

**S. Chand's**

**Revised  
Edition**

# ICSE COMPUTER APPLICATIONS

With BlueJ Based Java Programming

**FOR CLASS X**



**Dr. DHEERAJ MEHROTRA**

**S. CHAND**

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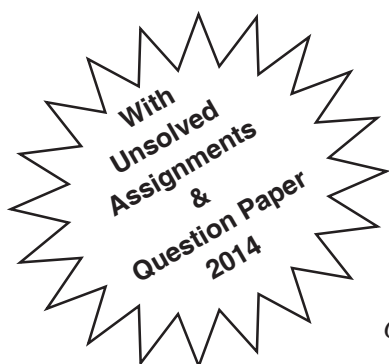


Strictly according to the Latest Syllabus for ICSE (Class X) prescribed by the  
Council for the Indian School Certificate Examinations, New Delhi

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(An imprint of S. Chand Publishing)

A Division of S. Chand & Co. Pvt. Ltd.

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First Edition 2004

**Revised Edition 2014 (As per New Syllabus 2015)**

Subsequent Editions and Reprints 2005 (Twice), 2006, 2007, 2008, 2009, 2010, 2012, 2013

Reprint 2015 (Examination Paper 2014)

ISBN: 978-81-219-2376-7 Code: I020D 072

PRINTED IN INDIA

By Vikas Publishing House Pvt. Ltd., Plot 20/4, Site-IV, Industrial Area Sahibabad, Ghaziabad-201010  
and Published by S. Chand & Company Pvt. Ltd., 7361, Ram Nagar, New Delhi-110055.

## PREFACE TO THE REVISED EDITION

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Computer Applications, the mantra of Quality Knowledge these days has had its day of age with the arena of ICSE course curriculum and is going to be a testing phenomenon for the children from the year 2014-15 examination. I was happy to attend the orientation programme for the new syllabus conducted by the Research, Development & Consultancy Division of the Council at Noida. The expertise shadowed so many issues related to the new course of study but finally segmented to the implementation of BlueJ as the workstation for the programming platform.

The present contents have been especially designed keeping in view the guidelines given during the programme by the experts with emphasis on interaction with single object of any class and the execution of its *public* methods. I have specifically also included completed executed programmes for the JDK environment for the users as they may initially be not very friendly with the BlueJ environment. The biggest difference between BlueJ and traditional development environments is that BlueJ is not concerned with running programs. Instead, you investigate objects. One can even use BlueJ to simply compile and run JDK stand alone programs by right clicking on the class with the main method and run main with the default value of null for the *args* parameter.

Special thanks to my wife, Mrs. Yogita Mehrotra, for the compilation and execution of programs and helping me define and design the logic as and when required.

I would appreciate comments, questions, corrections, criticisms and any other kind of feedback concerning the book.

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# SYLLABUS

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## ICSE COMPUTER APPLICATIONS CLASS X YEAR 2016

There will be **one** written paper of **two hours** duration carrying 100 marks and Internal Assessment of 100 marks.

The paper will be divided into two sections A and B.

**Section A** (Compulsory – 40 marks) will consist of compulsory short answer questions covering the entire syllabus.

**Section B** (60 marks) will consist of questions which will require detailed answers and there will be a choice of questions in this section.

<b>THEORY – 100 Marks</b>
---------------------------

### 1. Revision of Class IX Syllabus

- (i) Elementary Concept of Objects and Classes.
- (ii) Values and types.
- (iii) Conditionals and non-nested loops.

### 2. Class as the Basis of all Computation

Objects and Classes

Objects encapsulate state and behaviour- numerous examples; member variables; attributes or features. Variables define state; member functions; Operations/ methods/ messages/ functions define behaviour.

Classes as abstractions for sets of objects; class as an object factory; concept of type, primitive data types, composite data types. Variable declarations for both types; difference between the two types. Objects as instances of a class.

Consider real life examples for explaining the concept of class and object.

### 3. Constructors

Constructor and its types.

Default constructor, parameterized constructor, constructor with default parameter and constructor overloading.

### 4. Functions

Functions and its types.

Need of functions. Types of functions (pure and impure). Function declaration and definition, ways of calling functions (call by value and call by reference), Returning information/ messages from the functions and use of multiple functions and more than one function with the same name (function overloading). Use of static data member with static member function. Discuss invocation of functions on objects (through the reference). Discuss the concept of this with a reference to the object on which the invocation is made again.



## 5. Class as a User Defined Type

*Class as a composite type, distinction between primitive type and composite or class types.*

*Class may be considered as a new data type created by the user, that has its own functionality.*

*The distinction between primitive and composite types should be discussed through examples. Show how classes allow user defined types in programs. All primitive types have corresponding class wrappers.*

*The following methods are to be covered:*

*int parseInt(String s), int valueOf(String s),  
long parseLong(String s), long valueOf(String s),  
float parseFloat(String s), float valueOf(String s),  
double parseDouble(String s),  
double valueOf(String s),  
boolean isDigit(char ch),  
boolean isLetter(char ch),  
boolean isLetterOrDigit(char ch),  
boolean isLowerCase(char ch),  
boolean isUpperCase(char ch),  
boolean isWhitespace(char ch),  
char toLowerCase(char ch),  
char toUpperCase(char ch).*

## 6. Iterations.

*Loops, nested loops, break and continue.*

*Revision of loops (while, do while and for).*

*Show how each kind of loop can be converted to the other form of the loop. Introduce nested loops through some simple examples. Demonstrate break and continue statements with the help of loops/ nested loops.*

## 7. Using Library Classes

*Simple input, output, String, packages and import statements.*

*Browsing the documentation for classes in the libraries and illustrating their use. The following functions have to be covered:*

