NAV BHARAT
COMPUTER EDUCATION
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"O" Level

Information Technology Tools and Network

- Introduction to Computer
  - Computer and Latest IT gadgets
  - Evolution of Computers & its applications
  - IT gadgets and their applications
  - Basics of Hardware and Software
  - Central Processing Unit
  - Input devices
  - Output devices
  - Computer Memory & storage
  - Application Software
  - Systems Software
  - Utility Software
  - Open source and Proprietary Software
  - Mobile Apps
- Introduction to Operating System
  - Operating System
  - Basics of Operating System
  - Operating Systems for Desktop and Laptop
  - Operating Systems for Mobile Phone and Tablets
  - User Interface for Desktop and Laptop
  - Task Bar
  - Icons & shortcuts, running an application
  - Operating System simple setting
  - Using mouse and changing its properties
  - Changing system date and time
  - Changing display properties
  - To add or remove Program and its features
  - Adding, removing & sharing Printers
  - File and Folder management
  - Types of file extensions
- Word Processing
  - Word Processing Basics
  - Opening Word Processing Package
  - Title Bar, Menu Bar

- Toolbars & Sidebar
- Creating a New Document
- Opening and Closing Documents
- Opening Documents
- Save and Save As
- Closing Document
- Using The Help
- Page Setup, Page Layout Borders
- Watermark
- Print Preview
- Printing of Documents
- PDF file and Saving a Document as PDF file
- Text Creation and manipulation
- Document Creation
- Editing Text
- Text Selection
- Cut, Copy and Paste
- Font, Color, Style and Size selection,
- Alignment of Text
- Undo & Redo
- AutoCorrect
- Spelling & Grammar
- Find and Replace
- Formatting the Text
- Creating and using user defined Styles
- Paragraph Indentation
- Bullets and Numbering
- Change case
- Header & Footer
- Table Manipulation
- Insert & Draw Table
- Changing cell width and height
- Alignment of Text in cell
- Delete / Insertion of Row
- Column and Merging & Splitting of Cells
- Border and Shading
- Mail Merge
- Table of Contents, Indexes
- Adding Comments, Tracking changes
- Macros

- Spreadsheet
  - Elements of Spread Sheet
  - Creating of Spread Sheet
  - Concept of Cell Address [Row and Column] and selecting a Cell
  - Entering Data [text number date] in Cells
  - Page Setup

- Printing of Sheet
- Saving Spreadsheet Opening and Closing
- Manipulation of Cells & Sheet Modifying / Editing Cell Content
- Formatting Cell (Font Alignment Style)
- Cut, Copy, Paste & Paste Special Changing
- Cell Height and Width
- Inserting and Deleting Rows Column
- AutoFill
- Sorting & Filtering Freezing panes
- Formulas Functions and Charts
- Using Formulas for Numbers (Addition, Subtraction Multiplication & Division)
- AutoSum Functions (Sum, Count, MAX, MIN, AVERAGE)
- Sort,
- Filter, Advanced Filter
- Database Functions (DSUM, DMIN,DMAX, DCOUNT DCOUNTA)
- What-if Analysis
- Pivot table Charts (Bar, Column, Pie Line)
- Data Validation

- Presentation
  - Creation of Presentation
  - Using a Template Creating a Blank Presentation
  - Inserting & Editing Text on Slides Inserting and Deleting Slides in a Presentation
  - Saving a Presentation
  - Manipulating Slides
  - Inserting Table
  - Adding Pictures
  - Inserting Other Objects
  - Resizing and Scaling an
  - Object Creating & using Master Slide
  - Presentation of Slides
  - Choosing a Set Up for Presentation Running a SlideShow Transition and Slide Timings
  - Automating a Slide Show
  - Providing Aesthetics to Slides & Printing
  - Enhancing Text Presentation
  - Working with Color and Line Style
  - Adding Movie and Sound
  - Adding Headers Footers and Notes
  - Printing Slides and Handouts
- Introduction to Internet and WWW
  - Basic of Computer Networks
  - Local Area Network (LAN)
  - Wide Area Network (WAN)
  - Network Topology
  - Internet
  - Concept of Internet & WWW
  - Applications of Internet

