



UNIVERSITY DEPARTMENT OF COMPUTER APPLICATIONS

(COMPUTER CENTRE)

(Recognised by Govt. of Bihar & Approved by AICTE, New Delhi)

TILKA MANJHI BHAGALPUR UNIVERSITY

BHAGALPUR – 812007, Bihar, India

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MCA Syllabus

MCA Semester – I

CSC-1	Computer Organization and Architecture	Credit: 4
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Unit-1. Fundamentals of Digital Logic: Boolean Algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps. Combinational Circuits : Adders, Mux, De-Mux, Sequential Circuits : Flip-Flops (SR, JK & D), Counters : synchronous and asynchronous Counter

Unit-2. Computer System: Comparison of Computer Organization & Architecture, Computer Components and Functions, Interconnection Structures. Bus Interconnections, Input / Output: I/O Module, Programmed I/O, Interrupt Driven I/O, Direct Memory Access

Unit-3. Memory System Organization: Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory. Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performance, Cache Coherence. Virtual Memory, External Memory : Magnetic Disks, Optical Memory, Flash Memories, RAID Levels

Unit-4. Processor Organization: Instruction Formats, Instruction Sets, Addressing Modes, Addressing Modes Examples with Assembly Language [8085/8086 CPU] , Processor Organization, Structure and Function. Register Organization, Instruction Cycle, Instruction Pipelining. Introduction to RISC and CISC Architecture, Instruction Level Parallelism and Superscalar Processors: Design Issues. Control Unit: Micro-Operations, Functional Requirements, Processor Control, Hardwired Implementation, Micro-programmed Control

Unit-5. Fundamentals of Advanced Computer Architecture: Parallel Architecture: Classification of Parallel Systems, Flynn's Taxonomy, Array Processors, Clusters, and NUMA Computers. Multiprocessor Systems : Structure & Interconnection Networks, Multi-Core Computers: Introduction, Organization and Performance.

Reference Books:

1. Computer Organization & Architecture, William Stallings, 8e, Pearson Education.
2. Computer Architecture & Organization, John P. Hayes, 3e, Tata McGraw Hill.
3. Computer Architecture & Organization, Nicholas Carter, McGraw Hill.
4. Computer Architecture & Organization, 2e, Miles Murdocca & Vincent Heuring, Wiley India.

CSC-2	Object Oriented Programming in C++ & Data Structure	Credit: 4
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Unit-1. Principal of Object Oriented Programming: Procedure oriented Vs Object oriented, OOP paradigm, Features of OOP, Basic Data types Tokens, Keywords, Constant, Variables, Operator I/O statements, Structure of C++ program, Arrays, pointers, Object modeling technique (OMT).

Unit-2. Object and Class: Defining class, Abstract class, Function prototype, Function with parameter, Passing object as a parameter, Constructor function, Types of constructor, Destructor Friend function, Friend class, Dynamic allocation operator new and delete.

Unit-3. Polymorphism and Inheritance: Types of polymorphism, Constructor overloading, Operator overloading, Template function Template class, Types of inheritance, private, protected and public derivation of class, Resolving ambiguity, Pointer to object, this pointer, Virtual class, virtual function.

Unit-4. Input - output and File handling I/O classes: File and stream classes, Opening and closing file Detecting end of file, String I/O, Char I/O, Object I/O, I/O with multiple object, File pointer, Disk I/O.

Unit-5. Exception handling, Name spaces and Standard Template library (STL):Need of Exception handling, try, catch and throws keywords, defining namespace, benefit of namespace, Component of STL.

Unit-6. Data Structures: Self-Referential Classes, Dynamic Memory Allocation and Data Structures, Linked Lists, Stacks, Queues, Trees.

Reference Books:

1. ReemaThareja, Object Oriented Programming with C++, OUP.
2. Deitel, C++ How to Program, PE.
3. Bajarnestroustroup, Object Oriented Programming Using C++, PE
4. Herbert Schildt, C++ - A Complete Reference, TMH.

