

R-23

SRI VENKATESWARA UNIVERSITY
BCA (Artificial Intelligence & Data Science) Honours– W.E.F. 2025-26

Year	Semester	Course	Title of the Course	No. of Hrs/Week	No. of Credits
III	V	12	Machine Learning using R	3	3
			Machine Learning using R LAB	2	1
		13	Cloud Computing	3	3
			Cloud Computing LAB	2	1
		14	Tableau for Data Visualization	3	3
			Tableau for Data Visualization LAB	2	1
		15	Software Engineering	3	3
			Software Engineering LAB	2	1


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BCA AI & DS Honours
III Year V Semester
COURSE 12: Machine Learning using R (w.e.f. 2025-26)

Theory

Credits: 3

3 hrs/week

I. Learning Outcomes: After completing this course, the student will be able to

1. Understand the basic concepts such as decision trees and neural networks.
2. Ability to formulate machine learning techniques to respective problems.
3. Apply machine learning algorithms to solve problems of moderate complexity.
4. Use and program in the programming language R

UNIT – I

INTRODUCTION: Overview of Machine learning, machine learning types, well posed learning algorithms and issues in machine learning. **CLASSICAL DATA ANALYSIS:** Mean, variance, Regression- linear. **CONCEPT LEARNING:** Introduction, a concept learning task and learning as search, version space and candidate elimination algorithm, inductive bias.

UNIT – II

DECISION TREE LEARNING: - introduction, Representation, basic decision tree learning algorithm, space search in decision tree learning algorithm ,cross validation and over fitting.

NEURAL NETWORK LEARNING: Introduction, Perceptrons - Representational power of Perceptrons, Back propagation algorithm.

UNIT – III

INTRODUCTION TO R: Basic features of R, Benefits of R, data types in R, Installing R, Getting started with the RStudio IDE, Running R, Packages in R, variable names and assignment, operators, Input/output functions.

UNIT-IV

Preview of Some Important R Data Structures: Vectors, Character Strings, Matrices, Lists, Data Frames, and Classes.

Control Structure: Conditional statements, Loops, dates and times, functions, String manipulations.

UNIT-V

Vectors: Scalars, Vectors, Arrays and Matrices: Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Vector Indexing, Common vector operations, Generating vector sequences, Repeating vector constants, using `all()` and `any()`, Vectorized operations.

TEXTBOOKS:

1. Tom Michel, Machine Learning, McGraw Hill, 1997.
2. The Art of R Programming by Norman Matloff, No starch press, SAN FRANCISCO, 2011.

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge University Press.
2. An Introduction to R for Beginners by SASHA HAFNER, on AUG-2019.



BCA AI & DS Honours
III Year V Semester
COURSE 12: Machine Learning using R

Practical

Credits: 1

2hrs/week

LIST OF EXPERIMENTS:

1. Write an R-Program to take input from the user.
2. Write an R-Program to compute a product of two integer values.
3. Write an R-Program to demonstrate working with operators (Arithmetic, Relational, Logical, Assignment operators).
4. Write an R Program to Check if a Number is Odd or Even
5. Write an R program to check whether the biggest of two values.
6. Write an R Program to check if the given Number is a Prime Number
7. Write an R Program to Find the Factorial of a Number
8. Write an R Program to Find the Fibonacci sequence Using Recursive Function.
9. Write an R Program to create a Vector and to access elements in a Vector.
10. Write an R Program to create a Matrix from a Vector using dim() function.


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MODEL QUESTION PAPER
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BCA AI & DS Honours
III Year V Semester
COURSE 12: Machine Learning using R (w.e.f. 2025-26)

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.



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BCA AI & DS Honours

III Year V Semester

COURSE 13 : CLOUD COMPUTING (w.e.f. 2025-26)

Theory

Credits: 3

3 hrs/week

Course Objectives:

1. This course introduces the basic principles of cloud computing, Cloud Computing models and Services, Virtualization Techniques, Resource Sharing, Load Balancing and Security issues in Cloud Computing.
2. It will also equip the students to understand major industry players in the public cloud domain.

