

COMPUTERS AND COMMUNICATION TECHNOLOGY (CCT)

(Classes XI & XII)

(Syllabus for Higher Secondary Stage)



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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 Applications, 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;
- 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.

COURSE OUTLINE FOR CLASS XI: THEORY (Total Periods 120)

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 formulae 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 formulae 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 and attachments and Address Book
- Downloading Files
- E-Services
 - E-Banking and E-Learning

8. Soft Skills for Effective Communication

- Development of 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 Designing Using Hyper Text Markup Language (HTML)

- Internet and the web
- Hyper Text Markup Language (HTML)
- Browsers
- Analysing the structure of a web page
- Using HTML tags and attributes for colouring, highlighting and aligning text
 - using media, banners, audio and video elements
 - tables, lists and blocks of content
 - interactivity
 - web forms and communicating with the server
- Modern trends in web publishing (Introduction only)¹
 - Dynamic sites
 - Cascading style sheets

10. Client-Side Scripting using Java-Script

¹ Elaborated in class XII

- 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
- Modular approach to projects
- Teamwork and its components
- Information Sharing amongst the group members
- Participating in a Group Project, some learning experiences

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, RAID
 - 3-D Optical Data 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
 - USB in embedded systems and wireless USB, microprocessor(Only brief outline)
- Emerging trends in Semiconductors (Only brief outline)
- Emerging trends in Communication systems (Only brief outline)
- Emerging trends in Quantum computing (Only brief outline)
- Emerging trends in software (Only brief outline)
 - Operating system
 - Application software
 - Educational and communication Software: Edutainment, Learning Management System (LMS)
 - Design, Media and Simulation Software: Media Development, Image Organizer, Graphic Art Software, Image Editing, Video Editing, Digital Audio Workstation, Music Sequencer (Also MIDI Sequencer), Diagramming Software
 - Simulation Software: Social Simulators, Flight Simulator, Scientific Simulators
 - Office Automation and Process Management software
 - Control and Analysis software

- Medical Software (Monitors Interpreter, Medication pumps and Interpreters, Analysis, Medical Informatics),
- Mapping software: Geographic Information System (GIS)
- Nanotechnology

14. Computer controlled devices

Sensors: Barcode scanning, Motion detection, Parking sensors, Temperature sensor

Smart Sensors

Location Tracking : Global Positioning System(GPS),

Automatic Teller Machine (ATM)

Robots and its uses

1. Hands on Experience:

(a) Workplace Productivity Tools

(i) Creating a document using some of the tools given below:

- Page and Paragraph setup
- Inserting picture and Table
- Mail-merge

OR

(ii) Creating a document using some of the tools given below:

- Formatting data and cells
- Using Functions and Formulae
- Using Charts

OR

(iii) Creating a document using some of the tools given below (Presentation must contain at least 5 slides):

- Formatting slides
- Using animations
- Inserting picture/sound/movie
- Using slide transitions

(b) Web Publishing Technologies

(i) HTML: A web page based on a particular topic. The webpage should be designed using following:

- Basic HTML tags (HTML/HEAD/TITLE/B/I/U/BR/HR)
- Forms - using <TABLE> tag
- Using pictures - using hyperlinks
- Using Buttons

(ii) JavaScript: A programming problem in JavaScript. The problem should cover some of following using:

- If, if...else. switch statements
- Loop statements (for/while/do...while)
- Objects (Date and Math)
- Using Buttons
- Object Handling Statements (for.. in/ with)
- JavaScript functions.

2. Project Work

A web-based project has to be developed using HTML and JavaScript.

3. Practical File

The Practical file should contain following:

- WebPages covering all the topics given in the chapter 9 of the book.
- JavaScript programs covering all the topics given in the chapter 10 of the book.

4. Viva-Voce

Viva will be based on the syllabus covered and project done.

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 MATTERS

- Effects on the way we:
 - Work
 - Socialise
 - Operate in other areas
- Cyber crime
- Prevention of crime
 - Cyber law: Indian IT Act
- Intellectual property
 - Software piracy
 - Plagiarism
 - Copyright and Patent
- Software licensing
 - Proprietary software
 - Free and Open source software
- Indian initiatives in open source software

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

2.1 : ELECTRONIC DATABASES

- Need for data in daily life
- Organising Data for easy retrieval and making meaning
- Drawing interpretation from tables, graphs maps and pie- charts
- Database as a back-end data container
- DBMS
- Creating, populating and managing databases
- Querying a database.
- SQL and its applications.
- Need for very large databases
- Constructing relationships
- Creating, populating & managing relational databases
- Querying relational databases.
- Database applications
 - Web applications: web forms and their interaction with databases
 - Desktop application: applications interfaces and their interaction with databases
- Security concerns & safeguarding data.

