

SCHEME OF EXAMINATION AND COURSE OF STUDY IN COMPUTER SCIENCE

For

B. Sc. I, II, III Years (Annual System)

(Effective from Academic Session 2019-20)

SYLLABUS COMMITTEE

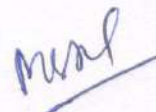
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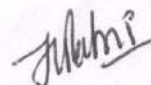
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To impart the knowledge of fundamental concepts of Computer Science and it's applications, the syllabus of Computer Science pertaining to B.Sc. (3-year degree course) has been prepared as per the demand of academic environment. The syllabus concepts are duly arranged unit wise and contents are included in such manner so that due importance is given to requisite theoretical and laboratory skills.

B.Sc. Ist Year

S.No.	Title	Paper Code	Max Marks
I	Paper –I: Computer Fundamental and Architecture	BCS-101	50
II	Paper –II: Mathematical Foundation of Computer Science	BCS-102	50
III	Paper –III: Programming in 'C'	BCS-103	50
	Practical : C Programming Lab	BCS-151	50

B.Sc. IInd Year

S.No.	Title	Paper Code	Max Marks
I	Paper –I: Operating System	BCS-201	50
II	Paper –II: C++ and Object Oriented Programming	BCS-202	50
III	Paper –III: Data Structures using C	BCS-203	50
	Practical : C++ Programming Lab	BCS-251	50

B.Sc. IIIrd Year

S.No.	Title	Paper Code	Max Marks
I	Paper –I: Java Programming	BCS-301	50
II	Paper –II: Digital Fundamentals and Computer Architecture	BCS-302	50
III	Paper –III: Database Management System	BCS-303	50
	Practical: Java Programming	BCS-351	50

Note: Examiner should set the paper covering all the units of the syllabus. The pattern of paper setting to be followed is as follows:

- Twelve Compulsory objective type questions of one mark each, $12*1=12$ marks.
- Examinees to attempt 6 short-answer type questions out of 10 questions (3 marks each) $3*6 =18$ marks.
- Examinees to attempt 4 long-answer type questions out of seven (5 marks each) $4*5=20$ Marks.


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B.Sc. (Computer Science)

B.Sc. –I Year

Paper – I

Computer Fundamental and Architecture

MM - 50

Unit – I

Introduction of Computers: Computer hardware components, Disk Storage, Memory, Keyboard, Mouse, Printers, Monitors, CD etc., and their functions, Comparison Based analysis of various hardware components.

Basic Operating System Concepts: MS-DOS, Windows, Functional knowledge of these operating systems, Introduction to Basic Commands of DOS, Managing File and Directories in various operating systems. Introduction to Networking and internet, Basic terms related with internet, TCP/IP.

Unit – II

Element of a Computer Processing System: Hardware, CPU, Storage Devices and media, VDU, Inputoutput devices, data communication equipment, Software – System software, application software.

Computer Languages: Classification, low level language, assembly language, higher level language, fourth generation languages.

Unit – III

Representation of information & Basic Building Blocks: Number System- Binary, Octal, Hexadecimal, Character Codes (BCD), SCII, EBCDIC and their conversion. Logic gates, Boolean algebra K-map simplification, Half adder, Full adder, Subtractor, Decoder, Encoder, Multiplexer, Demultiplexer.

Basic Organization: Operational flow chart (Fetch, Execute, Instruction Cycle), Organization of Central Processing Unit, Micro programmed control unit, single organization, general register organization, stack, organization, addressing modes, instruction formats, data transfer and manipulation, I/O organization, Bus architecture, Programming registers.

Unit – IV

Memory Organization: Memory hierarchy, main memory (RAM/ROM) chips, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory Management, magnetic disk and its performance, magnetic tape etc.

I/O Organization: Peripheral Devices, I/O interface, Modes of transfer, Priority interrupt, Direct memory access, Input-Output Processor and Serial Communication, I/O controllers, asynchronous data transfer.

