ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY,NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2022-23
COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22DS501T	Design and Analysis of Algorithms	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended to provide ● Analysis of asymptotic performance of algorithms. ● Analysis of asymptotic runtime complexity of algorithms including formulating recurrence relations. ● Understanding and way of designing of algorithms using greedy strategy, divide and conquer approach, dynamic programming.	Student will be able to: ● Apply various metho22DS to solve recurrence relation and analyze worst-case running times of algorithms using asymptotic notation. ● Implement greedy, divide & conquer algorithms and solve recurrences describing the performance of each. ● Understand dynamic-programming paradigm, analyze and implement dynamic programming algorithms ● Describe the major graph algorithms and employ graphs to model engineering problems ● Interpret the concepts of tractable and intractable problems and the classes P, NP-Hard, and NP-Complete.

Unit I [8Hrs]

Mathematical foundation, Important summation, combinatorics and logarithmic formulas for algorithmic analysis, algorithmic design principles, Review of asymptotic notations & growth of functions, Analysis Framework - Asymptotic Notations and its properties - mathematical analysis for recursive and non-recursive algorithms, recurrences, solutions of recurrence relations using technique of recursion tree method, substitution method, and master method, probability distributions, analyzing control structures.

Unit II [9Hrs]

Asymptotic notations for analysis of algorithms, best, worst case and average case analysis, amortized analysis and it's applications, analysis of sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, lower bound proof, elementary and advanced data structures with operations on them and their time complexity, sorting networks.

Unit III [8Hrs]

Divide and conquer basic strategy, binary search, quick sort, merge sort, Fast Fourier Transform etc. Greedy method - basic strategy, 0/1 knapsack problem, application to job sequencing with deadlines problem, Strassen's Matrix Multiplication, minimum cost spanning trees -Prim's algorithm and kruskal's algorithm , single source shortest path - Dijkstra's and Bellman Ford algorithm, closest-pair and convex – hull problems etc.

Unit IV [9Hrs]

Dynamic Programming basic strategy, multistage graphs, all pairs shortest path Floyd Warshall algorithm, single source shortest paths, optimal binary search trees, travelling salesman problem, matrix chain multiplication, longest common sub sequence problem, Optimal Merge pattern – Huffman Trees.

Unit V [8Hrs]

Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking basic strategy, 8-Queen's problem, graph coloring, Hamiltonian Circuit Problem - Subset Sum Problem , randomized and approximate algorithms, NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's Theorem, decision and optimization problems, polynomial reduction.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Algorithms	Cormen T.H		Prentice Hall of India

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Algorithms	Horowitz, Sahani, Rajsekharan		Galgotia Publications Pvt. Ltd
2	Fundamentals of Algorithms	Brassard, Bratley		Prentice Hall
3	Data Structures and Algorithms	Alfred V. Aho, John E. Hopcroft , Jeffrey D. Ullman	Reprint 2006	Pearson Education

		JULY 2024	1	Applicable for 2024-25
Chairman - BoS	Dean – Academics	Date of Release	Version	

B. Tech. Scheme of Examination & Syllabus 2022-23
COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22DS501P	Design and Analysis of Algorithms Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended to provide • Analysis of asymptotic performance of algorithms. • Analysis of asymptotic runtime complexity of algorithms including formulating recurrence relations. • Understanding and way of designing of algorithms using greedy strategy, divide and conquer approach, dynamic programming.	Student will be able to: • Apply various metho22DS to solve recurrence relation and analyze worst-case running times of algorithms using asymptotic notation. • Implement greedy, divide & conquer algorithms and solve recurrences describing the performance of each. • Understand dynamic-programming paradigm, analyze and implement dynamic programming algorithms • Describe the major graph algorithms and employ graphs to model engineering problems

Expt. No.	Title of the experiment
1	Implementation and Time Analysis of sorting algorithms.Bubble Sort, Selection Sort, Insertion Sort,Merge Sort and Quick Sort.
2	Implementation and Time Analysis of linear and binary search algorithms.
3	Implementation of Max-Heap sort algorithm.
4	Implementation and Time Analysis of factorial program using iterative and recursive method
5	Implementation of a knapsack problem using dynamic programming.
6	Implementation of chain matrix multiplication using dynamic programming.
7	Implementation of a knapsack problem using greedy method.
8	Implementation of Graph and Searching(BFS and DFS).
9	Implement Prim's algorithm
10	Implement Kruskal's algorithm.
11	Implement LCS problem.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Algorithms	Cormen T.H		Prentice Hall of India

