

SRI VENKATESWARA UNIVERSITY
DEGREE COURSE IN BACHELOR OF COMPUTER APPLICATIONS (BCA)
ARTIFICIAL INTELLIGENCE & DATA SCIENCE
New Course Introduced under CBCS W.E.F. 2021-22

SCHEME OF INSTRUCTIONS AND EXAMINATIONS
II SEMESTER

S.No	Paper Code	Subject	Hours/Week	No of Credits	Max. Marks Internal assessment	Max. Marks University Exam	Total Marks
1.		English – II	4	3	25	75	100
2.		Language(H/T/S) – II	4	3	25	75	100
3.		Life Skill Course – II	2	2	-0-	50	50
4.		Skill Development Course – II	2	2	-0-	50	50
5.		Skill Development Course – III	2	2	-0-	50	50
6.	C4	Statistical Foundations for AI & Data Science	4	3	25	75	100
	C4-P	Statistical Foundations for AI & Data Science Lab	2	2	-0-	50	50
7.	C5	Introduction to Artificial Intelligence	4	3	25	75	100
	C5-P	Artificial Intelligence Lab (Prolog)	2	2	-0-	50	50
8.	C6	Python for AI & Data Science	4	3	25	75	100

	C6-P	Python for AI & Data Science Lab	2	2	-0-	50	50
Total			32	27	125	675	800

SRI VENKATESWARA UNIVERSITY
BCA DEGREE COURSE IN ARTIFICIAL INTELLIGENCE & DATA SCIENCE
FIRST YEAR - II SEMESTER
(Syllabus under CBCS w.e.f. 2021-22)

Core Course Paper – C4: STATISTICAL FOUNDATION FOR AI & DATA SCIENCE

(Total hours of teaching – 60 @ 04 Hrs./Week Credits 3)

Course Objectives

1. Statisticians help to design data collection plans, analyze data appropriately and interpret and draw conclusions from those analyses. The central objective of the undergraduate major in Statistics is to equip students with consequently requisite quantitative skills that they can employ and build on in flexible ways.
2. Majors are expected to learn concepts and tools for working with data and have experience in analyzing real data that goes beyond the content of a service course in statistical methods for non-majors. Majors should understand [1] the fundamentals of probability theory, [2] statistical reasoning and inferential methods, [3] statistical computing, [4] statistical modeling and its limitations, and have skill in [5] description, interpretation and exploratory analysis of data by graphical and other means; [6] graduates are also expected to learn to communicate effectively.

Course 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 analyzing in 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

Introduction to Statistics: Introduction of Statistics-Sources of data-techniques of data collection-primary data and secondary data-methods of collecting primary data and secondary data-classification of data-frequency distribution.

Diagrammatic and graphic representation: Introduction-significance of diagrams and graphs difference between diagrams and graphs-general rules for constructing diagrams – Bar diagrams – Pie charts – technique of construction of graphs – histogram – frequency polygon – ogive curves.

UNIT – II

Descriptive Statistics Sampling Techniques – Data Classification – Tabulation – Frequency and graphic Representation – Measures of Central Tendency – Arithmetic mean, merits and demerits – Arithmetic mean individual observation, discrete series, continuous series – Median, merits and demerits – median individual observation, discrete series, continuous series – Mode, merits and demerits – Mode individual observation, discrete series, continuous series.-27[

Measures of Variation: Quartiles and Percentiles – Moments - Skewness and Kurtosis.

UNIT-III

Measures of Dispersion: Introduction – properties of a good measures of dispersion-methods of studying dispersion-Range, Quartile deviation, Mean deviation(MD), Variance, Standard deviation (SD), its merits and demerits, calculation for Individual observation, calculation on discrete and continuous Series-Coefficient of Variation.

Correlation and Regression Scatter Diagram – Karl Pearson’s Correlation Coefficient – Rank Correlation - Correlation Coefficient for Bivariate Frequency Distribution – Regression Coefficients – Fitting of Regression Lines.

UNIT-IV

Probability Theory: Random Experiment – Sample Space – Events – Axiomatic Definition of Probability – Addition Theorem – Multiplication Theorem – Baye’s Theorem -Applications.

Distribution Function: Continuous and Discrete Random Variables – Distribution Function of a Random Variable – Probability Mass Functions and Probability Density Functions – Characteristic Functions – Central Limit Theorems.

