

**BCA- Even (II) Semester (Scheme and Syllabus):**

<b>Semester-Even (II)</b>						
Sr. No.	Course Code	Courses	Periods Per Week			Credits
			L	T	P	
1	CA3CO05	Object Oriented Programming	4	0	4	6
2	CA3CO06	Computer Architecture	3	1	0	4
3	CA3CO07	Data Structure	3	0	4	5
4	CA3CO08	Mathematics-II	3	1	0	4
5	CA3AE02	Environmental Science	3	0	0	3
6	CA3EG02	Desktop Publishing	2	0	2	3
		Total	18	2	10	<b>25</b>
			<b>30</b>			

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO05	Object Oriented Programming	4	0	4	8	6

### Unit-I

**Introduction:** Basic concepts of OOP: object, class, data abstraction, data encapsulation, inheritance, polymorphism, Static and dynamic binding, message passing, benefits of OOP's, disadvantage of OOP's, application of OOP's, a simple program, anatomy of program, creating a source file, compiling and Linking .

### Unit-II

**Tokens, Expressions and Control structures :** Preprocessor directive, Tokens, keywords, Identifiers and constants , Data types- Basic, User defined and Derived, Variables- Declaration and Dynamic initialization, operators- scope resolution operator, Member Referencing operators, Memory management operators, manipulator, Expression and their types, Special Assignment Expressions, Type conversions, Implicit & Explicit conversions, Control structure: for, do, while, do-while, if, if-else, switch. Jump statement: break, continue, go to, exit.

### Unit-III

**Functions & Classes:** Main function, Function prototyping, Call by value, Call by reference, Return by reference, Inline functions, Arguments - default, constant, Math library functions, string handling function.

Defining classes and objects, constructors and destructors, access modifiers-public, private, protected, Defining member functions inside and outside class definition, Arrays within a class, Memory allocation of objects, Static data members and static member functions, Array of objects, Object as function arguments, Returning objects, Friend functions.

### Unit-IV

**Inheritance:** Introduction, Base class and derived class, reusability of code through inheritance Examples, Types of Inheritance ,Virtual base class, Abstract class , Constructors in derived class.

**Polymorphism:** Introduction, Compile Time Polymorphism, Function overloading, Operator Overloading ,Overloading unary and binary operator, Overloading using friend function Overloading insertion and extraction operators ,String manipulation using operator overloading, Runtime Polymorphism, this Pointer, pointers to objects, pointer to derived classes, Virtual functions and pure virtual functions.

### Unit-V

**File Handling:** Classes for File Stream operations, File operations - Opening, Closing and updating, Error handling during File operations, Command Line arguments, Exception Handling(Introduction) .

## **Text Books**

1. Herbert Schildt, C++ The Complete Reference, Mcgraw Hill Education , 4th Edition,.
2. E . Balagurusamy, Object oriented programming with C++ , Mc Graw Hill Education, 4th Edition.

## **References Books**

1. S.B.Lippman and J.Lajoie ,C++ Primer, Pearson Education, 3rd Edition.
2. B.Stroutstrup ,The C++ Programming Language, Pearson Education ,3rd Edition.
3. T.Gaddis, J.Walters and G.Muganda ,OOP in C++, Wiley DreamTech Press,3rd Edition.
4. R.Lafore, Object Oriented Programming in C++, Galigotia Publications pvt ltd, 3rd Edition.
5. Dr. G. T. Thampi, Dr. S. S. Mantha, ,Object Oriented Programming in C++ , DreamTech Press, 2nd Edition.

## **List of Practicals:**

1. Write a program to sum of all even and odd number.
2. Write a program to find smallest of three numbers.
3. Write a program to check the given number is palindrome or not.
4. Write a program to calculate the average of three numbers.
5. Write a program to find maximum and minimum of three numbers using functions.
6. Write a program to understand concept of class & objects.
7. Write a program to understand concept of constructors & destructors.
8. Write a program to understand working of different access specifiers.
9. Write a program to understand concept of inline functions.
10. Write a program to understand concept of call by value & call by reference.
11. Write a program to understand working of static functions & data members.
12. Write a program to understand concept of friend function.
13. Write a program to understand concept Inheritance & its type.
14. Write a program to understand concept of abstract class.
15. Write a program to understand concept of virtual base class.
16. Write a program to understand concept of function overloading.
17. Write a program to understand concept of operator overloading(unary & binary operator).
18. Write a program to understand concept of overloading using friend function.
19. Write a program to demonstrate concept of runtime polymorphism.
20. Write a program to demonstrate concept of exception handling.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO06	Computer Architecture	3	1	0	5	4

### Unit-I

**Introduction to Computer Architecture:** what is a Computer, A basic Computer, Structure of a typical desktop computer, computers as dumb machines, the language of instructions, Instruction Set Design.

