



**V Semester**

Sr No	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Continual Assessment	End Sem Examination	Total
1	DS501T	Theory of Computation	3	-	-	3	30	70	100
2	DS502T	Software Engineering and Project Management	3		-	3	15	35	50
3	DS503T	Machine Learning for Data Science	3	-		3	30	70	100
4	DS503P	Machine Learning for Data Science Lab	-	-	2	1	25	25	50
5	DS504T	Professional Elective-I	3		-	3	30	70	100
6	DS505P	Computer Lab-II	-	-	2	1	25	25	50
7	AS501T	Economics and Management	3	-	-	3	30	70	100
8	DS506T	Open Elective - I	3	-	-	3	30	70	100
9	DS507P	Technical Skill Development - II	-	-	2	1	50	-	50
10	DS508T	Career Development - III	2	-	-	0	Audit	-	-
<b>Total</b>			<b>20</b>	<b>0</b>	<b>6</b>	<b>21</b>	<b>215</b>	<b>435</b>	<b>700</b>

DS506T	<b>Open Elective - I</b>
DS506T(i)	Data Analytics

DS504T	<b>Professional Elective - I</b>
DS504T(i)	Distributed Database & Object Oriented databases
DS504T(ii)	Data Warehousing & Mining
DS504T(iii)	Computer System Security

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**FIFTH SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
DS501T	Theory of Computation	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
<b>This course is intended</b> <ul style="list-style-type: none"><li>To study the theoretical foundation of finite state machines and its application.</li><li>To study formal languages and related grammar.</li><li>To study basic computational function related to finite automaton.</li></ul>	<b>Students will be able to</b> <ul style="list-style-type: none"><li>design the Finite State Machine with mathematical representation.</li><li>define regular expression for the given Finite State Machine and vice versa.</li><li>represent context free grammar in various forms along with its properties.</li><li>design Push Down Automaton and Turing Machine as FSM and its various representation.</li><li>differentiate between decidable and undecidable problems.</li></ul>

**Unit I** **[7Hrs]**

Strings, Alphabet, Language operations, Finite state machine definitions, Finite automation model, Acceptance of strings and language, Non deterministic finite automaton, Deterministic finite automaton, Equivalence between NFA and DFA, Conversion of NFA into DFA, Moore and Mealy machines.

**Unit II** **[7Hrs]**

Regular sets, Regular expressions, Identity Rule, Manipulation of regular expressions, Equivalence between RE and FA, Inter conversion, Pumping lemma, Closure properties of regular sets (proofs not required), Chomsky hierarchy of languages, Regular grammars, Right linear and left linear grammars, Equivalence between regular grammar and finite automaton, Inter conversion between RE and RG.

**Unit III** **[7Hrs]**

Context free grammar, Derivation trees (Syntax tree and Parse tree), Ambiguous Grammar, Context Free Language (CFL), Closure properties of CFL, Normal Form of grammar: Chomsky Normal form, Greibach normal form, CYK algorithm.

**Unit IV** **[7Hrs]**

Push Down Automaton, Turing Machine: Definition, Model of TM, Design of TM, Universal Turing Machine, Types of TM's (proofs not required), Turing Computable Functions, Linear bounded automaton.

**Unit V** **[7Hrs]**

Decidability and Undecidability of problems, Properties of recursive & recursively enumerable languages, Halting problems, Post correspondence problem, Ackerman function, Recursive Function: Basic functions and operations on them, Primitive recursive function,  $\mu$ -recursive function, Bounded Minimization, Unbounded Minimization.

**Text Books**

S.N	Title	Authors	Edition	Publisher
1	Introduction to Automata Theory, Languages and Computation	J. E. Hopcraft, R. Motwani, J. D Ullman	2 <sup>nd</sup> Edition	Pearson Education, Aisa
2	Theory of Computer Science, Automata, Languages and Computation	K. L. P. Mishra and N. Chandrasekaran	3 <sup>rd</sup> Edition	PHI Learning.

**Reference Books**

S.N	Title	Authors	Edition	Publisher
1	Introduction to Theory of Computation	Sipser	2 <sup>nd</sup> Edition	Cengage publications
2	An Introduction to Formal Languages and Automata	Peter Linz		
3	Introduction to Languages and the theory of Automata	John Martin		TMH Publication
4	Elements of Theory of Computation	Lewis H.P and Papadimition C.H		

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**FIFTH SEMESTER**

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
DS502T	Software Engineering and Project Management	2	-	-	2	15	35	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"><li>● To provide understanding of software engineering principles</li><li>● To enable students to understand stages involved in the development of software project</li><li>● To get acquainted with software quality, reliability and software configuration management.</li></ul>	<p>Students will be able to</p> <ul style="list-style-type: none"><li>● distinguish and apply software development techniques to the different kinds of project.</li><li>● understand role of software engineer, analyze project requirements and author a formal specification for a software system.</li><li>● apply design process, steps for effective UI design depending on the requirement of the project.</li><li>● design test cases, apply testing strategies and demonstrate the ability to plan, estimate project.</li><li>● demonstrate the ability to work in development of software using Agile-Scrum Development</li></ul>

**Unit I** [5Hrs]  
What is Software?, Role of Software Engineer, software development phases Process Models: Waterfall Model, Prototype model Evolutionary Models: Incremental model, Spiral Model, Agile process: Scrum, Extreme programming.

