Shirpur Education Society's

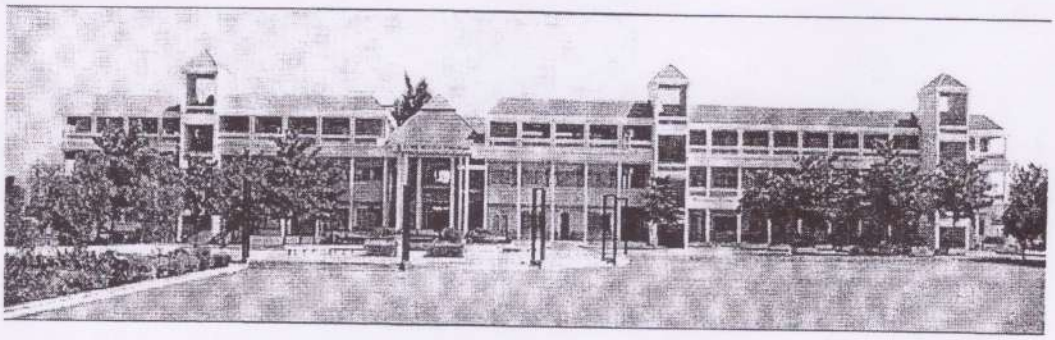
R. C. Patel Institute of Technology, Shirpur

(An Autonomous Institute)

Course Structure and Syllabus

Second Year Master of Computer Application (MCA)

With effect from Year 2024-25



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Semester-III (w.e.f. 2024-25)

Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credits
							Continuous Assessment (CA)				ESE		
							TA/CA	Term Test 1 (TT1)	Term Test 2 (TT2)	Avg. of (TT1 & TT2)			
				L	T	P	[A]			[B]	[C]	[A+B+C]	
1	PC	PCMC3010T	Machine Learning	2			20	20	20	20	60	100	2
2	PC	PCMC3010L	Machine Learning Laboratory			2	25				25	50	1
3	PC	PCMC3020T	Cloud Computing	2			20	20	20	20	60	100	2
4	PC	PCMC3020L	Cloud Computing Laboratory			2	50					50	1
5	PC	PCMC3030T	Cyber Security	2			20	20	20	20	60	100	2
6	PC	PCMC3030L	Cyber Security Laboratory			2	25				25	50	1
7	PC	PCMC3040T	Microservices and Architecture	2			20	20	20	20	60	100	2
8	PC	PCMC3040L	Microservices and Architecture Laboratory			2	25				25	50	1
9	PE	PEMC3050T	Department Elective - II	2			20	20	20	20	60	100	2
10	PE	PEMC3050L	Department Elective - II Laboratory			2	50					50	1
11	OE	OEMC3060T	Open Elective	3			20	20	20	20	60	100	3
12	BS	BSMC3070	Professional Ethics	1			20					20	1
13	BS	BSMC3080	Interpersonal Skills			2	50					50	1
14	PJ	PJMC3090L	Capstone Project			6	50				50	100	3
15	HM	HMMC30100L	Employability Skill Development Program-II			2	50					50	1
			Total	14		20	465			120	485	1070	24

Table 1: **Department Elective-II**

Code	Name of the Course
PEMC30501T	DevOps
PEMC30501L	DevOps Laboratory
PEMC30502T	Blockchain Technology
PEMC30502L	Blockchain Technology Laboratory
PEMC30503T	Big Data Analytics
PEMC30503L	Big Data Analytics Laboratory

Table 2: **Open Elective**

Code	Name of the Course
OEMC30601T	Basic Decision making with Spreadsheet
OEMC30602T	Algorithmic Trading
OEMC30603T	Introduction to Virtual Reality and Augmented Reality
OEMC30604T	Game Design

Prepared by:
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Semester - III

Machine Learning (PCMC3010T)

Teaching Scheme
Lectures : 02 Hrs./week
Credits : 02

Examination Scheme
Term Test : 20 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 60 Marks
Total Marks : 100 Marks

Prerequisite: Probability and Statistics, Python Programming

Course Objective:

This course provides a concise introduction to the fundamental concepts in machine learning from a practical perspective. Also, it covers the different learning algorithms and paradigms used in Machine Learning.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Identify machine learning techniques suitable for a given problem.	L1	Remember
CO2	Solve the problems using various machine learning techniques, .	L3	Apply
CO3	Develop an application using machine learning techniques,.	L6	Create
CO4	Evaluate and interpret the results of the algorithms.	L4	Analyze

Course Contents

Unit-I Machine Learning Fundamentals — 02 Hrs.

Terminology, Supervised and Unsupervised Learning with examples, Underfitting / Overfitting, Bias-Variance Trade-off, Model Selection, Applications.

Unit-II Exploratory data Analysis — 02 Hrs.

Missing Value Treatment, Handling Categorical data: Mapping ordinal features, Encoding class labels, Performing one-hot encoding on nominal features, Outlier Detection and Treatment. Feature Engineering: Variable Transformation and Variable Creation, Selecting meaningful features.

Unit-III Regression — 06 Hrs.

Linear regression using Least Squares (analytical approach), Linear regression using Gradient Descent (iterative approach), Multiple linear regression, Polynomial regression.

Unit-IV Classification — 08 Hrs.

Performance Evaluation, Confusion Matrix, Accuracy, Precision, Recall, F1-score, ROC Curves, AUC, k-fold Cross-Validation. Logistic Regression, Naive Bayes Classifier, Support Vector Machines, Neural Networks: Perceptron, Multi-layer Perceptron, Training using Back-propagation, Applications.

Unit-V Tree-Based Methods — 06 Hrs.

Basics of Decision Trees, Regression Trees, Classification Trees, Trees v/s Linear Models, Advantages and Disadvantages of Trees, Ensemble techniques- Bagging, Boosting, Random forest.

Unit-VI Unsupervised Learning — 06 Hrs.

Challenges of Unsupervised Learning, Partitioning Methods: K-Means clustering, Dimension Reduction Methods, Principal Component Analysis (PCA), Hierarchical Clustering, Introduction to Recommender systems (Non-personalized and Content-based).

Text Books:

1. Judith Hurwitz, Daniel Kirsch, "Machine Learning for dummies", IBM Limited Edition, John Wiley and Sons, Inc., 2018.

2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", 2nd Edition, Springer, 2017.

Reference Books:

1. Aurelien Geron, "Hands-on Machine Learning with Scikit Learn, Keras and Tensorflow", 2^{nd} Edition, Oreilly Publication, 2019.

2. James, Witten, Hastie, Tibshirani," Introduction to Statistical Learning", 7th Edition, Springer, 2017.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test (The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Machine Learning Laboratory (PCMC3010L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Continuous Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Prerequisite: Probability and Statistics, Python Programming

Course Objective:

Gain a comprehensive understanding of various machine learning algorithms, including supervised, unsupervised, and reinforcement learning. Learn techniques for data cleaning, normalization, transformation, and feature extraction.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Implement the workings and applications of different algorithms.	L3	Apply
CO2	Ability to use metrics to assess model performance and avoid overfitting/under fitting.	L1	Remember
CO3	Proficiency in building models for predictive tasks using algorithms like linear regression, decision trees, SVMs, and neural networks.	L3	Apply
CO4	Ability to apply algorithms like k-means, hierarchical clustering.	L3	Apply

List of Laboratory Experiments:

1. Write a python program to import and export data using Pandas library functions.
2. Demonstrate various data pre-processing techniques for a given dataset.
3. Develop Linear Regression model.
4. Develop Logistic Regression model.
5. Implement CART Decision Tree Algorithm.
6. Implement Support Vector Machine.
7. Implement Naive Bayes Classification.
8. Implement K-Nearest Neighbour.
9. Implement Random Forest ensemble method.
10. Implement K-Means Clustering algorithm.

Evaluation Scheme:

Laboratory:

Continuous Assessment (CA):

Laboratory work will be based on PCMC3010L with minimum 10 to 12 experiments to be incorporated. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

Oral / Practical examination will be based on the entire syllabus including the practicals performed during laboratory sessions.

