BCA 1ST SEMESTER SYLLABUS

Semester	Paper Name	Course type	Credit
I	Computer Fundamentals	Compulsory	4 (3+1)
	Introduction to C-Programming	Compulsory	4 (3+1)
	Mathematics I	Compulsory	4

Computer Fundamentals

1. Learning Outcomes: After completing this course, students will know about fundamentals of Computer System and Software.

2. Prerequisites: 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 (45 classes)

b) Practical: 30 hrs (15 classes)

c) Non Contact: NIL

9. Reference books:

(a) Fundamentals of Computers, E Balagurusamy, McGraw Hill Education

(b) Fundamentals of Computers, V. Rajaraman, Neeharika Adabala, PHI Learning

(c) Computer Fundamentals, Anita Goel, Pearson Education

10. Contents of Syllabus:

(a) Theory

Unit I: Introduction to Computers and number systems 7 hrs

Number system, decimal, binary, octal and hexadecimal number system, conversion among number systems, definition of computer, basic components of computer, bus, evolution of computers, Generations of computers, classification of computers, data representation in a computer, ASCII, Unicode

Unit II: Memory and storage devices 8 hrs

Memory, memory hierarchy, registers, general purpose and special purpose registers, primary and secondary memory, volatile and non volatile memory, semiconductor memory, SRAM and DRAM, Read Only Memory, magnetic storage devices, optical storage devices, solid state devices, flash memory, storage evaluation criteria

Unit III: Input devices 7 hrs

Input device, keyboard, keyboard layouts, pointing devices, mechanical and optical mouse, scanner, hand-held and flat-bed scanners, OMR, OCR, MICR, digital camera, touchpad, trackball,

joystick, digitizer, digital microphone

Unit IV: Output devices 7 hrs

Monitor, LCD, LED, plasma monitor, printers, impact printers, non-impact printers, dot matrix printers, inkjet printers, laser printers, thermal printers, plotters, voice output systems, projector,

Unit V: Programming languages and Software 11 hrs

CPU, control unit, computer instruction, instruction set, instruction execution life cycle, program, programming languages, machine level language, assembly language, low level language, high level language, language translators, assembler, compiler, interpreter, algorithm, definition of pseudocode, flowchart, flowchart of algorithm to find maximum of n numbers, software, flowchart of algorithm to find minimum of n numbers, flowchart of algorithm to find average of n numbers, software, flowchart of algorithm to display first n terms of Fibonacci series, flowchart of algorithm to check whether a given number is prime, software, software, application software, examples of application software, system software, examples of system software, what is operating system, what is device driver, open source software, proprietory vs open source software, examples of proprietory and open source software

Unit VI: Computer Network and Internet 5 hrs

Computer network, network topologies, LAN and WAN, internet, ISP, services over internet, www, web server, web browser, HTML, HTML tags: <html>, <head>, <title>, <body>, <h1>, <h2>, <h3>, <h4>, <h5>, <h6>,
, <p>, <a>, <ul>, <ol>, <li>, , <table>, <th>, <tr>, <td>, introduction to CSS, domain name, URL, DNS, E-mail, telnet, FTP

(b) Practical

(i) Using a word processing software such as Libreoffice Writer 2 classes

(ii) Using a spreadsheet software such as Libreoffice Calc 3 classes

(iii) Using a presentation software such as Loibreoffice Impress 2 classes

(iv) Using an image editing software such as GIMP 2 classes

(v) Using an audio editing software such as Audacity 2 classes

(vi) Using a video editing software such as Openshot 2 classes

(vii) Designing HTML webpages 2 classes

11. Particulars of course designer:

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Introduction to C-Programming

1. Learning Outcomes: At the end of the course, students will be able to:
   (a) Understand the basics of C programming like data types and operators
   (b) Understand and write program in C to implement conditions, loops, functions
   (c) Work on arrays, strings and basic file operations

2. Prerequisites: 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 (45 classes)

   b) Practical: 30 hrs (15 classes)

   c) Non Contact: NIL

9. Reference books:

   (a) B.S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", Mcgraw-Hill, 2007.
   (b) B. Kernighan, D. Ritchie, "The C Programming Language", Second Edition, Prentice Hall, 1988
   (c) E. Balaguruswami, "Programming in ANSI C", 2nd Ed., Tata McGraw Hill, 2004.
   (d) P. Greg, D. Miller. "C Programming: Absolute Beginner's Guide", 3rd ed. Que, 2016.

