

# **Computers and Communication Technology (CCT)**

(Syllabus for Higher Secondary Stage)



**Department of Computer Education and Technological Aids  
National Council of Educational Research and Training  
Sri Aurobindo Marg, New Delhi-110016**

## COMPUTERS AND COMMUNICATION TECHNOLOGY (CCT)

(Classes XI XII)

### Introduction

Computers and communication technology have become a way of life in the present day world. That everyone should be educated about the use and implications of this technology is the need of the hour. Students with a science/mathematics background prefer courses on Computers and their applications. The course outlined here is an attempt to design a generally friendly course that would not only be contemporary but also leave sufficient scope for expansion into unknown realms of computer activity that may emerge in future.

This course attempts to go beyond “how computers work” to how we work with the computer and related technologies and the social context in which the technologies are used or misused. Presumably, this would be a coveted course for “everybody”, for it deals with the real challenges that the discipline is trying to solve and emphasises the interface between the computer science, informatics practices and the society at large. It deals with the social issues related to the unprecedented expansion of ICT and touches on many dimensions that go beyond “programming” a machine. It fosters the development of problem solving and, equally or possibly more important, problem formulating skills. It reduces the importance of technology and underscores the need for learning skills to manipulate the technology. It focuses on some of the real problems that come up with the expansion of the technology security, piracy and digital identity. Above all, the course addresses as much on the excitement as on the limitations of the new information technology.

The National Curriculum Framework 2005 recommends that theoretical component of Higher Secondary stage should emphasise on problem solving methods and that the awareness of historical development of key concepts be judiciously integrated into the content. The proposed course of study is aligned to these broad guidelines.

The National Knowledge Commission also refers to preparing a workforce adequately skilled and oriented to actively participate in the emerging Knowledge Economy. This course would be a major contributor to developing the skill sets required for the future for all school leavers.

### The Vision

All students at the Higher Secondary stage will:

- **understand** CCT and reflect upon the ethics and impact of its use, synthesising new insights and making reasoned decisions as CCT evolves.
- **manage** CCT by making creative, productive and efficient technology choices for the tasks at hand.
- **use** CCT to structure inquiries, solve problems and gather, organise, validate and communicate information on a local and global scale.
- **Skill** development in these areas will be accomplished through the integrated use of CCT in the curricular context.

### The Integrated Approach

Education is being equated with the acquisition of certain key skills : reading, writing and numeracy. In present scenario, we require an enhanced set of skills that includes these skills, but also reflects current skills related to the effective use of CCT. The integrated approach therefore, aims at placing the computer at the centre of learning and integrating all fields that are most effectively managed by using CCT.

### **The Rationale**

Higher Secondary is a crucial stage of school education because at this stage specialised, discipline based, content oriented courses are introduced. Students who reach this stage after 10 years of general education choose subjects that would enable them to pursue their career in academic courses like Computer Science, Computer Application, Information Technology, Economics, Commerce, Psychology, Anthropology, Geography, etc., or professional courses like Engineering, Medicine, Architecture, Journalism, Photography, Business Management, Theatre, etc., and it is expected that CCT will be one of those subjects. Therefore, there is a need to provide learners with sufficient conceptual background of CCT highlighting its vast scope, which will make them competent to meet the challenges of academic and professional courses after the Higher Secondary stage.

The course has been so woven as to identify the various applications, issues and concerns of CCT and contextualising the concepts required to acquire the relevant skills. The ground rule of such a course is to understand that the content transaction should never be attempted by removing the child away from the computer, therefore it is imperative to address the infrastructure challenge seriously and explore viable and innovative alternatives with regard to hardware, software and connectivity technologies appropriate for rural and urban Indian schools.

### **Themes**

The course has been developed on following six themes that emerge from NCF2005 which have been further classified into units and/or chapters:

- I : Welcome to the World of CCT
- II : Workplace Productivity Tools
- III : Communication Concepts and Skills
- IV : Web Publishing Technologies
- V : Teamwork and Web Based Collaboration Tools
- VI : Emerging Technologies

### **General Outcomes**

General outcomes for CCT course include:

- **Knowledge** : Students need to know the facts, concepts, etc. The knowledge learned in CCT includes the vocabulary of computer hardware, software and computer programming languages. They should also know health and safety issues and career information, etc.
- **Understanding** : Students need to understand different concepts, principles, generalisations, function of computer hardware, syntax of computer programming languages, programming standards and conventions and project management practices.
- **Skills and Strategies** : Students need to know and apply processes and

strategies in developing skills. The skills include problem solving, critical thinking, communication and teamwork.