Course Outcomes: Upon Completion of the course, the students will be able to

1. Understand the basic principles of cloud computing.
2. Analyze different types of cloud services – Cloud Computing Models and Cloud Computing Services.
3. Understand Virtualization techniques
4. Use different Cloud Platforms
5. Learn different File systems and Security issues in Cloud Computing Platforms

Unit-I: Introduction to Cloud Computing, Evaluation and Enabling Technologies, Benefits and Challenges, Cloud Computing Model

CASE STUDY: Identify different types of Public Cloud, Private Cloud, and Hybrid Cloud

Unit-II: Cloud Computing Services, Elements of Cloud Security model, Cloud Security reference model, Examining Cloud Security against traditional computing, Security Policy

CASE STUDY: Identify various real-time examples of Cloud Computing Services and work with them

Unit-III: Virtualization basics, Machine or Server Level Virtualization, Major Server virtualization products and vendors, Types of Virtualization, Advantages and Disadvantages of Virtualization, Virtualization Security Threats

CASE STUDY: Install any Virtualization Software and Perform any task

Unit-IV: Resource Pooling and Sharing, Multi-tenancy, Resource Provisioning, Scaling, Scaling strategies in Cloud, Types of Scaling, Load balancing in Cloud, Categories of Load Balancing, Service Oriented Architecture (SOA), Elements of a service, Benefits of SOA

CASE STUDY: Perform different operations using Google Cloud and Amazon Elastic Compute Cloud (EC2)

Unit-V: Cloud Native File System, Storage types, Relational DBMS in Cloud, Non-Relational DBMS in Cloud, Cloud Security, Treats to cloud security, Infrastructure Security in Cloud, Information Security in Cloud, Identity Management and Access Control

CASE STUDY: Identify and work with Popular cloud storages for developers, Popular General Purpose Cloud Storages

Prescribed Text Books:

1. Cloud Computing: Sandeep Bhowmik , Cambridge University Press
2. CLOUD COMPUTING:Principles and Paradigms by Rajkumar Buyya, James Broberg, Andrzej Goscinski
3. The Definite Guide to Cloud Computing by Dan Sullivan

BCA AI & DS Honours
III Year V Semester
COURSE 13 : CLOUD COMPUTING

Practical

Credits: 1

2hrs/week

LIST OF EXPERIMENTS:

Course Outcomes: Upon Completion of the course, the students will be able to

1. Working with Virtual machines.
2. Run simple programs on virtual box.
3. Acquire knowledge in Google App Engine
4. Get practical exposure on CloudSim

Experiments:

1. Install Virtualbox / VMware Workstation with different flavours of linux or windows OS on top of windows10 or 11.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create hello world app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)

Web Resources:

1. Cloud Computing Fundamentals Labs - Cloud Academy


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BCA AI & DS Honours
III Year V Semester
COURSE 13: CLOUD COMPUTING (w.e.f. 2025-26)

Time : 3 Hrs

Max Marks : 75

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BCA AI & DS Honours
III Year V Semester
COURSE 14: Tableau for Data Visualization (w.e.f. 2025-26)

Theory	Credits: 3	3 hrs/week
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Learning Outcomes:

1. Ability to collect and arrange data in a specific manner using visualization tool
2. Ability to analyze data visually with the concepts like filter, sort etc.
3. Able to differentiate different comparison methodologies
4. Able to understand various types of charts in Tableau 4. Ability to generate reports with functions, joins, unions etc.

UNIT-I:

Data Visualization: Definition, importance of data visualization in data science, various visualization tools, History of Visualization, developing a visualization aesthetic – maximizing data link ratio, proper scaling and labeling, effective use of color and shading, the power of repetition.

UNIT-II:

Basics of Tableau: Introduction, Advantages of Tableau, Tableau products, file types in Tableau: Tableau Workbook, Tableau Packaged Workbook, Tableau data source, Tableau Packaged data source, Tableau Data Extract, Installing Tableau software, Tableau Creator, Tableau prep, Tableau Explorer, Tableau Server.

UNIT-III:

Tableau Desktop UI: The Tableau product line, Desktop Architecture, Tableau environment, Data source Page, Workspace, workbooks and sheets, Visual cues and Icons in Tableau, fields in data pane.

Connect to files: Connect to Excel or Text file, Connect to MS-Access, Connect to RData files
Connect to Server: Connect to Oracle, Connect to SQL Server, Connect to MySQL.

UNIT-IV:

Tableau Charts: Understanding dimensions and measures, **Chart Types:** Area Chart, bar Chart, Bubble chart, Funnel Chart, Gantt chart, Waterfall chart, Geographic map, Sorting: Sorting on Axis, Sorting on specific fields, Filtering Data.

UNIT-V:

Tableau Reports: Joins: Inner, Left and Right joins, Unions,

Functions used in Tableau: Number functions, logic functions, string functions, aggregate functions.


