Informatics Practices

CLASS XI

Code No. 065

2021-22

1. **Prerequisite :** None
2. **Learning Outcomes** :

At the end of this course, students will be able to:

- Identify the components of the Computer System.
- Create Python programs using different data types, lists and dictionaries.
- Explain what is 'data' and analyse using NumPy.
- Explain database concepts and Relational Database Management Systems.
- Retrieve and manipulate data in RDBMS using Structured Query Language
- Identify the Emerging trends in the fields of Information Technology.

3. **Distribution of Marks and Periods** :

Unit No.	Unit Name	Marks	Periods Theory	Periods Practical	Total Period
1	Introduction to Computer System	5	10	-	10
2	Introduction to Python	25	35	35	70
3	Data Handling using NumPy	15	28	15	43
4	Database concepts and the Structured Query Language	20	25	25	50
5	Introduction to Emerging Trends	5	7	-	7
	Practical	30	-	-	-
	Total	100	105	75	180

4. **Unit Wise syllabus**

Unit 1: Introduction to Computer System

Introduction to computers and computing: evolution of computing devices, components of a computer system and their interconnections, Input/Output devices.

Computer Memory: Units of memory, types of memory – primary and secondary, data deletion, its recovery and related security concerns.

Software: purpose and types – system and application software, generic and specific purpose software.

Unit 2: Introduction to Python

Basics of Python programming, Python interpreter - interactive and script mode, the structure of a program, indentation, identifiers, keywords, constants, variables, types of operators, precedence of operators, data types, mutable and immutable data types, statements, expressions, evaluation of expressions, comments, input and output statements, data type conversion, debugging, control statements: if-else, for loop

Lists: list operations - creating, initializing, traversing and manipulating lists, list methods and built-in functions.: len(), list(), append(), extend(), insert(), count(), find(), remove(), pop(), reverse(), sort(), sorted(), min(), max(), sum()

Dictionary: concept of key-value pair, creating, initializing, traversing, updating and deleting elements, dictionary methods and built-in functions: len(), dict(), keys(), values(), items(), get(), update(), clear(), del()

Unit 3: Data Handling using NumPy

Data and its purpose, importance of data, structured and unstructured data, data processing cycle, basic statistical methods for understanding data - mean, median, mode, standard deviation and variance. Introduction to NumPy library, NumPy arrays and their advantage, NumPy attributes, creation of NumPy arrays; from lists using np.array(), np.zeros(), np.ones(),np.arange() , indexing, slicing, and iteration; concatenating and splitting array;

Arithmetic operations on one dimensional and two dimensional arrays.

Calculating max, min, count, sum, mean, median, mode, standard deviation, variance on NumPy arrays.

Unit 4: Database concepts and the Structured Query Language

Database Concepts: Introduction to database concepts and its need, Database Management System. Relational data model: concept of attribute, domain, tuple, relation, candidate key, primary key, alternate key, foreign key.

Structured Query Language: Data Definition Language, Data Query Language and Data Manipulation Language, Introduction to MySQL: Creating a database, using database, showing tables using MySQL, Data Types : char, varchar, int, float, date

Data Definition Commands: CREATE, DROP, ALTER (Add and Remove primary key, attribute).

Data Query Commands: SELECT-FROM- WHERE, LIKE, BETWEEN, IN, ORDER BY, using arithmetic, logical, relational operators and NULL values in queries, Distinct clause

Data Manipulation Commands: INSERT, UPDATE, DELETE.

Unit 5: Introduction to the Emerging Trends

Artificial Intelligence, Machine Learning, Natural Language Processing, Immersive experience (AR, VR), Robotics, Big data and its characteristics, Internet of Things (IoT), Sensors, Smart cities, Cloud Computing and Cloud Services (SaaS, IaaS, PaaS); Grid Computing, Block chain technology.

5. Practical Marks Distribution

Sl.No.	Unit Name	Marks
1	Problem solving using Python programming language	8
2	Problem solving using NumPy	5
3	Creating database using MySQL and performing Queries	5
4	Practical file (minimum of 20 python programs , 5 Numpy programs and 20 SQL queries)	7
5	Viva-Voce	5
	Total	30

6. Suggested Practical List :

6.1 Programming in Python

1. To find average and grade for given marks.
2. To find the sale price of an item with a given cost and discount (%).
3. To calculate perimeter/circumference and area of shapes such as triangle, rectangle, square and circle.
4. To calculate Simple and Compound interest.
5. To calculate profit-loss for a given Cost and Sell Price.
6. To calculate EMI for Amount, Period and Interest.
7. To calculate tax - GST / Income Tax.
8. To find the largest and smallest numbers in a list.
9. To find the third largest/smallest number in a list.
10. To find the sum of squares of the first 100 natural numbers.
11. To print the first ‘n’ multiples of a given number.
12. To count the number of vowels in a user entered string.
13. To print the words starting with a particular alphabet in a user entered string.

14. To print the number of occurrences of a given alphabet in a given string.
15. Create a dictionary to store names of states and their capitals.
16. Create a dictionary of students to store names and marks obtained in 5 subjects.
17. To print the highest and lowest values in the dictionary.

6.2 Numpy Program

18. To create an array of 1D containing numeric values 0 to 9.
19. To create a NumPy array with all values as 0.
20. To extract values at odd numbered positions from a NumPy array.
21. To create a 1-D array having 12 elements usinf arange(). Now, convert this array into a 2-D array with size 4X3.
22. To perform basic arithmetic operations on 1D and 2D array .

6.3 Data Management: SQL Commands

23. To create a database
24. To create a student table with the student id, class, section, gender, name, dob, and marks as attributes where the student id is the primary key.
25. To insert the details of at least 10 students in the above table.
26. To delete the details of a particular student in the above table.
27. To increase marks by 5% for those students who have Rno more than 20.
28. To display the entire content of the table.
29. To display Rno, Name and Marks of those students who are scoring marks more than 50.
30. To find the average of marks from the student table.
31. To find the number of students, who are from section 'A'.
32. To add a new column email in the above table with appropriate data type.
33. To add the email ids of each student in the previously created email column.
34. To display the information of all the students, whose name starts with 'AN' (Examples: ANAND, ANGAD,..)
35. To display Rno, Name, DOB of those students who are born between '2005- 01-01' and '2005-12-31'.
36. To display Rno, Name, DOB, Marks, Email of those male students in ascending order of their names.
37. To display Rno, Gender, Name, DOB, Marks, Email in descending order of their marks.
38. To display the unique section available in the table.

Reference:

NCERT Informatics Practices - Text book for class - XI ***(ISBN- 978-93-5292-148-5)***