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Algorithms	Horowitz, Sahani, Rajsekharan		Galgotia Publications Pvt. Ltd
2	Fundamentals of Algorithms	Brassard, Bratley		Prentice Hall
3	Data Structures and Algorithms	Alfred V. Aho, John E. Hopcroft , Jeffrey D. Ullman	Reprint 2006	Pearson Education

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22DS502T	**Operating Systems**	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
This course is intended ● Make the students familiar with the basics of Operating system ● Introduce the notion of process, various features of process, CPU scheduling algorithm ● Discuss the goal and principles of system protection & Security in modern computer system	**students will be able to** ● Describe basic concept of Operating System ● Identify and solve problems involving process management & memory management. ● Demonstrate security issues

Unit I [8Hrs]
Importance of Operating Systems, Basic Concepts and Terminology, An Operating System Architecture, types of Operating System ,Operating System as a Manager :Manager Memory Management Functions, Processor Management Functions, Device Management Functions, Information Management Functions., Operating system concepts, Files and Security, System calls for Process Management, for File Management and for Directory Management.

Unit II [8Hrs]
Management Processes Concept :Processes and Threa22DS. Process Model and Thread Model. Job Scheduler, Process Scheduling, operation on process,. Overview of Inter-process communication: Race Conditions, Critical Regions, Mutual Exclusion with busy waiting etc. .CPU Scheduling: Introduction to Scheduling, Scheduling criteria, Scheduling Algorithms, Algorithm Evaluation and Scheduling in different Systems.

Unit III [8Hrs]
Process Synchronization Synchronization Hardware, Semaphores, and Classical Problem of Synchronization, Monitors and Atomic Transaction Introduction to Deadlocks: Graphical representation of a deadlock, Deadlock strategies: Ignore a deadlock, detect a deadlock ,Recover from a deadlock ,Prevent a deadlock, Avoid a deadlock

Unit IV [8Hrs]
Memory Management :Single Contiguous Memory Management ,Fixed Partition Memory Management : Introduction, Allocation Algorithm, swapping ,relocation and address translation Variable Partition: Introduction ,Allocation Algorithm, swapping, relocation and address translation, Non-contagious Allocation -general concepts Paging ,Segmentation Virtual Memory Management system :general concepts ,Page replacement algorithm

Unit V [8Hrs]
Operating system Security and protection :Introduction ,Security Threats ,Attacks on Security ,Security Violation through parameters ,Computer Worms, Computer Virus :Types of virus, Infection method ,mode of operation , detection ,removal, prevention. Authentication :In centralized Environment ,Distributed Environment   Protection Mechanism :Protection Framework ,Access Control List, Capability List ,Combined Schemes

Text Books

S.N	Title	Authors	Edition	Publisher
1	Operating System	A.Godbole	3rd Edition	TMH
2	Operating System Concepts	A.Silberschatz,Peter B. Galvin,Grag Gagne	8th edition	

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22DS503T	**Machine Learning for Data Science**	**3**	**-**	**-**	**3**	**30**	**70**	**100**

Course Objectives	Course Outcomes
This course is intended	**Students will be able to**
• To introduce the basic concepts and techniques of machine learning. • To understand major machine learning algorithms. • To identify machine learning techniques suitable for a given problem.	• Apply various preprocessing techniques before solving the problems • Use supervised machine learning techniques to solve different problems. • Apply probability based models to solve different problems. • Apply statistical approach to the problem of pattern classification • Apply un-supervised and Reinforcement Learning techniques to solve different problems

Unit I   **[7Hrs]**

Foundations for ML: ML Techniques overview, Validation Techniques (Cross-Validations), Overfitting and under-fitting, Data Normalization, Hypothesis Evaluation, Feature Reduction/Dimensionality reduction, Linear and Logistic regression.

Unit II   **[7Hrs]**
Discriminative ML Metho22DS: Classification and its use cases, Decision Tree, Algorithm for Decision Tree Induction, Creating a Perfect Decision Tree, Confusion Matrix, Random Forest algorithm, Bagging and Boosting

Unit III   **[7Hrs]**
Artificial Neural Network: Linear threshold units, Perceptron, Multilayer networks, Feature extraction, Feature selection techniques: Filter Method, Wrapper Method, Dimensionality Reduction techniques: Introduction to PCA, LDA.

