(Effective from session 2016-17)

BCA- 101: Introduction to Information Technology

UNIT-I

Computer Basics: Algorithms, A Simple Model of a Computer, Characteristics of Computers, Problem-solving Using Computers.

Data Representation: Representation of Characters in computers, Representation of Integers, Representation of Fractions, Hexadecimal Representation of Numbers, Decimal to Binary Conversion, Error-detecting codes.

Input & Output Devices: Description of Computer Input Units, Other Input Methods, Computer Output Units(Printers ,Plotters)

UNIT-II

Computer Memory: Memory Cell, Memory Organization, Read Only Memory, Serial Access Memory, Physical Devices Used to Construct Memories, Magnetic Hard Disk, floppy Disk Drives, Compact Disk Read Only Memory, Magnetic Tape Drives.
Processor: Structure of Instructions, Description of a Processor, Machine Language and Instruction set . processors used in desktops and lap tops.

Specification of a desktop and Lap top computer currently available in the market (Specifications of processor,motherboard &chipset, memory, interface & capacity of hard disk & DVD drives, I/O ports)

UNIT-III

Computer Architecture: Interconnection of Units, Processor to Memory communication, I/O to Processor Communication, Interrupt Structures, Multiprogramming, Processor Features, Reduced Instruction , Set Computers (RISC), Virtual Memory.
Software Concepts: Types of Software, Programming Languages, Software (Its Nature & Qualities), Programming Languages.

UNIT-IV

Operating Systems: History and Evolution. Main functions of OS Multitasking ,Multiprocessing,Time Sharing ,Real Time OS with Examples

Database Management System :Purpose and Organization of Database ,Introduction to Data Models

Computer Generation & Classifications: First Generation of Computers, The Second Generation, The Third Generation, The Fourth Generation, The Fifth Generation, Moore's Law, Classification of computers, Distributed Computer System, parallel computers.

UNIT- V

Computers & Communications : Introduction to Computer Communications, Introduction to Computer Networks, Types of Networks, OSI/TCP Model, LAN technologies (fast Ethernet &Gigabit Ethernet), How LAN works, Brief survey of active and passive LAN components.

Internet: Network, Client and Servers, Host & Terminals,TCP/IP, World Wide Web, Hypertext, Uniform Resource Locator, Web Browsers, IP Address, Domain Name, Internet Services Providers, Internet Security, Internet Requirements, Web Search Engine, Net Surfing, Internet Services, Case Study, Intranet.

Cyber Laws: Introduction to Cyber Laws**,**Cyber crime,Cyber contract,Cyber privacy,ITAct

Recommended Books

1. P .K. Sinha ,Fundamentals of Computers, BPBPublications
2. 1.V. Rajaraman, Fundamentals of Computers, 3rd Edition , PHIPublications

BCA-102: PC Software Packages

(This paper must be taught in the Lab using PC software)

UNIT-I

DOS: Introduction, history & versions of DOS, DOS basics- Physical structure of disk, drive name, FAT, file & directory structure and naming rules, booting process, DOS system files, DOS commands- internal & external,

UNIT-II

Windows Operating System : Windows concepts, Features, Windows Structure, Desktop, Taskbar, Start Menu, My Computer, Recycle Bin, Windows Accessories- Calculator, Notepad, Paint, Wordpad, Character Map, Windows Explorer, Entertainment, Managing Hardware & Software- Installation of Hardware & Software, Using Scanner, System Tools, Communication, Sharing Information between programs.

UNIT-III

Word Processing; MS-Word: Features, Creating, Saving and Opening Documents in Word, Interface, Toolbars, Ruler, Menus, Keyboard Shortcut, Editing, Previewing, Printing,& Formatting a Document, Advanced Features of MS Word, Find & Replace, Using Thesaurus, Using Auto- Multiple Functions, Mail Merge, Handling Graphics, Tables & Charts, Converting a word document into varipus formats like- Text, Rich Text format, Word perfect, HTML etc.

UNIT-IV

Worksheet- MS-Excel: Worksheet basics, creating worksheet, entering into worksheet, heading information, data, text, dates, alphanumeric values, saving & quitting worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, Keyboard shortcuts, Working with single and multiple workbook, working with formulae & cell referencing, Auto sum, Coping formulae, Absolute & relative addressing, Worksheet with ranges, formatting of worksheet, Previewing & Printing worksheet, Graphs and charts, Database, Creating and Using macros, Multiple worksheets- concepts, creating ndusing.

UNIT-V

Introduction to Power Point: 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.
Other packages: DTP software: Brief survey of MS Publisher, Pagemaker, Coreldraw.
Adobe Photoshop

Recommended Books:

1. PC Software for Windows – R.K.Taxali
2. Unix Concepts and Applications – SumitabhaDas

BCA 103: Problem Solving through C Programming

UNIT-I

Algorithm and algorithm development:

Definition and properties of algorithm, flow chart symbols, conversion of flow chart to language, example of simple algorithms, Introduction to program design, errors – syntax error, runtime error, logic error.