Suggested Readings:

1. Raja Raman V, "Fundamentals of Computers"
2. Sanders D.H., "Computer Today"
3. Willam Stalling, "Computer Organization & Architecture" Pearson Education Asia
4. Mano Mirris, "Computer System Architecture" PHI

Unit – I

Relation: Type and compositions of relations, Pictorial representation of relations, Equivalence relations, Partial ordering relation.

Function: Types, Composition of function, Recursively defined function. Mathematical Induction: Pano's axioms,

Unit – II

Mathematical Induction, Discrete Numeric Functions and Generating functions, Simple Recurrence relation with constant coefficients, Linear recurrence relation without constant coefficients, Asymptotic Behaviour of functions.

Unit – III

Algebraic Structure: Properties, Semi group, monoid, Group, Abelian group properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.

Unit – IV

Propositional Logic: Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers, Posets, Hasse Diagram.

Suggested Readings:

1. Liptschutz, Seymour, "Discrete Mathematics", TMH
2. Trembley, J.P. & R. Manohar, "Discrete mathematical Structure with Application to Computer Science", TMH.
3. Kenneth H. Rosen, "Discrete Mathematics and its applications", TMH.
4. Doerr Alan and Levasseur Kenneth, "Applied Discrete Structure for computer Science", Galgotia Publication Pvt. Ltd.



Unit – I

Programming in C: Features of C and its Basic Structure, Simple C programs, Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor.

Operators: Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operators.

Unit – II

Data Types and Input/Output Operators: Floating-point Numbers, Converting Integers to Floatingpoint and vice-versa, Mixed-mode Expressions, The type cast Operator, The type char, Keywords, Character Input and Output, Formatted input and output, The gets() and puts() functions.

Control Statements and Decision Making: The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break statement and continue statement.

Function: Built-in and user-defined, function declaration, definition and function call, parameter passing, call by value, call by reference, recursive functions.

Unit – III

Arrays and String: One Dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings.

Pointers: Basics of Pointers, Pointers and One-dimensional Arrays, Pointer Arithmetic, Pointer Subtraction and Comparison, Similarities between Pointers and One-dimensional Arrays, Null pointers, Pointers and Strings, Pointers and two-dimensional arrays, Arrays of Pointers.

Structures and Unions: Basics of Structures, Arrays of Structures, Pointers to Structures, Selfreferential Structures, Unions.

Unit – IV

Dynamic Memory Allocation and Linked List: Dynamic Memory Allocation, Allocating Memory with malloc, Allocating Memory with calloc, Freeing Memory, Reallocating Memory Blocks, Pointer Safety, The Concept of linked list, Inserting a node by using Recursive Programs, Sorting and Reversing a Linked List, Deleting the Specified Node in a Singly Linked List.

File Management: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Random Access to Files, Command Line Arguments.

Suggested Readings:

1. V. Rajaraman, "Fundamentals of computers", PHI
2. Pater Norton's "Introduction of Computer", TMH
3. Hahn, "The Internet Complete Reference", TMH
4. Gottfried, "Programming in C", Schaum's Series Tata McGraw Hill

B. Sc-II Year

Paper-I

Operating System

MM-50

UNIT-I

Definition of operating system and functions, Evolution of OS, Simple Batch Systems, Multi-programmed Batched Systems, Time-Sharing Systems, Personal Computer system, Distributed Systems and Real-Time Systems, Operating System Structures-Command Interpreter System, Operating System Services, System Calls, Process Management: Process Concept, Process control Block, process Scheduling, Inter-Process Communication

UNIT-II

CPU scheduling Algorithms, Scheduling Criteria, FCFS, SJF, Round Robin Scheduling, Priority Based Scheduling, Definition Deadlock, Deadlock Characterizations, Method for Handling Deadlock Handling, Deadlock prevention, Deadlock Avoidance

UNIT-III

Storage Management: Basic Concepts, Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging Segmentation

UNIT-IV

Virtual Memory- Demand Paging, Paging Replacement Algorithms, Thrashing.
File System: File Concept, Access Methods, Directory Structure, Protection, File System Structure. Allocation methods.

