Paper Name: FUNDAMENTALS OF COMPUTER AND PROGRAMMING

1. **Learning Outcome:**
   - Student will able to learn about basics of computer system, which includes both the concept of computer hardware and software.
   - Student will able to learn about what is programming language, how to design an algorithm to solve a particular problem
   - Student will able to learn about C programming language.
2. **Prerequisite:** NIL
3. **Semester: 1**
4. **Course Type: Compulsory**
5. **Course Level: 100-199** .
6. **Theory Credit:** 3
7. **Practical Credit:** 1
8. **Number of required hours:**
   a) Theory: 45 hrs
   b) Practical: 30 hrs
   c) Non Contact: 5 hrs

9. List of reference books

[1] Anita Goel, *Computer Fundamentals*, Pearson.
[2] *Comdex: Hardware and Networking Course Kit*, Dream Tech Press.
[3] V. Rajaraman, Neeharika Adabala, *Fundamentals of Computers*, PHI.
[4] Ron Gilster, *PC hardware: A beginners Guide*, Tata McGraw Hill.
[5] E. Balaguruswamy, *Computer Fundamentals and C Programming*, Tata McGraw Hill.
[6] B.S. Gottfried, *Programming with C*, Tata McGraw Hill.
[7] B.W. Kernighan, D.M. Ritchie, *The C Programming Language*, PHI.

10. Detailed Syllabus

Unit no.	Unit content	No.of classes
1	**Basics of Computer System** Evolution of Computer System, Classification of Computer, Modern Computer, Hardware and Software, Major components of a computer (A brief introduction of CPU, Main Memory, I/O units), Keyboard, Display, Mouse, Printers etc, Secondary Storage Devices (Hard Disks, Optical Disks, Flash Memory), Cache Memory and Virtual Memory concepts, Backup Devices, SMPS, BIOS, Processor,	7

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	Motherboard, Sockets and Slots, Power Connectors, Peripheral Connectors, Bus Slots, USB, Pin Connectors, Network Interface Card, Network Cabling, I/O Box, Switches, RJ 45 Connectors, Patch Panel, Patch Cord, Racks, Evolution of OS, Types of OS, Functions of OS.	
2	**Hard Disk Drive** Logical Structure and File System, FAT, NTFS. Hard Disk Tools: Disk Cleanup, Error Checking, Defragmentation, Scanning for Virus, Formatting, Installing Additional HDD, New trends in HDD, Optical Media, CDROM, Theory of Operation, Drive Speed, Buffer, CD-R, CD-RW, DVD ROM, DVD Technology, Preventive Maintenance for DVD and CD Drives, Driver Installation, Writing-Cleaning CD and DVD.	5
3	**Number System** Representation of Numbers and Characters in Computer, Binary, Hexadecimal, Octal, BCD, ASCII, EDCDIC and Gray codes, Conversion of Bases, Representation of Signed Integers, Sign and Magnitude, 1's Complement and 2's Complement Representation, Arithmetic Operations using 2's Complement Representation, Conditions for Overflow/Underflow and Its Detection.	7
4	**Concept of Algorithm** Programming Language, Bootstrapping, Assembler, Compiler, Interpreter, Linker and Loader, Definition and Concept of Algorithm and Flow Chart, Writing Simple Algorithms and Drawing Flow Charts for Simple Problems like Finding Sum, Max, Min, Average of a List of Numbers etc.	6
5	**Introduction to C Programming** **(20 Lectures)** Elementary Data Types, Variables, Constants, Identifiers and Reserved Word, Constant Data Types, Syntax and Semantics, Variable Declarations, Initialization of Variable during Declarations, Scope and Lifetime of Variables, Operand, Operators in C: Definition of Unary, Binary and Ternary Operators, Arithmetic Operators, Assignment Operators, Relational Operators, Logical Operators and Bitwise Operators, Precedence and Associatively of C Operators, Expression in C, L-value and R-value, Side Effects of Operators, Cast and Sizeof Operator, Type Conversion.	20

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	Expression Statement, Conditional Statement: if, if-else, switch, Iterative Statement: white, do-while, for, Other Statement: break, continue, goto, return, null Statement, block Statement. Definition and Declaration of Array, Accessing Elements in One Dimensional and Two Dimensional Arrays Function Declaration, Function Declaration and Definition, Calling a Function, Parameters Passing Methods: Call by Value and Call by Address, Recursive Function. Basic Concept of Strings, Pointer and Structure in C, Different Storage Classes, Basic Concept of Files in C	

Practical Part

Part A: Computer Fundamentals **(5 Classes/10 hours)**

1. Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
2. Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva.
3. Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
4. Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva
5. Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Part B: Programming in C **(10 Classes/20 hours)**

(This is a suggestive list only. Questions are not limited to this list)

6. Write a program to display ASCII value of a character.
7. Write a program to check whether a number is perfect or not.
8. Write a program to find out the biggest of three numbers using nested if.

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9. Write a program to read a list of positive integers terminated by -1 and display the odd and even numbers separately and also their respective counts.
10. Write a program to read values of n and x and print the value of y using switch case where

    i. y=n+x when n=1
    ii. y=1+x/n when n=2
    iii. y=n+3x when n=3
    iv. y=1+nx when n>3 or n<1.
11. Write a program to find out minimum, maximum, sum and average of n numbers without using array.
12. Write a program to find out minimum, maximum, sum and average of n numbers using array.
13. Write a program to display the prime numbers within a given range.
14. Write a program to print the digits of a number in words. (e.g. if a number 841 is entered through the keyboard, your program should print "Eight Four One".)
15. Write a program to read n numbers in a sorted array and insert a given element in a particular position.
16. Write functions to compute the factorial of a number using both recursive and non-recursive procedure.
17. Write a program to display the first n Fibonacci numbers using both recursive and non-recursive procedure.
18. Write a function to check whether a given integer is prime or not and use it.
19. Write a program to multiply two matrices using function.
20. Write a program to read a m x n matrix and calculate the Row sum and Column sum of the matrix.
21. Write a program to concatenate two strings using function (without using library function).
22. Write a program to convert a string from upper case to lower case and vice versa.
23. Write a program to swap two numbers using function (pass the pointers).
24. Declare a structure of a student with details like roll number, student name and total marks. Using this, declare an array with 50 elements. Write a program to read details of n students and print the list of students who have scored 75 marks and above.

Write a program to copy a text file to another file.

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