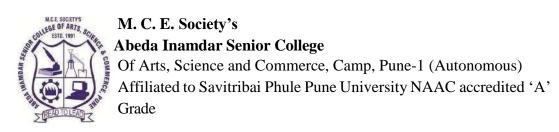# M. Sc. Computer Science

Syllabus

M.C.E. Society's
ABEDA INAMDAR SENIOR COLLEGE OF ARTS, SCIENCE AND COMMERCE (AUTONOMOUS), PUNE

With effect from 2023-2024

M.Sc.I 2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Software Architecture and Design Patterns
Course Code	23SMCS11MM
Semester	I
No. of Credits	4
Course Type	Major (MJ)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To introduce students to the basic concepts and techniques of SADP.
2.	To write java programs using Design Pattern and Frameworks to create reusable and flexible software systems.
3.	To understand Use of patterns and architectures for solving practical problems.
4.	To understand about design pattern.
5.	To understand about the process of deploying web apps using specificFrameworks

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will recognize the characteristics of patterns that make it useful to solve real-world problems.
2.	Students will process available data using python libraries and predict outcomes using Machine Learning algorithms to solve given problem.
3.	Student will Able to use specific frameworks as per applications need.
4	Students can design java application using design pattern techniques.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	**Introduction**	2
	1. UML The Notation 2. Process Unified Process / Rational Unified Process inception,elaboration, construction, transition 3. How various components fit in the life cycle 4. The artifacts at end of each process / discipline	1 1
Unit II	**Software Architecture**	4
	1. What Software Architecture is and what it isn't. 2. Why is architecture important? 3. Architectural structures and views	1 1 2
Unit III	**Architectural Styles**	6
	1. Architectural Styles 2. Pipes and Filters 3. Data Abstraction and Object – Oriented Organization 4. Event-Based, Implicit Invocation 5. Layered Systems 6. Repositories 7. Interpreters 8. Other familiar Architectures 9. Heterogeneous Architectures.	1 1 1 1 2 2
Unit IV	**Introduction to Patterns**	4
	1. What is a Pattern & Design Pattern 2. What makes a Pattern (GOF) 3. Describing Design Patterns. 4. Pattern Categories & Relationships between Patterns. 4.5Organizing the Catalogue. 5. Patterns and Software Architecture.	1 1 1 1
Unit V	**Study of Design Patterns**	12

	1. Creational Patterns-singleton, factory method, abstract factory
	2. Structural Patterns-adapter, decorator, facade
	3. Behavioural Patterns-
	   i. Iterator
	   ii. Observer
	   iii. Strategy
	   iv. command and state (study of intent, applicability, participants, structure, collaboration , Java Example code,Implementation and consequences)
		3
		3
		6

Unit VI	**GRASP(General Responsibility Assignment Software Patterns)**	10
	1. Expert, Creator, High Cohesion, Low Coupling	4
	2. Controller, Polymorphism, Pure Fabrication, Indirection	4
	3. Don't Talk to Strangers	2
Unit VII	**Study of Frameworks**	12
	1. Frameworks as reusable chunks of architecture	1
	2. The framework lifecycle, development using frameworks	1
	3. Spring Core Framework	1
	4. Spring Boot Framework	1
	5. Microservices with Spring	1
	6. Web Architectures: i. Google Web Tool Kit ii. Spring iii. Hibernate etc.	2
	7. Selection of proper framework	2
	8. Comparing Frameworks	1
	9. Advantages of Spring	1
	10. Web based Case Study	1
Unit VIII	**Case Study (any one of the web Architecture)**	10
	1. Take a Framework and find Patterns in the Frame work.	4
	2. Benefits of Patterns in the chosen Framework	3
	3. How Pattern interact in the selected Framework	3

References:

1. Design Patterns – Elements of Reusable Object-oriented Software By E. Gamma, Richard Helm, RalphJohnson , John Vlissides (GoF)

2. Pattern – Oriented Software Architecture (POSA) Volume 1. By : Frank Buschmann, Regine Meunier,Hans Rohnert, Peter Sommerlad, Michael Stal.