**Unit II** [5Hrs]  
Requirements Engineering: Initiating the process, Eliciting Requirements, Building the Requirements Model, Negotiating, Validating requirements, Requirements Analysis, Scenario-Based Analysis, Requirements Modeling strategies, Flow-Oriented Modeling, Class based modeling, SRS.

**Unit III** [5Hrs]  
Design: What is Design? Design Principles, Effective modular design, Design models: Data, Architectural Design. User Interface Design: Rules, User Interface Analysis and Design.

**Unit IV** [5Hrs]  
Software Testing: Testing Fundamentals, White Box Testing, Black Box Testing, Unit Testing, Integration Testing. Validation Testing, Debugging. Software Projects: Project Planning objectives, Software Scope, Feasibility.

**Unit V** [5Hrs]  
Software Quality Assurance: Concepts, Approaches, Software Quality Factor, Software Reviews, Software Reliability. Software Configuration Management

**Text Books**

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

**Reference Books**

S.N	Title	Authors	Edition	Publisher
1	OOA and Design	Grady Booch		Ad. Wesley
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
DS503T	Machine Learning for Data Science	3	-	-	3	30	70	100

Course Objectives	Course Outcomes
<b>This course is intended</b> <ul style="list-style-type: none"><li>To introduce the basic concepts and techniques of machine learning.</li><li>To understand major machine learning algorithms.</li><li>To identify machine learning techniques suitable for a given problem.</li></ul>	<b>Students will be able to</b> <ul style="list-style-type: none"><li>Apply various preprocessing techniques before solving the problems</li><li>Use supervised machine learning techniques to solve different problems.</li><li>Apply probability based models to solve different problems.</li><li>Apply statistical approach to the problem of pattern classification</li><li>Apply un-supervised and Reinforcement Learning techniques to solve different problems</li></ul>

**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 Methods: 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
DS503P	Machine Learning for Data Science Lab			2	1	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"><li>To understand basic machine learning algorithm for solving problem.</li><li>To understand the usage of datasets in implementing machine learning problems.</li><li>To understand various modern tools, packages and techniques for machine learning.</li></ul>	<p><b>Students will be able to</b></p> <ul style="list-style-type: none"><li>Apply various preprocessing techniques to prepare the data.</li><li>Use supervised machine learning techniques to solve different problems.</li><li>Apply probability based models to solve different problems.</li><li>Apply un-supervised and Reinforcement machine learning techniques to solve different problems.</li></ul>

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		
DS504T(i)	Professional Ele – I : Distributed Database & Object Oriented databases	3			3	CA	ESE	Total
						30	70	100

Course Objectives	Course Outcomes
<b>This course is intended</b> <ul style="list-style-type: none"><li>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.</li></ul>	<b>Students will be able to</b> <ul style="list-style-type: none"><li>Discuss basic concepts related to distribute DBMS.</li><li>Exemplify design of distributed database.</li><li>Describe distributed query processing and concurrency control.</li><li>Discuss basic concepts of OODBMS.</li><li>Demonstrate language and design for distributed database.</li></ul>

[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**

**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.

[6Hrs]

**Unit III**

**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**

[8Hrs]

**Unit IV**

**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.

[8Hrs]

**Unit V**

**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 Methods, Query Processing, Query Optimization, Data Access API (ODBC, DB Library, DAO, ADO, JDBC, OLEDB), COBRA.

