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

SCHEME OF INSTRUCTIONS AND EXAMINATIONS
I SEMESTER

S. No	Paper Code	Subject	Hours/ Week	No of Credits	Max. Marks Internal assessment	Max. Marks University Exam	Total Marks
1.		English – I	4	3	25	75	100
2.		Language(H/T/S) – I	4	3	25	75	100
3.		Life Skill Course – I	2	2	-0-	50	50
4.		Skill Development Course – I	2	2	-0-	50	50
5.	C1	Mathematical Foundations for Data Science	4	3	25	75	100
	C1-P	Mathematical Foundations for Data Science - Lab	2	2	-0-	50	50
6	C2	Introduction to Computers and Data Analytics using Excel	4	3	25	75	100
	C2-P	Data Analytics using Excel Lab	2	2	-0-	50	50
7.	C3	Problem Solving using C	4	3	25	75	100
	C3-P	Problem Solving using C - Lab	2	2	-0-	50	50
Total			**30**	**25**	**125**	**625**	**750**

SRI VENKATESWARA UNIVERSITY

BCA DEGREE COURSE IN ARTIFICIAL INTELLIGNECE &DATA SCIENCE

FIRST YEAR - I SEMESTER
(Syllabus under CBCS w.e.f. 2021-22)

Core Course Paper - C1: MATHEMATICAL FOUNDATION FOR DATA SCIENCE
(Total hours of teaching – 60 @ 04 Hrs./Week, Credits 3)

Course Objectives

In order to be able to formulate what a computer system is supposed to do, or to prove that it does meet its specification, or to reason about its efficiency, one needs the precision of mathematical notation and techniques. For instance, to specify computational problems precisely one needs to abstract the detail and then use mathematical objects such as matrices, differentiation and integration To prove that a proposed solution does work as specified, one needs to apply the principles of mathematical logic, and to use proof techniques such as induction. And to reason about the efficiency of an algorithm, one often needs to count the size of complex mathematical objects. The Mathematics foundation for data science course aims to provide this mathematical background.

Course Outcomes

After successful completion of this course, the student will be able to;
1. Have an idea about basic mathematical techniques which are necessary to analyze thestatically technique.
2. Able to know the concept of matrices and its operations.
3. Able to complete the adjoint and determinate of a square matrix, hence it's inverse.
4. Capable of solving the simultaneous equations using matrix method.
5. Understands the technique differentiation, integration and its applications.

UNIT-I

Matrix Algebra I: Introduction-Definition of Matrix-Various types of Matrices –Row Matrix-Column Matrix-Square Matrix-Rectangular Matrix-Scalar Matrix-Unit Matrix-Null Matrix-orthogonal Matrix-Addition of Matrices-Subtraction of Matrices-Multiplication of Matrices and their applications.

UNIT-II

Matrix Algebra II: Transpose of a Matrix-Symmetric Matrix-Skew Symmetric Matrix -Orthogonal Matrix - Singular Matrix - Non-Singular Matrix - Determinant of a Matrix -Adjoint of a Square Matrix - Inverse of a Matrix up to 3 order only.

UNIT-III

Matrix Algebra III: Rank of a Matrix - Definition - To find Rank of a Matrix for a given Matrix.
Solutions of Linear equations: 1.Matrix inversion method2.Cramer's Rule up to 3 order only

UNIT-IV

Maxima and Minima: Introduction of Differentiation and integration – Increasing and decreasing functions – Maxima and Minima Values of a Function in one variable only.

Numerical Integration: 1. Trapezoidal rule
                              2. Simpson's 1/3 rule
                              3. Simpson's 3/8 rule

UNIT-V

Set Theory: Definition of Set- Types of Sets-Union of Sets-Intersection of Sets-Venn diagrams-Operations on Sets-Complement of Set-Distributive Laws-De'Morgan's Laws

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

Text Books:

1. Mathematical Methods by Dr.T.K.V. Ivengar, Dr.B.Krishna Gandhi, Dr. S.Ranganatham, andDr.M.V.S.S.N. Prasad by S.Chand publications 6th revised edition 2011.

