UNIVERSITY OF MUMBAI

❧ *B. Sc (Computer Science)* ☙

☛Syllabus☚

F.Y.BSc.(W.E.F2004-05)

B.Sc. Computer Science: YEAR I

PAPER I

SECTION I

INTRODUCTION:
Computers: History of computers and their classification
Basics of Modern – day computer system: View of a computer as an integrated system, block diagram of a computer system. Components of Modern day Computer: - CPU, Memory, Input/output devices. Units of measuring memory. Working of a computer. Hardware and software related to computer.

1. Information: - Definition, characteristics & Interpretation, Data & it's logical & physical concepts, program & instructions: - binary instruction, minimum set of instruction.
Number Systems: - Binary, Decimal, Octal, Hexadecimal and their inter conversation
Computer Arithmetic:-Binary addition and subtraction using signed – magnitude 1's complements and 2's complements .Binary multiplication and Division .Floating point representation and arithmetic, arithmetic through stack.
Codes for Character Representation: - BCD, Excess-3, Gray Code
Computer Operation: - Instruction cycle, Program Flow of control with and without interrupts.

2. Digital Logic circuit:
Boolean algebra: Basic identities of Boolean algebra, Boolean Function
Logic Gates: - AND, OR, NOT, NOR, NAND, EX-OR, EX-NOR operation and their truth table, Minimization of gates by k-maps, Quine-Mc Clusky maps.
Multiplexers (MUX):-Working of MUX, implementation of expression using MUX.
Demultiplexer (DEMUX):- implementation of expression is using DEMUX, Decoder.
Circuits: - Half-Adder, Full-Adder, Half-Subtractor, Full Subtractor, 2-bit by 2-bit Multiplier, Various Code Converters
FLIP FLOP's :- concepts of sequential circuits ,S-R ,J-K ,Present & Clear ,Master Slave J-k, D ,T Flip flops ,their truth tables and excitation tables, conversion from one type to another type of flip flop , Resisters. Interconnection structure between CPU, memory and input-output devices.

3. Basic Organization:-
Memory Organization: - Primary Memory: - RAM, ROM, EPROM, Secondary memory Magnetic – Floppy and Hard Disks. Optical memory: - CDROM,

WORM, Concepts of virtual Memory and Cache Memory and why are they needed.

4. Introduction to Computer Languages and GUI :- Definitions of Assembles ,Compliers and interpreters ,interaction between computer and human through various interface ,enhancement over DOS environment , what is GUI .Common future and commonly used terms of GUI, Major components of GUI ,examples of GUI's.

Books & References:-

Computer Organization & Architecture: - Design &performance, William Stallings, Prentice Hall of India
Computer Networks, Andrew S. Tenenbaum, Prentice Hall of India
Information technology for Managements, Henry C. Lucas, McGraw Hill
Boylstead and Neshelesky,"Electronics Devices and Circuits ", 4th, Phi, 1999
George Kennedy," Electrical Communication System" Tata McGrew Hill 1993
Information Technology the Breaking Wave, Denis P Curtin, Kim Foley, Kuntal Sen., Cathleen Mortin, TMG.
Information Technology, Project Management, Kathy Schwalbe, Thompson Learing
Fundamentals of Digital Electronics by R.P.Jain
Digital Electronics by Derek, Molly,PHI
Digital Electronics, An introduction to Theory and Practice William H. Gothmann.Prentice –Hall of India pvt Ltd.
GUI Design for dummies, IDG Books.

SECTION-II

5. Introduction to 8085 microprocessors: - Organization of Microprocessor based system, 8085 Architecture, Concepts of adders line and Memory interfacing, Adders decoding and memory interfacing, 8085 Programming model, instruction Classification, instruction formats, Stack and subroutines, Developing Basic 8085 Programs.

6. Organization & Architecture, Structure & function of computer System.

System Buses: - Computer Components, Computer Function,

PCI: - Features of PCI bus, Why PCI bus is needed? Concepts of PCI Arbitration.

7. Internal Memory: - concepts of Cache Memory, Method of Cache Mapping, Concepts and need for cache coherency, External Memory:-RAID. Input/Output-I/O Modules (What are I/O modules? why do we require them?

8. CPU Organization- Registers organization (Classification of registers), instruction Cycle, Instruction Pipelining.

9. Concepts of Parallel processing:- Multiprocessing :- organization ,
time-Shared Bus, Multiport Memory, Central Control unit, Multi Processors.

Books & References
William Stalling," Computer Organization and Architecture" (4th Edition)-Phi,
19998.
Andrew C. Tanenbaum,"Styructured Computer Organization "(3rd Edition)-
PHI
Computer System Architecture- M. Morris MemoPHI, 1 998
John p Hayes," Computer Architecture and Organization"
Digital computer Fundamentals, Malvino
Microprocessor Architecture and Programming and Application with the
8085, R.S.Gankar, PRI
Digital Computer Fundamentals, Thomas C Bartee

LIST OF PRACTICALS FOR PAPER I SECTION I

1. Demo practical on various internal and externals parts of computer and
their interconnecting /working.
2. Demo/hands on practical on assembling the PC.
3. Study of multiplexer
4. Study of decoder/DMUX
5. Study of flip-flops
6. Study of counters
7. Study of universal Registers.
8. Study of Universal logic circuits using MUX.
9. Study of 4 bit full adder.
10. Implementation of Boolean equation, using AND, OR, NOT, NOR, NAND,
EXOR, Verification of K-map methods for minimization using AND, OR, NOT,
NOR, NAND, EX-OR, EX-NOR.