Unit IV   **[7Hrs]**
Bayes Decision Theory: Bayes decision rule, Minimum error rate classification, Normal density and discriminant functions, Naïve Bayes Classifiers, probably approximately correct (PAC) learning , Support Vector Machine.

Unit V   **[7Hrs]**
Unsupervised Learning: Clustering (K means, Hierarchical Clustering), Reinforcement Learning, Elements of Reinforcement Learning, Exploration vs. Exploitation dilemma, Q – Learning.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Understanding Machine Learning: From Theory to Algorithms	Shalev-Shwartz,S., Ben-David,S		Cambridge University Press
2	Pattern Recognition and machine learning	Christopher Bishop		Springer Verlag

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Machine Learning- an Artificial Intelligence Approach	Tom Mitchell	2nd Edition	Morgan Kaufmann
2	Algorithms for Clustering Data	A. K. Jain and R. C. Dubes	5th Edition	Prentice Hall PTR
3	Introduction to Machine Learning	Ethem Alpaydin	2nd Edition	PHI

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	**ESE**	**Total**
22DS503P	**Machine Learning for Data Science Lab**	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended ● To understand basic machine learning algorithm for solving problem. ● To understand the usage of datasets in implementing machine learning problems. ● To understand various modern tools, packages and techniques for machine learning.	**Students will be able to** ● Apply various preprocessing techniques to prepare the data. ● Use supervised machine learning techniques to solve different problems. ● Apply probability based models to solve different problems. ● Apply un-supervised and Reinforcement machine learning techniques to solve different problems.

Expt. No.	Title of the experiment
1	To understand the usage of datasets in implementing machine learning problems.
2	To implement the concept of data pre-processing (Working with various data types, fixing values, handling missing values and outliers, etc.) using public dataset.
3	To learn various modern tools, packages and techniques for machine learning.
4	To implement machine learning algorithm for solving problem.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Understanding Machine Learning: From Theory to Algorithms	Shalev-Shwartz,S., Ben-David,S		Cambridge University Press
2	Pattern Recognition and machine learning	Christopher Bishop		Springer Verlag

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Machine Learning- an Artificial Intelligence Approach	Tom Mitchell	2nd Edition	Morgan Kaufmann
2	Algorithms for Clustering Data	A. K. Jain and R. C. Dubes	5th Edition	Prentice Hall PTR
3	Introduction to Machine Learning	Ethem Alpaydin	2nd Edition	PHI

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	**ESE**	**Total**
22DS504T(i)	**Professional Elective– I : Distributed Database & Object Oriented databases**	**3**			**3**	**30**	**70**	**100**

Course Objectives	Course Outcomes
This course is intended	**Students will be able to**
• concepts of distributed and object oriented database management systems. Main focus is given to basic concepts of DDBMS, distributed database design, distributed query processing, distributed concurrency control, concepts of OODBMS, and language and design of object oriented database.	• Discuss basic concepts related to distribute DBMS. • Exemplify design of distributed database. • Describe distributed query processing and concurrency control. • Discuss basic concepts of OODBMS. • Demonstrate language and design for distributed database.

[6Hrs]

Unit I
Introduction to Distributed Database: Distributed Data Processing, Concepts of Distributed Database. Distributed vs. Centralized Database System; advantage and application. Transparency, performance and reliability, Problem areas of Distributed Database. Integrity Constraints in Distributed databases.

Unit II   [6Hrs]
Distributed Database Architectures : DBMS standardization, Architectural models for Distributed DBMS – autonomy, distribution and heterogeneity, Distributed Database architecture – Client/Server , Peer – to – peer distributed systems, MDBMS Architecture, Distributed Catalog management.

Unit III   [8Hrs]
Distributed Database Design: Design strategies and issues. Data Replication. Data Fragmentation – Horizontal, Vertical and Mixed. Resource allocation. Semantic Data Control in Distributed DBMS. Distributed Query Processing, Distributed Transaction Management

Unit IV   [8Hrs]
Object Oriented Database Concept: Data types and Object, Evolution of Object Oriented Concepts, Characteristics of Object Oriented Data Model. Object Hierarchies – Generalization, Specialization, Aggregation. Object Schema. Enter-object Relationships, Similarities and difference between Object Oriented Database model and Other Data models.