2. Quantitative Techniques by C.Satyadevi by S.chand Company

Reference Book:

1. Higher Engineering Mathematics by Dr.B.S.Grewal by Karna publisher"s 34th edition.

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Practical Paper - C1P: MATHEMATICAL FOUNDATION FOR DATA SCIENCE LAB
(Total hours of teaching – 30 @ 02 Hrs./Week, Credits 2)

1. Addition, Subtraction of Matrices.

2. Multiplication of Matrices.

3. Determinant of a Matrix and Inverse of a Matrix.

4. Singular and Non-Singular Matrices.

5. Cramer's Rule and Matrix Inversion Method.

6. Rank of a Matrix.

7. Forward Difference, Backward Difference table.

8. Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule

9. Problem on Union.

10. Problem on Intersection.

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Core Course Paper – C1: MATHEMATICAL FOUNDATIONS FOR 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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FIRST YEAR - I SEMESTER
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Core Course Paper – C2: INTRODUCTION TO COMPUTERS AND DATA ANALYTICS USING EXCEL
(Total hours of teaching – 60 @ 04 Hrs./Week Credits 3)

Course Objectives:

1. The objective of the course is to introduce the concepts of computer fundamental & theirapplications for the efficient use of Excel software in data analysis.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:
1. Understand the evolution and functionality of a Digital Computer.
2. Understand hardware and software components
3. Have exposure to Excel software package
4. Understand various functions & formulae used in data analysis, preparing charts etc.
5. Apply data analysis tools like pivot table, goal seek, scenarios etc.

UNIT- I

Introduction to Computers: Characteristics and limitations of computer, Block diagram of computer, types of computers, uses of computers, computer generations, **Types of Hardware:** Input devices and output devices, **Memories**: Primary memory, Secondary Memory, and cache memory,

UNIT -II

Types of Software: System software, Application software, commercial, open source, domain and free ware software
Microsoft Excel:
Fundamentals of Excel: Features of MS-Excel, Excel Program Screen, the Ribbon, Office buttonand Quick Access tool bar, Worksheets, rows, columns, cells.

UNIT -III

Worksheet basics: Creating a new workbook, Opening a Workbook, Saving a Workbook, Workbooks, Entering labels, values, and formulas in worksheet
Editing a worksheet: Editing cell contents - cutting, copying and pasting cells – Find and Replace
- Undo, Inserting rows and columns, Deleting rows and columns
Formatting Options: Adjusting row height and column width - Formatting cell values, conditional formatting

UNIT -IV

Formulas and Functions: **Formulas:** Enter and edit formula in Excel, operators used informula, cell references in formula
Functions: Definition, Inserting a function in Excel, Types of functions in Excel: Mathematical, Statistical, Logical, Text, Date & Time functions
Working with Data ranges: Sorting: Sorting on single column, sorting on multiple columns,Filtering: Filtering data using AutoFilter

UNIT- V

Working with Charts: Different types of charts, Creating a chart, Parts of chart, Changing chart type, changing chart options
Analyzing and Organizing Data: Data Validation, Scenarios, Subtotals
Working with PivotTables: Creating a PivotTable, Specifying PivotTable data, Working with PivotTable Layout

Text Books:

1. Fundamentals of Computers by Reema Thareja from Oxford University Press
2. Microsoft Excel 2007, Custom Guide Inc, 2007

Reference Books:

1. Rajaraman, Introduction to Information Technology, PHI
2. Peter Norton, Introduction to Computers, Sixth edition, Tata   McGraw Hill (2007).
3. Microsoft Office 2007 Fundamentals, 1st Edition By Laura Story, Dawna Walls
4. Working in Microsoft Office – Ron Mansfield - TMH.
5. MS Office 2007 in a Nutshell –Sanjay Saxena – Vikas Publishing House.

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FIRST YEAR - I SEMESTER
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Practical Paper – C2P: DATA ANALYTICS USING EXCEL LAB
(Total hours of teaching – 30 @ 02 Hrs./Week, Credits 2)

1. Prepare your class time table using different Text formatting

2. Create a pay slip with details of employee salary

3. Prepare an Excel sheet to calculate students result and grades based on their marks

4. Prepare an excel sheet to enter some strings and perform the following text functions

    a. Find length of strings

    b. Convert strings into uppercase and lowercase

    c. Remove extra spaces in the strings

    d. Extract substrings from the strings

5. Prepare an excel sheet to perform the following statistical analysis

    a. Find mean of the values

    b. Find mode of the values

    c. Calculate standard deviation

    d. Find largest and smallest values

6. Draw different types of charts for weather analysis of 5 successive years

7. Prepare an excel sheet for creating a pie chart for budget analysis

8. Prepare an excel sheet to illustrate the sorting

9. Prepare an excel sheet to illustrate the filtering

10. Prepare an excel sheet to illustrate the concept of sub totals

11. Prepare an excel sheet for restricting data entry using data validation feature

12. Create and demonstrate to analyze the daa using a pivot table

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FIRST YEAR - I SEMESTER
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Core Course Paper – C2: DATA ANALYTICS USING
EXCELMODEL 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