Cloud Computing (PCMC3020T)

Teaching Scheme
Lectures : 02 Hrs./week
Credits : 02

Examination Scheme
Term Test : 20 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 60 Marks
Total Marks : 100 Marks

Prerequisite: Computer Networks

Course Objective:

The course is designed to enable students to understand state-of-the-art cloud computing technologies and applications. This course covers basic models, architecture, virtualisation. It also delves into concepts, processes and best practices needed to secure cloud information. It emphasises on business models, risk management and service management aspects of cloud.

Course Outcomes:

After completion of the course, the student will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Classify the layers of cloud reference model based on their significance.	L4	Analyze
CO2	Address security concerns and orchestration in cloud environment.	L2	Understand

Course Contents

Unit-I Introduction to Cloud — 05 Hrs.

Essential Characteristics of Cloud, Cloud Service Models, Cloud Deployment Models, Cloud Service Brokerage, Cloud Reference Model, Considerations for building Cloud Infrastructure

Unit-II Physical Layer — 05 Hrs.

Compute System, Storage System Architecture, Network Connectivity

Unit-III Virtual Layer — 05 Hrs.

Virtual Layer Functions, Virtualization Software, Resource Pool and Virtual Resources.

Unit-IV Control Layer — 05 Hrs.

Control Layer Functions, Control Software, Resource Optimization Techniques.

Unit-V Cloud Security — 05 Hrs.

Threats, Security Mechanisms, IAM solutions, Security Algorithms.

Unit-VI Orchestration — 05 Hrs.

Container Approach, Docker Container, Items in a Dockerfile, Kubernetes Pods, Kubernetes Terminology, Kubernetes Cluster Model, Kubernetes Features.

Text Books:

1. Douglas E. Comer, The Cloud Computing Book: The Future of Computing Explained, 1st Edition, Taylor and Francis, 2021.

2. Tim Mather, "Security and Privacy Trends in Cloud Computing and Big Data", 1st Edition, Taylor and Francis, 2022.

Reference Books:

1. Umang Singh, San Murugesan and Ashish Seth, Emerging Computing Paradigms Principles, Advances and Applications, Wiley India, 2022.

2. Sanjiva Shankar Dubey, Cloud Computing and Beyond: A Managerial Perspective, 2nd Edition, Wiley, 2021.

3. John R. Vacca, "Cloud Computing Security Foundations and Challenges", 2nd Edition, CRC Press, 2021.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test (The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Cloud Computing Laboratory (PCMC3020L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Continuous Assessment : 50 Marks
Total : 50 Marks

Prerequisite: Computer Networks

Course Objective:

To learn and use version control systems. To develop web applications in cloud and work with virtual machine, design and development process involved in creating a cloud based application and to implement and use parallel programming using Hadoop.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Configure various virtualization tools such as Virtual Box, VMware workstation.	L2	Understand
CO2	Design and deploy a web application in a PaaS environment.	L6	Create
CO3	Understand how to simulate a cloud environment to implement new schedulers.	L2	Understand
CO4	Install and use a generic cloud environment that can be used as a private cloud.	L6	Create
CO5	Demonstrate, Install and use Hadoop.	L3	Apply

List of Laboratory Experiments:

1. Sketch out and analyze architecture of Moodle cloud portal and moodle cloud site and create different entities dynamically.

2. Create a scenario in wordpress for Social Marketing, Search engine and Sharing Tools.

3. Working in Replit to demonstrate different language.

4. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.

5. Install a C/C++ compiler in the linux operating system machine created using virtual box and execute Simple Programs.

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).

8. Install Hadoop single node cluster and run simple applications like wordcount.

9. Sign up for a popular SaaS application (e.g., Google Workspace, Microsoft 365, Salesforce). Explore the sign-up process, user onboarding experience, and initial configuration options.

10.Demonstrate the use of map and reduce tasks..

Evaluation Scheme:

Laboratory:

Continuous Assessment (CA):

Laboratory work will be based on PCMC3020L with minimum 10 to 12 experiments to be incorporated. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 10 Marks
2. Journal Submission: 10 Marks
3. Viva-voce: 10 Marks
4. Subject Specific Lab Assignment/Case Study: 20 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Cyber Security (PCMC3030T)

Teaching Scheme
Lectures : 02 Hrs./week
Credits : 02

Examination Scheme
Term Test : 20 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 60 Marks
Total Marks : 100 Marks

Prerequisite: Computer Programming

Course Objective: This course is an introduction to the field of Cyber Security. This course presents a balance of the managerial and technical aspects of the discipline. It will prepare students with the technical knowledge and skills needed to protect and defend computer systems and networks.

Course Outcomes:

After completion of the course, the student will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the basics of cyber security.	L2	Understand
CO2	Implement mechanisms of cryptography, authentication and access controls.	L2	Understand
CO3	Differentiate security mechanisms in programs and networks.	L2	Understand
CO4	Describe risk management related to computer security.	L1	Remember

Course Contents

Unit-I Introduction — 03 Hrs.

Basic components of computer security (CIA), characteristics of information, vulnerabilities, threats, attacks and controls, classifications of hackers..

Unit-II Cryptography — 07 Hrs.

Cryptographic basics, transposition cipher, substitution cipher, block and stream cipher steganography, public v/s private key encryption, Private key encryption: DES, Public key encryption: RSA, Key management, Key exchange – Diffie-Hellman, Digital Signature, one-way hash functions.

Unit-III Authentication — 03 Hrs.

Authentication basics, Password, Challenge response, Biometrics.

Unit-IV Access Control — 03 Hrs.

Access control principles, ACL, DAC, MAC, and Role based Access Control, Access control models, Kerberos.

Unit-V Program Security — 04 Hrs.

Secure programs, non-malicious Program Errors, Viruses and other malicious code, types of viruses, attack mechanism of viruses, Targeted Malicious Code, Controls Against Program Threats.

Unit-VI Network Security — 06 Hrs.

Eavesdropping, spoofing, denial of service attacks, Security controls: encryption, virtual private networks, SSL, Firewall: Kinds of Firewalls, Filtering Services, DMZ, IDS and its types of IDS.

Unit-VII Risk Management — 04 Hrs.

Risk analysis, various terminologies associated with risk management, Risk assessment techniques, managing risk, steps for risk management, Business impact analysis, various terminologies associated with BIA, Different types of continuity planning, testing and revising the plan.

Text Books:

1. M. Bishop, S. S. Venkatramanayya, "Introduction to Computer Security", 1st Edition, Pearson Education, 2014.

2. M. Whitman, H. Mattford, "Principles of Information Security", 6th Edition, Cengage Learning, 2017.

3. C. Pfleeger, S. Pfleeger, "Security in Computing", 5th Edition, Pearson Education, 2015.

Reference Books:

1. A. Kahate, "Cryptography and Network Security", 3rd Edition, Tata McGrawHill, 2017.

2. W. Stallings, "Cryptography and Network Security Principles and Practice", 7th Edition, Pearson Education, 2017.

3. Mark Rhodes-Ousley, Information Security: The Complete Reference, 2nd Edition, McGraw Hill Education, 2013.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test (The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Cyber Security Laboratory (PCMC3030L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Continuous Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Prerequisite: Computer Programming

Course Objective:

A cyber security lab course typically aims to provide hands-on experience and practical skills in defending and securing computer systems and networks. Providing practical, real-world experience in handling cyber security tools, techniques, and scenarios. Enhancing technical skills in areas such as network security, cryptography, penetration testing, and incident response.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand core concepts in cybersecurity, including threat types, attack vectors, and defensive strategies.	L2	Understand
CO2	Discuss risk assessments to identify potential vulnerabilities and threats to a system or network.	L2	Understand
CO3	Implement and manage network security measures such as firewalls, intrusion detection/prevention systems (IDS/IPS), and VPNs.	L6	Create
CO4	Apply cryptographic principles and techniques to secure data in transit and at rest.	L3	Apply

List of Laboratory Experiments:

1. Write a C program that contains a string(char pointer) with a value 'Hello World'. The programs should XOR each character in this string with 0 and display the result.

2. Write a C program that contains a string (char pointer) with a value /Hello World'. The program should AND or and XOR each character in this string with 127 and display the result.