Unit V   [8Hrs]
OODBMS Architecture Approach : The Object Oriented DBMS Architecture, Performance Issue in Object Oriented DBMS, Application Selection for Object Oriented DBMS, the Database Design for an Object Relational DBMS. The Structured Types and ADTs, Object identity, Extending the ER Model, Storage and Access Metho22DS, Query Processing, Query Optimization, Data Access API (ODBC, DB Library, DAO, ADO, JDBC, OLEDB), COBRA.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Principles of Distributed Database Systems	Ozsu, M. Tamer and Patrick Valduriez		Pearson Education
2	Object Oriented Database System - Approaches and Architectures;,	C.S.R. Prabhu		PHI.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Database Management System -.	Gerald V. Post		McGraw Hill
2	Database Systems – Design, Implementation and Management;	Peter Rob, Carlos Coronnel		Course Technology.

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22DS504T (ii)	**Professional Elective – I :** **Data Warehousing & Mining**	3			3	30	70	100

Course Objectives	Course Outcomes
This course is intended ● familiar with the concepts of data warehouse and data mining, ● acquainted with the tools and techniques used for Knowledge Discovery in Databases. ● able to perform classification and prediction of data.	**Student will be able to** ● Understand the stages in building a Data Warehouse. ● Apply various data preprocessing & data mining techniques to large data sets. ● Analyse multi-dimensional modelling techniques. ● Analyse and evaluate performance of algorithms for Association Rules. ● Perform classification and clustering of data using suitable classification and clustering algorithms. ● Compare and contrast different classifiers, different clustering metho22DS.

Unit I [8Hrs]
Data Warehousing and Business Analysis: - Data warehousing Components -Building a Data warehouse - Data Warehouse Architecture - DBMS Schemas for Decision Support - Data Extraction, Cleanup, and Transformation Tools - Overview of ETL and OLAP OLTP integration - comparison of OLAP with OLTP systems - ROLAP, MOLAP and HOLAP - Data Cube Computation metho22DS -Metadata - reporting tools - Query tools and Applications - Online Analytical Processing (OLAP) - OLAP and Multidimensional Data Analysis - Data Warehouse implementation - Parallel execution - Materialized views. - Advanced SQL support for OLAP.

Unit II [8Hrs]
Data Mining: - Fundamentals of Data Mining - Data Mining Functionalities - Data Preprocessing - Data Cleaning - Data Integration and Transformation - Data Reduction - Data Discretization and Concept Hierarchy Generation- Efficient and Scalable Data Mining Systems- Classification Of Data Mining Systems.
Basic concepts of Association Rule Mining: - Frequent Item set Mining Metho22DS - Mining Various Kin22DS of Association Rules - Association Mining to Correlation Analysis - Constraint-Based Association Mining.

Unit III [8Hrs]
Classification and Prediction: - Basic Concepts - Issues Regarding Classification and Prediction - Classification by Decision Tree Induction - Bayesian Classification - Rule Based Classification - Lazy Learners - Classification by Back propagation - Support Vector Machines - Associative Classification CSPE64- Rough set approach - Other Classification Metho22DS - Prediction - Accuracy Measures and Error Measures.

Unit IV [8Hrs]
Cluster Analysis: - Types of Data in Cluster Analysis - Measuring Data Similarity and Dissimilarity - A Categorization of Major Clustering Metho22DS - Partitioning Metho22DS - Hierarchical metho22DS - Density-Based Metho22DS - Grid-Based Metho22DS - Model-Based Clustering Metho22DS - Clustering High-Dimensional Data - Constraint-Based Cluster Analysis – Outlier Analysis.

Unit V [8Hrs]
Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects - Spatial Data Mining - Multimedia Data Mining - Text Mining - Mining the World Wide Web - Graph Mining - Mining biological data, social networks - Mining time series and sequence data.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Data Mining Concepts and Techniques	Jiawei Han, Micheline Kamber and Jian Pei	Third	Elsevier

Referer ce Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Data Mining, 2007.	Pang-Ning Tan, Michael Steinbach and Vipin Kumar		Pearson Education
2	Introduction to Data Mining with Case Studies	G. K. Gupta		PHI

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22DS504T(iii)	**Professional Elective – I : Computer System Security**	**3**			**3**	**30**	**70**	**100**

Course Objectives	Course Outcomes
To prepare students with the technical knowledge and skills needed to protect and defend computer systems and networks.	**Students will be able to** ● Understand common security terminology, threats, vulnerabilities, and security design principles. ● Understand basic cryptography concepts, and specific commonly used algorithms and protocols. ● Protect and defend computer systems and networks from cybersecurity attacks. ● Expresses professional responsibilities and make judgments based on legal and ethical principles in the context of computing practice. ● Obtain han22DS-on experience in using common security tools, such as firewalls, intrusion detection systems, and port scanning software.