- **Attitudes** : Students need to develop attitudes and habits that include setting goals, thinking strategically in approaching a task, considering personal health and safety, acting ethically and morally and reflecting on their own performance.

### **The Expected Learning Outcomes**

Each of the above outcomes is to be achieved through a variety of learning strategies and experiences. Some of these are described here theme-wise:

1. **Welcome to the world of CCT** : Understand basic concepts and components of CCT. Understand the IT enabled Applications and Services, Create an awareness of Cyber laws and Intellectual Property Rights. Sensitised about IT trends in India and Worldwide as well as Social and Ethical issues related to CCT.
2. **Workplace Productivity Tools** : Application of basic operational skills, including those like creation of documents, tabulation, slide presentation and integration of multimedia components.
3. **Communication Concepts and Skills** : Appreciate necessity of Soft Skills and using it effectively in communication. Apply soft skills in Web Chat, Blogging, VoIP, Video Conferencing, IP TV and Call Centre Applications. Understand the Computer Networks and basic terminologies. Understand and sensitise security and prevention issues.
4. **Web Publishing Technologies** : Understand the need of Web Publishing tools. Develop website and web based application. Understand Database concepts. Understand the need of database connectivity with web based applications.
5. **Teamwork and Web Based Collaboration Tools** : Understand the process of project creation and apply it to new projects. Understand the concept of globalisation and work in Cross Cultural Environment to effectively utilise the diverse specialisation from across the world.
6. **Emerging Technologies** : Acquaintance with the emerging trends in various technologies. Understand the need for processing and memory enhancements. Acquaintance with the Nano Technology, Grid, Parallel and Quantum Computing. Acquire knowledge of advances in various computer controlled devices.

### **Salient Features**

The proposed course of study as outlined in the following syllabus broadly covers some fundamental concepts of CCT, emphasizes on the processes like acquiring skills, problem solving abilities and application of CCT.

With this background, the proposed CCT curriculum at the Higher Secondary stage attempts to:

- develop a positive scientific attitude and appreciate contribution of CCT towards the improvement of quality of human life;
- develop problem solving skills and natural curiosity, aesthetic sense and creativity;
- realise the importance of interfacing CCT with other disciplines;

## *Computers and Communication Technology*

- face challenges of using CCT in the context of health, nutrition, environment, population, industries and agriculture;
- inculcate values of honesty, integrity, cooperation, concern for life and preservation of the environment and
- develop interest in studying CCT as a discipline.

**CLASS XI**

**THEORY**

**(Total Periods 120)**

**Course Outline**

**UNIT I : WELCOME TO THE WORLD OF CCT**

**(Total Periods 16)**

**1. Experiencing the World of CCT**

- Changes Due to CCT in Homes, Education, Public life
- CCT and the Digital Divide
- CCT and E-Commerce
- Major National Organisations Working in the Area of CCT

**2. Components of CCT**

- What is Computer?
- History, Evolution, Classification and Generations of computers
- Organisation of the Computer System
- Hardware
  - Input device, Memory or Storage Devices, Central Processing Unit, Output device and Computer PORTs
  - Computer Equipment Maintenance
- Communication technology and evolution of communication mediums
- Software
  - System software
  - Application Software
  - Shareware
  - Freeware
  - Open Source
- Algorithm, Flowchart and Number system
- Computer/Programming languages
  - Machine Language (First Generation Computer language)
  - Assembly Language (Second Generation Computer language)
  - High Level Language (Third Generation Computer language)
  - Fourth Generation Computer Language
  - Fifth Generation Computer language