3. Write a Java program to perform encryption and decryption using the following algorithms:

a. Ceaser Cipher

b. Substitution Cipher

c. Hill Cipher

4. Write a Java program to implement the DES algorithm logic.

5. Write a C/JAVA program to implement the Blowfish algorithm logic.

6. Write a C/JAVA program to implement the Rijndael algorithm logic .

7. Write a Java program to implement RSA Algorithm .
8. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
9. Calculate the message digest of a text using the MD5 algorithm in JAVA .
10. Write a java program to implement Diffie Hellman Key Exchange.

Evaluation Scheme:

Laboratory:

Continuous Assessment (CA):

Laboratory work will be based on PCMC3030L with minimum 10 to 12 experiments to be incorporated. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

Oral / Practical examination will be based on the entire syllabus including the practicals performed during laboratory sessions.

Microservices and Architecture (PCMC3040T)

Teaching Scheme	**Examination Scheme**
Lectures : 02 Hrs./week	Term Test : 20 Marks
Credits : 02	Teacher Assessment : 20 Marks
	End Sem Exam : 60 Marks
	Total Marks : 100 Marks

Prerequisite: Object-Oriented Programming, Java Programming, Web Technologies.

Course Objective: This course helps students to gain in-depth knowledge of Microservice-Based System Architecture. Students will gain knowledge to develop a Microservice for real-life scenario.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the concepts of Microservices and its architecture.	L2	Understand
CO2	Design, develop and test Microservices using Spring Boot.	L6	Create
CO3	Understand the concepts of Microservices governance, security and migration.	L2	Understand

Course Contents

Unit-I Microservice Evolution 02 Hrs.

Introduction to Microservices, Monolithic Architecture, Limitation of Monolithic, Service Oriented Architecture, Web Services, Need for Microservices Architecture, comparing the Microservice Architecture with SOA, features of MSA, Applications of MSA.

Unit-II Microservice Architecture 02 Hrs.

Overview of Microservice architectural styles, Design Principles of Microservices, Communication models for Microservices,Synchronous and Asynchronous communication, Microservice Transaction Management.

Unit-III Introduction to Spring Boot 02 Hrs.

Introduction to Spring Boot Framework, Overview of Spring Cloud Prerequisite of Spring Boot, Spring boot features, Spring Boot Architecture, Installation and configuration, Creating Spring boot project, Project Components.

Unit-IV Design and Development of Microservices 04 Hrs.

Microservices and Domain-Driven Design, Microservice Boundaries, Microservices Design Patterns-Decomposition patterns, Integration patterns, Database patterns, Observability Patterns, Cross-cutting concern Patterns.

Unit-V Building Microservices with Spring Boot 04 Hrs.

Setting up a development environment, Introduction to HTTP, REST and REST principles, Using Spring Boot to build RESTful Microservices, Getting started with Spring Boot, Developing the Spring Boot Java Microservices using STS, The Spring Boot configuration, Spring Repository.

Unit-VI Database Management in MSA 05 Hrs.

The Spring Data JPA using Spring boot ,Monolithic application and shared database, Database per Microservice, Sharing data between Microservices, cqrs, Transaction with Microservices Avoiding Distributed transactions with Two-Phase Commit, Database log mining, Event sourcing, Saga.

Unit-VII Integrating Microservices 03 Hrs.

Microservices Integration Patterns, requirements of integration services, Introduction to Service orchestration using Kubernetes , Service integration using Spring Boot.

Unit-VIII Microservices Testing and Registry 03 Hrs.

Need of testing, types of testing, testing of overall system, Testing individual Microservices, Service Registry and Discovery, Service registry and discovery using spring boot, API Gateway and Config Server.

Unit-IX Deploying and Running Microservices 03 Hrs.

Introduction to Docker and CI/CD pipeline , Deploying Microservices with Docker, container orchestration, Microservices deployment patterns.

Unit-X Microservices Security and migration 02 Hrs.

Basic security requirements, JWT and OAuth Implementation using Spring Boot Security. MSA Migration-Advantages, issues, process, disadvantages.

Text Books:

1. Kasun Indrasiri, Prabath Siriwardena, "Microservices for the Enterprise Designing, Developing, and Deploying", 1st Edition, Apress, 2018.

2. Sourabh Sharma, Mastering Microservices with Java Build Enterprise Microservices with Spring Boot 2.0, Spring Cloud, and Angular, 3rd Edition, Packt Publishing, 2019.

Reference Books:

1. Chellammal Surianarayanan, Gopinath Ganapathy, Raj Pethuru, Essentials of Microservices Architecture: Paradigms, Applications, and Techniques, 1st Edition, CRC Press, 2019.

2. Magnus Larsson, Hands-On Microservices with Spring Boot and Spring Cloud, 1st Edition, Packt Publishing, 2019.

3. Chris Richardson, Microservices Patterns With examples in Java, 1st Edition, Manning, 2018.

4. Eberhard Wolff, Microservices - A practical guide Principles, Concepts, and Recipes, 2nd edition, Impressum, 2018.

5. Irakli Nadareishvili, Ronnie Mitra, Matt McLarty, Mike Amundsen, Microservices Architecture: Aligning Principles, Practice and Culture, 1st Edition, O'reilly, 2016.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test (The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Microservices and Architecture Laboratory (PCMC3040L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Continuous Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Prerequisite: Object-Oriented Programming, Java Programming, Web Technologies.

Course Objective:

To learn, Understand and differentiate between various Microservices Architectural Styles and Apply Micro Services Architecture principles.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the principles and concepts of microservices architecture.	L2	Understand
CO2	Compare microservices architecture with monolithic architecture.	L5	Evaluate
CO3	Develop microservices using frameworks like Spring Boot.	L6	Create
CO4	Implement RESTful APIs for communication between microservices.	L3	Apply
CO5	Integrate data storage solutions like relational databases and NoSQL databases.	L3	Apply.

List of Laboratory Experiments:

1. Understand the fundamentals of microservices architecture and Compare monolithic vs. microservices architecture.
2. Create a simple microservice using Spring Boot.
3. Implement RESTful APIs in the microservice.
4. Implement synchronous communication using REST.
5. Set up and configure a service registry (e.g., Eureka, Consul).
6. Implement client-side service discovery in microservices.
7. Implement an API Gateway using Zuul or Spring Cloud Gateway.
8. Route requests from the API Gateway to appropriate microservices.
9. Set up centralized configuration management using Spring Cloud Config or Consul.
10. Externalize microservice configurations and manage them centrally.

Evaluation Scheme:

Laboratory:

Continuous Assessment (CA):

Laboratory work will be based on PCMC3040L with minimum 10 to 12 experiments to be incorporated. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

End Semester Examination (ESE):

Oral / Practical examination will be based on the entire syllabus including the practicals performed during laboratory sessions.

DevOps (Elective-II) (PEMC30501T)

Teaching Scheme	**Examination Scheme**
Lectures : 02 Hrs./week	Term Test : 20 Marks
Credits : 02	Teacher Assessment : 20 Marks
	End Sem Exam : 60 Marks
	Total Marks : 100 Marks

Prerequisite: Introduction to Modern Application Development.

Course Objective:

The aim of the course is to provide in-depth knowledge of various DevOps tools. It will expose students to hands-on practices in Continuous Development, Configuration Management, Continuous Integration, and finally, Continuous Monitoring of software throughout its development life cycle.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the DevOps Process and Lifecycle.	L2	Understand
CO2	Build different versions of the source code and deploy containers.	L6	Create
CO3	Develop applications and integrate the CI/CD Pipeline .	L6	Create

Course Contents

Unit-I Introduction to DevOps 03 Hrs.

DevOps and ITIL, Benefits of working in a DevOps environment, DevOps Lifecycle, How DevOps affects Architecture, DevOps Delivery Pipeline.

Unit-II Managing Code 03 Hrs.

The need for Source Code, Overview of Version Control systems Setting up a basic Git server, Hosted Git Server, Branching and merging in Git, Git Server implementation, Working with Remote repository.

Unit-III Continuous Integration and Delivery 04 Hrs.

Jenkins Architecture, Plugin Management in Jenkins, Jenkins Security Management, Notification in Jenkins, Jenkins Master-slave architecture, Jenkins Delivery Pipeline, Jenkins Declarative pipeline.