2.2 : WORKING WITH MULTIMEDIA TOOLS

- Introduction to multimedia
- Basics of multimedia
- Applications of multimedia (presentations, product description, Instruction, games)
- 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 : COMPUTER NETWORKS

- Need for Networking
- Types of Networks (LAN, WAN)
- Network topology (Star, Ring, Bus)
- Establishing networks
 - Hardware
 - Wired: Physical media that build up network
 - Cables (twisted pair, coaxial cable, optical fiber cable)
 - Network Cards
 - Switches (hub switch, packet switching)
 - Ports
 - Wireless (Infrared, Microwaves, Radio waves), Bluetooth, Wi- Fi(WLAN)
 - Protocols (TCP/IP, HTTP, FTP)
 - Software (servers like print, mail, firewall, web server, etc.)
 - Applications (computer telephony, teleconferencing, instant messaging)
 - Testing, troubleshooting and administering networks

3.2: NETWORK SECURITY

NETWORK SECURITY

- Risk assessment and security measures
 - Assets and types (data, applications, system and network)
- Security threats and attacks (passive, active); types and effects (e.g. Identity theft, denial of services, computer virus etc.)
- Security issues and security measures (Firewalls, encryption/decryption)
- Prevention

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

4.1 : DYNAMIC WEBSITES

- Database Connectivity and Dynamic WebPages.
- Functionalities of Dynamic WebPages.
- Querying the database; Request and retrieval of information; Structured Query Language (SQL).
- Technologies for dynamic pages – ASP/ASPX, PHP, JSP, etc.
- Case study of popular dynamic sites.
- Building Dynamic pages; Forms, queries and connections.

4.2 : APPLICATIONS OF DYNAMIC WEBSITES

Features, technologies, scope and emerging trends of:

- Feature rich web sites
- Online Dictionaries and Encyclopedias
- Banking and e-commerce applications
- ERP, CRM and other business management applications
- Content and Learning Management Systems
- Social networking, blogs and wikis

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

5.1 : CROSS CULTURAL COLLABORATION

- Globalisation
- Cross cultural 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
- Historical perspective
- Degrees of freedom
- Characteristics and anatomy of a robot
- Emotional robots
- Robots in use
- Challenges to robotics
- Intelligent Devices
- Machine Intelligence and Machine Learning

6.2 : EMERGING TRENDS AND ADVANCES

- Mobile computing
- Bioinformatics
- Biometrics
- Speech recognition
- Computer vision
- Nanotechnology
- Green computing

PRACTICALS: Class XII

(TOTAL PERIODS 80:)

Practical Examination: 30 Marks

Time: 3 HOURS

1. Hands on Experience: (15 marks)

(a) Using SQL commands design, develop and use a RDBMS.

- Creating Table using constraints (NULL, PRIMARY).
- Deleting & modifying Table.
- Inserting values in Table.
- Deleting & Updating records in Table.
- Generating Queries on single/ multiple table/s using clauses like - ORDER BY, WHERE, GROUP BY, HAVING, DISTINCT etc.
- Generating Query statements using functions like - SUM, COUNT, MIN, MAX, AVG, etc.

(b) Applications using Multimedia Tools

- Creating a poster on any topic
- Creating a movie on any topic, which should have background music and some animation.
- Creating a greeting card on any topic
- Creating web pages
- Integrating multimedia features in web pages

(c) Make blog on a theme e.g. Green Technology, organize an audio/video chat using free blog service.

2. Project Work (5 marks)

- A dynamic web site to be developed using database, web server, programming language e.g. Library management System, e-Commerce, MIS, social networking etc.
- Case study of a dynamic website

3. Practical File should contain: (5 marks)

- Print of 15 SQL commands with output
- Documentation of design of the dynamic web site
- Process documentation of development of Blog

4. Viva-Voce (5 marks)

Viva will be taken from the syllabus covered in class XII and project work.