- Website Address and URL
- Introduction to IP Address
- ISP and Role of ISP
- Internet Protocol
- Modes of Connecting Internet (HotSpot, Wifi, LAN Cable, BroadBand, USB Tethering)
- Identifying and uses of IP/MAC/IMEI of various devices
- Popular Web Browsers (Internet Explorer/Edge, Chrome, Mozilla Firefox, Opera etc.)
- Exploring the Internet
- Surfing the web
- Popular Search Engines
- Searching on Internet
- Downloading Web Pages
- Printing Web Pages
- Netiquettes, Overview of e-Governance
- Services like Railway Reservation
- Passport,eHospital [ORS]
- Accessing e-Governance Services on Mobile Using “UMANG APP”, Digital Locker

- Digital Financial Tools and Applications
  - Digital Financial Tools
  - Understanding OTP [One Time Password]and QR [Quick Response] Code
  - UPI [Unified Payment Interface]
  - AEPS [Aadhaar Enabled Payment System]
  - USSD[Unstructured Supplementary Service Data]
  - Card [Credit / Debit]
  - eWallet
  - PoS [Point of Sale]
  - Internet Banking
  - National Electronic Fund Transfer (NEFT)
  - Real Time Gross Settlement (RTGS)
  - Immediate Payment Service (IMPS)
  - Online Bill PaymentOverview of Futureskills and Cyber Security
- Introduction to Internet of Things (IoT)
  - Big Data Analytics
  - Cloud Computing
  - Virtual Reality
  - Artificial Intelligence
  - Social & Mobile
  - Blockchain Technology
  - 3D Printing/ Additive Manufacturing
  - Robotics Process Automation
  - Cyber Security
  - Need of Cyber Security
  - Securing PC
  - Securing Smart Phone

Web Designing and Publishing

- Introduction to Web Design
  - Introduction of Internet
  - WWW
  - Website
  - Working of Websites
  - Webpages
  - Front End, Back End
  - Client and Server Scripting Language
  - Responsive Web Designing
  - Types of Websites (Static and Dynamic Websites)
- Editos
  - Downloading free Editors like Notepad++, Sublime Text Editor
  - Making use of Editors, File creation and editing, Saving
- Html Basics
  - Introduction
  - Basic Structure of HTML
  - Head Section and Elements of Head
  - Section
  - Formatting Tags: Bold, Italic, Underline, Strikethrough, Div, Pre Tag
  - Anchor links and Named Anchors
  - Image Tag
  - Paragraphs
  - Comments
  - Tables
  - Lists
  - Forms
  - Form Elements
  - Input types
  - Input Attributes
  - Text Input Text Area
  - Dropdown
  - Radio buttons
  - Check boxes,
  - Submit and Reset Buttons
  - Frames
  - HTML 5 Introduction
  - HTML5 New Elements:
    i) Section, Nav, Article, Aside
    ii) Audio Tag, Video Tag
  - HTML5 Form Validations:
    i) Require, Pattern, Autofocus Attribute
    ii) email, number, date, Range type
    iii) HTML embed
    iv) multimedia, HTML Layout, HTML Iframe
- CSS

- Introduction to CSS
- Types of CSS
- CSS Selectors
  i) Universal Selector, ID selector, Tag Selector, Class Selector, Sub Selector, Attribute Selector, Group Selector, CSS
- Properties
  i) Background, Block, Box, List, Border, Positioning
- CSS Lists
- CSS Tables
- CSS Menu Design
- CSS Image Gallery