Unit I Concepts of Security [7Hrs]
The need for Security, Security Approaches, Principals of Security, Threats and attacks, Access control models, Efficiency and Usability, Passwor22DS, Social Engineering, Vulnerabilities from Programming Error .

Unit II Cryptography-I [8Hrs]
Number Theory: Prime numbers, Fermat's Theorem, Chinese Remainder Theorem. Introduction to Classical ciphers: Affine, Playfair, and Hill cipher. Block Cipher: DES, AES. Asymmetric Key Cryptosystems: RSA, Elgamal, Digital Signatures.

Unit III Cryptography-II [6Hrs]
Message Integrity and Authentication- Hash and MAC: SHA-512. Key Management: Kerberos, Diffie-Hellman, Digital Certificates, PKI. Transport Layer Security-TLS, IP security, VPN, SSL, DNS security, Crypto Currency and Bitcoin.

Unit IV System Security [7Hrs]
Viruses, Worms, and other Malware: Virus and Worm Features, Internet Scanning Worms, Mobile Malware, and Botnets, Firewalls.

Unit V Practical Implementations of Security [7Hrs]
Cryptographic toolkits- Usage of real-life tools, Security and Operating Systems, Database security, Cloud security.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Computer Security	Michael T. Goodrich and Roberto Tamassia		Addison Wesley, 2011
2	Cryptography and Network Security	Atul Kahate	4e	McGraw Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Cryptography and Network Security	William Stallings	7e	Pearson

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22DS505P	Computer Lab-II	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended • To introduces and understand processes, tools, and methodologies • to balance nee22DS throughout the DevOps Methodology, from coding and deployment to maintenance and updates.	**Students will be able to** • Understand the processes, tools, and methodologies used in the software development lifecycle. • Combine software development and operations. • Make use of the Cloud Environment and its Services • Adopt an DevOps Methodology.

Expt. No.	Title of the experiment
1	Introduction to SDLC, Agile and DevOps Methodology.
2	To Demonstrate Local Repository Management and Version Control Mechanism (VCS) Using Git.
3	To Demonstrate Remote Repository Management and Version Control Mechanism (VCS) Using GitHub.
4	To Demonstrate the concept of Branching in Local and Remote along with Conflict resolution mechanism Using Git and GitHub.
5	To Demonstrate Build automation on the project available in remote repository (GitHub) using build tool (MAVEN).
6	To demonstrate Jenkins tool installation and configuration over AWS Instance.
7	To Integrate Git, JDK, Maven and Jenkins for CICD Pipeline.
8	To Demonstrate Fully automate CICD Pipeline using Project Repository.
9	To Demonstrate configuration management, and application-deployment Using Ansible.
10	To Demonstrate platform as a service that use OS-level virtualization for software delivery Using Resource Management and Configuration Using Docker.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Software Engineering, A practitioner's approach	Roger Pressman	7th Edition	Tata Mcgraw Hill
2	Object Oriented Software Engineering Using UML Patterns and Java	Bernd Bruegge & Allen H. Dutoit.	2nd Edition,	

Reference Books

S.N	Title	Authors	Edition	Publisher
1	OOA and Design	Grady Booch		Ad. Wesly
2	OO Modeling and design	Rambhaugh		PHI

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22AS501T	**Economics and Management**	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
1. The course examines how the economics, business and industrial management practices are related and how business decision is taken.	• Apply managerial economics concept in business analysis and business decision making. • Explain relationships between production and costs and understand different forms of market structures. • Assess impact of macroeconomics and government policies on business and economy. • Recognize the functions of management and marketing management for business decisions. • Explore role of financial management in business and decision making.

Unit I	[8Hrs]

Economics, Classification of economics, Industrial economics, Consumer demand, Law of Demand, Determinants of demand, Demand forecasting, Law of supply, Utility, Law of diminishing marginal Utility, Types of Elasticity of demand

Unit II	[7Hrs]

Concept of Production, Factors of Production, Laws of return, Cost concepts and types of cost, cost curves, Market Structures-Perfect competition, Monopoly, Oligopoly, and Monopolistic competition.