### Unit-II

#### Computer Arithmetic:

Addition, Subtraction and Multiplication algorithms, divisor algorithms, Floating point arithmetic operations, decimal arithmetic operations.

### Unit-III

**Register Transfer Language and Micro-operations:** concept of bus, data movement among registers, A language to represent conditional data transfer, Data movement from/to memory. Design of simple arithmetic & logic & control unit. Arithmetic and logical operations along with register transfer.

### Unit-IV

**Assembly Language programming:** Pin Diagram of 8086, Architecture of 8086, Addressing Mode of 8086, detailed study of 8086/8088 assembly language, instruction set of 8086, loops and Comparisons, conditions and procedures, arithmetic operations in assembly language. Simple assembly language program of 8086.

### Unit-V

#### Memory System:

Speed imbalance between the arithmetic and memory units, advantages of memory hierarchies, RAM/ROM basic cell, building large memories using chips, Auxiliary memory, Associative memory, Cache Memory.

### Text Books

1. Smruti Ranjan Sarangi, "Computer Organisation and Architecture", Tata McGraw-Hill 2015.
2. M. Morris Mano, "Computer System Architecture", PHI. 1993
3. Liu Gibson, "Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design", PHI, 1999

### References Books

1. Govindarajalu "Computer Architecture & Organisation", Tata McGraw-Hill 2014
2. P.V.S Rao, "Computer System Architecture", PHI, 2009
3. Peter Able, "IBM PC Assembly language programming", PHI, 1994

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO07	Data Structure	3	0	4	7	5

### **Unit- I**

#### **Data Structures Basics:**

Data Definition, Built in data types, Basic Data Structure, Classification of Data Structure, Data structure Operations, Complexity of Algorithms: Time and space trade-off, notations of time complexity

### **Unit - II**

#### **Arrays:**

Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List.

### **Unit - III**

#### **Stacks and Queues:**

Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Applications of stack: Conversion of Infix to prefix and postfix Expressions, Applications of recursion. Queues: Array representation and implementation of queues, Operations on Queue.

### **Unit - IV**

#### **Linked List and Trees:**

Linked list: Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists. Trees: Basic terminology, Binary Trees, Binary tree representation, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, AVL Trees, B-trees.

### **Unit - V**

#### **Searching, Hashing, Sorting, Graph:**

Sequential search, binary search, comparison and analysis. Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Sorting: Insertion Sort, Bubble Sorting, Quick Sort and Heap Sort. Graphs: definition, representation, traversal and applications.

#### **Text Books:**

1. E. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.

2. R. Kruse, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002
3. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.

### **Reference Books:**

1. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
2. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt. Ltd.(Singapore).
3. N. Wirth, "Algorithms+ Data Structure= Program," Prentice Hall of India.
4. Goodrich and Tamassia, "Data Structure and Algorithms in C++," John Wiley and Sons.

### **List of Experiments**

1. Write a program for Array implementation of Stack.
2. Write a program for Array Implementation of Queue.
3. Write a program for Insertion and Deletion in Stack.
4. Write a program for Insertion and Deletion in Queue.
5. Write a program for Implementation of PUSH and POP operation on stack.
6. Write a program for Implementation of circular Queue.
7. Write a program for Implementation of Tree Structures, Binary Tree.
8. Write a program for Implementation of Linear Search Algorithm.
9. Write a program for Implementation of Binary search Algorithm.
10. Write a program for Implementation of Insertion Sort Algorithm.
11. Write a program for Implementation of Bubble Sort Algorithm.
12. Write a program for Implementation of Heap Sort Algorithm.
13. Write a program for Implementation of Quick Sort Algorithm.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO08	Mathematics-II	3	1	0	5	4

### Unit-I

**Differential Calculus:** Successive differentiation, Leibnitz theorem, Rolle's theorem, First and Second Mean value theorems, Taylor's theorem with Lagrange's forms of remainders, Expansion of a function of one variable in Taylor's and Maclaurin's infinite series.

### Unit-II

**Partial differentiation:** Partial derivatives, Differentiation of implicit function, Total differentiation, Euler's theorem for function of two variable, Deduction of Euler's theorem, Taylor series in two variables, Approximation and errors, Maxima and Minima of function of two variables.

### Unit-III

**Integral Calculus:** Review of integration, Definite integral as a limit of sum, Application in summation of series, Beta and Gamma function: Definitions, Relation between Beta and Gamma functions, Duplication formula, Applications of Beta & Gamma Functions.

