ICSE

INDIAN CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

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COMPUTER APPLICATIONS (86)

Developed by:
Research, Development and Curriculum Division (RDCD)
CISCE

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Council for the Indian School Certificate Examinations (CISCE)

MISSION STATEMENT

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ETHOS OF CISCE

- Trust and fair play.
- Minimum monitoring.
- Allowing schools to evolve their own niche.
- Catering to the needs of the children.
- Giving freedom to experiment with new ideas and practices.
- Diversity and plurality - the basic strength for evolution of ideas.
- Schools to motivate pupils towards the cultivation of:
  Excellence - The Indian and Global experience.
  Values - Spiritual and cultural - to be the bedrock of the educational experience.
- Schools to have an 'Indian Ethos', strong roots in the national psyche and be sensitive to national aspirations.

CLASS X

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

THEORY - 100 Marks

1. Revision of Class IX Syllabus

(i) Introduction to Object Oriented Programming concepts, (ii) Elementary Concept of Objects and Classes, (iii) Values and Data types, (iv) Operators in Java, (v) Data processing in Java, (vi) Mathematical Library Methods, (vii) Conditional statements in Java, (viii) Looping / Iterative statements in Java, (ix) Nested for loops.

2. Library classes

Introduction to wrapper classes, methods of wrapper class and their usage with respect to numeric and character data types. Auto boxing and Unboxing in wrapper classes.

Class as a composite type, distinction between primitive data type and composite data type 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. Introduce Auto boxing and unboxing with their definition and simple examples.

The following methods are to be covered:

int parseInt(String), longParseLong(String),

float parseFloat(String),

double parseDouble(String), boolean isDigit(char),

boolean isLetter(char),

boolean isLetterOrDigit(char),

boolean isLowerCase(char), boolean isUpperCase(char), boolean isWhitespace(char),

char toLowerCase (char)

char toUpperCase(char)

3. Arrays

Definition of an array, types of arrays, declaration, initialization and accepting data of single dimensional arrays, accessing the elements of single dimensional arrays.

Arrays and their uses, programs related to accessing the elements of the array [all data types], sorting *techniques - selection sort and bubble sort; Search techniques – linear search and binary search, Array as a composite type, length statement to find the size of the array (sorting and searching techniques using single dimensional array only).*

4. String handling

String class, methods of String class, implementation of String class methods, String array

The following String class methods are to be covered:

String trim ()

String toLowerCase() String toUpperCase()

int length( )

char charAt (int)

int indexOf(char)

int lastIndexOf(char)

String concat(String)

boolean equals (String)

boolean equalsIgnoreCase(String)

int compareTo(String)

int compareToIgnoreCase(String)
String replace (char oldChar,char newChar)

String substring (int beginIndex)

String substring (int beginIndex, int endIndex)

boolean startsWith(String)

boolean endsWith(String)

String valueOf(all types)

Programs based on the above methods, extracting and modifying characters of a string, alphabetical order of the strings in an array [Bubble and Selection sort techniques], searching for a string using linear search technique.

5. Class as the Basis of all Computation

Objects and Classes

Objects encapsulate state and behavior – numerous examples; member variables; attributes or features. Variables define state; member methods; Operations/methods/messages/ methods define behavior.

Classes as abstractions for sets of objects; class as an object factory; 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.

6. Constructors

Definition of Constructor, characteristics, types of constructors, use of constructors, constructor overloading.
Default constructor, parameterized constructor, constructor overloading. Difference between constructor and method.

7. Custom Methods

Need of methods, syntax of methods, forms of methods, method definition, method calling, method overloading, declaration of methods,
Ways to define a method, ways to invoke the methods – call by value [with programs] and call by reference [only definition with an example], Object creation - invoking the methods with respect to use of multiple methods with different names to implement modular programming, using data members and member methods, Actual parameters and formal parameters, Declaration of methods - static and non-static, method prototype / signature, - Pure and impure methods, - pass by value [with programs]] and pass by reference [only definition with an example],Returning values from the methods, use of multiple methods and more than one method with the same name (polymorphism - method overloading).

8. Disruptive technologies

Cyber hygiene, Cyber laws, Artificial intelligence, block chain technology, Internet of things, Robotics, 5G technology, Cloud computing.

Definition, types and uses of the above.

**** Project on this topic should be done.***

INTERNAL ASSESSMENT - 100 Marks

This segment of the syllabus is totally practical oriented. The accent is on acquiring basic programming skills quickly and efficiently.

Programming Assignments (Class X)

The students should complete a minimum of 15 laboratory assignments during the whole year to reinforce the concepts studied in class along with a written project on Disruptive Technologies.

Suggested list of Assignments:

The laboratory assignments will form the bulk of the course. Good assignments should have problems which require design, implementation and testing. They should also embody one or more concepts that have been discussed in the theory class. A significant proportion of the time has to be spent in the laboratory. Computing can only be learnt by doing.

The teacher-in-charge should maintain a record of all the assignments done by the student throughout the year and give it due credit at the time of cumulative evaluation at the end of the year.