UNIT-V

Probability Distributions: Probability Distributions – Recurrence Relationships – Moment Generating Functions – Cumulant Generating Functions – Continuous Probability Distributions - Rectangular Distribution – Binomial Distribution – Poisson Distribution – Continuous Probability Distributions – Uniform Distribution - Normal Distribution – Exponential Distribution.

Note:

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

Text Books:

1. Gupta, S.C. and Kapoor, V.K.: “Fundamentals of Mathematical Statistics”, Sultan & Chand & Sons, New Delhi, 11th Ed, 2002.
2. Statistical methods - S.P. Gupta.

Reference Books:

1. Quantitative Techniques1 –Sulthan Chand Publication
2. Hastie, Trevor, et al. “The elements of Statistical Learning”, Springer, 2009.
3. Ross, S.M., “Introduction to Probability and Statistics”,Academic Foundation, 2011.
4. Papoulis, A. and Pillai, S.U. , “Probability, Random Variables and Stochastic Processes”, TMH, 2010

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Practical Paper – C4P: **STATISTICAL FOUNDATION FOR AI & DATA SCIENCE**
(Total hours of teaching – 30 @ 02 Hrs./Week Credits 2)

1. Frequency distribution table
2. Bar diagrams.
3. Pie diagram.
4. Histogram.
5. Arithmetic Mean, Median.
6. Mode.
7. Mean Deviation
8. Standard Deviation.
9. Karl Pearson's Coefficient of Skewness.
10. Bowley's Coefficient of Skewness.

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Core Paper - C4: STATISTICAL FOUNDATION FOR AI & DATA SCIENCE
(Statistical tables and Electronic Calculators are allowed)
MODEL QUESTION PAPER

Time: 3 hours

Marks: 75 marks

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer any five of the following questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks

PART – A

Answer any Five of the following question.

(5X5=25M)

1	
2	
3	
4	
5	
6	
7	
8	

PART – B

Answer All The Questions. Each question carries 10 marks

(5X10= 50M)

9	(A)	OR
	(B)	
10	(A)	OR
	(B)	
11	(A)	OR
	(B)	
12	(A)	OR
	(B)	
13	(A)	OR
	(B)	

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Core Course Paper – C5: INTRODUCTION TO ARTIFICIAL INTELLIGENCE
(Total hours of teaching – 60 @ 04 Hrs./Week Credits 3)

Course Objectives:

1. The objective of the course is to introduce the basic concepts of Artificial Intelligence.

Course Learning Outcomes:

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

1. To understand various AI techniques.
2. To decide when to use which type of AI technique.

UNIT –I

Meaning and definition of artificial intelligence, Physical Symbol System Hypothesis, production systems, Characteristics of production systems; Breadth first search and depth first search techniques.

Heuristic search Techniques: Hill Climbing, Iterative deepening DFS, bidirectional search. Analysis of search methods. A* algorithm, and their analysis.

UNIT-II

Introduction to Genetic Algorithms

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, logical consequences, syntax and semantics of an expression, semantic Tableau.

UNIT-III

Forward and backward reasoning. Proof methods, substitution and unification, conversion to clausal form, normal forms, resolution, refutation, deduction, theorem proving, in fencing, monotonic and non monotonic reasoning.

Introduction to prolog. Network-based representation and reasoning, Semantic networks, Conceptual Graphs, frames. Description logic (DL), concept language, reasoning using DL. Conceptual dependencies (CD), scripts, reasoning using CD.

UNIT-IV

Introduction to natural language processing.

Adversarial search and Game theory, classification of games, game playing strategies, prisoner's Dilemma. Game playing techniques, mini max procedure, alpha-beta cut-offs. Complexity of alpha-beta search. Automated planning, classical planning problem, forward planning, partial order planning, planning with proposal logic, hierarchical task planning, multiagent planning

UNIT-V

Reasoning in uncertain environments, Fuzzy logic, fuzzy composition relation, operations on fuzzy sets. Probabilistic reasoning, Bayes theorem, construction of Bayesian networks, belief propagation.

Markov processes and Hidden Markov models

Text Books:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.