- CSS Framework
  - Web Site Development using W3.CSS Framework
  - W3.CSS Intro
  - W3.CSS Colors
  - W3.CSS Containers
  - W3.CSS Panels
  - W3.CSS Borders
  - W3.CSS Fonts
  - W3.CSS Text,
  - W3.CSS Tables
  - W3.CSS List
  - W3.CSS Images
  - W3.CSS Grid
- JavaScript and Angular JS
  - Introduction to Client-Side Scripting Language
  - Variables in Java Script
  - Operators in JS
  - Conditions Statements
  - JS Popup Boxes
  - JS Events
  - Basic Form
  - Validations in JavaScript
  - Introduction to Angular JS
  - Expressions
  - Modules and Directives
- Photo Editor
  - Features of Photo Editing
  - Tools
    i) Selection Tools
    ii) Paint Tools
    iii) Transform Tools
    iv) Text Tools
  - Layers
  - Brightness/ Contrast
  - Improve Colors and tone

- Filters
- Web Publishing and Browsing
  - Overview
  - SGML
  - Web hosting basics
  - Documents Interchange Standards
  - Components of Web Publishing
  - Document management
  - Web Page Design Considerations and Principles
  - Search and Meta Search Engines
  - WWW, Browser, HTTP
- Publishing Tools

Problem Solving Through Python

- Introduction to Programming
  - The basic Model of computation
  - Algorithms
  - Flowcharts
  - Programming Languages
  - Compilation
  - Testing & Debugging
- Algorithms and Flowcharts to Solve Problems
  - Flow Chart Symbols
  - Basic algorithms/flowcharts for sequential processing
  - Decision based processing and iterative processing
  - Some examples like:
    i) Exchanging values of two variables
    ii) Summation of a set of numbers
    iii) Decimal Base to Binary Base conversion
    iv) Reversing digits of an integer
    v) GCD (Greatest Common Divisor) of two numbers
    vi) Test whether a number is prime
    vii) Factorial computation
    viii) Fibonacci sequence
    ix) Evaluate 'sin x' as sum of a series
    x) Reverse order of elements of an array
    xi) Find largest
    xii) Number in an array
    xiii) Print elements of upper triangular matrix etc
- Introduction to Python
  - Python Introduction
  - Technical Strength of Python
  - Introduction to Python Interpreter and program execution
  - Using Comments
  - Literals
  - Constants
  - Python's Built-in Data types
  - Numbers (Integers, Floats, Complex Numbers, Real, Sets)
  - Strings (Slicing, Indexing, Concatenation, other operations on Strings)
  - Accepting input from Console
  - Printing statements
  - Simple 'Python' programs
- Operators, Expressions and Python Statements
  - Assignment statement
  - Expressions
  - Arithmetic
  - Relational
  - Logical
  - Bitwise operators and their precedence

- Conditional statements
  i) if
  ii) if-else
  iii) if-elif-else
  iv) Simple programs
- Notion of iterative computation and control flow
  i) range function
  ii) While Statement
  iii) For loop
- Break statement
- Continue Statement
- Pass statement
- Else
- Assert

- Sequence Data Types
  - Lists
  - Tuples and dictionary
  - Concept of mutability
  - Examples
    i) Finding the maximum
    ii) Minimum
    iii) Mean
    iv) Linear search on list/tuple of numbers
    v) Counting the frequency of element in a list using a dictionary
- Functions
  - Top-down approach of problem solving
  - Modular programming and functions
  - Function parameters
  - Local variables
  - Return statement
  - Doc Strings
  - Global statement
  - Default argument values
  - Keyword arguments
  - VarArgs parameters
  - Library function-
    i) input()
    ii) eval()
    iii) print()
  - String Functions:
    i) count(), find(), rfind(), capitalize(), title(), lower(), upper(), swapcase(), islower(), isupper(), istitle(), replace(), strip(), lstrip(), rstrip(), split(), partition(), join(), isspace(), isalpha(), isdigit(), isalnum(), startswith(), endswith(), encode(), decode()
    ii) String
    iii) Slicing
  - Membership
  - Pattern Matching

- Numeric Functions:
  i) eval(), max(), min(), pow(), round(), int(), random(), ceil(), floor(), sqrt()
- Date & Time Functions
- Recursion

