

ARYABHATTA COLLEGE

Department of Computer Science

GENERAL ELECTIVE PAPERS IN COMPUTER SCIENCE

Offered to students of B.Sc. (Hons.)/ B.A.(Hons.) of other Departments/ Disciplines

(Other than B.Sc. (Hons.) Computer Science)

Each paper consists of:

- Theory (60 lectures, 100 marks)
- Practical (60 lab classes, 50 marks)

Semester 1 (GE-1): Introduction to Programming (programming in C++)

Objective of the paper: The main objective of this paper is to introduce students to programming. C++ would be the programming language taught. The course content starts with basic programming concepts and then moves on to object oriented programming. This subject will be the first step for entering into the world of computer programming where one can use his/her knowledge and creativity to write computer programs.

C++ is used in finance, video games, high-performance embedded and real-time systems, transportation, manufacture, and other industries where determinism and precision are important.

Skill Sets required: No specific skill sets are required. A student who is eager to learn programming will enjoy this paper.

Semester 3 (GE-3): Computer Networks and Internet Technologies

Objective of the paper: The main objective of this paper is to introduce student to computer networks and related concepts like internet. The course also covers designing of web pages using HTML and JavaScript.

Skill Sets required: No specific skill sets are required. Students interested in getting an elementary knowledge of web designing should take this paper.

Semester 1: GENERAL ELECTIVE 1 (GE-1)

INTRODUCTION TO PROGRAMMING

Theory (60 lectures, 100 marks); Practical (60 lab classes, 50 marks)

THEORY: 60 lectures

Introduction to C and C++

(5 Lectures)

History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O

(10 Lectures)

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h).

Expressions, Conditional Statements and Iterative Statements

(10 Lectures)

Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

Functions and Arrays

(10 Lectures)

Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Derived Data Types (Structures and Unions)

(5 Lectures)

Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

File I/O, Preprocessor Directives

(8 Lectures)

Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files,

Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

Using Classes in C++

(8 Lectures)

Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables & Functions, Objects as parameters, Specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.

Inheritance and Polymorphism

(4 Lectures)

Introduction to Inheritance and Polymorphism

Reference Books:

1. Herbtz Schildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.
2. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
3. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
4. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
5. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc., O-D Publishing, LLC USA.
6. Robert Lafore, "Object Oriented Programming in C++ by 4th Edition, SAMS Publishing

PRACTICAL: (60 lab classes, 50 marks)

Suggested program list

1. Write a program to find greatest of three numbers.
2. Write a program to find gross salary of a person
3. Write a program to find grade of a student given his marks.
4. Write a program to find divisor or factorial of a given number.
5. Write a program to print first ten natural numbers.
6. Write a program to print first ten even and odd numbers.
7. Write a program to find grade of a list of students given their marks.
8. Create Matrix class. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
 - a) Sum
 - b) Difference
 - c) Product
 - d) Transpose

Semester 3: GENERAL ELECTIVE 3 (GE-3)

COMPUTER NETWORKS AND INTERNET TECHNOLOGIES

Theory (60 lectures, 100 marks); Practical (60 lab classes, 50 marks)

THEORY: 60 lectures

Computer Networks: (6 Lectures)

Introduction to computer network, data communication, components of data communication, data transmission mode, data communication measurement, LAN, MAN, WAN, wireless LAN, internet, intranet, extranet.

Network Models: (8 Lectures)

Client/ server network and Peer-to-peer network, OSI, TCP/IP, layers and functionalities.

Transmission Media: (4 Lectures)

Introduction, Guided Media: Twisted pair, Coaxial cable, Optical fiber. Unguided media: Microwave, Radio frequency propagation, Satellite.

LAN Topologies: (2 Lectures)

Ring, bus, star, mesh and tree topologies.

Network Devices: (2 Lectures)

NIC, repeaters, hub, bridge, switch, gateway and router.

Internet Terms: (2 Lectures)

Web page, Home page, website, internet browsers, URL, Hypertext, ISP, Web server, download and upload, online and offline.

Internet Applications: (6 Lectures)

www, telnet, ftp, e-mail, social networks, search engines, Video Conferencing, e-Commerce, m-Commerce, VOIP, blogs.

Introduction to Web Design: (16 Lectures)

Introduction to hypertext markup language (html) Document type definition, creating web pages, lists, hyperlinks, tables, web forms, inserting images, frames, hosting options and domain name registration. Customized Features: Cascading style sheet (css) for text formatting and other manipulations.

JavaScript Fundamentals: (14 Lectures)

Data types and variables, functions, methods and events, controlling program flow, JavaScript object model, built-in objects and operators.

Reference Books:

1. Computer networks – Tannenbaum
2. Data Communication and Networking – Forouzan – Tata McGraw Hill.
3. D.R. Brooks, An Introduction to HTML and Javascript for Scientists and Engineers, Springer W. Willard, 4.HTML A Beginner's Guide, Tata McGraw-Hill Education, 2009.
4. J. A. Ramalho, Learn Advanced HTML 4.0 with DHTML, BPB Publications, 2007

PRACTICAL: (60 lab classes, 50 marks)***Suggested program list*****Practical exercises based on concepts listed in theory using HTML.**

1. Create HTML document with following formatting – Bold, Italics, Underline, Colors, Headings, Title, Font and Font Width, Background, Paragraph, Line Brakes, Horizontal Line, Blinking text as well as marquee text.
2. Create HTML document with Ordered and Unordered lists, Inserting Images, Internal and External linking
3. Create HTML document with Table using text and an image
4. Create Form with Input Type, Select and Text Area in HTML.
5. Create an HTML containing Roll No., student's name and Grades in a tabular form.
6. Create an HTML document (having two vertical frames).
7. Create an HTML document containing horizontal frames.
8. Create a website of 6 – 7 pages with different effects as mentioned in above problems.
9. Create HTML documents (having multiple frames) in three formats.
10. Create a form using HTML which has the following types of controls:
 - I. Text Box
 - II. Option/radio buttons
 - III. Check boxes
 - IV. Reset and Submit buttons

List of Practicals using Javascript (*Create event driven program for following*):

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
2. Print the largest of three numbers.
3. Find the factorial of a number n.
4. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.

5. A person deposits Rs. 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.