Unit-IV Configuration Management Using Ansible 04 Hrs.

Introduction to Configuration Management, Infrastructure as Code, Introduction to Ansible, Ansible Architecture, Inventory Management, Ansible Modules, AD-HOC Commands, Ansible Playbooks, Ansible Roles.

Unit-V Containerization 04 Hrs.

Running a Container, Reuse Container, Docker Architecture, Container Lifecycle, Docker CLI, Port Binding, Detached and Foreground Mode, Dockerfile, Create a Docker Image, Run A custom Image, Share image.

Unit-VI Orchestration using Kubernetes 04 Hrs.

Kubernetes Core Concepts, Understanding Pods, Life-cycle of a Pod, Replica Set and Replication Controller Deployments, Daemon Set, Kubernetes workloads.

Unit-VII Provisioning 02 Hrs.

Introduction to Terraform, Terraform vs Ansible, Terraform Architecture, Terraform Configuration, Terraform Common Commands, Managing Terraform Resources, Terraform State.

Unit-VIII DevOps on Cloud 06 Hrs.

Why Cloud, introduction to Cloud Computing, Why DevOps on Cloud, Introduction to AWS, Various AWS services, DevOps using AWS, Continuous integration (CI), continuous delivery (CD), infrastructure as code, microservices, monitoring and logging, and communication and collaboration. Hands-on

labs give you experience building and deploying AWS Cloud Formation templates and CI/CD pipelines that build and deploy applications on Amazon Elastic Compute Cloud (Amazon EC2), serverless applications, and container-based applications.

Text Books:

1. Joakim Verona, Practical Devops, 2nd Edition, Ingram short title Publisher, 2018.
2. Jennifer Davis, Ryn Daniels, Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale, 1st Edition, O'Reilly Publisher, 2016.

Reference Books:

1. Veselin Kantsev, Implementing Devops on Aws, 1st Edition, Ingram short title Publisher, 2017.
2. Nigel Poulton, The Kubernetes Book, 1st Edition, Kindle, 2022.
3. Nigel Poulton, Docker Deep Dive, 1st Edition, Kindle, 2016.
4. Ankita Patil, Mitesh Soni, Infrastructure Automation with Terraform, 1st Edition, BPB Publications, 2022.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test (The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.
2. Total duration allotted for writing the paper is 3 hrs.

DevOps Laboratory (Elective-II) (PEMC30501L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Continuous Assessment : 50 Marks
Total : 50 Marks

Prerequisite: Introduction to Modern Application Development.

Course Objective:

The objective of this course is to familiarise participants with essential Git concepts and commands, enabling them to effectively use Git for version control and collaboration.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the Significance of DevOps and its Relationship with Cloud Platforms and Version Control Systems.	L2	Understand
CO2	Create and Configure CI/CD Build Jobs using Jenkins.	L6	Create
CO3	Create and Manage Docker Containers.	L6	Create
CO4	Illustrate the Establishment and Interaction with Resources within the Kubernetes Environment.	L3	Apply
CO5	Create a GitHub Account and Demonstrate a CI/CD Pipeline Using a Cloud Platform.	L6	Create.

List of Laboratory Experiments:

1. Exploring Git Commands through Collaborative Coding.
2. Implement GitHub Operations.
3. Implement GitLab Operations.
4. Applying CI/CD Principles to Web Development Using Jenkins, Git, and Local HTTP Server.
5. Exploring Containerization and Application Deployment with Docker.
6. Applying CI/CD Principles to Web Development Using Jenkins, Git, using Docker Containers.
7. Demonstrate Container Orchestration using Kubernetes.
8. Create the GitHub Account to demonstrate CI/CD pipeline using Cloud Platform.
9. Demonstrating Infrastructure as Code (IaC) with Terraform.
10. Install Jenkins on Windows.

Evaluation Scheme:

Laboratory:

Continuous Assessment (CA):

Laboratory work will be based on PEMC30501L with minimum 10 to 12 experiments to be incorporated. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 10 Marks
2. Journal Submission: 10 Marks
3. Viva-voce: 10 Marks
4. Subject Specific Lab Assignment/Case Study: 20 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Blockchain Technology(Elective-II) (PEMC30502T)

Teaching Scheme	**Examination Scheme**
Lectures : 02 Hrs./week	Term Test : 20 Marks
Credits : 02	Teacher Assessment : 20 Marks
	End Sem Exam : 60 Marks
	Total Marks : 100 Marks

Prerequisite: Programming (Java, Python)

Course Objective: The objective of this course is to introduce students to various technical and functional aspects of Blockchain and provide foundation for building any blockchain solution using Blockchain Technology.

Course Outcomes:

After completion of the course, the student will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the concepts of Blockchain technology.	L2	Understand
CO2	Identify various types of Blockchains and Consensus Mechanisms, Smart Contracts and Use cases.	L1	Remember
CO3	Use Blockchain platform for building solutions to real time applications	L3	Apply

Course Contents

Unit-I Introduction To Blockchain 04 Hrs.

Distributed DBMS – Limitations of Distributed DBMS, Introduction to Blockchain – History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain.

Unit-II Blockchain Architecture 08 Hrs.

Types of Blockchain-Public, Private, Permissioned, Hybrid Blockchains, Shared Ledger, Tokenized and Tokenless Blockchains Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET) .

Unit-III Blockchain-Based Futures System 04 Hrs.

Introduction, Characteristics, Contractual Confidentiality, Smart Contract Languages, Oracles, Deploying Smart Contracts on Blockchain.

Unit-IV Ethereum Basics 04 Hrs.

Ethereum and Smart Contracts,The Turing Completeness of Smart Contract Languages and verification challenges, using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts, Writing smart contracts using Solidity & JavaScript .

Unit-V Privacy, Security Issues in Blockchain 04 Hrs.

Pseudo-anonymity vs. anonymity, attacks on Blockchains: Sybil attacks, selfish mining, 51% attacks advent of algorand; Sharding based consensus algorithms to prevent these attacks.

Unit-VI Blockchain Application Development 04 Hrs.

Identifying Blockchain Platform, Proof of Concept, Development, Deployment, Blockchain Upgrades, Phases of Blockchain Implementation, Introduction to Blockchain Storage: IPFS, BigChainDB.

Unit-VII Use Cases of Blockchain Technology 02 Hrs.

Introduction, Blockchain Adoption, Use Cases: Finance, Education, Health, Government.

Text Books:

1. Imran Bashir, Packt, "Mastering Blockchain", 2nd Edition, Packt Publishing, 2019.

2. Kumar Saurabh, Ashutosh Saxena, "Blockchain Technology: Concepts and Applications", 1st Edition, Kindle Edition, 2020.

Reference Books:

1. Elad Elrom, "Edition The Blockchain Developer: A Practical Guide for Designing, Implementing, Publishing, Testing, and Securing Distributed Blockchain-based Projects, 1st ed. Elad Elrom, 2019.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test(The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Blockchain Technology Laboratory (Elective-II) (PEMC30502L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Continuous Assessment : 50 Marks
Total : 50 Marks

Prerequisite: Programming (Java, Python).

Course Objective:

To objective of this course to understand conceptual elements for Blockchain and cryptocurrencies, blockchain protocols and Security.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the basic concepts and technology used for blockchain.	L1	Remember
CO2	Describe the primitives of the distributed computing and cryptography related to blockchain.	L1	Remember
CO3	Illustrate the concepts of Bitcoin and their usage.	L3	Apply
CO4	Apply security features in blockchain technologies.	L3	Apply
CO5	Use smart contract in real world applications.	L3	Apply.

List of Laboratory Experiments:

1. Creation of Block.
2. Blockchain implementation.
3. Mining in Blockchain.
4. Peer-to-Peer implementation using Blockchain.
5. Creating Crypto-currency Wallet.
6. Develop and test smart contract on local Blockchain.
7. Develop and test smart contract on Ethereum test networks.
8. Write and deploy smart contract using Remix IDE and Metamask.
9. Design and develop Cryptocurrency.
10. Write the following programs for Blockchain in Python:Create a mining function and test it.

