

**SRI VENKATESWARA UNIVERSITY**  
**BCA (Artificial Intelligence) Honours– W.E.F. 2024-25**

| Year | Semester | Course | Title of the Course        | No. of Hrs /Week | No. of Credits |
|------|----------|--------|----------------------------|------------------|----------------|
| II   | IV       | 9      | Python Programming         | 3                | 3              |
|      |          |        | Python Programming Lab     | 2                | 1              |
|      |          | 10     | Prolog Programming         | 3                | 3              |
|      |          |        | Prolog Programming Lab     | 2                | 1              |
|      |          | 11     | Statistical Techniques     | 3                | 3              |
|      |          |        | Statistical Techniques Lab | 2                | 1              |

**Note:**

**Course-9 Python Programming** is common to all BCA Programmes General/ Artificial Intelligence/ Big Data / Data Science / Cloud Computing Specializations.

**Course-11 Statistical Techniques** is common to BCA Programmes Artificial Intelligence/ Big Data/ Data Science / Cloud Computing Specializations.

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**  
**BCA General/Artificial Intelligence/Big Data/Cloud Computing/ Data Science**  
**Honours**

**II Year IV Semester**  
**COURSE 9: PYTHON PROGRAMMING**  
**(w.e.f. 2024-25)**

|               |                   |                   |
|---------------|-------------------|-------------------|
| <b>Theory</b> | <b>Credits: 3</b> | <b>3 hrs/week</b> |
|---------------|-------------------|-------------------|

**Course Objectives:**

Python is a language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment, including a robust debugger and profiler. While it is easy for beginners to learn, it is widely used in many scientific areas for data exploration.

**Course Outcomes:**

Upon successful completion of the course, a student will be able to:

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.

**Unit-I**

**Getting Started with Python:** Introduction to Python, Python Keywords, Identifiers, Variables, Comments, Data Types, Operators, Input and Output, Type Conversion, Debugging. Flow of Control, Selection, Indentation, Repetition, Break and Continue Statement, Nested Loops.

**Strings-**String Operations, Traversing a String, String handling Functions.

**Case Study:**

1. Study the features that make Python different from Procedural Languages.

**Unit-II**

**Functions:** Functions, Built-in Functions, User Defined Functions, recursive functions, Scope of a Variable

**Python and OOP:** Defining Classes, Defining and calling functions passing arguments, Inheritance, polymorphism, Modules– date time, math, Packages.

**Exception Handling-** Exception in python, Types of Exception, User-defined Exceptions.

**Case Study:**

1. Present a report of how Exception handling is different from JAVA Exceptional Handling.

**Unit-III**

**List:** Introduction to List, List Operations, Traversing a List, List Methods and Built-in Functions.

**Tuples and Dictionaries:** Introduction to Tuples, Tuple Operations, Tuple Methods and Built-in Functions, Nested Tuples. Introduction to Dictionaries, Dictionaries are Mutable, Dictionary Operations, Traversing a Dictionary, Dictionary Methods and Built-in functions.

**Case Study:**

1. What are the special features of dictionaries and try to analyze about the same features in any other language.

**Unit-IV**

**Introduction to NumPy:** Array, NumPy Array, Indexing and Slicing, Operations on Arrays, Concatenating Arrays, Reshaping Arrays, Splitting Arrays, Statistical Operations on Arrays.

**Data Handling:** Introduction to Python Libraries, Series, Data Frame, Importing and Exporting Data between CSV Files and Data Frames.

**Case Study:**

1. Present a paper on advanced features of NumPy.

**Unit-V**

**Plotting Data using Matplotlib:** Introduction, Plotting using Matplotlib – Line chart, Bar chart, Histogram, Scatter Chart, Pie Chart.

**Database Connectivity:** Importing MySQL for Python, connecting with a database, forming a query in MySQL, Passing a query to MySQL.

**Case Study:**

1. Present a paper on the features and advantages of MySQL compared to other commercial Databases.

**References:**

1. Mark Lutz, Learning Python, 5th Ed. O'REILLY
2. Core Python Programming by Dr. R. Nageswara Rao
3. Problem Solving and Python Programming by E. Balaguru Swamy
4. Python programming: using problem solving approach by Reema Thareja.
5. Albert Lukaszewski, MySQL for Python, Packet Publishing