UNIT-II

Basics of C – Language:

History, Constants – Integer, Real, Character; Variables and Keywords; Data types and size, constants, arrays, pointers, Operators – arithmetic, relational, logical, increment and decrement, bitwise and assignment, Hierarchy of Operators and Operations, Associativity of Operators, creation and evaluation of expressions.

UNIT-III

Control Structure:

Decision Structure: - Simple if, if – else, if – else – if, nested if, switch case; Loop Control Structure:- while , do while and for; Use of break, goto andcontinue;

UNIT-IV

Functions:

Function definition, declaration and prototypes, Call by Value and Call by Reference, Scope Rule of Functions.

UNIT-V

Complex C-Language:

Variables – external, static, register; Recursive functions; multi – dimensional arrays; Pointers and arrays, pointer arrays, Structures – declaring and accessing elements, array of structure, File Input/Output – Create, Open, Read, Write, Delete, Close;

Recommended Books:

1. **Yashavant Kanetkar, Let usC**
2. **Balaguruswamy, Programming inC**

BCA – 104: Basic Physics

(This paper must be taught to impart basic knowledge of physics to understand principle behind technologies used in Computer Application. Avoid derivations of equations and problem solving. Question paper must be set accordingly)

UNIT-I

Basic Concepts : Definition of Science, engineering and technology. Importance of Mathematics and Physics in ICT. Units and Dimensions, MKSA Units, Idea of order of magnitude scale of Mass, time and length with examples. Measurement of length using vernier caliper and screw gauge, Newton's laws of motion, physical quantities as scalars and vectors, vector addition, scalar and vector product of two vector, Brief idea of types of forces in nature, torque, rotational motion and moment of inertia, simple examples of conservation of energy, momentum and angularmomentum.

Optical instruments: Electromagnetic spectrum, frequency,wavelength and energy associated with electromagnetic radiation, formation of image by lens, eye, Sensitivity of eye to electromagnetic radiation, defects of vision, Brief understanding of telescope, microscope, eye pieces.

UNIT-II

Electrostatics: Concept of Potential and field due to a charge, Gauss's law; dielectric constant, capacitance of a parallel plate condenser, energy stored in condenser, series and parallel combination of capacitances, types of capacitances used in electronic circuits, rating of capacitances.

Current Electricity: Electric current, Ohm's law, types of resistances and colour codes, Kirchhoff's laws, analysis of simple circuits, Thevenin, Norton and maximum power transfer theorems, principle of potentiometer, magnetic effect of current, field due to circular current loop.

UNIT-III.

Transducers: Thermoelectric effect and thermocouples, thermisters, LDRs, piezo electric effect, speakers and mic, electro chemical effect, primary and secondary cells, batteries. Electrical rating of cells andbatteries

Interaction of magnetic field and current: for ce on current carrying conductor, moving coil galvanometer, conversion of galvanometer into ammeter and voltmeter, multimeter.

UNIT-IV

Electromagnetic induction: self and mutual inductances, chocks coil and transformers.

AC circuits: peak and rms voltage and current, power factor, L-R, C-R and L-C-R curcuits with their phase diagrams, series and parallel resonant curcuits.
AC &DC current, understanding electric power distribution in offices and houses, electrical safety,electric fuse, rating of electrical accessories. Importance of good earthing.

Semiconductors: Qualitative description of energy bands, metals, insulators and semiconductors, n and p types of semiconductors, semiconductor p-n junction, metal semiconductor junction, current voltage characteristics of pn junction diode, half wave and full wave rectifiers, Zener diode and voltage regulation, LEDs, photo diode, and solarcell.

UNIT-V

Transistors: Definition, Current in bipolar junction transistor, Amplifier: Brief idea of CE,CC amplifier and its charactersistics, gain indecibels,Frequency vs gain graph, cascading amplifiers, Oscillator: Brief idea about oscillators of different frequency range, Different types of wave forms. Brief introduction to Integrated circuits with scale of integration, Use of MOS and CMOS Transistors.

Lasers: Basic principle, He-Ne and semiconductor lasers, basic concepts of communication using optical fibers.

Brief idea of working and uses of Cathode ray Oscilloscope, Working principle of LCD and plasma devices, UPS, SMPS**.**

Recommended Books:

1 Physics, Part-I Kumar, Mittal; Nageen Publication,Meerut.
2 Concepts Of Physics, Part 1, H C Verma; BharatiBhawan.
3 Concepts of Physics, Part2, H C Verma; BhartiBhawam.

BCA 105: Basic Mathematics

Objectives: The aim of this course is to impart basic knowledge of Mathematics and its further application in various disciplines in computational sciences and technology. As Some of the students in BCA come from Arts , Commerce and Biology stream, Level of course is 12^{th} standard.

Unit-I

Sets & Relations : Sets and elements, Equal sets, Universal set & Empty set, Subsets, Venn diagrams, Basic operations on sets, Union & Intersection, Complements, Difference, Symmetric Difference, Fundamental Products, Algebra of sets and Duality, Finite Sets, Counting Principle, Classes of sets, Power sets, Partitions, Mathematical Induction, Cartesian Products of Sets, Relations, Pictorial representations of Relations, Composition of relations, Types of relations, Equivalence Relations, Partial ordering relations.