10. Detailed Syllabus:

A. Theory

Unit 1: Getting started with C programming (10 Lectures)

Introduction to programming languages- High-level vs low level languages, compiled vs interpreted languages. Structure of a C program. Introduction to Header files. Main function and a simple program execution. Compiling and executing a program. C tokens – keywords, identifiers, constants, operators. Statements and expressions in C. Basic data types in C - integers, floats, doubles, characters. Void. Size and range of values of data types. Variables. Constants – integer constant, real constant, character constant, string constant. Declaration and initialization of variables and constants. Assigning values to variables. Operators in C – binary and unary operators. Arithmetic, assignment, logical, comparison, bitwise and conditional operators. Order of precedence of operators. Associativity of operators. Input and output statements – getchar(), getc(), getch(), putchar(), putc(), puts(), scanf(), printf(), format specifiers. Typecasting.

Unit 2: Control Structures in C (9 Lectures)

Control Structures in C. Basic programming constructs- Sequence, selection and iteration. Conditional statements – if, else, switch case. Nested conditions. Loops – for loop, while loop, do-while loop. Using loop for counting iterations. Using while loop for indefinite iterations. Nested loops. Break and continue statements.

Unit 3: Arrays and Strings (8 Lectures)

Introduction to Arrays. Declaration and initialization of arrays. Accessing array elements. Multidimensional arrays. Introduction to Strings. Declaration and initialization of strings. String input and output in C.

Unit 4: Functions and Pointers (9 Lectures)

Introduction to Pointers. Pointer declaration and initialization. Pointers and addresses. Pointers and Arrays. Basic concept of dynamic memory allocation, malloc(), calloc(). Introduction to functions. Function declaration and definition. Return types of function. Function arguments. Function calling – call by value vs call by reference. Passing an array as argument to a function. Basic concept of recursion.

Unit 5: Introduction to Structures and Unions (4 Lectures)

Basic concept of Structures and Unions in C. Structure declaration and initialization. Union declaration and initialization. Difference between structures and unions.

Unit 6: File Processing in C (5 Lectures)

Basic concept of file handling. Opening and closing file using fopen() and fclose(). Binary vs text files. Reading and writing files – fgets(), fscanf(), fprintf(). Random access to files.

B. List of Practical

(This is a suggestive list only. Questions need not be restricted to this list. The practical are advised to be performed in Linux environment)

(a) Write a program in C to print "Hello World"
(b) Write a program to take input of two numbers and print their sum, product, difference.
(c) Write a program to find the smallest or greatest of three numbers given as input.
(d) Write a program to print the sum and product of digits of an integer.
(e) Write a program to take a number representing a month and print the name of the month using switch case.
(f) Write a program that calculates the grade of a student based on their marks in a subject using nested if-else statements. Also print the range of marks for each grade using switch case.
(g) Write a program to take a number as input and print all the even numbers up to that number using while and for loop.
(h) Write a program to ask the user for an input to stop a loop or continue repeating after printing the iteration count using a do-while loop.
(i) Write a program to find the maximum, minimum, sum and average of *n* numbers without using array.
(j) Write a program that takes two integers as input and finds their greatest common divisor (GCD) using nested while loops and if statements.
(k) Write a program that calculates the sum of the first *n* terms of the Fibonacci sequence, where *n* is entered by the user, using a for-loop.
(l) Write a program that takes an integer as input and checks if it is a prime number.

(m) Write a program that calculates the sum of the first *n* terms of an arithmetic series, where *n*, the first term and common difference of the series are entered by the user.

(n) Write a program to compute the sum of the first *n* terms of the following series

S =1-2+3-4+5……

(o) Write a program to create an array with inputs from the user and print the same.

(p) Write a program to perform following actions on an array entered by the user:

a) Print the even-valued elements

b) Print the odd-valued elements

c) Print the array in reverse order

(q) Write a program to take a matrix from the user and print the transpose of the same.

(r) Write a program to ask for the name of the user and print the same.

(s) Write a program to take a string of length more than 10 and find the number of vowels in the string. Also print the position of the vowels in the string.