Reference Books:

1. Artificial Intelligence by Luger (Pearson Education)
2. Russell & Norvig, Artificial Intelligence: A Modern Approach, Pearson Education

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Practical Paper – C5P: ARTIFICIAL INTELLIGENCE LAB (Prolog)
(Total hours of teaching – 30 @ 02 Hrs./Week Credits 2)

1. Installation of gnu-prolog, Study of Prolog (gnu-prolog), its facts, and rules.
2. Write simple facts for the statements and querying it.
3. Write a program for Family-tree.
4. Write Program for Monkey-banana Problem.
5. Write a program which behaves a small expert for medical Diagnosis.
6. Write programs for computation of recursive functions, like, factorial, Fibonacci numbers, etc.
7. Write program to solve 5-queens problem.
8. Write a Program for water jug problem.
9. Write a program for travelling salesman program.
10. Case study of standard AI programs, like, Mycin, and AI Shell

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Core Paper - C5: INTRODUCTION TO ARTIFICIAL INTELLIGENCE
(Statistical tables and Electronic Calculators are allowed)
MODEL QUESTION PAPER

Time: 3 hours

Marks: 75 marks

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer any five of the following questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks

PART – A

Answer any Five of the following question.

(5X5=25M)

1	
2	
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4	
5	
6	
7	
8	

PART – B

Answer All The Questions. Each question carries 10 marks

(5X10= 50M)

9	(A)	OR
	(B)	
10	(A)	OR
	(B)	
11	(A)	OR
	(B)	
12	(A)	OR
	(B)	
13	(A)	OR
	(B)	

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Core Course Paper – C6: PYTHON FOR AI & DATA SCIENCE

(Total hours of teaching – 60 @ 04 Hrs./Week Credits 3)

Course Objectives:

The course aims to make the student acquainted with general computer programming concepts like conditional execution, loops, Python programming language syntax, semantics, and the runtime environment, as well as with general coding technique. The course also helps to understand about how to handle data and to visualize data using various Python packages and tools..

Course Learning Outcomes:

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

1. Give basic knowledge about python variables, operators and data types
2. Helps to get an idea about python control structures
3. To be aware of python complex data types
4. Familiarize with Python files, databases and advanced python objects.
5. Get an overall idea about various python packages and GUI programming along with thorough understanding of data and its formatting.

Unit-I

Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.

Unit-II

Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.

Unit-III

Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.

Unit-IV

Advanced Python Objects, map(),Advanced Python Lambda and List Comprehensions, Advanced Python Demonstration: The Numerical Python Library (NumPy), The Series Data Structure, Querying a Series, The DataFrame Data Structure, DataFrame Indexing and Loading, Querying a DataFrame, Indexing Dataframes, Missing Values.

Unit-V

Understanding the Python Packages for Data Science- SciKit Learn, Matplotlib, Importing and Exporting Data in Python, Getting Started Analyzing Data in Python, Understanding the Data, Dealing with Missing Values in Python, Data Formatting in Python.

Text Books:

1. Wesley J. Chun, —Core Python Applications Programming, 3rd Edition , Pearson Education, 2016
2. Jeeva Jose &P.SojanLal, —Introduction to Computing and Problem Solving with PYTHON, Khanna Publishers, New Delhi, 2016

Reference Books:

1. Downey, A. et al., "How to think like a Computer Scientist: Learning with Python", John Wiley, 2015
2. John Zelle, —Python Programming: An Introduction to Computer Science, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410

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Practical Paper – C6P: PYTHON FOR AI & DATA SCIENCE LAB
(Total hours of teaching – 30 @ 02 Hrs./Week Credits 2)

1. Demonstrate usage of branching and looping statements
2. Demonstrate Recursive functions
3. Demonstrate Lists
4. Demonstrate Tuples and Sets
5. Demonstrate Dictionaries
6. Demonstrate Aggregation
7. Demonstrate Indexing and Sorting
8. Demonstrate ScatterPlot
9. Demonstrate 3D plotting
10. Demonstrate usage of Pivot table
11. Demonstrate use of and query()
12. Demonstrate handling of missing data
13. Demonstrate hierarchical indexing

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Practical Paper – C6P: PYTHON FOR AI & DATA SCIENCE LAB
(Statistical tables and Electronic Calculators are allowed)
MODEL QUESTION PAPER

Time: 3 hours

Marks: 75 marks

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer any five of the following questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks

PART – A

Answer any Five of the following question.

(5X5=25M)

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PART – B

Answer All The Questions. Each question carries 10 marks

(5X10= 50M)

9	(A)	OR
	(B)	
10	(A)	OR
	(B)	
11	(A)	OR
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13	(A)	OR
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