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 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	10	10	-	10
2	Introduction to Python	25	35	28	63
3	Database concepts and the Structured Query Language	30	23	17	40
4	Introduction to Emerging Trends	5	7	-	7
	Practical	30	-	-	-
	Total	100	75	45	120

TERM - 1

Distribution of Theory Marks

Unit No	Unit Name	Marks
1	Introduction to computer system	10
2	Introduction to Python	25
	Total	35

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.

- 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()

Distribution of Practical Marks

Topic	Marks
Python program (pen and paper or Collab or any online idle or pyroid screen for mobile)	10
Practical File- 15 python Programs	3
Viva	2
Total	15

Suggested Practical List

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.

TERM - 2

Distribution of Theory Marks

Unit No	Unit Name	Marks
3	Database concepts and the Structured Query Language	30
4	Introduction to Emerging Trends	5
	Total	35

Unit 3:

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 4:

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.

Distribution of Practical Marks

Topic	Marks
SQL Queries (pen and paper)	8
Practical File SQL Queries - 20 Queries	4
Viva	3
Total	15

Suggested Practical List :

Data Management: SQL Commands

1. To create a database
2. 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.
3. To insert the details of at least 10 students in the above table.
4. To delete the details of a particular student in the above table.
5. To increase marks by 5% for those students who have Rno more than 20.
6. To display the entire content of the table.
7. To display Rno, Name and Marks of those students who are scoring marks more than 50.
8. To find the average of marks from the student table.
9. To find the number of students, who are from section 'A'.
10. To add a new column email in the above table with appropriate data type.
11. To add the email ids of each student in the previously created email column.
12. To display the information of all the students, whose name starts with 'AN' (Examples: ANAND, ANGAD,..)
13. To display Rno, Name, DOB of those students who are born between '2005- 01-01' and '2005-12-31'.
14. To display Rno, Name, DOB, Marks, Email of those male students in ascending order of their names.
15. To display Rno, Gender, Name, DOB, Marks, Email in descending order of their marks.
16. To display the unique section available in the table.

Reference:

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

Informatics Practices
CLASS XII
Code No. 065
2021-2022

1. **Prerequisite**: Informatics Practices – Class XI

2. **Learning Outcomes**

At the end of this course, students will be able to:
- Create Series, Data frames and apply various operations.
- Visualize data using relevant graphs.
- Design SQL queries using aggregate functions.
- Learn terminology related to networking and the internet.
- Identify internet security issues and configure browser settings
- Understand the impact of technology on society including gender and disability issues.

3. Distribution of Marks and Periods

Unit No	Unit Name	Marks	Periods Theory	Periods Practical	Total Period
1	Data Handling using Pandas and Data Visualization	25	25	25	50
2	Database Query using SQL	25	20	17	37
3	Introduction to Computer Networks	10	12	0	12
4	Societal Impacts	10	14	-	14
	Project	-	-	7	7
	Practical	30	-	-	-
	Total	100	71	49	120

<u>Term - 1</u>

Distribution of Theory Marks

Unit No	Unit Name	Marks
1	Data Handling using Pandas and Data Visualization	25
4	Societal Impacts	10
	Total	35

Unit 1:

Data Handling using Pandas and Data Visualization

Data Handling using Pandas -I

● Introduction to Python libraries- Pandas, Matplotlib.
● Data structures in Pandas - Series and data frames.Series: Creation of series from dictionary, scalar value; mathematical operations; series attributes, head and tail functions; selection, indexing and slicing.

● Data Frames: creation of data frames from dictionary of series, list of dictionaries, text/CSV files, display, iteration. Operations on rows and columns: add (insert /append) , select, delete (drop column and row), rename, Head and Tail functions, indexing using labels, Boolean indexing.

Data Visualization

● Data Visualization : Purpose of plotting, drawing and saving of plots using Matplotlib (line plot, bar graph, histogram). Customizing plots:; adding label, title, and legend in plots.

Unit 4:
Societal Impacts
● Digital footprint, net and communication etiquettes,
● Data protection, intellectual property rights (IPR), plagiarism, licensing and copyright,
● Free and open source software (FOSS),
● Cybercrime and cyber laws, hacking, phishing, cyber bullying, overview of Indian IT Act.
● E-waste: hazards and management. Awareness about health concerns related to the usage of technology.