*String Library functions:*

*Char charAt(int i)  
int compareTo(String1, String2);  
String concat(String str);  
boolean endsWith(String str);  
boolean equals(String str);  
boolean equalsIgnoreCase(String str);  
int indexOf(char ch);  
int lastIndexOf(char ch);*

`int length( );`  
`String replace(char oldChar, char newChar);`  
`boolean startsWith(String str);`  
`String toLowerCase( )`  
`String toUpperCase( )`  
`String trim( )`  
`String.valueOf(all types)`  
 Mathematical Library Functions:  
`pow(x,y), log(x), sqrt(x), ceil(x), floor(x), rint(x), abs(a), max(a,b), min(a,b), random( ), sin(x),`  
`cos(x), tan(x).`

*Introduce the concept of packages and import statement (Avoid discussing the details of libraries).*

## **8. Encapsulation**

Access specifiers and scope and visibility

Access specifiers- *private and public*, Visibility rules for *private, package and public access specifiers*. Scope of *variables, instance variables, argument variables, local variables*.

## **9. Arrays**

Arrays- *storing, retrieving and arranging data*.

Arrays and their users, sorting algorithms- *selection sort and bubble sort*; Search algorithms- *linear search and binary search*- *Example of a composite type*. Array creation. Sorting and searching algorithms should be discussed (*single dimensional array only*).

## **11. Input/ Output**

Basic input/ output using Scanner and Printer classes from JDK.

The scanner class can be used for input of various types of data (e.g. *int, float, char etc.*) from the standard input stream.

# **INTERNAL ASSESSMENT**

## **Assignments and Project**

The students should complete a number of laboratory assignments during the whole year to reinforce the concepts studied in the class.

The students should build one real life project using the concepts taught.



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## ELEMENTARY CONCEPT OF CLASSES & OBJECTS

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### **OOP (Object Oriented Programming ):**

OOP stands for Object Oriented Programming. It is the latest trend in programming languages supported by C++ and Java and has had the revolutionary success in the race of OOP. The limitations of the Procedure Oriented Programming (POP) languages, have given place to the development of the OOP.

### **PRECEDURAL / NON PROCEDURAL LANGUAGE :**

Procedural programming uses a structured approach to coding the program where the functionality of the program is broken down into a number of functions of subroutines to make it easier to follow and reduce the need to repeat code. It is a programming paradigm based upon the concept of the modularity and scope of program code (i.e., the data viewing range of an executable code statement). A main procedural program is composed of one or more modules (also called packages or units), either coded by the same programmer or pre-coded by someone else and provided in a code library. Non procedural Programming language on the other hand is one where the programmer specifies an explicit sequences of steps to follow to produce a result. Common a procedural languages include Basic, Pascal, {C} and Modula-2.

### **GENERAL CONCEPTS :**

#### ***Object :***

An object is an identifiable entity with some characteristic and behaviour.

#### ***Class :***

A Class is a group of objects that share common properties and relationships.

The Objects are variables of type Class eg.

If animal has been defined as a Class, then the statement;

animal dog;

will create an Object featuring dog belonging to the class animal.

In common sense, the OOP programs are sets of objects which communicate through messages. An object is defined by variables and methods also known as functions. A class is a prototype describing variables and methods of all objects of the same type. You program by defining the classes of objects necessary to perform a task. Classes are organized in hierarchies with classes lower in hierarchy inheriting state and behaviour from parent classes. This inheritance mechanism provides a natural way of structuring programs. This also means that you define new classes by specifying how these are different. A

class inherits all the methods and variables from its parent class. You rewrite a method if necessary, *overriding* it.

The basic concepts of Object Oriented Programming (OOP) are :

- (a) Abstraction                      (b) Encapsulation
- (c) Inheritance                    (d) Polymorphism

**Abstraction** refers to the act of representing essential features without including the background details or explanations.

**Encapsulation** is an act of wrapping up of data and methods into a single unit (called class). It is one of the most fundamental concepts of the Object Oriented programming. The very insulation of the data from direct access by the program is termed as Data Hiding. Encapsulation, is hence, just a way to implement **Abstraction**.

**Inheritance** is the process by which objects of one class acquire the properties of objects of another class. This further provides an important extension to the idea of reusability. i.e. a particular programmer can make use of an existing class and without any further modifications, add additional features and capabilities to it, by deriving a new class from the existing one, through inheritance.

**Polymorphism** is the capacity to allow objects having different internal structures to share the same external interface. It is the ability for a message or data to be processed in more than one form.

#### **ADVANTAGES OF OBJECT ORIENTED PROGRAMMING :**

- (a) Elimination of redundant coding system and usage of existing classes through inheritance.
- (b) Programs can be developed by sharing existing modules.
- (c) Security of data values from other segments of the program through data hiding.
- (d) Possibility of co-existence of multiple instances of an object without any interference.
- (e) Easy interface within the program through message communication by objects.

#### **OBJECT-ORIENTED PROGRAMMING LANGUAGES :**

The different Object Oriented Programming Languages are C++, Java, Smalltalk, Simula, Eiffel etc.

In the object oriented programming approach, object represents an entity that can store data and has its interface through methods.

#### **HISTORIAL DEVELOPMENT OF JAVA :**

JAVA is an object oriented programming language. It was developed by Sun Microsystems in 1991 as a part of the research work to develop software for consumer electronics. It was designed to be small, simple and portable across platforms and operating systems, both at the source and at the binary level. It was developed as a full-fledged programming language in which one can accomplish the same sorts of tasks and solve the similar problems that one can in other

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