**BCA General/Artificial Intelligence/Big Data/Cloud Computing/ Data Science  
Honours**

**II Year IV Semester**

**COURSE 9: PYTHON PROGRAMMING**

**Practicals**

**Credits: 1**

**2 hrs/week**

**Lab Programs**

1. Write a Program to check whether given number is Armstrong or not.
2. Write a Program to check whether given number is perfect or not.
3. Write a program to find factorial of given number using recursive function
4. Write a program to implement inheritance and polymorphism
5. Demonstrate a python code to print try, except and finally block statements
6. Write a program to demonstrate String handling functions
7. Write a program to input n numbers from the user. Store these numbers in a tuple. Print the maximum and minimum number from this tuple.
8. Write a program to enter names of employees and their salaries as input and store them in a dictionary
9. Write a program to implement statistical operations on arrays using numPy
10. Write a program to import and export CSV file to DataFrame.
11. Create the DataFrame Sales containing yearwise sales and perform basic operation on it.
12. Visualize the plots using matplotlib lib.
13. Write a program to connect with MySQLdatabase and perform CRUD(Create, Read, Update and Delete) operations

**MODEL QUESTION PAPER**  
**SRI VENKATESWARA UNIVERSITY::TIRUPATI**  
**BCA General/Artificial Intelligence/Big Data/Cloud Computing/ Data Science**  
**Honours**  
**II Year IV Semester**  
**COURSE 9: PYTHON PROGRAMMING**  
**(w.e.f. 2024-25)**

**Time : 3 Hrs**

**Max Marks : 75**

**SECTION - A**

**Answer any Five of the following**

**5 X 3= 15 Marks**

1. Short answer question from Unit-1
2. Short answer question from Unit-1
3. Short answer question from Unit-2
4. Short answer question from Unit-2
5. Short answer question from Unit-3
6. Short answer question from Unit-3
7. Short answer question from Unit-4
8. Short answer question from Unit-4
9. Short answer question from Unit-5
10. Short answer question from Unit-5

**SECTION - B**

**Answer any Five of the following**

**5 X 12= 60 Marks**

11. Long answer question from Unit-1
12. Long answer question from Unit-1
13. Long answer question from Unit-2
14. Long answer question from Unit-2
15. Long answer question from Unit-3
16. Long answer question from Unit-3
17. Long answer question from Unit-4
18. Long answer question from Unit-4
19. Long answer question from Unit-5
20. Long answer question from Unit-5

**Note: The question paper setter is requested to set question paper based on a model question paper and ensure coverage across all units equally.**

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**  
**BCA Artificial Intelligence Honours**  
**II Year IV Semester**  
**COURSE 10: Prolog Programming**  
**(w.e.f. 2024-25)**

**Theory** **Credits: 3** **3 hrs/week**

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**I. Learning Outcome:**

1. be able to write programs in Prolog using techniques such as accumulators and difference structures;
2. know how to model the backtracking behaviour of program execution;
3. appreciate the unique perspective Prolog gives to problem solving and algorithm design;
4. understand how larger programs can be created using the basic programming techniques used in this course.

**UNIT - I**

An example program: defining family relations, Extending the example program by rules, A recursive rule definition, How Prolog answers questions, Declarative and procedural meaning of programs

**UNIT - II**

Data objects, Matching, Declarative meaning of Prolog programs, Procedural meaning, Example: monkey and banana, Order of clauses and goals, Remarks on the relation between Prolog and logic.

**UNIT - III**

Lists, Operators, Arithmetic:: Representation of lists, Some operations on lists, Operator notation, Arithmetic. Retrieving structured information from a database, Doing data abstraction, Simulating a non-deterministic automaton, Travel planning, The eight queens problem.

**UNIT - IV**

Preventing backtracking, Examples using cut, Negation as failure Problems with cut and negation Input and Output:: Communication with files, Processing files of terms, Manipulating characters, Constructing and decomposing atoms, Reading programs: consult, reconsult.

**UNIT - V**

Testing the type of terms, Constructing and decomposing terms: arg, name, Various kinds of equality, Various kinds of equality, Control facilities, bagof, setof and findall.  
General principles of good programming, How to think about Prolog programs, Programming style, Debugging, Efficiency

**Text Book:**

PROLOG PROGRAMMING FOR ARTIFICIAL INTELLIGENCE - Ivan Bratko

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**BCA Artificial Intelligence Honours**

**II Year IV Semester**

**COURSE 10: Prolog Programming**

**Practical**

**Credits: 1**

**2 hrs/week**

**List of Experiments**

**V. Prolog Programming Lab**

1. A program in prolog to implement simple facts and Queries

- a) Ram likes mango.
- b) Seema is a girl.
- c) Bill likes Cindy.
- d) Rose is red.
- e) John owns gold.

**Clauses**

likes(ram ,mango). girl(seema).  
red(rose). likes(bill  
,cindy). owns(john  
,gold).