Distribution of Practical Marks

Topic	Marks
Pandas program (pen and paper or Collab or any online idle or pyroid screen for mobile)	8
Practical File 15 Pandas Programs	3
Project synopsis	2
Viva	2
Total	15

Suggested Practical List

Data Handling

1. Create a panda's series from a dictionary of values and a ndarray
2. Given a Series, print all the elements that are above the 75th percentile.
3. Create a Data Frame quarterly sales where each row contains the item category, item name, and expenditure. Group the rows by the category and print the total expenditure per category.
4. Create a data frame for examination result and display row labels, column labels data types of each column and the dimensions
5. Filter out rows based on different criteria such as duplicate rows.
6. Importing and exporting data between pandas and CSV file

5.2 Visualization

1. Given the school result data, analyses the performance of the students on different parameters, e.g subject wise or class wise.
2. For the Data frames created above, analyze, and plot appropriate charts with title and legend.
3. Take data of your interest from an open source (e.g. data.gov.in), aggregate and summarize it. Then plot it using different plotting functions of the Matplotlib library.

Project Synopsis

The synopsis should cover the brief description about the project along with reasons for selection of the dataset. The learner should write the source of the dataset whether created or taken from any reliable source. The learner should write what analytics can be done on the project.

Term - 2

Distribution of Theory Marks

Unit No	Unit Name	Marks
2	Database Query using SQL	25
3	Introduction to Computer Networks	10
	Total	35

Unit 2:
Database Query using SQL
- Math functions: POWER (), ROUND (), MOD ().
- Text functions: UCASE ()/UPPER (), LCASE ()/LOWER (), MID ()/SUBSTRING ()/SUBSTR (), LENGTH (), LEFT (), RIGHT (), INSTR (), LTRIM (), RTRIM (), TRIM ().
- Date Functions: NOW (), DATE (), MONTH (), MONTHNAME (), YEAR (), DAY (), DAYNAME (). Aggregate Functions: MAX (), MIN (), AVG (), SUM (), COUNT (); using COUNT (*).
- Querying and manipulating data using Group by, Having, Order by.

Unit 3:

Introduction to Computer Networks

- Introduction to networks, Types of network: LAN, MAN, WAN.
- Network Devices: modem, hub, switch, repeater, router, gateway.
- Network Topologies: Star, Bus, Tree, Mesh.
- Introduction to Internet, URL, WWW and its applications- Web, email, Chat, VoIP.
- Website: Introduction, difference between a website and webpage, static vs dynamic web page, web server and hosting of a website.
- Web Browsers: Introduction, commonly used browsers, browser settings, add-ons and plug-ins, cookies.

Distribution of Practical Marks

Topic	Marks
SQL queries (pen and paper)	7
Practical File – 12 SQL Queries	2
Final Project Submission	3
Viva	3
Total	15

Suggested Practical List

Data Management

1. Create a student table with the student id, name, and marks as attributes where the student id is the primary key.
2. Insert the details of a new student in the above table.
3. Delete the details of a student in the above table.
4. Use the select command to get the details of the students with marks more than 80.
5. Find the min, max, sum, and average of the marks in a student marks table.
6. Find the total number of customers from each country in the table (customer ID, customer Name, country) using group by.
7. Write a SQL query to order the (student ID, marks) table in descending order of the marks.

Project Work

The aim of the class project is to create tangible and useful IT applications. The learner may identify a real-world problem by exploring the environment. e.g. Students can visit shops/business places, communities or other organizations in their localities and enquire about the functioning of the organization, and how data are generated, stored, and managed.

 The learner can take data stored in csv or database file and analyze using Python libraries and generate appropriate charts to visualize. If an organization is maintaining data offline, then the learner should create a database using MySQL and store the data in tables.

 Data can be imported in Pandas for analysis and visualization. Learners can use Python libraries of their choice to develop software for their school or any other social good. Learners should be sensitized to avoid plagiarism and violation of copyright issues while working on projects. Teachers should take necessary measures for this. Any resources (data, image etc.) used in the project must be suitably referenced.

 The project can be done individually or in groups of 2 to 3 students. The project should be started by students at least 6 months before the submission deadline.