Evaluation Scheme:

Laboratory:

Continuous Assessment (CA):

Laboratory work will be based on PEMC30502L with minimum 10 to 12 experiments to be incorporated. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 10 Marks
2. Journal Submission: 10 Marks
3. Viva-voce: 10 Marks
4. Subject Specific Lab Assignment/Case Study: 20 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Big Data Analytics (Elective-II) (PEMC30503T)

Teaching Scheme
Lectures : 02 Hrs./week
Credits : 02

Examination Scheme
Term Test : 20 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 60 Marks
Total Marks : 100 Marks

Prerequisite: Programming Knowledge

Course Objective: The aim of the course is to introduce the concept of Big Data in Data Science. It will provide information on the procedure to analyze, process and extract information from datasets that are both voluminous and complex. It will outline how big data technologies can be harnessed by businesses to study emerging challenges and engage in better decision making.

Course Outcomes:

After completion of the course, the student will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Explain the process of Big Data storage, processing, visualization, and application on workplaces and research environments	L2	Understand
CO2	Develop new approaches to Social Analytics and Security issues on Big Data	L6	Create
CO3	Create and set-up a Hadoop cluster for handling big data and distributed file system and computing	L6	Create

Course Contents

Unit-I Introduction to Big Data — 02 Hrs.

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System.

Unit-II HDFS (Hadoop Distributed File System) — 03 Hrs.

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

Unit-III Map Reduce — 03 Hrs.

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

Unit-IV Hadoop Eco System — 05 Hrs.

Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.Hbase: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction.

Unit-V Data Visualization in Big Data — 04 Hrs.

Need for visualization, creating visualization, Existing Visualization Techniques, Big Data Visualization Challenges Techniques, visualizing big data, Key techniques, Visual Analysis of Big Data.

Unit-VI Big Data Analytics Algorithms — 07 Hrs.

Collaborative filtering, Classification, Clustering, text data mining, Basic concepts in text retrieval, Information retrieval models, Implementation of a search engine, Evaluation of search engines, Advanced search engine technologies.

Unit-VII Application of Big data — 06 Hrs.

Spatial-temporal data, financial data, big multimedia data, big medical/health data and big scientific data.

Text Books:

1. Subhashini Chellappan, Seema Acharya,Big Data and Analytics, 2nd Edition, Wiley, 2019.
2. G. Sudha Sadasivam , R. Thirumahal ,BIG DATA ANALYTICS, 1st Edition, Oxford University Press, 2020.

Reference Books:

1. Trevor Hastie,The Elements Of Statistical Learning: Data Mining, Inference, And Prediction, 2nd Edition, Springer, 2017.
2. Ahmed F. Zobaa , Trevor J. Bihl, Big Data Analytics in Future Power Systems, 1st Edition, CRC Press, 2018.
3. C.S.R. Prabhu, Aneesh Sreevallabh Chivukula, Aditya Mogadala , Rohit Ghosh (Author), L.M. Jenila Livingston, Big Data Analytics: Systems, Algorithms, Applications, 2nd Edition, Springer, 2020.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test(The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Big Data Analytics Laboratory (Elective-II) (PEMC30503L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Continuous Assessment : 50 Marks
Total : 50 Marks

Course Objectives: This course is designed to Get familiar with Hadoop distributions, configuring Hadoop and performing File management tasks and Experiment MapReduce in Hadoop frameworks and Understand different approaches for building Hadoop MapReduce programs for real-time applications.

Course Outcomes:

After completion of the course, the student will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Configure Hadoop and perform File Management Tasks.	L2	Understand
CO2	Apply MapReduce programs to real time issues like word count, weather dataset and sales of a company.	L3	Apply
CO3	Analyze huge data set using Hadoop distributed file systems and MapReduce.	L4	Analyze
CO4	Apply different data processing tools like Pig, Hive and Spark.	L3	Apply

Suggested Experiments:

1. Install Apache Hadoop.
2. Develop a MapReduce program to calculate the frequency of a given word in agiven file.
3. Develop a MapReduce program to find the maximum temperature in each year.
4. Develop a MapReduce program to find the grades of student's.
5. Develop a MapReduce program to implement Matrix Multiplication.
6. Develop a MapReduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year.
7. Develop a MapReduce to analyze weather data set and print whether the day is shinny or cool day.
8. Develop a Java application to find the maximum temperature using Spark.

9. Develop a MapReduce program to find the tags associated with each movie by analyzing movie lens data.

10. Develop a program to calculate the maximum recorded temperature by year wise for the weather dataset in Pig Latin.

Evaluation Scheme:

Laboratory:

Continuous Assessment (CA):

Laboratory work will be based on PEMC30503L with minimum 10 to 12 experiments to be incorporated. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 10 Marks
2. Journal Submission: 10 Marks
3. Viva-voce: 10 Marks
4. Subject Specific Lab Assignment/Case Study: 20 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Basic Decision making with Spreadsheet (OEMC30601T)

Teaching Scheme	**Examination Scheme**
Lectures : 03 Hrs./week	Term Test : 20 Marks
Credits : 03	Teacher Assessment : 20 Marks
	End Sem Exam : 60 Marks
	Total Marks : 100 Marks

Prerequisite: NIL.

Course Objective:

The aim of the course is to provides comprehensive instruction using spreadsheet software as a productive decision making tool. Further, it will enable students to apply spreadsheet capability, analyze various models influencing variables from period to period and evaluate data patterns to solve possible outcomes of an uncertain event.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Solve managerial decision problems using spreadsheet techniques.	L2	Understand
CO2	Analyze the basic decision models, linear regression models, linear and nonlinear optimization models, and simulation models.	L4	Analyze
CO3	Predict forecasting using popular for the pre-processing of time series techniques .	L3	Apply

Course Contents

Unit-I Introduction 05 Hrs.

Introduction to spreadsheets; historical development; basic capabilities of spreadsheets and their usage for creating models; types of data used in spreadsheets; spreadsheet notations for mathematical operations; common built in formulas and functions; conditional expressions; relative and absolute references.

Unit-II Addressing Uncertainty and Probability 05 Hrs.

Random variables and probability distributions, Changes in discrete and continuous time, Power, exponential, and log functions, Probability trees and decision trees, Correlation and Regression., Simulation and Optimization.

Unit-III Model building 06 Hrs.

Designing spreadsheets reflecting assumptions; decision variables; and outcomes, creating basic cashflow models; revaluating small business opportunities; incorporating what-if analysis; identifying key variables using sensitivity analysis; linear programming models and deterministic models.

Unit-IV Optimization with Spreadsheets using Solver 05 Hrs.

Linear programming, sensitivity analysis, transportation and assignment problems, network optimization problems, integer and nonlinear programming, multi-objective optimization, applications of optimization in different areas.

Unit-V Simulation and Optimization 06 Hrs.

Use of spreadsheets to implement Monte Carlo simulations and linear programs for optimization; model uncertainty and risk in spreadsheets; and use of Excel's solver What-if analysis, Inventory simulation, Waiting Line simulation, Simulation with two Quality Inspectors, other simulation issues.

Unit-VI Time Series Analysis 03 Hrs.

Forecasting Time Series Patterns, Moving Averages and Exponential Smoothing, Linear Trend Projection, Seasonality.

Text Books:

1. David Anderson, Dennis J. Sweeney, Thomas Arthur Williams, Introduction to Management Science: Quantitative Approaches to Decision Making, 15th Edition, CENGAGE Learning Custom Publishing, 2018.

2. Cliff Ragsdale, Spreadsheet Modeling and Decision Analysis: A Introduction to Business Analytics, 8th Edition, Cengage Learning India Pvt. Ltd., 2018.

Reference Books:

1. Elliot Bendoly Excel Basics to Blackbelt: An Accelerated Guide to Decision Support Designs, 2nd Edition, Cambridge University Press, 2013.

2. Cliff Ragsdale, Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Business Analytics, 8th Edition, South-Western College Publishing, 2014.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test(The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Algorithmic Trading (OEMC30602T)

Teaching Scheme
Lectures : 03 Hrs./week
Credits : 03

Examination Scheme
Term Test : 20 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 60 Marks
Total Marks : 100 Marks

Prerequisite: NIL.