3. Software Architecture in Practice. By Len Bass, Paul Clements, Rick Kazman

4. Applying UML and Patterns By Craig Larman.

5. Software Architecture- Perspectives on an emerging discipline by Mary shaw and David Garlan

6. Head First Design Pattern by Kathy Sierra, Bert Bates, Elisabeth Robson, Eric Freeman Publisher: O'ReillyMedia, Inc.

7. Building Microservices-Designing Fine-Grained Systems By Sam Newman Publisher: O'Reilly Media

8. Design patterns in Java by Douglas Schmidt Publisher O'Reilly

9. Professional Java Development with the Spring Framework 1st Edition by Rod Johnson, Alef Arendsen,Thomas Risberg, Colin Sampaleanu ; WROX publication

10. Mastering Spring 5: An effective guide to build enterprise applications using Java Spring and Spring Bootframework, 2nd Edition by Ranga Rao Karanam ; PACKT publishing

Course/ Paper Title	Machine Learning
Course Code	23SMCS12MM
Semester	I
No. of Credits	4
Course Type	Major (MJ)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To introduce students to the basic concepts and techniques of Machine Learning.
2.	To write python programs using machine learning algorithms for solving practical problems.
3.	To understand about Machine Learning Library and use cases.
4.	To understand about the process of deploying ML model.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will able to recognize the characteristics of machine learningthat make it useful to real-world problems.
2.	Students will process available data using python libraries and predict outcomes using Machine Learning algorithms to solve given problem.
3.	Students will able to estimate Machine Learning models efficiency usingsuitable metrics.
4.	Students will able to design application using machine learning techniques.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	**Introduction to Machine Learning**	10

	1. Data Science, Artificial Intelligence and Machine Learning
	2. Why Learn and What is Learning
	   i. What is Machine Learning
	   ii. Traditional Programming Vs. Machine Learning
	   iii. Machine Learning Process
	   iv. Types of Data
	   v. Key Elements of Machine Learning (Representation, Evaluation and Optimization)
		1
		
		3

	vi. Dimensionality Reduction (Feature Reduction)
	3. Descriptive and Inferential Statistics:
	   i. Probability Distribution
	   ii. Distance Measures (Euclidean and Manhattan)
	   iii. Correlation and Regression
	   iv. Hypothesis Testing
	   v. Creating our own dataset
	   vi. Importing the dataset, Handling
	4. Missing Data, Splitting the dataset into the Training setandTest set, Feature Scaling
		3
		
		3

Unit II	**Machine Learning Models**	8

	1. Type of Learning-
	   i. Supervised
	   ii. Unsupervised
	   iii. Semi Supervised Learning
	2. Components of Generalization Error (Bias, Variance, underfitting, overfitting)
	3. A Learning System Cycle
	4. Metrics for evaluation :
	   i. Accuracy
	   ii. Scalability
	   iii. squared error
	   iv. precision and recall
	   v. likelihood
	5. Classification Accuracy and Performance
		2
		
		1
		1
		2
		
		2

Unit III	**Regression Models**	12

	1. Linear Regression
	   i. Simple
	   ii. Multiple
	   iii. Polynomial
	2. Non-linear Regression
	   i. Decision Tree
	   ii. Support Vector
	   iii. Random Forest
		6
		
		6

Unit IV	Classification Models	16

	1. K – Nearest Neighbors (KNN)
	2. Logistic Regression
	3. Naive Bayes Theorem
	4. Support Vector Machine
	5. Decision Forest Classification
	6. Random Tree Classification
	7. Dimensionality Reduction Algorithms
	8. Gradient Boosting algorithms
	        i. GBM
	        ii. XGBoost
	        iii. LightGBM
	        iv. CatGBM
		2
		1
		2
		1
		1
		2
		2
		5

Unit V	Clustering Models	8
	1. K-means 2. Hierarchical Clustering (Agglomerative,Divisive), Dendrogram 3. Selecting optimal number of clusters: WithinClusters Sum of Squares (WCSS) by Elbow Method	2 3 3
Unit VI	Association Rules	6
	1. Key Terms: Support, Confidence and Lift 2. Apriori Algorithm	3 3

References:

