Informatics Practices (New)

CLASS XI (Code No. 065)

2019-20

Learning Outcomes:

1. Ability to identify the functionality of various components of Computer System.
2. Ability to develop application using simple python.
3. Ability to use, develop & debug programs independently.
4. Ability to store and retrieve data using an RDBMS.
5. Ability to understand societal, legal and ethical aspect of technology.
6. Ability to ensure safety and security in cyber-space.

Distribution of Marks and Periods:

Unit No.	Unit Name	Marks	Periods	
		Theory	Theory	practicals
1.	Introduction to Computer System	5	3	2
2.	Introductory Python Programming	30	45	35
3.	Data Handling	10	20	15
4.	Data Management	15	30	20
5.	Society, Law and Ethics	10	10	0
		70	**108**	**72**

Unit 1: Introduction of Computer System

Basic computer organisation: Computer system – I/O Devices, CPU, memory, hard disk, battery, power, transition from a calculator to a computer and further to smart devices.

Trouble shooting with parts of computer and basic operations of operating system Basic concept of Data representation: Binary, ASCII, Unicode

Unit 2: Introduction Python Programming

Familiarization with the basic of Python programming: a simple "hello world" program, process of writing a program, running it, and print statements; simple data-types: integer, float, string. Introduce the notion of variable, and methods to manipulate it (concept of L-value and R-value even if not taught explicitly). Tokens - keywords,

identifiers, Literals, Delimiters. Knowledge of data type and operators: accepting input from the console, assignment statement, expressions, operators (assignment, arithmetic, relational and logical) and their precedence.

Conditional statements: if, if-else, if-elif-else; simple programs: e.g.: absolute value, sort 3 numbers, divisibility.

Notion of iterative computation and control flow: for (range() , len()), while, flowcharts.

Suggested programs: finding average and grade for given marks, amount calculation for given cost-qty-discount, perimeter-wise/ area-wise cost calculation, interest calculation, profit-loss, EMI, tax calculation (example from GST/Income Tax).

List and dictionary: finding the maximum, minimum, mean; linear search on a list of numbers, and counting the frequency of elements in a list using a dictionary.

Text handling: compare, concat, and substring operations (without using string module).

Introduction to Python modules: importing math (sqrt, ceil, floor, pow, fabs), random (random, randint, randrange), statistics (mean, median) modules.

Unit 3: Data Handling

Numpy 1D array, 2D array Arrays: slices, joins, and subsets. Arithmetic operations on 2D arrays.

Unit 4: Data Management

Relational databases: Concept of a database, relations, attributes and tuples, keys - candidate key, primary key, alternate key, foreign key; Degree and Cardinality of a table.

Use SQL - DDL/DML commands to CREATE TABLE, INSERT INTO, UPDATE TABLE, DELETE FROM, ALTER TABLE, MODIFY TABLE, DROP TABLE, keys, and foreign keys; to view content of a table: SELECT-FROM-WHERE-ORDER BY alongwith BETWEEN, IN, LIKE. (Queries only on single table)

Aggregate Functions : MIN , MAX, AVG, COUNT, SUM

Unit 5: Society, Law and Ethics

Cyber safety: safely browsing the web, identity protection, confidentiality, social networks, netiquettes, digital footprint, 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, and phishing and identity verification.

Class XI Practical

S. No	Description	Marks
1	Problem solving using arithmetic operations, conditional statements and iterations with the help of a Python program 60% logic + 20% documentation + 20% code quality (To be tested on the day of the final exam)	6
2	Problem solving using numPy (To be tested on the day of the final exam)	4
3	SQL - 5 Queries based on single table (To be tested on the day of the final exam)	5
4	Report File ● Minimum 20 Python Programs ● Minimum 20 SQL Queries	6
5	Viva	4
6	Project using the concepts learnt in the course	5
	Total	**30**

Programming in Python

(Sample problems to be solved using expressions, conditions, loops, list, dictionary, and strings.)

- To find average and grade for given marks,
- To find amount for given cost-qty-discount,
- To calculate cost perimeter-wise/ area-wise,
- To calculate interest (Simple and Compound)
- To calculate profit-loss for given Cost and Sell Price
- To calculate EMI for Amount, Period and Interest,
- To calculate tax (examples from GST/Income Tax)
- To find the largest and smallest numbers in a list.
- To find the third largest number in a list.
- To find the sum of squares of the first 100 natural numbers.
- To find whether a string is a palindrome or not.
- To compute x^n, for given two integers x and n,
- To compute the greatest common divisor and the least common multiple of two integers.
- To test if a number is equal to the sum of the cubes of its digits. Find the smallest and largest such numbers in the range of 100 to 1000.

Data Handling:

The following are some representative lab assignments.

- Import numpy as `np` and print the version number.
- To create an array of 1D containing numeric values 0 to 9
- To create a numPy array with all values as True
- To extract all odd numbers from numPy array
- To extract all even numbers from numPy array
- To copy the content of an array A to another array B, replacing all odd numbers of array A with -1 without altering the original array A
- To replace all odd numbers in numPyarr with -1
- To copy content of a 1D array into a 2D array with 2 rows
- To perform basic arithmetic operations on 1D and 2D array

Data Management:

SQL Commands At least the following SQL commands should be covered during the labs: create, insert, delete, select.

The following are some representative assignments.

- To create a database
- To create student table with the student id, class, section, gender, name, dob, and marks as attributes where the student id is the primary key.
- To insert the details of at least 10 student in the above table.
- To delete the details of a particular student in the above table.
- To increase marks by 5% for those students, who have Rno more than 20
- To display the entire content of table on screen
- To display Rno, Name and Marks of those students, who are scoring marks more than 50.
- To find the average of marks from the student table
- To find the number of students, who are from section 'A'
- To add a new column email of appropriate data type
- To find the minimum and maximum marks obtained by students
- To modify email for each student.
- To display the information all the students, whose name starts with 'AN' (Examples: ANAND, ANGAD,..)
- To display Rno, Name, DOB of those students, who are born between '2005-01-01' and '2005-12-31'
- To display Rno, Name, DOB, Marks, Email of those male students in ascending order of their names.
- To display Rno, Gender, Name, DOB, Marks, Email in descending order of their marks.

Project

A complete solution of a problem stating the problem, objective, source code, output Students in group of 2-3 are required to work collaboratively to develop a project using Programming Skills learnt during the course.
(Sample Examples can be a combination of few problems illustrated above)