modes, machine language, assembly language, simple programs. Comparative study of CISC Intel 8-bit microprocessors and 16 bit microprocessors. Charateristics of RISC and comparison with CISC.

I/O Organization, Memory mapped and standard I/O mapped. Modes of data transfer, Programmed I/O, interrupt driven, Direct Memory Access, DMA controller. Polling, Priority interrupt Controller.

References

1. W. Stallings, "Computer Organization and Architecture: Designing for performance", Prentice Hall of India.
2. M. Mano, "Computer System Architcture", 3rd Edition, Pearson Education, Inc., 2003.
3. R.S. Gaonkar, "Micrprocessor Architecture, Prgramming and Applicatin with the 8085", 5th Edition, Penram International Publishing (India) Pvt. Ltd., 2011.
4. Rafiquzzaman, "Micrprocessor, Theory and Application: Intel and Motorla, Prentice Hall of India..
5. J. Hays, "Computer Architecture and Organization", McGraw-Hill.

B.Sc. Part II

Paper II: Computer Networks

Mobile Communication Channels

Channel capacity, baud and bit rate, maximum data rate of a channel, TDM & FDM multiplexing, synchronous and asynchronous transmission, data transmission modes.

The Electrical Interface

Attention & distortion sources, signal types, signal propagation delay, Transmission media-wired and wireless, comparison of different transmission media, Concepts of modulation-AM, FM & PM. Digital vs. analog signal modulation, baseband band and broadband transmission.

Data Networks:

Circuit switching, message & packet switching, virtual circuit vs. circuit switching; Network topologies-linear, circular, star tree & graph; Ethernet, token ring, token bus & FDDI; ATM & role of ATM in inter-networks; Network protocol basics; Error control and link management; Data link control protocols- bit oriented & character oriented protocols; OSI model; TCP/IP

Error detection & correction

Error detection & correction for synchronous & asynchronous transmission; Data correction using parity, checksum error detection; Hamming code, CRC

B.Sc. Part II

Paper III: Data Structures

Introduction:

Data structure, representation & Implementation, Complexity calculation of algorithms, Linear & non-linear data structures**.**

Linear Data Structures

Arrays, Ordered list & their representations; List operations-insertion, deletion & transversal; Stack, Queues, Priority Queues, Linked lists, Doubly linked lists, multi-channel lists and their variations; Algorithms for polynomial additions, Sparse matrix representation, Infix & postfix expressions, Garbage collection.

Non-Linear Data Structures

Binary trees & their representations, Binary trees traversals, Threaded binary trees, Height balancing and AVL tree, union and find algorithms, Decision tree.

Searching & Sorting

Sequential search, binary search, hashing, chaining and symbol tables, collision processing, Indexed search techniques, Internal & external sorting.

B.Sc. III

Paper-1: Programming in Java

Introduction to Java: Features of Java, JDK Environment

Object Oriented Programming Concept Overview of Programming, Paradigm, Classes, Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C++ and JAVA

Java Programming Fundamental :Structure of java program, Data types, Variables, Operators, Keywords, Naming Convention, Decision Making (if, switch),Looping(for, while) ,Type Casting

Classes and Objects: Creating Classes and objects, Memory allocation for objects, Constructor, Implementation of Inheritance, Implementation of Polymorphism, Method Overloading, Method Overriding, Nested and Inner classes

Arrays and Strings: Arrays, Creating an array, Types of Arrays, String class Methods, String Buffer methods.

Abstract Class, Interface and Packages: Modifiers and Access Control, Abstract classes and methods, Interfaces, Packages Concept, Creating user defined packages

Exception Handling: Exception types, Using try catch and multiple catch, Nested try, throw, throws and finally.

File Handling: Byte Stream, Character Stream, File IO Basics, File Operations, Creating file, Reading file, Writing File

Books Recommended:

1. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml, javascript, Perl Cgi , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
4. E Balagurusamy , Programming with JAVA, TMH, 2007

Software Lab based on Java

1. WAP to find the largest of n natural numbers.
2. WAP to find whether a given number is prime or not.
3. Write a menu driven program for following:
   (i). Display a Fibonacci series
   (ii). Compute Factorial of a number
   (iii). WAP to check whether a given number is odd or even.
   (iv). WAP to check whether a given string is palindrome or not.

4. WAP to print the sum and product of digits of an Integer and reverse the Integer.

5. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.

6. Write a program that will prompt the user for a list of 5 prices. Compute the average of the prices and find out all the prices that are higher than the calculated average.

7. Write a program in java to input N numbers in an array and print out the Armstrong numbers from the set.

8. Write java program for the following matrix operations:
   (i).Addition of two matrices
   (ii).Summation of two matrices
   (iii).Transpose of a matrix

9. Write a java program that computes the area of a circle, rectangle and a Cylinder using function overloading.

10. Write a Java program for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.

11. Write a program for the following string operations:
    - Compare two strings
    - Concatenate two strings
    - Compute length of a string

12. Create a class called Fraction that can be used to represent the ratio of two integers. Include appropriate constructors and methods. If the denominator becomes zero, throw and handle an exception.

B.Sc. III

Paper-2: Database Management Systems

Introduction to Database Management Systems: Characteristics of database approach, data models, DBMS architecture and data independence.

Entity Relationship and Enhanced ER Modeling: Entity types, relationships.

Relational Data Model : Basic concepts, relational constraints, relational algebra, SQL queries.

Database design: ER to relational mapping, functional dependencies, normal forms upto third normal form.

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.

2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.

3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.

4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.

Software Lab based on Database Management Systems

MySQL DDL Commands: Create table, alter table, drop table

DML Commands:

Select , update, delete, insert statements

Condition specification using Boolean and comparison operators (and, or,not,=,<>,>,<,>=,<=)

Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)

Multiple table queries (join on different and same tables)

Nested select statements

Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)

Categorization using group by……..having

Arranging using order by

B.Sc. III

Paper 3: System Administration and Maintenance

Operating System: Types of operating systems - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Real Time Systems. Basic OS functions, implementation consideration; methods of requesting system services – system calls and system programs, File Concepts, Directory and disk structure, Sharing and protection.

Linux/Unix: Installation and configuration, maintenance, What is Linux/Unix Operating systems, Kernel, API, cli, gui, Difference between Linux/Unix and other operating systems, Features and Architecture, Linux features, advantages, disadvantages

Windows: Windows operating system, history, versions. PC hardware, BIOS, Devices and drivers, Kernal Configuration and building Application installation, configuration and maintenance, Server services and Client services, Difference between Windows XP/windows7 and windows server 2003/2008

Software Lab Based on System Administration and Maintenance

Linux: Linux Desktop tour. Configuring desktop environment and desktop settings.

Basic Commands : Terminal, shell,Cat, ls, cd, date, cal, man, echo, pwd, Mkdir, rm, rmdir Ps, kill

Package Installation: Synaptic package manager

Windows: Creating users – Admin and regular. Path of their personal files. Adding and changing passwords. Difference between workgroup and domain. Concept of roles. user profiles – creating and roaming. Process and Disk management Windows Task manager. File systems – NTFS, FAT.

Network Administration: Ipconfig,Ping, tracert, route, hostname, net, netstat, whoami Set manual IP address, check connectivity – ipv4, ipv6

Administrator Tools

Control Panel -> Administrative Tools, Computer Management, Local security Policy, Performance Monitor, Task Scheduler, Antivirus and firewall.