Some sample problems are given below as examples. The problems are of varying levels of difficulty:

(i) Custom methods

(a) Programs depicting the concept of pure, impure, static, non- static methods, void and return.

(b) Programs based on overloaded methods including iterative, selection, character and strings

(c) Programs involving data members, member methods invoking the methods with respect to the object created.

(d) Slab based programs with object creation.

(ii) Constructors

(a) Programs based on different types of constructors mentioned in the scope of the syllabus.

(b) Outputs based on constructor overloading

(iii) Library classes

(a) Programs based on conversion of String to numeric and vice versa

(b) Converting character to lower case or uppercase

(c) Outputs based on all the methods mentioned in the scope of the syllabus.

(d) Programs to check whether a given character is an uppercase/ lowercase / digit etc.

(iv) Arrays

(a) accessing the elements of an array.

(b) sort techniques mentioned in the scope of the syllabus for arrays of all data types.

(c) Search techniques mentioned in the scope of the syllabus for arrays of all data types.

(d) Count the number of even / odd numbers, sum of even / odd numbers

(e) Display the array in reverse order, Square root of each element,

(f) Count number of upper case letters and lower case letters in a character array, sum of ASCII code of each character in an array

(v) String handling

(a) Outputs based on all the string methods mentioned in the scope of the syllabus.

(b) Programs based on extracting the characters from a given string and manipulating the same.

Important: This list is indicative only. Teachers and students should use their imagination to create innovative and original assignments

EVALUATION

The teacher-in-charge shall evaluate all the assignments done by the student throughout the year [both written and practical work]. He/she shall ensure that most of the components of the syllabus have been used appropriately in the assignments. Assignments should be with appropriate list of variables and comment statements. The student has to mention the output of the programs.

Proposed Guidelines for Marking

The teacher should use the criteria below to judge the internal work done. Basically, four criteria are being suggested: class design, coding and documentation, variable description and execution or output. The actual grading will be done by the teacher based on his/her judgment. However, one possible way: divide the outcome for each criterion into one of 4 groups: excellent, good, fair/acceptable, poor/unacceptable, then use numeric values for each grade and add to get the total.

Class design:

Has a suitable class (or classes) been used?
Are all attributes with the right kinds of types present? Is encapsulation properly done?
Is the interface properly designed?

Coding and documentation:

Is the coding done properly? (Choice of names, no unconditional jumps, proper organization of conditions, proper choice of loops, error handling, code layout) Is the documentation complete and readable? (Class documentation, variable documentation, method documentation, constraints, and known bugs - if any).

Variable description:

Format for variable description:

Name of the Variable	Data Type	Purpose/description

Execution or Output:

Does the program run on all sample input correctly?

Evaluation of practical work will be done as follows:

Subject Teacher (Internal Examiner): Assignments Written project	 40 marks 10 marks
Total	50 marks
External Examiner: Assignments Written project	 40 marks 10 marks
Total	50 marks

Evaluation of Written Project will be done as follows:

Introduction	2 marks
Content	4 marks
Presentation	2 marks
Conclusion/Summary	2 marks
Total	10 marks

Evaluation of Assignments will be done as follows:

Criteria (Total- 40 marks)	Class design (10 marks)	Variable description (10 marks)	Coding and Documentation (10 marks)	Execution OR Output (10 marks)
Excellent	10	10	10	10
Good	8	8	8	6
Fair	6	6	6	2
Poor	4	4	4	2

An External Examiner shall be nominated by the Head of the School and may be a teacher from the faculty, but not teaching the subject in the relevant section/class. For example, a Computer Teacher of class IX and above may be deputed to be the External Examiner for class X.

The total marks obtained out of 100 (80 marks assignment + 20 marks written project) are to be sent to CISCE by the Head of the school.

The Head of the school will be responsible for the online entry of marks on CISCE's CAREERS portal by the due date.

EQUIPMENT

There should be enough computer systems to provide for a teaching schedule where at least three-fourth of a time available is used for programming and assignments/practical work. The course shall require at least 4 periods of about 40 minutes duration per week. In one week, out of 4 periods the time should be divided as follows:

2 periods – Lecture cum demonstration by the Instructor.

2 periods – Assignments/Practical work.

The hardware and software platforms should be such that students can comfortably develop and run programs on those machines.

Since hardware and software evolve and change very rapidly the schools shall need to upgrade them as required. Following are the minimal specifications as of now.

RECOMMENDED FACILITIES:

- A lecture cum demonstration room with a MULTIMEDIA PROJECTOR/ an LCD and Overhead Projector (OHP) attached to the computer.
- A white board with white board markers should be available.
- A fully equipped Computer Laboratory that allows one computer per student.
- The computers should have a minimum of 2 GB RAM and at least a P – V or Equivalent Processor.
- Good Quality printers.
- A scanner, a web cam/a digital camera (Should be provided if possible).

SOFTWARE FOR CLASSES IX & X

Any suitable Operating System can be used.

For teaching fundamental concepts of computing using object oriented approach, Blue J environment (5.4.2 or higher version) compatible with JDK (11 or higher version) as the base or any other editor or IDE, compatible with JDK (11 or higher version) as the base may be used. Ensure that the latest versions of software are used.