**Goal ?-** likes (ram,What).

2. Write facts for following:

- a) Ram likes apple.
- b) Ram is taller than Mohan.
- c) My name is Subodh.
- d) Apple is fruit.
- e) Orange is fruit.
- f) Ram is male.

**MODEL QUESTION PAPER**  
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**II Year IV Semester**  
**COURSE 10: Prolog Programming**  
**(w.e.f. 2024-25)**

**Time : 3 Hrs**

**Max Marks : 75**

**SECTION - A**

**Answer any Five of the following**

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4. Short answer question from Unit-2
5. Short answer question from Unit-3
6. Short answer question from Unit-3
7. Short answer question from Unit-4
8. Short answer question from Unit-4
9. Short answer question from Unit-5
10. Short answer question from Unit-5

**SECTION - B**

**Answer any Five of the following**

**5 X 12= 60 Marks**

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12. Long answer question from Unit-1
13. Long answer question from Unit-2
14. Long answer question from Unit-2
15. Long answer question from Unit-3
16. Long answer question from Unit-3
17. Long answer question from Unit-4
18. Long answer question from Unit-4
19. Long answer question from Unit-5
20. Long answer question from Unit-5

**Note: The question paper setter is requested to set question paper based on a model question paper and ensure coverage across all units equally.**

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**  
**Common to BCA**  
**Artificial Intelligence/Big Data/Cloud Computing/Data Science**  
**II Year IV Semester**  
**COURSE 11: Statistical Techniques**  
**(w.e.f. 2024-25)**

**Theory** \_\_\_\_\_ **Credits: 3** \_\_\_\_\_ **3 hrs/week**

**Learning Outcomes:** After successful completion of this course, the student will be able to;

1. Knowledge of Statistics and its scope and importance in various areas such as Medical, Engineering, Agricultural and Social Sciences etc.
2. Knowledge of various types of data in diagrammatic representation.
3. Brief analysis of different types of data and tabulated.
4. Knowledge of various types of data, their organization and evaluation of summary measures such as measures of central tendency and dispersion etc.
5. Insights into preliminary exploration of different types of data.

**UNIT – I**

**Measures of Dispersion:** Introduction - methods of measuring Dispersion-Range, Quartile deviation, Mean deviation from Mean, Mean deviation from Median, Calculation for individual observation, calculation on Discrete Series and Continuous Series. (Problems Only)

**UNIT- II**

**Variance - Standard Deviation:** Meaning of Variance - Standard Deviation - calculation for Individual observation, calculation on discrete and continuous Series - Coefficient of Variation. (Problems Only)

**UNIT- III**

**Asymmetrical Distribution(Skewness):** Meaning of Symmetrical and Asymmetrical distribution – Concept of Skewness - Karl Pearson's coefficient of skewness, Bowley's Coefficient of skewness Calculation for continuous series. (Problems Only)  
(Problems Only)

**UNIT- IV**

**Measures of Correlation:** Meaning of Correlation – Measure of Correlation in individual observation only – Probable Error – Karl Pearson's – Spearman Rank Correlation Co-efficient. (Problems Only)

**UNIT- V**

**Index Numbers:** Unweighted Index Numbers – Simple Aggregative Method – Simple Average of Relatives method using Arithmetic Mean – Weighted Index Numbers – Laspeyre's Index Numbers, Paasche's Index Number, Fisher's Ideal Index Numbers – Time Reversal Test and Factor Reversal Test. (Problems Only)

**Note :**

1. Concentration on numerical problems only.
2. Proofs of theorems and Derivations of expressions are omitted.

**Text Books:**

1. Statistical methods - S.P. Gupta.
2. Fundamentals of Mathematical Statistics - SC Gupta and V.K. Kapoor

**Reference Books:**

Quantitative Techniques –Sultan Chand Publication

**Suggested Co-Curricular Activities:**

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
  - a. Quiz (on topics where the content can be compiled by smaller aspects and data  
(Individuals or groups as teams))
  - b. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

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**II Year IV Semester**

**COURSE 11: Statistical Techniques**

**Practicals**

**Credits: 1**

**2 hrs/week**

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**Statistical Foundation - Practical** (Programme implementation may be either Python/  
Java/C Programming Languages)

1. Quartile Deviation
2. Mean Deviation
3. Standard Deviation.
4. Karl Pearson's Coefficient of Skewness.
5. Bowley's Coefficient of Skewness.
6. Karl Pearson's Coefficient of Correlation
7. Spearman Rank Correlation Coefficient
8. Unweighted Index Number
9. Weighted index Number
10. Time Reversal Test

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**II Year IV Semester**  
**COURSE 11: Statistical Techniques**  
**(w.e.f. 2024-25)**

