

BCA 3rd SEMESTER SYLLABUS
DEPARTMENT OF COMPUTER SCIENCE & IT
COTTON UNIVERSITY

PAPER : BCA301C

OBJECT ORIENTED PROGRAMMING USING C⁺⁺
(Credits: 3+1+1=5)

UNIT I: Introduction to object oriented programming [6 Lectures]

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.

UNIT II: C++ basics [8 Lectures]

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 III: Objects and classes [6 Lectures]

Encapsulation, information hiding, abstract data types, Object & classes, attributes, functions, C++ class declaration, member functions, State identity and behavior of an object, static data members and member functions, friend functions, constant member functions.

UNIT IV: Constructors and operator overloading [8 Lectures]

Constructors and destructors, instantiation of objects, Default parameter value, object types, C++ garbage collection, Metaclass/abstract classes. Operator overloading: Overload unary, binary operators, overloading binary operators using friends, manipulation of strings using operators.

UNIT V: Inheritance and polymorphism [10 Lectures]

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 VI: Exception Handling and files [10 Lectures]

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. 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.

Textbooks:

1. Herbert Schild, “ The complete reference to C++”, Osborn McGraw Hill

Recommended Books:

1. R. Lafore, “Object Oriented Programming using C++”, Galgotia Publications
2. Ian Graham, “Object Oriented Methods”, Addison Wesley..
3. E. Balaguruswamy, “Object Oriented Programming with C++”, Tata McGraw Hill

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PAPER : BCA302C

COMPUTER ORGANIZATION AND ARCHITECTURE

(Credits: 3+1+1=5)

UNIT I: Data representation [6 Lectures]

Data types, fixed-point representation, floating – point representation, other binary codes, error detection codes.

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic logic shift unit.

UNIT II: Basic computer organization and design [8 Lectures]

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Register reference instructions, Input – Output Instructions, Design of Accumulator Logic.

UNIT III: Central processor organization [8 Lectures]

Processor bus organization, arithmetic logic unit (ALU) instruction formats, addressing modes, data transfer and manipulation, program control, microprocessor organization.

UNIT IV: Input-output organization [8 Lectures]

Peripheral devices, asynchronous data transfer, direct memory access (DMA) ,priority interrupt, input –output processor (IOP).

UNIT V: Memory organization [8 Lectures]

Auxiliary memory, microcomputer memory hierarchy , associative memory , virtual memory, cache memory.

UNIT VI: 8085A microprocessor [10 Lectures]

Internal architecture of 8085 microprocessor, User Programmable registers, PC, SP, accumulator, flags, data bus, address bus, control bus, instruction word size, opcode format, data format. Assembly language programming in 8085A microprocessor: Complete instruction set in detail, programming examples, logic operation, counters and time delays, stack and subroutine, processing arrays, bit manipulation.

Textbooks:

1. M.Moris Mano , Computer System, Architecture, 2nd Edition Prentice Hall of India.

Recommended Books:

1. Heuring and Jordan, Computer systems design and Architecture , Peason Edition
2. William Stallings , Computer Organisation and Archotecture, Peason Education
3. Floyed , Digital Fundamentals,8th Edition , Peason Education.
4. Andrew S. Temenbauam, Structured Computer Organization , 3rd Edition ; Prentice Hall of India.
5. David Patterson & Hennessy , Computer Organization & Design , Elsevier.

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PAPER : BCA303C

SYSTEM PROGRAMMING
(Credits: 3+1+1=5)

UNIT I: Background [8 lectures]

Introduction, brief description and functions of Assembler, Loaders, Linkers, Macros, Compilers, Interpreters.

UNIT II: Assemblers [10 lectures]

Assembly language, Assembly process, Data structures, Macros and macroprocessors.

UNIT III: Macro language and the macro processor [10 lectures]

Macroinstruction, Features of macro facility, Macro instruction arguments, conditional macro Expansion, macro calls within macros, macro instructions defining macros., Implementation, Statement of problem, implementation of a restricted facility, A two pass algorithm, A single pass algorithm, implementation of macro calls within macros. Implementation within an assembler

UNIT IV: Linkers & loaders [8 lectures]

Basic concepts, Static and dynamic linking, Loader schemes, Compile & go, General loading Scheme, absolute loaders, Subroutine Languages, Relocating loaders, Direct linking loaders, other loading Schemes – Binders, linking loaders, Overlays, Dynamic binders. Design of absolute loader., Design of a Direct linking loader Specification of problem, Specification of data structure, format of databases algorithm.

UNIT V: Compilers [12 lectures]

Introduction to Compilers, Phases of compiler.

Textbooks:

1. Dhamdhere: System programming and Operating System TMH

Recommended books:

1. John J. Donowon , System Programming, TATA McGraw-Hil.
2. Beck: System Software, 3/e Pearson Education

PAPER : BCA304C

FORMAL LANGUAGE AND AUTOMATA THEORY

(Credits: 3+1+0=4)

UNIT I: Finite Automata [6 Lectures]

DFA, NFA, NFA with -moves. Equivalence of DFA and NFA. Reduction of the number of states in a finite automata.

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UNIT II: Regular Languages and Regular Grammar [10 Lectures]

Concept of languages and grammar. Regular expressions. Connection between regular expressions and regular languages. Regular grammars, Right and Left-Linear Grammars. Equivalence between Regular languages and Regular grammars.

UNIT III: Properties of Regular Languages [8 Lectures]

Closure under simple set operations- union, intersection, concatenation, complementation and star-closure. Decision algorithms for emptiness, finiteness and infiniteness, equality. Proof of non-regularity using Pigeonhole principle and using pumping lemma for regular languages.