Suggested Readings:

- 1 – Fundamental of Operating System – Donovan
- 2 – Operating System – M.Deal
- 3 – Operating Systems – William Stallings



UNIT-I

OOP concept, Procedural vs OOP programming, OOP terminology and features, Tokens, Character set, Keywords, Data-types, Data Types declarations, Constants and variables, expressions, Standard Library and header files. Operator and Expressions: Arithmetic Operator, Increment/Decrement Operator, Relational Operator, Logical Operator and conditional operators, library functions, Logical Expressions, C++ shorthand,

UNIT-II

Flow of control statements: Selection statements, Iteration statement, Jump statement, Construction of loops and implementation, While, Do-while, For statements nested loops. If-else, switch, break, continue and Go to statements. Classes and Objects: Need for Classes, Declaration of Classes, referencing class Members, Scope of class and its members Nested Classes, Functions in a class: Inline Functions, Constant Member functions, Nesting of Member Functions, friend function, Memory allocation of objects, Arrays of objects, Static Class Member

UNIT-III

Functions, function definition, Default arguments, Constant arguments, Call by value, Call by reference, returning from a function, storage class specifier and variables, storage class specifier and Functions automatic, external and static variables, Pointer: Declarations, Passing to a function, Operations on Pointers

UNIT-IV

Arrays two dimensional and multidimensional arrays, Arrays of Pointers, Pointers and functions, Constructors and Destructor: Declaration, Definition and characteristics, Function Overloading, Inheritance: Need, Different forms, Single Inheritance, Multilevel Inheritance, C++ Memory Map: Dynamic and Static Allocation of Memory, Stacks Queues and Linked Lists, Declarations, File handling: Open, Close, Create, Process, Detecting EOF.

Suggested Readings:

- 1 – C++ Premier – Stephen Prata
- 2 – C++ Programming Language – D S Malik
- 3 – Programming with C++ - D. Ravichandran

The image shows three handwritten signatures in blue ink. The first signature is on the left, the second is in the middle, and the third is on the right. Each signature has a long arrow pointing downwards and to the right, suggesting a sequence or flow.

UNIT-I

Structure, definition, and application, Lists, Basic Terminology, Static Implementation of Lists, Pointer Implementation of Lists, Insertion in a List, Deletion from a List, Storage of Sparse, Arrays using Linked List, Doubly Linked Lists, Circular Linked List

UNIT-II

Defining Stack and Queue, Stack Operations and Implementation, Array Implementation, Pointer Implementation, Stack Applications, Convert Number Bases by Using Stacks, Infix to Postfix Conversion, Queues: Operations and Implementation, Queue Application, Priority Queues

UNIT-III

Defining Graph, Basic Terminology, Graph Representation, Graph Traversal, Depth First Search (DFS), Breadth First Search (BFS), Shortest Path Problem, Minimal Spanning Tree, Binary Trees, In order Traversal, Post order Traversal, Preorder Traversal, Binary Search Trees, Operations on a BST, Insertion in Binary Search Tree, Deletion of a node in BST, Search for a key in BST, Height Balanced Tree.

UNIT-IV

Searching and Sorting techniques, Sequential Search, Binary Search, Internal Sort, Insertion Sort, Bubble Sort, Quick Sort, 2-way Merge Sort, Heap Sort

Suggested Readings:

1 – Data Structure Using 'C' – A K Sharma

2 – Fundamentals of Data Structures – Horowitz and Sahni

3 – Introduction to Data Structures with applications – Trembley J.P. & Sorenson P.G. Mcgraw-Hill.

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B.Sc. -III Year

Paper-I

Java Programming

MM-50

UNIT - I

Overview of Java Constants, Variables & data types, Operators & Expressions, Decision making, Branching & looping; Classes & Objects : Classes, Objects & methods, Inheritance, Arrays; Interfaces; Packages.

UNIT - II

Exception Handling Fundamentals, Exception types, Uncaught exceptions, Using try & catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java's built- in exceptions, User defined exception subclasses; Multithreaded Programming: Java thread model, Main thread, Creating thread, Creating multiple threads, Thread priorities, Synchronization, Inter-thread communication, Interrupting threads.

UNIT - III

String Handling, Java I/O Classes & interface , Stream Classes, Byte Stream, Character Stream, Serialization. AWT: Working with Windows, Graphics, Text; Control and Layout Manager.