**UNIT II: WORKPLACE PRODUCTIVITY TOOLS**

**(Total Periods 28)**

**3. Word Processing Tool**

- Introduction
- Starting Word processor
- Creating, Saving and Opening a document
- Text Formatting, Bullets and Numbering, etc.
- Tabs, Style, Views
- Insert Table and Picture
- Copy, Move and Delete

- Checking Spelling and Grammar
- Page Layout
- Mail Merge

#### **4. Electronic Spreadsheet**

- Create, save and open a worksheet
- Entering data – text, numbers and formulas in a worksheet
- Navigating within a Worksheet and also between different Worksheets of a Workbook
- Inserting and deleting cells, rows and columns in a worksheet
- Select, copy, paste and delete cell data within the worksheet
- Using various formulas and inbuilt functions
- Update worksheets using special tools like spell check and auto correct
- Setup the page and margins of worksheets for printing
- Format the data in the worksheet globally or selectively
- Define and apply styles
- Enhance worksheets using charts

#### **5. Electronic Presentation Tool**

- Introduction and Starting the program
- Anatomy of the application window
- Starting a fresh presentation
- Adding new slide
- Navigating across slides
- Saving and Opening presentation
- Text formatting options
- Copy, Move and Delete slides and text
- Applying designs
- Using Animations
- Slide Transitions
- Insert clip art
- Insert sound/movies
- Viewing the presentation
- Pack and Go

### **UNIT III : COMMUNICATION CONCEPTS AND SKILLS**

**(Total Periods 20)**

#### **6. Convergence of CCT**

- Components of Communication Systems
  - Message, Sender, Receiver, Transmission Medium and Protocol
- Model and application of Communication System
- Evolution of Communication Systems
- Convergence of Communication Technologies
  - Developing uniform data representation and digitisation technologies
  - Convergence of Standards and Protocols, Network
- Convergence of Network
  - Convergence in Voice Communication

- Convergence of Video and Wireless Network Communication
- Convergence of Application
- Importance of Standardisation

## **7. The Internet**

- History and Functions of the Internet
- Working with Internet
  - Web Browsers, World Wide Web, Uniform Resource Locator and Domain Names
- Uses of Internet
  - Search for Information, Email, Chatting, Instant messenger services, News Group, Teleconferencing, Video-Conferencing, E-Commerce and M-Commerce
- Manage an E-mail Account
  - E-mail Address, configure E-mail Account, log to an E-mail, Receive E-mail, Sending mails, sending files an attachments and Address Book
- Downloading Files
- E-Services
  - E-Banking and E-Learning

## **8. Soft Skills for Effective Communication**

- Developed Soft Skills
  - Hard Skills and Soft Skills
- Communication
  - Importance of Soft Skills in Effective Communication
  - Components, Process and Model of effective communication
- Communication through E-mail
  - Subject, Information, Quotation Document, Identification, Signature, Separators
- Auto Message Responder and E-mail Attachment Size
- Removing Barriers like Timelines and Cultural Diversity; Greetings and Salutations at all stages in communication through soft skills
- Writing/Letter Writing Skills
- Importance of Values, Attitude and Etiquettes in communication
- Importance of careful proofing of the documents created
- Audio/Video communication skills and Listening Skills

## **UNIT IV : WEB PUBLISHING TECHNOLOGIES**

**(Total Periods 36)**

### **9. Web Page Authoring Using Hyper Text Markup Language (HTML)**

- Hyper Text Markup Language
  - Define the term Hyper Text Markup Language
  - Express the importance of HTML standards
  - Describe some of the differences between the various versions of HTML like HTML 2.0, HTML 3.2, and HTML 4.0



- Identify the meaning and purpose of HTML tags.
- Differentiate between container and empty tags and also classify HTML tags as logical or physical
- Differentiate between a tag and an attribute
- Understand the usage of the basic HTML structural tags like: <HTML>, <TITLE>, <HEAD> and <BODY>
- Learn how to use formatting tags for improving the presentation of your web pages.
- Identify HTML codes for creating unordered, ordered, definition and nested lists for a web page.
- Design simple web pages using the basic and formatting tags of HTML.
- Web Page Authoring Using HTML
  - Forms
  - Tags
  - Types of Attributes
- Adding Interactivity
  - Introduction
  - Form
  - Tag
  - Check box