### Unit –IV

**Multiple Integral:** Physical interpretation of double and triple integral, Evaluation of Double and Triple integrals for Cartesian and Polar coordinates, Change the order of Integration in double integral, Applications of double and triple integral in Area and Volume.

### Unit–V

**Ordinary Differential Equations:** Order and degree of Ordinary differential equation, Formation of ordinary differential equation, Solution of First degree and first order differential equations by method of Separation of variables, Solution of Homogeneous and Linear Ordinary differential equation of first order, Solution of Exact differential equation and Reducible to exact differential equation, Linear differential Equations of second and higher order with constant coefficients.

### Text Books/References

1. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.
3. Gorakh Prasad – Differential Calculus, Pothishala pvt. Ltd. Allahabad.
4. Gorakh Prasad – Integral Calculus, Pothishala pvt. Ltd. Allahabad.
5. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons 1999.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3AE02	Environmental Science	3	0	0	3	3

## Unit I

### Environmental Communication and Public Awareness

Multidisciplinary nature of environmental studies: Scope and Significance of environmental education; Public awareness and rural outreach; Concept of sustainability and sustainable development – Principles, imperatives and threats; three E's to optimize sustainable development, Sustainable Agriculture and Organic Farming.

## Unit II

### Domestic and Global Environmental Concerns

Domestic environmental concerns: Human population growth: Impacts on environment, Water conservation and Management;; Disaster management; Solid Waste management; Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan;; case studies.

Global environmental concerns: Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading; Ozone layer depletion,

## Unit III

### Natural resources and Biodiversity

Natural Resources: Land resources and land use change; Land degradation, soil erosion, salinization and desertification. Water: Use and over exploitation of surface and ground water, floods, droughts, conflicts over water;. Use of alternate energy sources, case studies.

## Unit IV

### Ecosystem and Environmental Pollution

Ecosystem: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.

Environmental pollution: types, causes, effects and control of; Air, water, soil and noise pollution; nuclear hazards and human health risks, Acid rain and impacts on human communities and agriculture.



## Unit V

### Sustainable habitat and Green Technology

Sustainable Habitat: Concept of Green Building and its rating systems, Heating Ventilation and Air Conditioning (HVAC) systems.

Green Technology: Hybrid Vehicle Technology, Industrial ecology, Green Technology, Green Business, Green Computing,

### Field work (Equal to 5 lecture hours)

- Visit to a local area for documentation of environmental assets- viz. river/forest/grassland/hill/mountain
- Visit to a local polluted site- Urban/Rural/Industrial/Agricultural
- Study of social/ environmental problem in a particular area
- Survey of simple ecosystems-pond, river, hill slopes, etc.

### Recommended Books

1. Environmental Science by Dr. Surinder Deswal, *Dhanpat Rai & Co. publication*
2. Environmental Studies by R. Rajgopalan, *Oxford IBH Publication 2011*
3. Environmental Studies by Dr. Preeti Jain.....*Manthan publication*
4. Environmental Science (8 th Edition) (2010): Daniel D. Chiras, Jones & Bartlett Ltd
5. Introduction to Environmental Science and Engineering (2<sup>nd</sup> Ed.) (2004): G. M. Masters, Pearson Education Pvt. Ltd.
6. Fundamentals of Environmental Science: G. S. Dhaliwal, G. S. Sangha and P. K. Raina, Kalyani Publication
7. Environmental Chemistry : A. K. De
8. Environmental Chemistry : B.K. Sharma, and H. Kaur
9. Environmental Science (6 th ed) (1997): Jr. G. T. Miller, Wadsworth Pub. C
10. Environmental Science –S.C. Santra
11. A text book of Environmental Studies.,2006. D.K.Asthana, Meera Asthana (S.Chand&Co.)
12. Handbook of Environmental Laws, Acts, Rules, Guidelines, Compliances and Standards, Vol. I and II, BS Publications, Hyderabad.
13. Introduction to Environmental Legislation, B.L.Chavan, A.R.Shahane and C.S. Rawandale, Asian Inst. Env. Law., Karmala.
14. Environmental Law Case Book Leelakrishnan. P, 2004, , Lexis Nexis, Butterworths
15. Environmental Law in India Singh Gurdip, 2004, , Mcmillan & Co.
16. G.J. Rau and C.D. Wee ten, "Environmental Impact Analysis Hand book, McGraw Hill, 1980.
17. Petts Judith, 1999, Handbook of environmental impact assessment. Vol. 1, Blackwell Science

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3EG02	Desktop Publishing	2	0	2	4	3

### **Unit – I**

#### **Introduction of Desktop Publishing (DTP):**

Use of DTP in advertisements, books and magazines, news paper, table editor. Introductions to Printing, use of Desktop Publishing in publications, importance and advantage of DTP in publication. Applications of DTP. Different tools of DTP.