Unit-II

Functions, Limts and Continuity : Functions, Kinds of Functions , Concept of real function, Domain and Range (simple cases), Composition Function, One-to-one, onto, into, invertible functions, Mathematical Functions , Exponential and Logarithmic Functions, Graph of functions (plotting of linear function, absolute value function, parabolic functions, Sin(x), Cos(x), tan(x), reciprocal function, e^x, log x, Signum function), Polar coordinates and graph, Limit of variable, Limit of function, Evaluation of limits of various types of functions, Continuity & Discontinuity at a point, Continuity over aninterval.

Trignometrical Functions: Definitions, proofs for any angle θ, signs of ratios, ratios of some standard angles.

Unit-III

Quadratic Equation: Solution of Quadratic Equations, Nature of Roots.

Co-ordinates and Loci: Cartesian co-ordinate system, Introduction to Polar co-ordinates, distance between two points, section formulae, Area of triangle, Locus and its Equation.

Straight Line: Equation of straight line parallel to an Axis, slope form, intercept form, through two point condition of concurrency of three lines.

Matrices and Determinants : Definition and Types of Matrices, Addition , Subtraction and Multiplication of a Matrices, Scalar Multiplication, Transpose of Matrix, Determinants, Determinants of square matrix of order 1, 2 and 3, Area of a triangle, Solution of system of linear equations by Cramer's Rule, Minors and Cofactors , Adjoint of a Matrix, Inverse of a Matrix(up to order 3).

Unit-IV

Differential Calculus: Derivative of a Function, Various Formulae-Product and Quotient Rule of Differentiation, Differentiation of Function of Function(chain rule), Trignometrical functions, Inverse Trignometrical functions, Exponential function, Logarithmic function, Implicit functions, Logarithmic Differentiation, Diffentiation of function w.r.t. another function, Higher Derivatives, Successive Differentiation, Liebnitz Theorem, Expansion of functions(up to 3 or 4 terms only) using Maclaurin's and Taylor's Theorem, Maxima and Minima (simple cases), Curve tracing (simple cases), Introduction to partial differentiation.

Unit-V

Integral Calculus : Anti-Derivatives, Constant of integration, Indefinite integral, Elementary Integration Formulae, Methods of Integration, Integration by Substitution, Integration by parts, integration through partial fractions and rationalisation, Concept of Definite integral, properties of definite integral, Integration of ${}_0\int^{\pi/2} \mathrm{Sin}^n x \, \mathrm{Cos}^m x$ using Gamma function. Area of Bounded Region, Circle, Parabola, Ellipse in standard form between two ordinates and x- axis.

Books:

1. Descrete Mathematics . Schaum'sOutlines
2. Differential Calculas By Shanti Narayan,P.K.Mittal
3. Integral Calculas By Shanti Narayan,P.K.Mittal
4. Elementary Calculas By Gokhru &Bhargav.
5. Business Mathematics By Quaji Zameeruddin, V.K.Khanna,S.K.Bhambri
6. Comprehencive Mathematics Class XII Part-A By ParmanandGupta

BCA 106: Computer Organization

UNIT-I

Overview of electronics: Electronic components – Register, Capacitor and Inductors, Semiconductor devices – Diodes, Transistors (BJT and FET). Analog vs Digital electronics, Transistor as a switch. Integrated circuits, SSI, MSI, LSI, and VLSI circuits. Multivibrators – astable, bistable, monostable, counters ripple and decade, edge and level triggering.

UNIT-II

Building blocks of computer system: Basic building blocks – I/O, Memory, ALU and its components, Control Unit and its functions, Instruction –word, Instruction and Execution cycle, branch, skip, jump and shift instruction, Operation of control registers; Controlling of arithmeticoperations;

UNIT-III

Addressing techniques and registers: Addressing techniques – Direct, Indirect, Immediate, Relative, Indexed addressing and paging. Registers – Indexed, General purpose, Special purpose, overflow, carry, shift, scratch, Memory Buffer register; accumulators; stack pointers; floating point; status information and buffer registers.

UNIT-IV

Memory: Main memory, RAM, static and dynamic, ROM, EPROM, EEPROM, EAROM, Cache and Virtual memory.

UNIT- V

Interconnecting System components:

Buses, Interfacing buses, Bus formats – address, data and control, Interfacing keyboard, display, auxiliary storage devices and printers. I/O cards in personal computers.

Introduction to Microprocessors and Microcontrollers: introduction to 8085 micropocesor, examples of few instructions to understand addressing techniques. Difference between microprocessor andmicrocontrollers.

Recommended Books

1. Andrew S. Tanenbaum , Structured Computer Organization,PrinticeHall
2. William Stallings, Computer Organization and Architecture , Sixth Edition, Pearson

BCA 107: Practical I: PC Software and Basic Electronics Lab.

Experiments based on papers BCA 102 and BCA 106.

BCA 108: Practical II: C Programming Lab.

Experiments based on paper BCA 103 under Linux OS