Course Objective:

The aim of the course is to provide Students with basic consortium related to market trading. It also provides information on development of real-time strategies. It focuses on creating trading engines that will be supported by advance data analytics.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe various conglomerate involved in market practices like investors, brokers, dealers, arbitrageurs, retail traders, day traders and types of orders.	L2	Understand
CO2	Explain various trading Strategies based on technical Indicators.	L2	Understand
CO3	Operate day trading , Bid and Ask Price, Spread, Pips, Margin, Leverage, Order Types using fundamental analysis.	L2	Understand

Course Contents

Unit-I Introduction 05 Hrs.

Basics of Algorithmic Trading Different types of order, order properties, market structure, Brokers, dealers, Bid/Ask spreads, Block trades, Arbitrage, Buy side trades.

Unit-II Technical Trading 10 Hrs.

Basic Philosophy of Technical Approach for Investment, Dow theory, Chart construction, Basic concept of trends, Technical Analysis Applied to Different Trading Mediums and Time Dimensions Pattern study: Major reversal pattern: Head and shoulders, Double top and double bottom Triple top and triple bottom Continues pattern : Triangles, Flags and pennants, Wedge and Rectangle. Major indicators and oscillators:Simple moving average, Exponential moving average, Relative strength index, Moving average convergence/divergence(MACD), Bollinger Bands, and Stochastic

Unit-III Trading Strategies 08 Hrs.

Implementation of Scalping, Scaling, Advance Jobbing and Trend Jobbing in Live Market Environment Triangular Arbitrage Strategies for Forex market Mean Reverting Strategies like Pair Trading in derivatives market Basket Strategy (Index-Index, Index-Stocks) Statistical Arbitrage Strategies Pre and Post Result based Trading Strategies using Sentiment Indicators Overview on High Frequency Trading .

Unit-IV Back testing 07 Hrs.

Implementation of A Simple Backtester Trading Strategy, Pitfalls, Components.

Text Books:

1. Yves Hilpisch, Python for Algorithmic Trading: From Idea to Cloud Deployment, 1st Edition, O'Reilly Media, 2020.

2. Stefan Jansen, Hands-On Machine Learning for Algorithmic Trading: Design and implement investment strategies based on smart algorithms that learn from data using Python Paperback – Import, 1st Edition, Packt Publishing Limited, 2018.

Reference Books:

1. Murphy, J., Technical Analysis of the Financial Markets, 1st Edition, Prentice Hall Press, 2020.

2. Nison, S., Japanese Candlestick Charting Techniques, 2nd Edition, Penguin USA, 2001.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test(The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Introduction to Virtual Reality and Augmented Reality (OEMC30603T)

Teaching Scheme
Lectures : 03 Hrs./week
Credits : 03

Examination Scheme
Term Test : 20 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 60 Marks
Total Marks : 100 Marks

Prerequisite: NIL.

Course Objective:

This course is designed to give numerous perspectives on Virtual reality and Augmented Reality based on fundamentals of sensation, perception, engineering aspects next generation technologies and gaming .

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Describe the working of Virtual Reality (VR) and Augmented Reality (AR) systems.	L2	Understand
CO2	Illustrate the use of hardware that enables design and implementation of VR & AR systems.	L3	Apply
CO3	Apply the concepts of the visual perceptions in VR-AR technologies .	L3	Apply
CO4	Utilize the concepts of motion, sensor and audio in VR & AR systems.	L3	Apply

Course Contents

Unit-I Introduction to Virtual Reality and Augmented Reality 06 Hrs.

Definition, History, Human Physiology and Perception, Key Elements of VR & AR, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality & Augmented Reality. The Relationship Between Virtual Reality, Augmented Reality and Other Technologies-Media, Spectrum Between Real and Virtual Worlds, working of VR & AR based Systems.

Unit-II Representing the Virtual World 06 Hrs.

Visual Representation in VR, Haptic Representation in VR Displays: Displays – Audio Displays, Haptic Displays, Visual Displays, Other sensory displays, Visual Perception, Requirements and Characteristics, Spatial Display Model. Processors – Role of Processors, Tracking & Sensors - Tracking, Calibration, and Registration, Characteristics of Tracking Technology, Mobile Sensors, Optical Tracking, Sensor Fusion.

Unit-III The Geometry of Virtual World, Psychology of Human Vision 06 Hrs.

Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR. Geometric Vision in Augmented Reality : Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Simultaneous Localization and Mapping, Outdoor Tracking Augmented Reality Software - Introduction, Major Software Components for Augmented Reality Systems. Introduction to Virtual world, shopping and educational resources using Virtual Gesture.

Unit-IV Visual Perception 06 Hrs.

Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information Visual Rendering - Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions. Introduction to filmora and other open source tools for visual perception: concept development Introduction to marker-based tracking, types of markers, marker camera pose and identification, visual tracking, Marker types real world examples Tracking methods- Visual tracking, feature based tracking, hybrid tracking, and initialization and recovery.

Unit-V Motion in Real and Virtual Worlds 06 Hrs.

Introduction to Virtual Motions and comparison with Real motions, Velocities and Accelerations, Tracking 2D and 3D Orientation, Tracking Position and Orientation, Tracking Attached Bodies Scene

Generator, Tracking system, monitoring system, Game scene AR Devices, Virtual retinal systems, Monitor bases systems, Projection displays, Video see through systems. Introduction and Applications of mixed reality, I/O, Computer Vision. Introduction to Real time VR based utilities, Sensible seasoning in VR.

Text Books:

1. Steven M. LaValle, Virtual Reality, Cambridge University Press, 2019.
2. William R Sherman and Alan B Craig, Understanding Virtual Reality: Interface, Application and Design, (The Morgan Kaufmann Series in Computer Graphics). Morgan Kaufmann Publishers, San Francisco, CA, 2018.
3. Alan B Craig, William R Sherman and Jeffrey D Will, Developing Virtual Reality Applications: Foundations of Effective Design, Morgan Kaufmann, 2009.

Reference Books:

1. Gerard Jounghyun Kim, Designing Virtual Systems: The Structured Approach Springer Press, 2005.
2. Kharis O'Connell Designing for Mixed Reality, O'Reilly Media Publication, 2016.
3. Sanni Siltanen- Theory and applications of marker-based augmented reality, Julkaisija – Utgivare Publisher. 2012.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test(The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.
2. Total duration allotted for writing the paper is 3 hrs.

Game Design (OEMC30604T)

Teaching Scheme
Lectures : 03 Hrs./week
Credits : 03

Examination Scheme
Term Test : 20 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 60 Marks
Total Marks : 100 Marks

Prerequisite: NA.

Course Objective:

This course aims to help course learners to produce a game's high concept document, one page blueprint, a physical prototype, pitch and supporting design documentation to move from a simple idea to a fleshed-out design, ready for implementation.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Interpret the term "game," incorporating different concepts and multiple perspectives.	L2	Understand
CO2	Analyse the mechanics of paper and digital games, considering how these mechanics affect gameplay and player experiences .	L3	Apply
CO3	Design, develop, and test games using an iterative design process and considering user feedback.	L3	Apply
CO4	Create Design Documents using design template to communicate design ideas.	L3	Apply

Course Contents

Unit-I Overview of Games — 05 Hrs.

Definition of Game, Genres of Games, Platforms of Game Distribution, Game Industry, Business of Game Publishing.

Unit-II Game Designing and Paper Prototyping — 07 Hrs.

Game Analysis Frameworks (Mechanics, Dynamics, Aesthetics (MDA) model and Design, Play and Experience (DPE) model), Layered Tetrad (Inscribed, Dynamic, Cultural layer), Iterative Design, Brainstorming and Ideation, Scoping, Design Goals, Math and Game Balance, Puzzle Design, Benefits of Paper Prototyping, Paper Prototyping Tools.

Unit-III Digital Prototyping — 06 Hrs.

Thinking in Digital Systems, Tools of Digital Prototyping, Introducing development environment Unity and development language C#, Variables and Components, Boolean Operations and Conditionals, Loops, Lists and Arrays, Functions and Parameters, Object Oriented Thinking, Agile Mentality.

Unit-IV Making Design better — 06 Hrs.