Unit III	[7Hrs]

The functions of central bank, Inflation, Deflation, Recession. Measures to control Inflation, National income, GDP, GNP, Liberalization, Privatization and Globalization

Unit IV	[7Hrs]

Definition of management, functions of management – planning, organizing, directing, Controlling, human resources Management, Marketing Management, Concepts of Marketing, Marketing mix, Methods of pricing, channels of distribution, advertising and sales promotion.

Unit V	[7Hrs]

Financial Management, nature and scope of financial management, Sources of finance, Types of capital, Brief outline of profit and loss account, balance sheet, Budgets and types of budgets, Ratio analysis

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Managerial Economics	D.N. Dwivedi	8th	Vikas Publishing
2.	Modern Economic Theory	K.K. Dewett	2005	S. Chand Publisher
3.	Industrial Management	Dr.I.K. Chopde, Dr.A.M. Sheikh	Revised edition	S. Chand Publisher

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Industrial Organization and Industrial economics	T.R. Banga, S.C. Sharma	2006	Khanna Publishers

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	**ESE**	**Total**
22DS561O(i)	**Open Elective – I – Data Analytics**	**3**	**-**	**-**	**3**	**30**	**70**	**100**

Course Objectives	Course Outcomes
This course aims to provide students with introductory knowledge of several data analytic techniques that can be used for data science and business applications.	**Student will be able to** - demonstrate basic data analytics concepts - apply pre-processing techniques on collected data - perform data computation and manipulation. - perform data visualization. - Perform exploratory data analysis.

Unit I	[7Hrs]

Introduction: Introduction to Data Science - Evolution of Data Science - Data Science Roles - Stages in a Data Science Project - Applications of Data Science in various fiel22DS - Data Security Issues.

Unit II	[7Hrs]

Data Collection and Data Pre-Processing: Data Collection Strategies - Data Pre-Processing Overview - Data Cleaning - Data Integration and Transformation - Data Reduction - Data Discretization.

Unit III	[6Hrs]

Data computation - arrays Operations on arrays Indexing, slicing, and iterating Reading and writing arrays on files. Data Manipulation - data structures & index operations, Reading and Writing data with different formats into Metadata for imported Datasets.

Unit IV	[6Hrs]

Data Visualization - Gri22DS, axes, plots Markers, colors, fonts, and styling Types of plots - bar graphs, pie charts, histograms scatter plots.

Unit V	[7Hrs]

Exploratory Data Analytics: Descriptive Statistics - Mean, Standard Deviation, Skewness and Kurtosis - Box Plots -Pivot Table - Heat Map, Generalization Error - Out-of-Sample Evaluation Metrics - Cross Validation - Overfitting - Under Fitting

S.N	Title	Authors	Edition	Publisher
1	Smarter Decisions : The Intersection of IoT and Data Science	JojoMoolayil		PACKT
2	Doing Data Science	Cathy O'Neil, Rachel Schutt		O'Reilly
3	Data Science and Big data Analytics	David Dietrich, Barry Heller, Beibei Yang		EMC 2013
4	Handbook of Research on Cloud Infrastructures for Big Data Analytics	Raj, Pethuru		IGI Global
5	The Data Science Design Manual	Skiena, Steven S		CRC press

S.N	Title	Authors	Edition	Publisher
1	Practical Data Science with R	Nina Zumel, John Mount.		Manning
2	Data Science for business	F. Provost, T Fawcett		

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ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2022-23
COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
22DS506P	Technical Skill Development - II			2	1	50	-	50

Course Objectives	Course Outcomes
This course is intended to understand how to create applications using Full Stack Development techniques.	**Students will be able to** • Make a choice from various front and back-end tools • Understand and create applications on their own • Design Web based solutions for real life problems • Develop web-based application using suitable client side and server-side code. • Implement web-based application using effective database access.

Expt. No.	Title of the experiment
1	To create a website using HTML CSS and JavaScript.
2	To create a simple calculator Application using React JS
3	To create and Build a Password Strength Check using Jquery
4	Using the CMS design a web page using the drag and drop method.
5	Create a simple app landing page using Bootstrap.
6	To establish database connectivity using MySQL.
7	To perform insert/delete/update/join/etc. operations in MySQL.
8	Develop a working application/website by selecting a real-life problem statement (Mini-project).

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Full Stack JavaScript Development With MEAN: MongoDB, Express, AngularJS, and Node.JS, SitePoint	Colin Ihrig	1st Edition	
2.	Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites	Robin Nixon	3rd edition	O'Reilly Media

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