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# COMPUTER SCIENCE

with python 

**Textbook for Class XI**

- Computer Systems and Organisation
- Computational Thinking and Programming
- Society, Law and Ethics

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*Specimen copy*

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# Syllabus

## Distribution of Marks

Unit No.	Unit Name	Marks	Periods	
			Theory	Practical
1.	Computer Systems and Organisation	10	10	10
2.	Computational Thinking and Programming-1	45	80	60
3.	Society, Law and Ethics	15	20	-
<b>Total</b>		<b>70</b>	<b>110</b>	<b>70</b>

## Unit 1 : Computer Systems and Organisation (CSO)

(10 Theory + 10 Practical)

- ❖ Basic computer organisation: description of a computer system and mobile system, CPU, memory, hard disk, I/O, battery.
- ❖ Types of software: application, system, utility.
- ❖ Memory units : bit, byte, MB, GB, TB, and PB.
- ❖ Boolean logic : OR, AND, NAND, NOR, XOR, NOT, truth tables, De Morgan's laws, Logic circuits.
- ❖ Number System : numbers in base 2, 8, 16, binary addition.
- ❖ Encoding Schemes : ASCII, UTF8, UTF32, ISCI and Unicode.
- ❖ Concept of compiler and interpreter.
- ❖ Operating System (OS) — need for an operating system, brief introduction to functions of OS, user interface.
- ❖ Concept of cloud computing and cloud services (SaaS, IaaS, PaaS), cloud (public/private), Blockchain technology.

## Unit 2 : Computational Thinking and Programming-1

(80 Theory + 60 Practical)

- ❖ *Introduction to Problem solving* : Problem solving cycle — Analysing a problem, designing algorithms and representation of algorithm using flowchart and pseudo-code.
- ❖ *Decomposition* — concept, need for decomposing a problem, examples of problem solving using decomposition.
- ❖ *Familiarization with the basics of Python programming* : a simple “hello world” program, process of writing a program (interactive and script mode), running it, and print statements; simple data-types: integer, float, string.
- ❖ Features of Python, Python Character Set, Token & Identifiers, Keywords, Literals, Delimiters, Operators.
- ❖ *Comments* : (Single line & Multiline/Continuation statements), Clarity & Simplification of expression.
- ❖ Introduce the notion of a variable and methods to manipulate it (concept of L-value and R-value even if not taught explicitly).
- ❖ *Knowledge of data types and operators* : accepting input from the console, assignment statement, expressions, operators and their precedence.
- ❖ *Operators & types* : Binary operators-Arithmetic, Relational operators, Logical Operators, Augmented Assignment operators.
- ❖ Execution of a program, errors — syntax error, run-time error and logical error.
- ❖ *Conditional statements* : if, if-else, if-elif-else; simple programs: e.g. : absolute value, sort 3 numbers and divisibility of a number.



- ❖ *Notion of iterative computation and control flow* : for(range( ), len( )), while using flowcharts, suggested programs : calculation of simple and compound interests, finding the factorial of a positive number etc.
- ❖ *Strings* : Traversal, operations – concatenation, repetition, membership ; functions/methods – len( ), capitalize( ), title( ), upper( ), lower( ), count( ), find( ), index( ), isalnum( ), islower( ), isupper( ), isspace( ), isalpha( ), isdigit( ), split( ), partition( ), strip( ), lstrip( ), rstrip( ), replace( ), String slicing.
- ❖ *Lists* : Definition, Creation of a list, Traversal of a list. Operations on a list – concatenation, repetition, membership; functions/methods – len( ), list( ), append( ), extend( ), insert( ), count( ), index( ), remove( ), pop( ), reverse( ), sort( ), min( ), max( ), sum( ); Lists Slicing ; Nested lists; finding the maximum, minimum, mean of numeric values stored in a list; linear search on list of numbers and counting the frequency of elements in a list.
- ❖ *Tuples* : Definition, Creation of a Tuple, Traversal of a tuple. Operations on a tuple – concatenation, repetition, membership; functions/methods – len( ), tuple( ), count( ), index( ), sorted( ), min( ), max( ), sum( ); Nested tuple ; Tuple slicing ; finding the minimum, maximum, mean of values stored in a tuple ; linear search on a tuple of numbers, counting the frequency of elements in a tuple.
- ❖ *Dictionary* : Definition, Creation, Accessing elements of a dictionary, add an item, modify an item in a dictionary; Traversal, functions/methods – len( ), dict( ), keys( ), values( ), items( ), get( ), update( ), del( ), delclear( ), fromkeys( ), copy( ), pop( ), popitem( ), setdefault( ), max( ), min( ), count( ), sorted( ), copy( ); Suggested programs : count the number of times a character appears in a given string using a dictionary, create a dictionary with names of employees, their salary and access them.
- ❖ *Sorting algorithm* : bubble and insertion sort ; count the number of operations while sorting.
- ❖ *Introduction to Python modules* : Importing math module (pi, e, sqrt, ceil, floor, pow, fabs, sin, cos, tan); random module (random, randint, randrange), statistics module (mean, median, mode).

### Unit 3 : Society, Law and Ethics

(20 Theory)

- ❖ *Cyber safety* : safely browsing the web, identity protection, confidentiality, social networks, cyber trolls and bullying.
- ❖ *Appropriate usage of social networks* : spread of rumours, and common social networking sites (Twitter, LinkedIn, and Facebook) and specific usage rules.
- ❖ *Safely accessing web sites* : adware, malware, viruses, trojans.
- ❖ *Safely communicating data* : secure connections, eavesdropping, phishing and identity verification.
- ❖ *Intellectual property rights, plagiarism, digital rights management, and licensing* (Creative Commons, GPL and Apache), open source, open data, privacy.
- ❖ *Privacy laws, fraud; cyber-crime* – phishing, illegal downloads, child pornography, scams; cyber forensics, IT Act, 2000.
- ❖ *Technology and society* :
  - ❖ Understanding of societal issues and cultural changes induced by technology.
  - ❖ *E-waste management* : proper disposal of used electronic gadgets.
  - ❖ Identity theft, unique ids and biometrics.
  - ❖ Gender and disability issues while teaching and using computers.

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