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III. TEXT BOOKS:

1. Pro Tableau – A Step-by-Step guide – Seema Acharya, Subhashini Chellappan – Apress
2. Learning Tableau 2019 Tools for Business Intelligence, data prep, and visual analytics Joshua N. Milligan – Packt Tableau for Dummies – Molly Monsey and Paul Sochan - John Wiley & Sons, Inc.,

IV. Recommended 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))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. 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))



BCA AI & DS Honours
III Year V Semester
COURSE 14: Tableau for Data Visualization
Credits: 1

Practical

2hrs/week

LIST OF EXPERIMENTS:

1. Demonstration of installation of Tableau desktop software
2. Demonstration of start page of Tableau environment.
3. Bringing data from a text file by connecting from Tableau
4. Bringing data from a Excel file by connecting from Tableau
5. Bringing data from a Oracle Database by connecting from Tableau
6. Bringing data from a R-Data file by connecting from Tableau
7. Applying filters on data
8. Joining the data from different data sources
9. Performing union operations on the data source
10. Creating and changing the measures and dimensions of various charts


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COURSE 14: Tableau for Data Visualization (w.e.f. 2025-26)

Time : 3 Hrs

Max Marks : 75

SECTION - A

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SECTION - B

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BCA AI & DS Honours

III Year V Semester

COURSE 15: Software Engineering(w.e.f. 2025-26)

Theory

Credits: 3

3 hrs/week

Learning Outcomes

1. Ability to gather and specify requirements of the software projects.
2. Ability to analyze software requirements with existing tools
3. Able to differentiate different testing methodologies
4. Able to understand and apply the basic project management practices in real life projects
5. Ability to work in a team as well as independently on software projects

UNIT I

INTRODUCTION: The Evolving Role of Software – Software and its characteristics – Software Myths – Software Engineering – Components of Software Engineering – Software Engineering – A Layered Technology. Reactive Vs Proactive Risk Strategies – types of Software Risks – Risk Management process

UNIT II

SOFTWARE PROCESS MODELS: Prescriptive Models – The waterfall Model – Incremental Process Models: The Incremental Model, The RAD Model, Evolutionary Process Model: Prototyping Model, The spiral Model

UNIT III

REQUIREMENTS ENGINEERING: Requirements Engineering Tasks, Initiating the Requirement Engineering Process.

BUILDING THE ANALYSIS MODEL: Requirements Analysis, Analysis Modeling Approaches, Data Modeling Concepts, Flow – oriented Modeling: Creating a Data Flow Model.

UNIT IV

SOFTWARE DESIGN: Design Process & Design Quality – Design concepts – Architectural styles & Patterns. Quality Management: Quality Concepts – Software Quality Assurance

UNIT V

SOFTWARE QUALITY AND TESTING : Functional Testing – System Testing – User satisfaction Testing – Test Cases – Test plans.

SOFTWARE PROJECT MANAGEMENT (SPM): Introduction – SPM basics – Project Management –Project Integration Management – Project Life Cycle.



III. References Text Books:

1. Roger Pressman S., "Software Engineering: A Practitioner's Approach", McGraw Hill, 2010.

Reference Books:

1. Software Engineering Principles and Practice by Deepak Jain Oxford University Press
2. Sommerville, "Software Engineering", Eighth Edition, Pearson Education, 2007
3. Pfleeger, "Software Engineering: Theory & Practice", 3rd Edition, Pearson Education, 2009
4. Carlo Ghazi, Mehdi Jazayari, Dino Mandrioli, "Fundamentals of Software Engineering", Pearson Education, 2003


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BCA AI & DS Honours
III Year V Semester
COURSE 15: Software Engineering

Practical

Credits: 1

2hrs/week

LIST OF EXPERIMENTS:

1. Studying various phases of RAD Model.
2. Studying various phases of Water-Fall Model.
3. Prepare SRS for Banking or On line book store domain problem
4. Calculate effort using FP oriented estimation model
5. Analyze the Risk related to the project and prepare RMMM plan.
6. Develop Time-line chart and project table using PERT project scheduling methods.
7. Develop Time-line chart and project table using CPM project scheduling methods.
8. Draw E-R diagram, DFD, CFD and STD for the project.
9. Design of the test cases
10. Prepare FTR. Version control and change control for software configuration item



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BCA AI & DS Honours
III Year V Semester C
COURSE 15: Software Engineering (w.e.f. 2025-26)

Time : 3 Hrs

Max Marks : 75

SECTION - A

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SECTION - B

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