<div align="center">

PART – A

</div>

Answer any _Five_ of the following question.   **(5X5=25M)**

1	
2	
3	
4	
5	
6	
7	
8	

<div align="center">

PART – B

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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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FIRST YEAR - I SEMESTER

(Syllabus under CBCS w.e.f. 2021-22)

Core Course Paper – C3: PROBLEM SOLVING USING 'C'

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

Course Objectives:

1. This course aims to provide exposure to problem-solving through programming. It introduces the concepts of the C Programming language.

Course Learning Outcomes:

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

1. Understand the programming languages and flow charts.
2. Apply logical skills to analyse a given problem
3. Develop an algorithm for solving a given problem.
4. Understand 'C' language constructs like Iterative statements, Array processing, Pointers, etc.
5. Apply 'C' language constructs to the algorithms to write a 'C' language program.

UNIT- I

Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms, Flow Charts, Programming Languages – Generations of Programming Languages
Introduction to C: Introduction – Structure of C Program – Writing the first C Program – Filesused in C Program – Compiling and Executing C Programs - Programming Examples

UNIT- II

C Fundamentals: Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Operators in C – I/O Statements (scanf, printf)
Decision Control Statements: Introduction to Decision Control Statements – Conditional Branching Statements: simple if, if.else, nested if, switch statements – Programming Examples

UNIT- III

Iterative Control Statements: Iterative Statements – Nested Loops – Break and Continue Statement – Go to Statement
Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Valuesin Array – one dimensional array for inter-function communication – Two dimensional Arrays – two dimensional arrays for inter-function communication
Strings: Introduction – String operations – String functions

UNIT- IV

Functions: Introduction – using functions – Function declaration/ prototype – Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.
Structure and Unions: Introduction – Nested Structures – Arrays of Structures – Structures and Functions – Unions – Arrays of Unions Variables

UNIT- V

Pointers: Introduction to Pointers – declaring Pointer Variables – Passing Arguments to Functions using Pointer – Pointer and Arrays – Dynamic Memory Allocation
File Handling: Introduction to Files, File modes, File operations, Using Files in C, Reading Datafrom Files, Writing Data from Files, Detecting the End-of-file

Text Books:

1. Computer Fundamentals and Programming in C by Reema Thareja from Oxford UniversityPress

Reference Books:

1. E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.
2. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
3. Yashavant Kanetkar - Let Us 'C' – BPB Publications.
4. Brain W Kernighan and Dennis M Ritchie - The 'C' Programming language - Pearsonpublications.

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FIRST YEAR - I SEMESTER

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Practical Paper – C3P: PROBLEM SOLVING USING C Lab

(Total hours of teaching – 30 @ 02 Hrs./Week, Credits 2)

1. Write a program to find

    a. Area of Circle

    b. Area of triangle

2. Write a Program to find

    a. simple interest

    b. Compound Interest

3. Write a program to convert temperature from Celsius to Fahrenheit

4. Write a program to find whether a number is even or odd

5. Write a program to find sum and average of 5 numbers

6. Write a program to check whether the given number is Armstrong or not.

7. Write a program to find the sum of individual digits of a positive integer.

8. Write a program to generate the first n terms of the Fibonacci sequence.

9. Write a program to find both the largest and smallest number in a list of integer values

10. Write a program to calculate factorial of given integer value using recursive functions

11. Write a program for addition of two matrices.

12. Write a program for multiplication of two matrices.

13. Write a program to perform various string operations.

14. Write a program to search an element in a given list of values.

15. Write a C program to

    a. Write data into a File.

    b. Read data from a File

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Core Course Paper – C3: PROBLEM SOLVING USING 'C'

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

<p align="center">PART – A</p>

Answer any _Five_ of the following question.   **(5X5=25M)**

1	
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<p align="center">PART – B</p>

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)	