### **Unit – II**

#### **Basics of Image Editing Tool:**

Introduction to image editing tool, various graphic files and extensions vector image and raster images, various colour modes and models. Exploring menu bar, tool bar, option bar. Working with images, use of selection tool.

### **Unit – III**

#### **Working with Image Editing Tool:**

Introduction to screen and work area in image editing tools and palettes of image editing tool, use of layers and filters working with images. Mixing of graphics and image in a single page production. Give different effects to an image.

### **Unit – IV**

#### **Basics of Page Editing Tool:**

Introductions to page editing tool: Tool Box, Styles, Menus, Different screen Views, Importing text/Pictures, Auto Flow and Columns. Page Layout: Different page format/ Layouts, News paper page format, Page orientations. Installing Printers, Scaling (Percentages), Printer setup.

### **Unit – V**

#### **Working with frames and pages:**

Introduction to Creating Frames: Converting Other Objects to Frames, perform operations on text. Inserting and Removing Pages: Inserting and Removing Pages, Adjusting Spacing of Characters. Adding Design Elements, Importing Graphics into page editing tool.

### **Text Book**

1. Dinesh Maidasani, “Desktop Publishing”, Laxmi publication, second edition 2009.
2. Sandee Cohen, “Best Practices for Desktop Publishing”, Pearson education, 2012.
3. Shrish Chavan, “Rapidex Desktop Publishing Course”, Unicorn book pvt. Ltd., 2005.

## **Reference Book**

1. Kevin G. Proot, "Adobe Page Editing Tool 7.0", Course Technology, 2003
2. Brie Gyncild, "Adobe photoshop CS6", Adobe publisher, 2012
3. Adobe Creative Team, "Adobe Page Editing Tool 7.0", by Adobe publisher, 2002.
4. Adobe Creative Team, "Adobe Photoshop 7.0", by Adobe publisher, 2002.

## **List of practical:**

### **Image Editing Tool**

1. Write a procedure to design a visiting card containing at least one graphic and text information.
2. Write a procedure to take a photographic image. Give a title for the image. Put the border. Write your names. Write the name of institution and place.
3. Write a procedure to prepare a cover page for the book in your subject area. Plan your own design.
4. Write a procedure to extract the flower only from given photographic image and organise it on a background. Selecting your own background for organisation.
5. Write a procedure to adjust the brightness and contrast of the picture so that it gives an elegant look.
6. Write a procedure to position the picture preferably on a plain background of a colour of your choice - positioning includes rotation and scaling.
7. Write a procedure to remove some part of the given photographic image.
8. Write a procedure to type a word and apply the effects shadow embosses.
9. Write a procedure to use appropriate tool(s) from the toolbox, cut the objects from 3 files (for example f1.jpg, f2.jpg and f3.jpg); organise them in a single file and apply feather effects.
10. Write a procedure to display the background given (filename: garden.jpg) through your name using mask.
11. Write a procedure to make any part of picture black & white in a given picture.

## Page Editing Tool Lab work

1. Open Page Editing Tool and create a new magazine layout which includes the following setup options:
  - page size - magazine narrow
  - orientation tall
  - 4 page spread
  - numbering - Lower Roman
  - Margins 1.25 inches- top, and .75 inches - all other sides.
2. Save the document as classexample1.
3. On the first page of your magazine spread, select the Text tool from the Page Editing Tool toolbox and draw a text box. In the text box, on nine individual lines type the word "text attribute." Use each of these nine lines to illustrate each of the nine texts attributes that you can use from the text palette. You might find Figure 6 on page 92 of the optional Page Editing Tool book useful. On line ten, type the word "The" with a capital "T." Set the font size for the capital "T" at 24 point. Set the font size for the "he" at 12. Use kerning on your text palette to pull the "h" underneath the capital "T."
4. Use <Print Screen> to capture Page Editing Tool's floating control palette and paste it into the second page of your magazine layout. Select the crop tool from the Page Editing Tool toolbox and crop the pasted image to include only the control palette.
5. Go to page 3 of your magazine layout. Insert a new text box and in the text box list the entire file name rules that you should follow when saving files that will be used on the web.
6. Go to page 4 of your magazine layout. Insert a new text box. Enter the following text:
  - A title
  - Your name
  - Your address
  - Your email address

Position the upper left hand corner of the textbox at exactly 2" down and 2" over.  
Make the text box exactly 4" wide.

7. Insert vertical guidelines on page 4 at 2", 4" and 6" and insert horizontal guidelines at 2", 4", 6" and 8".
8. Write a procedure to save your work and close Page Editing Tool.
9. Write a procedure to Transfer a copy of this file to your AFS space in the web folder.