**Time : 3 Hrs**

**Max Marks : 75**

**SECTION - A**

**Answer any Five of the following**

**5 X 3= 15 Marks**

**NOTE: Statistical tables and Electronic Calculators are allowed**

1. Calculate range and its Co-efficient

|       |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|
| Marks | 80 | 90 | 70 | 60 | 40 | 30 |
|-------|----|----|----|----|----|----|

2. Calculate Co-efficient of Quartile Deviation

$$Q_1 = 40 \quad Q_3 = 60$$

3. What is Symmetrical and Asymmetrical Distribution

4. Calculate Karl Pearsons Co-efficient of Skewness

$$\text{Mean} = 40; \text{Median} = 50; \text{SD} = 20$$

5. Calculate Variance

|        |    |    |    |    |    |
|--------|----|----|----|----|----|
| Values | 10 | 20 | 30 | 40 | 50 |
|--------|----|----|----|----|----|

6. Calculate Co-efficient of variation

$$\text{Mean} = 40; \text{SD} = 30$$

7. Calculate rank correlation co-efficient

|                     |    |    |    |    |    |
|---------------------|----|----|----|----|----|
| Marks in Maths      | 40 | 60 | 70 | 50 | 30 |
| Marks in Statistics | 80 | 50 | 40 | 70 | 40 |

8. Define Probable Error

9. Time Reversal Test

10. Fishers Ideal Index

**SECTION - B**

**Answer any Five of the following**

**5 X 12= 60 Marks**

11. Calculate co-efficient of Quartile Deviation

|           |      |       |       |       |       |       |       |
|-----------|------|-------|-------|-------|-------|-------|-------|
| Class     | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| Frequency | 10   | 20    | 10    | 30    | 20    | 10    | 20    |

12. Calculate Mean Deviation from Mean

|        |      |       |       |       |       |       |       |
|--------|------|-------|-------|-------|-------|-------|-------|
| Marks  | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| No. of | 4    | 6     | 10    | 20    | 10    | 6     | 4     |

|          |  |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|--|
| Students |  |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|--|

13. Calculate Karl Pearsons co-efficient of Skewness

|           |      |       |       |       |       |       |       |
|-----------|------|-------|-------|-------|-------|-------|-------|
| Class     | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| Frequency | 6    | 5     | 7     | 14    | 8     | 5     | 5     |

14. Calculate Bowleys co-efficient of Skewness

|                 |      |       |       |       |        |         |         |
|-----------------|------|-------|-------|-------|--------|---------|---------|
| Marks           | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | 100-120 | 120-140 |
| No. of Students | 14   | 13    | 12    | 15    | 17     | 19      | 10      |

15. From the following find out who is the best and more consistent

|   |    |    |    |    |    |    |
|---|----|----|----|----|----|----|
| X | 40 | 50 | 60 | 70 | 80 | 90 |
| Y | 35 | 85 | 75 | 65 | 45 | 45 |

16. Find the co-efficient of Standard Deviation

|           |      |       |       |       |       |       |
|-----------|------|-------|-------|-------|-------|-------|
| Class     | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
| Frequency | 4    | 6     | 10    | 20    | 10    | 10    |

17. Find Karl pearsons co-efficient of correlation

|   |    |    |    |    |    |    |    |    |   |   |
|---|----|----|----|----|----|----|----|----|---|---|
| X | 9  | 8  | 7  | 6  | 5  | 4  | 3  | 2  | 6 | 7 |
| Y | 10 | 12 | 14 | 16 | 20 | 13 | 12 | 11 | 5 | 4 |

18. Calculate Spearman's Rank correlation co-efficient

|   |     |    |    |    |    |    |
|---|-----|----|----|----|----|----|
| A | 50  | 60 | 80 | 70 | 30 | 90 |
| B | 100 | 90 | 70 | 60 | 80 | 40 |

19. Calculate Fisher's Ideal Index

| Commodities | 2023     |          | 2022     |          |
|-------------|----------|----------|----------|----------|
|             | Price(₹) | Quantity | Price(₹) | Quantity |
| A           | 4        | 20       | 3        | 10       |
| B           | 5        | 10       | 2        | 12       |
| C           | 3        | 30       | 3        | 5        |
| D           | 4        | 20       | 2        | 6        |

20. Calculate Index Numbers Under (a) Simple Aggregative method (b) Simple Average of Relatives using AM

| Commodities | Price(₹) |      |
|-------------|----------|------|
|             | 2023     | 2024 |
| A           | 12       | 18   |
| B           | 14       | 22   |
| C           | 16       | 20   |

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