User Experience Design, Playtesting, Functionality, Completeness and Balance, Fun and Accessibility.

Unit-V Communicating your Designs — 06 Hrs.

Visualization, Concept Art, Formats for Design Documents (Design Templates ex: One Page Design Template, High Concept Template etc.), Selling your ideas to the Game Industry].

Text Books:

1. Jeremy Gibson, Introduction to Game Design, Prototyping, and Development, Pearson Education, (ISBN-13: 978-0321933164, ISBN-10: 0321933168), 2015.

2. Tracy Fullerton, Game Design Workshop-A Playcentric Approach to Creating Innovative Games, 4th Edition, CRC Press Taylor and Francis Group, (ISBN-13: 978-1138090770), 2018.

Reference Books:

1. Ernest Adams, Fundamentals of Game Design, 3rd Edition, Pearson Education, (ISBN-13: 978-0321929679, ISBN-10: 0321929675), 2013.

2. Jesse Schell, The Art of Game Design: A Book of Lenses, 2nd Edition, CRC Press Taylor and Francis Group, (ISBN-13: 978-1138413696, ISBN-10: 1138413690), 2008.

Evaluation Scheme:

Theory :

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Teacher Assessment (B):

Conduction of Term Test

20 Marks for the test(The Two-term tests will be conducted of 30 Marks each, considering an average of these marks and scaled down to 20 Marks)

Term Test (TT) (for 20 Marks)

End Semester Examination (C):

1. Question paper based on the entire syllabus, summing up to 60 marks.

2. Total duration allotted for writing the paper is 3 hrs.

Professional Ethics (BSMC3070)

Teaching Scheme
Lectures : 01 Hrs./week
Credits : 01

Examination Scheme
Teacher Assessment : 20 Marks
Total Marks : 20 Marks

Prerequisite: NIL

Course Objective:

This course is designed to encourage students to inculcate human values, that will enable them to grow as a responsible human being. The course also helps students to understand how to maintainethical conduct in discharging professional duties, which will be beneficial for them in their professional lives.

Course Outcomes:

After completion of the course, the student will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the engineering code of ethics and be able to apply them as necessary.	L2	Understand
CO2	Understand moral complexities in many engineering activities and decision-makingprocesses.	L2	Understand
CO3	Understand some of the contemporary issues in the engineering professions,	L2	Understand
CO4	Effectively communicate their knowledge and understanding of engineering ethics.	L2	Understand

Course Contents

Unit-I Introduction to Ethics- 02 Hrs.

- Concept of morals and ethics,
- Study of engineering ethics;
- Laws and ethics;
- Personal and professional ethics.

Unit-II Professional Practice in Engineering- 02 Hrs.

- Concept of morals and ethics,
- Common morality ASME code of ethics,
- Technical codes and standards,
- Accepted standards of Engineering practice and the standard of care.

Unit-III Ethics as design-doing justice to moral Problem- 02 Hrs.

- Discuss about ethics as a design to solve moral problems
- Comparison between moral problems and engineering design problems;
- Moral lessons from design problems;
- Implications of the dynamic character of problem situations.

Unit-IV Rights and Responsibilities of Engineers- 04 Hrs.

- Moral responsibilities;
- Conflicts of interests;
- Confidentiality,
- Engineers, organizations and ethics,
- Engineer-manager relationships;
- loyalty;
- The concept of whistleblowing

Unit-V Responsibility for the Environment- 05 Hrs.

- Rapid Technological growth and depletion of resources,

- Reports of the Club of Rome.
- Limits of growth: sustainable development
- Energy Crisis: Renewable Energy Resources
- Environmental degradation and pollution.
- Eco-friendly Technologies.
- Environmental Regulations,
- Environmental Ethics
- Appropriate Technology,
- Movement of Schumacher; later developments of Technology and developing notions.
- Problems of Technology transfer,
- Technology assessment impact analysis.
- Problems of man, machine, interaction,
- Impact of assembly line and automation.
- Human centered Technology

Text Books:

1. P.A. Vesilind and A. S Gunn, Engineering Ethics and Environment, 1st Edition, CambridgeUniversity Press, 1998.

2. Charles B. Fleddermann, Engineering Ethics, 3rd Edition, Pearson, 2007.

Reference Books:

1. Caroline Whitbeck, Ethics in Engineering – Practice and Research, 2nd Edition, Cambridge University Press, 2011.

Evaluation Scheme:

Theory:

Teacher Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of semester.

Interpersonal Skills (BSMC3080)

Teaching Scheme
Practicals : 02 Hrs./week
Credits : 01

Examination Scheme
Continuous Assessment : 50 Marks
Total Marks : 50 Marks

Prerequisite: NIL.

Course Objective:

The course aims to build and enhance skills critical to future employability through a medley of activities and simulation practices. Also vital skills like persuasion, team participation, self-branding and workplace communications are developed through this course.

Course Outcomes:

After completion of the course, students will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Demonstrate awareness of business networks and communicate appropriately in various contexts.	L3	Apply
CO2	Illustrate the knowledge of team dynamics to work productively in teams and participate effectively in contexts such as group discussions.	L3	Apply
CO3	Apply persuasive communication strategies to articulate themselves in situations such as personal interviews.	L3	Apply
CO4	Create social media plans and employment related documents to showcase their personal brand.	L6	Create

Course Contents

Unit-I Corporate Communication 06 Hrs.

Workplace hierarchy and importance of Formal and Informal Networks, Cross cultural communication, Business etiquette and netiquette, Corporate presentations-sales and elevator pitch, advanced features in Power-Point(zoom, morph), data and non data driven graphics in presentations.

Unit-II Group and Team Dynamics 08 Hrs.

Group Discussions(GD) - speaking in GDs, discussing problems and solutions, creating a cordial and cooperative atmosphere, using persuasive strategies, being polite and firm, turn-taking strategies, effective intervention, reaching a decision, Organizational GD, GD as part of selection process: characteristics, evaluation and analysis Dynamics of group formation, the dysfunctions of groups and teams: norm violation and role ambiguity, groupthink and group-polarization, team building exercises.

Unit-III Employment Communication 08 Hrs.

Self-branding through social media, resume-traditional and non-traditional formats- scannable, video portfolios, visual, etc.; cover letters-solicited and unsolicited

Unit-IV Personal Interviews 08 Hrs.

Virtual hiring practices; stages of interview: face-to-face interviews: causes of failure in an interview, types of interview questions, mock interviews.

Text Books:

1. Meenakshi Raman and Sangeeta Sharma, Technical Communication: Principles and Practices, 3rd ed., Oxford University Press, 2015
2. Fred Luthans, Organisation Behaviour: An Evidence Based Approach, 12th ed. McGraw Hill, 2013

Reference Books:

1. Frances Trought, Brilliant Employability Skills, 2nd ed. Pearson, 2017.
2. S P Robbins, Timothy A Judge and Neharika Vohra, Organizational Behavior, 15th ed., Pearson, 2013
3. Scot Ober and Newman Amy, Contemporary Business Communication, 8th ed., Biztantra Publications, 2017
4. Cliff Atkinson, Beyond Bullet Points,4th ed., Pearson Education, 2018.

Evaluation Scheme:

Laboratory:

Continuous Assessment (CA):

Laboratory work will be based on BSMC3080 with minimum 10 to 12 experiments /Tutorial exercises based on the syllabus. The distribution of marks for term work shall be as follows:

1. Performance in Experiments: 10 Marks
2. Journal Submission: 10 Marks
3. Viva-voce: 10 Marks
4. Subject Specific Lab Assignment/Case Study: 20 Marks

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the term work.

Capstone Project (PJMC3090L)

Practical Scheme
Practical : 06 Hrs./week
Credit : 03

Examination Scheme
Continuous Assessment : 50 Marks
End Sem Exam : 50 Marks
Total : 100 Marks

Prerequisite: Knowledge of all core and elective courses completed

Course Objectives:

The capstone project is designed to provide a culminating design experience to the students' learning with essentially required hands-on experience to ensure that they graduate with the required practical and soft skills. The course aims to encourage students to think critically, solve challenging problems, do a feasibility study and develop written and oral communication skills, teamwork and planning. The students may also work in interdisciplinary areas which will help broaden their scope and learning in different domains.