UNIT IV: Context free languages [10 Lectures]

Context-free grammars, leftmost and rightmost derivations, derivation trees. Parsing and Ambiguity in grammars and languages. Simplification of Context free Grammars- removing useless productions, empty-productions and unit-productions. Normal forms- Chomsky and Greibach normal forms.

UNIT V: Pushdown Automata [6 Lectures]

Definition and language accepted (acceptance by empty stack and final state and their equivalence). Pushdown Automata and Context free languages. Deterministic PDA and Deterministic Context free Languages.

UNIT VI: Properties of Context free Languages [8 Lectures]

Pumping Lemma for CFL. Using Pumping Lemma to show certain languages not to be Context free. Closure properties of CFL closure under union, concatenation and starclosure. and showing that CFLs are not closed under intersection and complementation. Decision algorithms for emptiness, finiteness and infiniteness.

Textbooks:

1. An introduction to Formal Languages and Automata, Peter Linz, Narosa.

Recommended Books:

1. Introduction to Automata Theory, Languages and Computation, Hopcroft and Ullman, Addison Wesley.
2. K. L. P. Mishra, N. Chandrasekaran; Theory of Computer Science (Automata, Languages and Computation), P. H. I.
3. T. H. Cormen, C. E. Leiserson and R. L. Rivest, Introduction to Algorithms, Tata-Mcgraw Hill Publishers.

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PAPER : BCA305C

Computer graphics and Introduction to Human Computer Interface
(Credits: 3+0+1=4)

UNIT I: Computer Graphics: Points, lines and curves [8 Lectures]

Raster Scan and Random Scan graphics storages, displays processors and character generators, colour display techniques, interactive input/output devices, Scan conversion, line-drawing algorithms, circle and ellipse generation, conic-section generation, polygon filling, anti-aliasing.

UNIT II: Transformation and Two-dimensional viewing [8 Lectures]

Translation, Rotation, Scaling, Mirror Images, Coordinate system, 3D- Transformation, Rotation about an arbitrary axis, Orthogonal Projections, Multiple Views, Isometric Projection, Perspective Projections (one ,two and three vanishing points), Wire Frame Perspective Depth.Co-ordinate systems, linear transformations, line and polygon clipping algorithms.

UNIT III: Three-dimensional concepts [8 Lectures]

3-D representations, transformations, perspective and parallel projections, spline curves and surfaces, Hidden Surface and hidden - line removal algorithms, Shading models and colour models for solid objects.

UNIT IV: Introduction to HCI [10 Lectures]

Task-centred system design: task-centered process, development of task examples, evaluation of designs through a task-centered walk-through.

User-centred design and prototyping: assumptions, participatory design, methods for involving the user, prototyping, low fidelity prototypes, medium fidelity prototypes, wizard of Oz examples.

Methods for evaluation of interfaces with users: goals of evaluation, approaches, ethics, introspection, extracting the conceptual model, direct observation, constructive interaction, interviews and questionnaires, continuous evaluation via user feedback and field studies, choosing an evaluation method.

UNIT V:User Interface Design [6 Lectures]

Models, Principles and Practices. Beyond screen design: characteristics of good representations, information visualization, Tufte's guidelines, visual variables, metaphors, direct manipulation

UNIT VI: Graphical screen design [8 Lectures]

Graphical design concepts, components of visible language, graphical design by grids.Design principles and usability heuristics: design principles, principles to support usability, golden rules and heuristics, HCI patterns

Textbooks:

- 1.Hearn and M. P. Baker, Computer Graphics, PHI .
2. Research Methods in Human-Computer Interaction, Second Edition ,by Jonathan Lazar, Jinjuan Heidi Feng, Harry Hochheiser, Morgan Kaufmann.

Recommended Books:

1. Computer Graphics,Plastock,, Schaum Outline Series, TMH
2. "Designing the user interface", 3rd Edition Ben Shneidermann, Pearson Education Asia.
3. "Human –Computer Interaction", D.R.Olsen, Cengage Learning.
4. "Human – Computer Interaction", I.Scott Mackenzie, Elsevier Publishers.

BCA 3rd SEMESTER SYLLABUS
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(Skill Enhancement Course)

PAPER : BCA101SEC

INFORMATION AND COMMUNICATION TECHNOLOGIES
(Credits: 1+0+1=2)

UNIT I: Computer System [2 Lectures]

Evolution of computer system, Modern computer, Classification of computer, Personal Computer hardware: Monitor, Keyboard, Mouse, Scanner, printer, speaker

UNIT II: Hard Disk Drive [3 Lectures]

logical structure and file system, FAT, NTFS. Hard disk tools: Disk cleanup, error checking, de fragmentation, scanning for virus, formatting, installing additional HDD. New trends in HDD. Floppy Disk Drive

UNIT III: Optical Media [4 Lectures]

CDROM, drive speed, buffer, cache, CD-r, CD-RW, DVD ROM, DVD technology, preventive maintenance for DVD and CD drives, New Technologies. Driver installation, Writing and cleaning CD and DVD.

UNIT IV: Processor [4 Lectures]

Intel processor family. Latest trends in processor, Motherboard, Sockets and slots, power connectors. Peripheral connectors. Bus slots, USB, pin connectors. Different kinds of motherboards. RAM, different kinds of RAM. RAM up gradation. Cache and Virtual Memory (only concept will be given without going into implementation details)

UNIT V: SMPS, BIOS [3 Lectures]

SMPS. BIOS. Network Interface Card, network cabling, I/O Box, Switches, RJ 45 connectors, Patch panel, Patch cord, racks, IP address.

Textbooks:

1. Vikas Gupta; Comdex“ Hardware and Networking Course Kit; DreamTech press.

Recommended Books

1. Ron Gilster; PC hardware: A beginners Guide; Tata McGraw Hill. (First edition)