LIST OF PRACTICALS FOR PAPER I SECTION I
1. Demo practical on working of 8085.
2. Basic programs of 8085.
3. Study of system Buses.
4. Study of internal memory, i/o modules, operating system supports.
5. Concepts of parallel processing.
6. Demo practical on working of 8086.
7. Basic program of 8086.
8. Writing simple assembly language program.

References:

1. Experiments for digital computer Electronics – M.A. Miller to accompany "Digit computer Electronics- Malians"
2. Teachers manual containing cross assembler.
3. Experiments manual for D.V.Hall MP.
   Instruction manual for D.V.Hall MP
4. I.B.M PC assembler languages programming –Able ,Peter
5. I B M PC technical Ref.Manual
6. Programming 8086/8088- M Thorme, Benjamium Cumming, 1986.

BSc. Computer Science : Year I
PAPER I I

Introduction:
Introduction to software, overview of problem solving theory and the areas where problem solving is appropriate, recognition of problems suitable for getting solution by computer, techniques of problem-solving.

Concept of programming:
Programming methodology: data storage using variables, variables and constants, control structures, programming language syntax: - facilities and rules, program design: - algorithmic development of a solution to a problem, producing test data, programming standards and practice: - using comments, consistent indentation and descriptive identifiers.
Computer languages: - Categories of programming languages
Different styles of programming: structured, event driven, object oriented.

C Fundamentals: -
C character set, keywords and identifiers, constants and variables, rules for naming variables.
Data types, declaration of variables according to their data type such as int, float, double, char and string variables.

Getchar(), getch() , putchar(), scanf(), printf(), gets(), puts(), operators in C: - mathematical, incremental/ decremental , relational, logical, conditional, or ternary operators

Types of statements in C: -
Conditional statements, if, if-else, nested if and if-else, switch …case…..default statement.
Goto, break, continue statement.
Looping statements: - While, do-while, for statement

Functions: - Function prototypes, user defined functions passing arguments to a function by value, recursive functions

Storage classes: - automated, external, static, register, variables in single file environment

Arrays: - Defining, initializing and processing an array, passing arrays to function, introduction to multidimensional; arrays, arrays and string

String handling functions in C.

Section II
Advanced C and C++

Pointers in C: - Declartions, referencing and de-referencing, passing pointers (passing value by reference) to functions, pointers to array.
Use of command line arguments in C.

Structures and union: Defining and processing a structure, pointers and structures, passing structures, passing structures, through a function. Unions, Examples to stress the use of union instead of structures.

Concept of dynamic allocation of memory and functions such as mallloc , calloc , realloc, sizeof operator, free, linked list, bitwise operators and bit fields, use of macros in C.

Handling files in C: fopen, fclose, fgetc, fputc, fgets, fputs, fscanf, fprintf, putw, use of structures, command line arguments in files.

Comparison between C and C++: moving programs from C to C++.
Comments in C++. Working with C++ compiler
C++ Fundamentals: New keyword for C++, Constants and variables. Data types, preprocessor directives, declaration in C++, header file required in C++, use of cin << and cout >>.

Scope resolution operator ->*,*, delete , new, endl, setw operators.

Object oriented programming using C++:- Characteristics of object oriented programming, function prototypes in C++, function overlodding, operator overloading, inline functions, static, virtual, and friend functions

Classes and objects:- Structures and classes, union and classes, data hiding and encapsulation, private and public members, member functions, accessing class members, objects as function parameters, static data and member functions, friend functions and friend classes. Constructors, parameters constructors, destructor, constructor overloading, constructor with default arguments, constructor with dynamic operations, concept of inheritance and example.

References:
How to solve it by computers by R. G. Dromey(PHI)
Programming in C by Schuam out line series.
Let us C by Yashwant Kanetkar (BPB)
Practical C programming , O'Reilly.
Algorithms with C, O'Reilly.
A Structured programming approach using C by Behrouz Forouzan, Thomas learning.
Mastering algorithms with C , Kyle Loudon, Shroff publishers.
Practical C Programming, Steve Oualline, Shroff publishers.
Let us C++ by Yashawant Kanetkar(BPB)
The revolutionary guide to OOP using C++ by V. Olshevsky and A. Ponomarev (Wrox publication)
Object oriented programming using C++ by Balguruswamy.

List of practical

1. Practical C fundamentals, input output functions.
2. Practical using different statements in C.
3. Practical on use of library as well as user defined functions-part
4. Practical on recursive functions.
5. Practical using arrays.
6. Practical on use of arrays and functions.
7. Practical on strings and string handling functions.
8. Practical on concept of pointers.
9. Practical using structures.
10. Practical on bitwise operators.
11. Practical using macros.
12. Practical on file handling in C
13. Practical on simple C++ programs.
14. Practicals based on concept of object oriented programming: function overloading, Operator overloading, use of friend function.
15. Practical on use of classes, objects in C++
16. Practical based on concept of inheritance.