- File Processing
  - Concept of Files
  - File opening in various modes and closing of a file
  - Reading from a file
  - Writing onto a file
  - File functions-open ()
  - close ()
  - read ()
  - readline()
  - readlines()
  - write()
  - writelines()
  - tell()
  - seek()
  - Command Line arguments
- Scope and Modules
  - Scope of objects and Names
  - LEGB Rule
  - Module Basics
  - Module Files as Namespaces
  - Import Model
  - Reloading Modules
- NumPy Basics
  - Introduction to NumPy ndarray
  - datatypes
  - array attributes
  - array creation routines
  - Array From Existing Data
  - Array From Numerical Ranges
- Indexing & Slicing

Internet of Things and its Applications

- Introduction to Internet of Things– Applications/Devices, Protocols and Communication Model
  - Introduction - Overview of Internet of Things(IoT)
  - The characteristics of devices and applications in IoT ecosystem
  - Building blocks of IoT
  - Various technologies making up IoT ecosystem
  - IoT levels
  - IoT design methodology
  - The Physical Design/Logical Design of IoT
  - Functional blocks of IoT and Communication Models
  - Development Tools used in IoT.
- Things and Connections
  - Working of Controlled Systems
  - Real-time systems with feedback loop e.g. thermostat in refrigrator, AC, etc.
  - Connectivity models–
    i) TCP/IP versus OSI model,
    ii) Different type of modes using wired and wireless methodology
  - The process flow of an IoT application
- Sensors, Actuators and Microcontrollers
  - Sensor -
    i) Measuring physical quantities in digital world e.g. light sensor
    ii) Moisture sensor
    iii) Temperature sensor etc.
  - Actuator –
    i) Moving or controlling system e.g. DC motor
    ii) Different type of actuators
  - Controller–
    i) Role of microcontroller as gateway to interfacing sensors and actuators
    ii) Microcontroller vs microprocessor
    iii) Different type of microcontrollers in embedded ecosystem
- Building IoT applications
  - Introduction to Arduino IDE–
    i) Writing code in sketch
    ii) Compiling-debugging
    iii) Uploading the file to Arduino board
    iv) Role of serial monitor
  - Embedded 'C' Language basics-
    i) Variables and Identifiers
    ii) Built-in Data Types
    iii) Arithmetic operators and Expressions
    iv) Constants and Literals
    v) assignment
  - Conditional Statements and Loops-
    i) Decision making using Relational Operators
    ii) Logical Connectives-conditions

iii) if-else statement
iv) Loops:
(1) while loop
(2) do while
(3) for loop
(4) Nested loops
(5) Infinite loops
v) Switch statement

- Arrays–
  i) Declaring and manipulating single dimension arrays
- Functions-
  i) Standard Library of C functions in Arduino IDE
  ii) Prototype of a function
  iii) Formal parameter list
  iv) Return Type
  v) Function call
- Interfacing sensors–
  i) The working of digital versus analog pins in Arduino platform
  ii) Interfacing LED
  iii) Button
  iv) Sensors-DHT
  v) LDR
  vi) MQ135
  vii) IR
  viii) Display the data on Liquid Crystal Display(LCD)
  ix) Interfacing keypad
- Serial communication –
  i) Interfacing HC -5 (Bluetooth module)
  ii) Control/handle 220V AC supply– interfacing relay module.

- Security and Future of IoT Ecosystem
  - Need of security in IoT- Why Security?
  - Privacy for IoT enabled devices-
  - IoT security for consumer devices-
  - Security levels
  - Protecting IoT devices
  - Future IoT eco system -
  - Need of power full core for building secure algorithms
  - Examples for new trends -
  - AI, ML penetration to IoT
- Soft skills-Personality Development
  - Personality Development -
  - Determinants of Personality-
    i) Self-awareness
    ii) Motivation
    iii) Self-discipline etc.
  - Building a positive personality
  - gestures

- Self-esteem
  - i) Self-efficacy
  - ii) Self-motivation
- Time management
- Stress management
- Etiquettes & manners
- Communication and writing skills-
  - i) Objective
  - ii) Attributes and categories of communication
  - iii) Writing Skills –
    - (1) Resume, Letters, Report, Presentation etc.
  - iv) Interview skills and body language.