Course Outcomes:

After completion of the course, the student will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Select an appropriate problem statement after reviewing the literature and identifying the research gaps.	L4	Analyze
CO2	Formulate the different use cases/feasible design model.	L2	Understand
CO3	Implement the prototype/proof of concept, test and validate the results.	L3	Apply
CO4	Manage a team project.	L3	Apply
CO5	Summarize the topic into a technical report.	L2	Understand

Syllabus:

A student is required to carry out elaborated project work. The project may be either design and fabrication work or a simulation and synthesis of a problem/system, and develop algorithms and verify feasibility of implementation. At the end of the semester students will be required to submit a report detailing the literature review, design problem formulation, analysis functional simulation and synthesis, work plan and work done and present his/her work carried out before examiners.

Prescribed project report guidelines:

Size of report shall be of minimum 50 pages. Project Report should include appropriate content for:

- Introduction
- Literature Survey
- Related Theory
- Implementation details
- Project Outcomes
- Conclusion
- References

Assessment criteria for the departmental committee (including project guide) for Continuous Assessment:

Guide will monitor weekly progress and marks allocation will be as per Table 1.

Assessment criteria for the departmental committee (including project guide) for End Semester Exam:

Departmental committee (including project guide) will evaluate project as per Table 2.

Table 1: Continuous Assessment Table

Sr	Exam Seat No	Name of Student	Student Attendance	Log Book Maintenance	Literature Review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 2: Evaluation Table

Sr	Exam Seat No	Name of Student	Project Selection	Design/ Simulation/ Logic	Hardware/ Programming	Result Verification	Presentation	Total
			5	5	5	5	5	25

Employability Skill Development Program-II (HMMC30100L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Continuous Assessment : 50 Marks
Total : 50 Marks

Prerequisites: Basic Mathematics, Basic knowledge of C programming.

Course Objectives:

1. To write optimized code.
2. Able To Solve Programming Questions with Time complexity.
3. Develop Logic building in Programming.
4. Able to increase problem solving skills in programming.

Course Outcomes:

After completion of the course, the student will be able to -

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Analyze and solve the logical problem based on words, venn diagram etc.	L4	Analyze
CO2	Understand and solve the English comprehension, Sentence completion, Sentence Correction problems.	L2 and L4	Understand, Analyze
CO3	Understand and illustrate the concept of Exception Handling, Garbage collection.	L2 and L3	Understand, Apply
CO4	Understand and help students not just pass out as graduate but skilled professionals.	L2	Understand

Course Contents

Unit-I 10 Hrs

Variables : Local variables, Global variables, 'global' keyword,Rules of Identities.

Functions : Introduction, Prototype, Classification of functions,No arguments and No return values, With arguments and With return values.

No arguments and With return values and Operators : With arguments and No return values, Recursion, Argument type functions, Default arguments functions, Required arguments functions, Keyword arguments functions, Variable arguments function, Arithmetic Operators, Relational operators, Logical operators, Bitwise operators, Shift operators.

Control Statements : Conditional Control Statements, if, if-else, if-elif-else,nested-if, Loop Control Statements, While, For.

Branching Statements : Break, Continue, pass, return, exit.

Exception Handling : Introduction, The need of exception handling,Getting exceptions, Default exception handler, Handling exception, Try, Except Handling exceptions using Exception class, Finally, block, Releasing resources using Finally block, Raise, Creating a user exception class. Raise exception manually, Exceptions based application.

Multithreading : Introduction, Multitasking, Multi-tasking v/s Multi-threading, threading module, Thread class introduction, Creating thread, The life cycle of a thread, Single-threaded application, Multi-threaded application, Sleep() method. Sleep() v/s run(), Join() v/s Sleep(), Multiple custom threads creation, The execution time of single-threaded application, The execution time of multi-threaded application, Synchronization of threads.

Unit-II 10 Hrs

Inner classes and Regular expressions: Basic syntax of inner class, Advantages of Inner classes, Access class level members of inner classes, Access object level members of inner classes, Local inner classes, Complex inner classes, Accessing data of inner classes, 're' module, Match(), Search(), find() etc, and actual projects web scrapping.

Mail extraction: Date extraction, Mobile number extraction, Vehicle number extraction, zoom chat analysis realtime.

Expressions using operators and symbols: Split string into characters, Split string into words, Lambda expressions.

String handling using regex: Introduction to Strings, Indexing and Slicing, Special operators in String handling, Old style String formatting, String library methods, Quotes and Escape characters in a String representation, String Immutability, Logical programs using Strings.

Unit III 8 Hrs

Object-Oriented Programming: Introduction to OOPs, Classes, Objects, Structure to OOP application, Contexts of OOP application, Class level members, Object level members, self variable, Constructor and Initialization of object, Private, Protected, Public, Program codes,Rules, Implementation, Abstraction, Polymorphism ,Introduction, Types of Inheritance, Single inheritance, Multi-Level inheritance, Method overriding, Object initialization using constructor, Multiple inheritances, Hierarchical inheritance, Method overriding in Multilevel inheritance,Introduction, Importance of Modularity programming, Import keyword, User defined modules creation, Function based modules, Classes based modules, Connecting modules, 'from' keyword.

Collections Framework: Introduction to collection of data types, Importance of Data processing, DS algorithms introduction. **List:** Create a list, Adding elements, Deleting elements, Pre-defined functionality of List, Nested List, Immutability and Mutability of List. **Set:** The functionality of Set object, Frozen set, Dictionaries, Create a dictionary, Adding elements **Dict:** Pre-defined functions of Dict class, Programs using Collection types.

Garbage collection : Introduction, Importance of manual GC, Self-referenced objects, 'gc' module, Collect() method, Threshold function.

Unit IV — 8 Hrs

Tkinter: – GUI Types of Layouts , Create Labels and Display images, Create Buttons, Create Events, StringVar class, Calculator program using GUI.

Basic ML AI including Projects: Iterators, Nested functions, Generators, Closures,Decorators, Basic ML and AI, PIP, Visualization etc...

Project Domain(Per domain 1 or 2 project).

- ML/AI Based Projects
- Data Analysis Based projects
- Test Summarization based projects
- web scrapping and crawling

Unit V — 10 Hrs

DBMS Using Python: Introduction to Mysql, Mysql – Python connectivity, DDL, DRL, DML, Transaction management examples (rollback and commit), GUI –Database connectivity.

NoSql Using Python: Installation and Configuration, MongoDB Tools, Collection and Documents, CRUD and the MongoDB Shell, Introduction to CRUD, Introduction to the MongoDB API, Creating a Database, Collection and Documents.

Data Modelling and Schema Design: MongoDB Database References Model Tree Structures, MongoDB Analysing Queries, Atomic Operations, Map Reduce, Text Search, Regular Expression, Capped Collections Administration MongoDB Deployment and Cluster setup, MongoDB GridFS, Trident Spout, Working with Replica Sets, MongoDB Sharding.

Text Books:

1. Dr. R. Nageswara Rao, "Core Python Programming", 2^{nd} Edition, Dreamtech Pres, Wiley Publication, 2018.
2. Hennery Korth and Abraham Silberschatz, "Database System Concepts", 7^{th} Edition, McGraw Hill, 2019
3. Brad Daylel, "NoSQL with MongoDB in 24 Hours", 1^{st} edition, Sams Teach Yourself, January 2015.

Reference Books:

1. Dr. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations", S Chand Publication.
2. M. G. Venkateshmurthy, "Programming Techniques through C", Pearson Publication.
3. Behrouz Forouzan, "A Computer Science Structure Programming Approaches using C", Behrouz Forouzan, Cengage Learning.
4. Yashwant Kanetkar, "Let Us C", Yashwant Kanetkar, BPB Publication.

Evaluation Scheme:

Continuous Assessment(CA):

Continuous Assessment (CA) will carry weightage of 50 marks. The components of CA and the distribution of marks for term work shall be as follows:

1. MCQ Test based on Aptitude: 20 Marks
2. MCQ Test based on Programming skills: 20 Marks
3. Mock Interview: 10 Marks
4. Total Marks: 50 Marks

Any other component recommended by BOS and approved by Dean Academics.