

S.No	Paper Code	Subject	Hours/Week	No of Credits	Max.Marks Internal assessment	Max. Marks University Exam	Total Marks
1.	C16	Data Science and Machine Learning with R	4	4	25	75	100
2.	C16P	Data Science and Machine Learning with R-Lab	2	2	-0-	50	50
3.	C17	Artificial Intelligence and Machine Learning Theory and Practice	4	4	25	75	100
4.	C17P	Artificial Intelligence and Machine Learning Theory and Practice- Lab	2	2	-0-	50	50
5.	C18	Introduction to Soft Computing	4	4	25	75	100
6.	C18P	Introduction to Soft Computing-Lab	2	2	-0-	50	50
7	C19	Optimization Technique for Data Analytics	4	4	25	75	100
8	C19P	Optimization Technique for Data Analytics- Lab	2	2	-0-	50	50
9	C20	Data Analytics in The Aws Cloud	4	4	25	75	100
10	C20P	Data Analytics in The Aws Cloud -Lab	2	2	-0-	50	50
Total			30	30	125	625	750

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ARTIFICIAL INTELLIGENCE & DATA SCIENCE

(W.E.F.2021-22) V SEMESTER

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C16-DATA SCIENCE AND MACHINE LEARNING WITH R

UNIT I

Introduction to Data Sciences and Machine Learning, Machine Learning Algorithms, Extended Machine Learning Algorithms.

UNIT II

Introduction to R, More on Data Structures, Decision Control and Looping Statements.

UNIT III

Generating and Manipulating Data in R, Working with Data, Using dplyr () and tidyr () packages.

UNITIV

Plotting graphs in R, Social Media Mining.

UNIT V

Implementing Machine Learning Algorithms, Implementing Extended Machine Learning Algorithms.

TEXT BOOK

1. Reema Thareja, “Data Science and Machine Learning in R”, Mc Graw Hill 2021.

REFERENCE BOOKS

1. Dr. Dhaval Maheta, “Data Analysis Using R: A Primer for Data Scientist”, 2021.

2. Brett Lantz, “Machine Learning with R”, third edition, Packt Publishing Limited.

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**C17-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING THEORY
AND PRACTICE**

UNIT I Foundations of Artificial Intelligence- Basics of Ai, Problem Solving Methods in Ai, Informed and Uninformed Search Strategies Knowledge Representation.

UNIT II Basics of Machine Learning-Neural Networks and Applications, Fuzzy Logic and Applications, Statistical Machine Learning, Decision Processes and Reinforced Learning, Classification Problems in Machine Learning.

UNIT III Applications of Ai- Game Playing, Text Analysis and Mining, Expert Systems and Applications

UNIT IV Logic In Artificial Intelligence- First Order Logic, Prolong Modern Artificial Intelligence Languages and Tools.

UNIT V Trends in Machine Larning- Concepts in Machine Learning, Advanced Topics in Machine Learning.

TEXT BOOK

1. LAVIKA GOEL “Artificial Intelligence: Concepts and Applications”, Wiley,2021.

REFERENCE BOOKS

1. DEEPIKA M, VIJAY CUDDAPAH, AMITENDRA SRIVASTAVA,SRINIVAS MAHNKALI, “AI and ML POWRING THE AGETS OF AUTMATION” BPB PUBLICATION,

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C18-INTRODUCTION TO SOFT COMPUTING

UNIT I

Introduction To Soft Computing -Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNIT II

Artificial Neural Networks-Back propagation Neural Networks - Kohonen Neural Network - Learning Vector Quantization -Hamming Neural Network - Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.

UNIT III

Fuzzy Systems - Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNIT IV

Genetic Algorithms -Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators -Convergence of Genetic Algorithm.

UNIT V

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller

TEXT BOOKS

1. N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2. S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt.Ltd., 2nd Edition, 2011.
3. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017.

REFERENCES

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, —Neuro-Fuzzy and Soft Computing‡, Prentice-Hall of India, 2002.
2. Kwang H.Lee, —First course on Fuzzy Theory and Applications‡, Springer, 2005.
3. George J. Klir and Bo Yuan, —Fuzzy Sets and Fuzzy Logic-Theory and Applications‡, Prentice Hall, 1996.
4. James A. Freeman and David M. Skapura, —Neural Networks Algorithms, Applications, and Programming Techniques‡, Addison Wesley, 2003.

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C19-OPTIMIZATION TECHNIQUE FOR DATA ANALYTICS

UNIT I

Introduction to Operations Research, Origin and Development of OR, Definition of OR, Applications of OR, Models and their classifications, Advantages and Limitations of OR

UNIT-II

Linear programming problem (LPP), Formulation of LPP, Solution of LPP using graphical method and simplex method (\leq inequality only).

UNIT-III

Transportation problem: Mathematical formulation, IBFS of transportation problem using northwest corner rule, least-cost rule and Vogel's approximation method, Simple problems.

UNIT-IV

Assignment problem, definition, mathematical formulation of assignment problem, solution of transportation problem using Hungarian algorithm, unbalanced assignment problem, simple problems, difference between assignment and transportation problems

UNIT-V

Introduction – Definition – Terminology and Notations Principal Assumptions, Problems with N Jobs through Two Machines Problems with N Jobs through Three Machines

TEXT BOOKS

1. Operations Research (2nd Edition) by S.Kalavathi, Vikas Publications Towers Pvt. Ltd.

REFERENCE BOOKS

1. Operations Research by Kanthiswaroop, P.K.Gupta, Manmohan by Sultan Chand & Sons

2. Operations Research by Paneerselvam by Prentice Hall of India

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C20-DATA ANALYTICS IN THE AWS CLOUD

UNIT – I

Introduction Definition of Cloud – Evolution of Cloud Computing – Benefits of Cloud Computing - Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT – II

Cloud Enabling Technologies Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures-Tools and mechanisms.

UNIT-III

Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery. Cloud Architecture & Services: Layered Cloud Architecture Design –Public, Private and Hybrid Clouds -Cloud computing models: IaaS – PaaS – SaaS, cloud delivery models, cloud deployment models.

UNIT-IV

AWS & Networking Introduction to AWS, AWS Global infrastructure, Google cloud platform, network switches & virtual private cloud (VPC) , VPC and Subnets , IP addressing in AWS, AWS security groups, EC2 instance types. EC2 pricing models

UNIT-V

Cloud storage Cloud Storage –Advantages of Cloud Storage – Cloud Storage Providers – S3 (Simple Storage Service) - S3 Features. Security in cloud Software-as-a-Service Security – Security Governance – Virtual Machine Security-Security types: network level, host level, application level

TEXT BOOKS

- 1) Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
- 2) Overview of AWS : AWS whitepaper , copyright@aws,inc, and/or its affiliates. BY AWS.
- 3) Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

REFERENCE BOOKS

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach", Tata Mcgraw Hill, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice) ", O'Reilly, 2009.