## **10. Client-Side Scripting using Java-Script**

- Java-Script
  - Introduction
  - Client Server Model
  - Data types and values
  - Expression and Operators
  - Special Operators
  - JavaScript Statements
  - Branching and selection statements
  - Object Manipulation Statements
  - JavaScript functions

## **UNIT V: TEAMWORK AND WEB-BASED COLLABORATION TOOLS (Total Periods 4)**

### **11. Project Based Learning**

- Development of Interpersonal and Communication Skills in a Group
- Thinking and Collaborating
- Information Sharing amongst the group members
- Participating in a Group Project

### **12. CCT Project in Local context**

- National e-Governance Plan (NeGP),
- E-Governance: Definition, Need and Architecture
- E-Governance Projects: Objectives, Categories and Beneficiaries, Application areas of Projects, and Implementation
- Government's e-Governance Initiatives

**UNIT VI : EMERGING TECHNOLOGIES**

**(Total Periods 16)**

**13. Emerging trends in CCT**

- Emerging trends in Computer Storage
  - Removable Storage Devices: Hard Disk Storage,
  - Optical Storage, USB and Other Forms of Storage, RAID Technology
  - Smarter Storage Devices: Object Storage Devices, Self-Monitoring, Analysis, and Reporting Technology
  - Network Storage: Storage Area Network, Network Attached Storage and Storage Virtualisation
  - Online Storage Options
- Emerging trends in processing technologies
  - Intel Dual Core
  - Intel Virtualisation Technology
  - Hyper-Threading Technology
  - Speedstep
  - Xeon Processors
- Emerging trends in application software (**Only brief outline**)
  - Educational Software: Edutainment, Learning Management System
  - Media Development Software : Image Organizer , Graphic Art Software, Image Editing, Video Editing, Digital Audio Workstation, Music Sequencer (Also MIDI Sequencer ), Diagramming Software
  - Simulation Software: Social Simulators, Battlefield Simulations, Flight Simulator, Scientific Simulators
  - Medical Software: Monitors Interpreter, Medication Pumps Interpreter, Analysis Software, Expert Systems, Medical Informatics, Therapy Delivery, Medical and Healthcare Educational Software
  - Construction Software: Computer-Aided Design (CAD), Computer-Aided Engineering, Computer-Aided Manufacturing (CAM)
  - Transportation Software: Quotes and Order Entry Software, Dispatching Software, Freight Billing Software, Driver Settlement Software, Fuel And Mileage Management Software, Fleet Maintenance Software, Accounts Receivable Software, Accounts Payable Software, Payroll Management Software, General Ledger Management Software, Safety And Accident Reporting Software
  - Enterprise Infrastructure Software: Digital Asset Management (DAM) Software, Document Management Software, Geographic Information System (GIS) Software,

**14. Computer controlled devices**

- Sensors: Barcode scanning, Motion detection, Oxygen (Lambda) sensor, Temperature sensor
- Smart Sensors: Location Sensing,
- Applications of Smart sensors
- Experiments with Simple sensors

**PRACTICALS**

**(Total Periods 80)**

**Suggested Activities**

**HTML**

Simple web design applications

- Generation of simple HTML pages
- Tables in HTML
- Frames in HTML
- Forms in HTML

**JAVA SCRIPT – 1**

- Simple display programs
- Simple programs using if – construct
- Simple programs using if – else - construct
- Simple programs using switch, exit, break, and continue.
- Simple programs using for – loop, while, do-while
  - To display a list of numbers
  - Simple pyramid generation.
- Program using one-dimensional and two-dimensional arrays.
- Program to accept single data values.
- Program to accept multiple data values
- Program to accept password data values
- Program to accept data and validate values

**PROJECTS RELATED TO CCT**

- Project related to real life situation
- Project related to local context

**COURSE OUTLINE FOR CLASS XII : THEORY  
(TOTAL PERIODS: 120)**

**UNIT I : WELCOME TO THE WORLD OF CCT (TOTAL PERIODS: 12)**

**1.1 : EXPANDING WORLD OF CCT : CAREER OPPORTUNITIES**

- Commerce
- Industry
- Medicine
- Scientific research
- Governance
- Entertainment
- Other fields