(t) Write a program using pointers to copy a string to another string variable without using library function.

(u) Write a program that swaps two numbers using pointers.

(v) Write a program to calculate Factorial of a number (i) using recursion, (ii) using iteration

(w) Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.

(x) Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.

(y) Write a function to accept two arrays as argument and returns their sum as an array.

(z) Write a program to implement struct in C. Create a structure of Student with RNo, Name and other credentials with proper datatype and print the same.

(aa) Write a program to implement union in C. Create a structure of Person with Pid, Name and other credentials with proper datatype and print the same.

(bb) Write a C program that opens a file for reading and displays the contents of the file in binary mode and text mode.

(cc) Write a C program that opens a file for reading and displays the contents of the file line by line on the screen.

(dd) Write a C program that opens a file in append mode and allows the user to add text to the end of the file.

Particulars of course designer:

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Mathematics I

1. Learning Outcomes: After successful completion of this course, students will be able to:
   (a) Learn the concepts of set, relation, and function from Computer Science point of view.
   (b) Know how to view a table/database as an n-ary relation.
   (c) Learn what a matrix is and relate it with arrays used in programming.
   (d) Understand determinants and how determinants are used in solving simultaneous equations.
   (e) Get familiar with statistical and probabilistic measures that are used in computation related software/packages.

2. Prerequisites: NIL

3. Semester: 1

4. Course type: Compulsory

5. Course level: 100-199

6. Theory credit: 4

7. Practical credit: 0

8. Number of required hours:

   a) Theory: 60 hrs (60 classes)

   b) Practical: NIL

   c) Non Contact: NIL

9. Reference books:
   (a) Discrete Mathematics Structures with Applications to Computer Science, J. P. Tremblay and R. Manohar, Mc-Graw Hill.
   (b) Discrete Mathematics, N. Ch.SN Iyengar, K.A. Venkatesh, V. M. Chandrasekaran, P. S. Arunachalam, Vikash Publishing House Pvt Ltd.
   (c) Elements of Discrete Mathematics, C. L. Liu, Mc-Graw Hill International Ed.

10. Course Details:

UNIT I: Sets, Relations and Functions (16 Lectures)

Sets: definition of set, cardinality of sets, finite, countable and infinite sets. Operations on sets, Venn diagram. Principle of inclusion and exclusion and their applications on simple problems. Multisets.

Relations: Definition and properties of binary relations, closures of relations, equivalence relations, equivalence classes and partitions, n-ary relations and representation of n-ary relations as tables. Partial ordering relations and lattices,

Functions: Definition of function**,** one-to-one and onto, principles of mathematical induction. Concave and convex functions.

UNIT II: Matrices (15 Lectures)

Definition and different types (such as identity matrix, diagonal matrix etc) of matrices, row and column operations; vectors and matrices, Addition, subtraction and multiplication of matrices, Properties of matrix operations, Existence of additive and multiplicative identity and additive inverse of a matrix. Representing relations using matrices. Transpose of a matrix and its

properties. Symmetric and skew symmetric matrices, Elementary transformation of a matrix, Invertible matrices.

UNIT III: Determinants (16 Lectures)

Determinant of a square matrix, minor, cofactor, Adjoint of a matrix and matrix inversion. Inverse of a matrix using elementary transformation. Rank of a matrix and determination of rank of a matrix. Eigen values and Eigen vectors of a matrix (Stressing on symmetric matrices), Cayley-Hamilton theorem – Cramer's rule, Consistency of a system of linear non-homogenous equations and existence of solutions (statement only), Simple problems, Solutions of simultaneous linear equations by Gaussian elimination method.

UNIT IV: Fundamentals of Statistics and Discrete Probability (13 Lectures) Types of Data, Attributes and variables; Construction of Frequency, Cumulative frequency.Graphical representation of Frequency distribution: Histogram, Frequency Polygon, FrequencyCurve and Cumulative Frequency curves (Ogive curves). Diagrammatic representations: Simplebar, Subdivided bar, Pie diagrams.

Measures of central tendency-Mean, Median and Mode. Measures of variation – Range,Interquartile range, Standard Deviation and Variance.

Sample space, events, random variables, basic probability. Conditional Probability and Bayestheorem.

Particulars of course designer:

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