[8Hrs]

**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
DS504T(ii)	Professional Ele – I : Data Warehousing & Mining	3			3	30	70	100

Course Objectives	Course Outcomes
This course is intended <ul style="list-style-type: none"> <li>familiar with the concepts of data warehouse and data mining,</li> <li>acquainted with the tools and techniques used for Knowledge Discovery in Databases.</li> <li>able to perform classification and prediction of data.</li> </ul>	<b>Student will be able to</b> <ul style="list-style-type: none"> <li>Understand the stages in building a Data Warehouse.</li> <li>Apply various data preprocessing &amp; data mining techniques to large data sets.</li> <li>Analyse multi-dimensional modelling techniques.</li> <li>Analyse and evaluate performance of algorithms for Association Rules.</li> <li>Perform classification and clustering of data using suitable classification and clustering algorithms.</li> <li>Compare and contrast different classifiers, different clustering methods.</li> </ul>

**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 methods –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 Methods – Mining Various Kinds 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 Methods – 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 Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – 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

**Reference 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
DS504T(iii)	Professional Ele – 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.	<b>Students will be able to</b> <ul style="list-style-type: none"><li>● Understand common security terminology, threats, vulnerabilities, and security design principles.</li><li>● Understand basic cryptography concepts, and specific commonly used algorithms and protocols.</li><li>● Protect and defend computer systems and networks from cybersecurity attacks.</li><li>● Expresses professional responsibilities and make judgments based on legal and ethical principles in the context of computing practice.</li><li>● Obtain hands-on experience in using common security tools, such as firewalls, intrusion detection systems, and port scanning software.</li></ul>

**Unit I Concepts of Security**

[7Hrs]

The need for Security, Security Approaches, Principals of Security, Threats and attacks, Access control models, Efficiency and Usability, Passwords, 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
DS505P	Computer Lab-II			2	1	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ul style="list-style-type: none"><li>● To introduces and understand processes, tools, and methodologies</li><li>● to balance needs throughout the DevOps Methodology, from coding and deployment to maintenance and updates.</li></ul>	<p><b>Students will be able to</b></p> <ul style="list-style-type: none"><li>● Understand the processes, tools, and methodologies used in the software development lifecycle.</li><li>● Combine software development and operations.</li><li>● Make use of the Cloud Environment and its Services</li><li>● Adopt an DevOps Methodology.</li></ul>

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	7 <sup>th</sup> Edition	Tata Mcgraw Hill
2	Object Oriented Software Engineering Using UML Patterns and Java	Bernd Bruegge & Allen H. Dutoit.	2 <sup>nd</sup> 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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# ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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

## B.Tech. Scheme of Examination & Syllabus 2023-24

### COMPUTER ENGINEERING

#### FIFTH SEMESTER

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

Course Objectives	Course Outcomes
<ul style="list-style-type: none"><li>The course examines how the economics, business and industrial management practices are related and how business decision is taken.</li></ul>	<ul style="list-style-type: none"><li>Apply managerial economics concept in business analysis and business decision making.</li><li>Explain relationships between production and costs and understand different forms of market structures.</li><li>Asses impact of macroeconomics and government policies on business and economy.</li><li>Recognize the functions of management and marketing management for business decisions.</li><li>Explore role of financial management in business and decision making.</li></ul>

<b>Unit I</b>	[8Hrs]
Economics, Classification of economics, Industrial economics, Applications of Industrial economics. Types of Business structures, Consumer demand, Law of Demand, Determinants of demand, Demand forecasting, Law of supply, Utility, Law of diminishing marginal Utility, Types of Elasticity of demand	
<b>Unit II</b>	[8Hrs]
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. Business cycles, optimum size of firm.	
<b>Unit III</b>	[8Hrs]
The functions of central bank, Inflation, Deflation, Recession. Measures to control Inflation, National income, GDP, GNP, Monetary and fiscal policy of government. Liberalization, Privatization and Globalization	
<b>Unit IV</b>	[8Hrs]
Definition of management, functions of management - planning, organizing, directing, Controlling, Introduction to human resources Management, Marketing Management, Concepts of Marketing, Marketing mix, Methods of pricing, Marketing mix. channels of distribution, advertising and sales promotion.	
<b>Unit V</b>	[8Hrs]
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, Principles of costing	

#### 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
DS506T(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.	<b>Student will be able to</b> <ul style="list-style-type: none"><li>● demonstrate basic data analytics concepts</li><li>● apply pre-processing techniques on collected data</li><li>● perform data computation and manipulation.</li><li>● perform data visualization.</li><li>● Perform exploratory data analysis.</li></ul>

**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 fields – 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 - Grids, 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.

**Text Books**

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

**Reference Books**

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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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
DS507P	Technical Skill Development			2	1	50		50

Course Objectives	Course Outcomes
This course is intended to understand how to create applications using Full Stack Development techniques.	<b>Students will be able to</b> <ul style="list-style-type: none"><li>• Make a choice from various front and back-end tools</li><li>• Understand and create applications on their own</li><li>• Design Web based solutions for real life problems</li><li>• Develop web-based application using suitable client side and server-side code.</li><li>• Implement web-based application using effective database access.</li></ul>

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

		February 2023	1	Applicable for 2023-24
Chairman - BoS	Dean – Academics	Date of Release	Version	