**1.2 : SOCIAL, ETHICAL AND LEGAL ASPECTS**

- Effects on the way we:
  - ✓ Work
  - ✓ Socialise
  - ✓ Operate in other areas
- Cyber crime
- Prevention of crime
  - ✓ Cyber law: Indian IT Act, international agreement and practices
  - ✓ Security threats and attacks (passive, active)
- Intellectual property
  - ✓ Software piracy
  - ✓ Plagiarism
  - ✓ Copyright and Patent
- Software licensing
  - ✓ Proprietary software
  - ✓ Open source (free software)
- Indian initiatives in open source software

**UNIT II : WORKPLACE PRODUCTIVITY TOOLS (TOTAL PERIODS: 32)**

**2.1 : ELECTRONIC DATABASE**

- Database concepts
- Features of a database
- Database Management Systems (DBMS)
- Types of DBMS
- Database objects: Tables, In-built functions, Views
- Table Attributes: Field, Records, Keys, constraints
- Types of SQL commands: DDL, DML, DCL, TCL(using MySQL/Sybase/Oracle/DB2)

**2.2 : WORKING WITH MULTIMEDIA TOOLS**

- Introduction to multimedia

- Basics of multimedia
- Installation of multimedia software
- Capturing and manipulation of image and sound
- Animation tools
- Graphics Techniques
- Sound Techniques
- Real life applications of multimedia

**UNIT III : COMMUNICATION CONCEPTS AND SKILLS (TOTAL PERIODS: 16)**

**3.1 : SOFT SKILL PRACTICES**

- Soft skills revisited
- Some soft skills
  - ✓ Interpersonal skills
  - ✓ Team spirit
  - ✓ Social graces
  - ✓ Business etiquette
  - ✓ Negotiation skills
  - ✓ Behavioural traits such as attitude, motivation and time management
- Case Studies/ Group activities

**3.2 : COMPUTER NETWORKS**

- Introduction
- Types of Networks
- Transmission media
  - ✓ Wired – Copper, Optical fibre
  - ✓ Wireless – Infra Red, Microwaves, Radio-waves
- Applications of networks: Telephone Lines, Bluetooth, Wi-Fi (WLAN), Wi-Max (WMAN)
- Cellular Technology

**UNIT IV : WEB PUBLISHING TECHNOLOGIES (TOTAL PERIODS: 36)**

**4.1 : CLIENT-SERVER CONNECTIVITY**

- Client Server Architecture
- Client- Server Computing
- Client Process
- Server Process
- Middleware
- Client Server technical Issues

**4.2 : SERVER – SIDE SCRIPTING (JSP)**

- JavaScript Revisited
- JavaScript objects : String, Array, Number, Boolean
- Event Programming
- Using JSP for Processing forms

**UNIT V : TEAMWORK AND WEB-BASED COLLABORATION TOOLS (TOTAL PERIODS: 16)**

**5.1 : CROSS CULTURAL COLLABORATION**

- Globalisation
- Cross culture collaboration
- Possibilities and hurdles
- Bridging Digital Divide
- Scope for international collaboration

**5.2 : WEB-BASED COLLABORATION TOOLS**

- Social networking tools
- Language translation tools
- E-collaboration utilities and services

**UNIT VI : EMERGING TECHNOLOGIES**

**(TOTAL PERIODS: 8)**

**6.1 : COMPUTER-CONTROLLED DEVICES**

- Introduction to Robotics
- Intelligent Devices

**6.2 : EMERGING TRENDS**

- Mobile computing
- Bio – informatics
- Biometrics
- Speech recognition
- Computer vision
- Nanotechnology
- Green computing

**PRACTICALS**

**(TOTAL PERIODS 80)**

**SUGGESTED ACTIVITIES – HTML**

- Form based programs
- Frames and forms based programs

**SQL**

- Simple SQL commands
  - ✓ Creation, deletion and modification of tables and its data
  - ✓ Inserting values in SQL
  - ✓ Putting constructs in tables
  - ✓ Showing grouped data

**PROJECTS RELATED TO CCT**

- Project related to real life situation
- Project related to local context