CSC-3	Operating System & Shell Programming	Credit: 4
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Unit-1. Introduction: Definition, Design Goals, Evolution; Concept of User, job and Resources; Batch processing, Multi-programming, Time sharing; Structure and Functions of Operating System.

Unit-2. Process Management: Process states, State Transitions, Process Control block, Context Switching, Process Scheduling, Scheduling algorithm, Threads, Inter process synchronization and communication-need, Mutual exclusion, semaphore, Monitors, Messages, Deadlock, Deadlocks Prevention, Deadlocks Avoidance, Deadlocks Detection..

Unit-3. Memory Management: Address Binding, Dynamic Loading and Linking Concepts, Logical and Physical Addresses, Contiguous Allocation, Fragmentation, Paging, Segmentation, Combined Systems, Virtual Memory, Demand Paging, Page fault, Page replacement algorithms, Global Vs Local Allocation, Thrashing, Working Set Model, Page Fault Frequency.

Unit-4. File and Secondary Storage Management: File Attributes, File Types, File Access Methods, Directory Structure, File System Organization and Mounting, Allocation Methods, Free Space management; Disk Structure, Logical and Physical View, Disk Head Scheduling, Formatting, Swap Management. Operating System Security, Case Study of UNIX/ LINUX and WINDOWS Operating systems.

Unit-5. Shell programming: Need of Shell programming, types of Shells in Linux/Unix, Shell variables: User Defined Variables, environment variables, predefined variables, reading values into user defined variables, command substitution computation on shell variable , handling shell variables, passing arguments to the shell, shift command, conditional execution operators, conditional statements , test command, Iterative statements : for, while, until, break, continue statements , practical examples on shell programming. Exercises on shell programming.

Reference Books:

1. Chauhan, Principles of Operating System, OUP.
2. A. Tanenbaum, Operating System, PE.
3. W. Stalling, Operating System, PHI.
4. YashwantKanitkar, Unix Shell Programming, BPB.
5. Silberschatz and Galvin, Operating System Concepts, Addison Wesley.

AECC-1	Environmental Sustainability &Swachchha Bharat Abhiyan Activities	Credit: 4
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Unit-1. Introduction to environmental studies: Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.

Unit-2. Ecosystems: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

Unit-3. Natural Resources (Renewable and Non-renewable Resources): Land resources and land use change; Land degradation, soil erosion and desertification; Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water : Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit-4. Environmental Pollution: Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution; Nuclear hazards and human health risks. Solid waste management : Control measures of urban and industrial waste. Pollution case studies.

Unit-5. Environmental Policies & Practices: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Reference Books:

1. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
2. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
3. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
4. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.

CSC-4	Practical based on CSC-2 & CSC-3	Credit: 5
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1. CPP Program For Functions With Default Arguments.
2. CPP Program For Call By Value.
3. CPP Program For Call By Reference.
4. CPP Program For Parameterized Constructor.
5. CPP Program For Accessing Member Function Through Object.
6. CPP Program For Matrix Addition.
7. CPP Program For Declaring Pointers as Class Member.
8. CPP Program To Implement Encapsulation .
9. CPP Program For Declaring Static Members as Class Member.
10. CPP Program To Implement Operator Overloading Including Unary and Binary Operators.
11. CPP Program To Implement Function Overloading
12. CPP Program To Implement Virtual Functions
13. CPP Program To Implement Virtual Base Classes
14. CPP Program To Implement Sequential Access File Handling
15. CPP Program To Implement Random Access File Handling.
16. CPP Program To Overriding Template Function.
17. CPP Program To Implement Pure Virtual Function.
18. CPP Program To Implement Multiple Inheritance and also Passing Parameters To Base Class Constructors.
19. CPP Program To Access Private and Protected Members Outside Classes Using Friend Function
20. CPP Program To Understanding Protected Qualifier Activities
21. CPP Program To Implement Inheritance
22. CPP Program To Implement Constructor and Destructor
23. CPP Program For Constructor Over Loading
24. CPP Program For Unary Operator Overloading
25. CPP Program for delete and new Operator Overloading