UNIT -IV

Event Handling: Delegation Event Model, Event Classes, Sources of Events, Events Listener interfaces, Handling Mouse and Keyboard Event. Networking : Networking, Java and the Net, Inet address, TCP/IP client sockets, URL, URLconnection, TCP/IP server sockets. Applet Class: Applet basics, applet architecture, applet skeleton, Applet Display Methods, requesting repainting, Passing Parameters to applets. Servlets : Background, Life cycle of a servlet, Servlet API

Suggested Readings:

- 1 - JAVA Programming - K. Rajkumar
- 2 - Programming with Java - E. Balaguruswamy.
- 3 - CORE JAVA - Kiran Gurbani & Ashwin Mehta

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UNIT-I

Introduction to Number system and codes: Different number systems and their conversions (Decimal, Binary, Octal, and Hexadecimal), 1's Complement and 2's complement, Floating Point numbers, Coding – BCD, Gray, ASCII Boolean algebra and Gate networks: Fundamental concepts of Boolean algebra, Inverter gates, AND gate, OR gate, NAND gate, NOR gate, X-OR gate, X-NOR gate, The universal property of NAND gate and NOR gate, Basic laws of Boolean algebra, De Morgan's theorems, Simplification of Boolean expression, Karnaugh map (SOP)

UNIT-II

Combinational circuit & Sequential circuit: Adders (Half and Full), Decoder, Encoder, Multiplexer, Demultiplexer (Introductory Concepts only). Flip-Flops (SR flip-flops, D flip-flops, JK flip-flops), Edge – Triggered flip-flops and Master Slave flip-flops, Introduction to Registers and Counters

UNIT-III

Introduction of Microprocessor: Evolution of microprocessor, Embedded microprocessor, Architecture of Intel 8085, operating model of 8085, Register organization of 8085, Intel 8086 Microprocessor, Bus Interface and Execution Unit (BIU and EU), Interrupts 8085 Read and write Bus Cycle.

UNIT-IV

Instruction Set: Instruction format, Addressing modes, Data transfer Instruction, Arithmetic Instruction, Logical Instruction Processor Control Instructing, string Instructions, Interrupts instructions, 8085 Assembly Language Programming.

Suggested Readings:

- 1 – Digital Design and Computer Architecture – David Harris
- 2 – Fundamentals of Digital Circuits – A. Anand Kumar
- 3 – Computer A Organization and Architecture – Rajaraman

M. S. S.
W. S.
T. S.

UNIT-I

Data, Information and Knowledge, Introducing concept of databases and different kinds of database users, Architecture of A Database, Data Dictionary, Data administration function, DBMS

Data Models, views of data-schemas and instances, Data Independence, Conventional data models & systems. Database Design using ER model : Entities, Relationships, Representation of entities, attributes, relationship attributes, relationship set, Generalization, aggregation, Structure of relational Database and different types of keys.

UNIT-II

Codd's rules, Relational data model & relational algebra, Relational model concept, Relational model constraints, Relational Algebra, Relational database language, Structured Query Language- Introduction, Data definition, views and queries in SQL, Specifying constraints and indexes in SQL, Data Manipulation, Data maintenance, Multiple Table Operations, Transaction integrity facilities,

UNIT-III

Relational Database design : Database Design – ER to Relational, Functional dependencies, Normalization, Normal forms based on primary keys (1 NF, 2 NF, 3 NF and BCNF), Loss less joins and dependency preserving decomposition

UNIT-IV

Overview of physical storage media, File organization, Organization of records in files, Data dictionary storage. Transaction And Concurrency control: Concept of transaction, ACID properties, Serializability, States of transaction, Concurrency control : Locking techniques

Crash Recovery and Backup : Failure classifications, Recovery & atomicity, Log base recovery, Recovery with concurrent transactions, Failure with loss of Non-Volatile storage

Suggested Readings:

- 1 – Database Management System – V. Rajyalakshmi
- 2 – Database Systems: Concepts, Design and Applications – Shio Kumar Singh
- 3 – Introduction to Database Management Systems – Atul Kahte