1. Mitchell, Tom M. "Machine learning. WCB." (1997).
2. Rogers, Simon, and Mark Girolami. A first course in machine learning. CRC Press, 2015.
3. Friedman, Jerome, Trevor Hastie, and Robert Tibshirani. The elements of statisticallearning. Vol.1. Springer, Berlin: Springer series in statistics, 2001.
4. Witten, Ian H., and Eibe Frank. Data Mining: Practical machine learning tools andtechniques. Morgan Kaufmann, 2005.
5. Machine learning course material by Andrew Ng, Stanford University
6. Sutton, Richard S., and Andrew G. Barto. Reinforcement learning: An introduction. Vol. 1. No. 1.Cambridge: MIT press, 1998.
7. Iba, Takashi, et al. "Learning patterns: A pattern language for active learners." Conference on PatternLanguages of Programs (PLoP). 2009

Abeda Inamdar Senior College

Of Arts, Science and Commerce, Camp, Pune-1 (Autonomous)

Affiliated to Savitribai Phule Pune University NAAC accredited 'A' Grade

Course/ Paper Title	Data Mining
Course Code	23SMCS13MM
Semester	I
No. of Credits	2
Course Type	**Major (MJ)**

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To introduce students to the basic concepts and techniques of Data Mining.
2.	To develop skills of using recent data mining software for solving practical problems.
3.	To extend to the knowledge about data mining
4.	To perform the pre-processing of data and apply mining techniques on it.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will have knowledge about basic concepts and techniques of Data Mining
2.	Student will able to solve practical problems using data mining software
3.	Students will able to perform pre-processing of data.
4.	Students will able to apply data mining techniques.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	**Introduction to Data Mining**	4
	1. Basic Data Mining Tasks 2. DM versus Knowledge Discovery in Databases 3. Data Mining Issues 4. Data Mining Metrics 5. Social Implications of Data Mining 6. Overview of Applications of Data Mining	1 1 1 1
Unit II	**Introduction to Data Warehousing**	6
	1. Architecture of DW 2. OLAP and Data Cubes 3. Dimensional Data Modelling-star, snowflake schemas 4. Data Pre-processing – Need, Data Cleaning, Data Integration &Transformation, Data Reduction 5. Pattern Matching	1 1 1 2 1
Unit III	**Data Mining Techniques**	8
	1. Frequent item-sets and Association rule mining: Apriori algorithm, Use of sampling for frequent item-set, FP tree algorithm 2. Graph Mining: Frequent sub-graph mining, Tree mining, Sequence Mining	4 4
UNIT IV	**Software for data mining and applications of data mining**	4
	1. R 2. Weka 3. Sample applications of data mining	2 2
UNIT V	**Text and Web mining**	8
	1. Text mining 2. Applications of Text Mining 3. Process and Tools of Text Mining 4. Web Mining 5. Web content, structure and usage mining	2 2 2 1 1

References:

1. Data Mining: Concepts and Techniques, Han, Elsevier ISBN:9789380931913/ 9788131205358
2. Margaret H. Dunham, S. Sridhar, Data Mining – Introductory and Advanced Topics, Pearson Education
3. Tom Mitchell, ―Machine Learning‖, McGraw-Hill, 1997
4. R.O. Duda, P.E. Hart, D.G. Stork. Pattern Classification. Second edition. John Wiley and Sons, 2000
5. Christopher M. Bishop, ―Pattern Recognition and Machine Learning‖, Springer 2006
6. Raghu Ramkrishnan, Johannes Gehrke, Database Management Sysstems, Second Edition, McGraw HillInternational
7. Ian H.Witten, Eibe Frank Data Mining: Practical Machine Learning Tools and Techniques, Elsevier/(MorganKauffman), ISBN:9789380501864

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Course/ Paper Title	Practical based on SADP and ML
Course Code	23SMCS14MM
Semester	I
No. of Credits	4
Course Type	Major (MJ)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To write java programs using Design Pattern and Frameworks to create reusable and flexible software systems.
2.	To understand about the process of deploying web apps using specificFrameworks.
3.	To write python programs using machine learning algorithms for solving practical problems.
4.	To understand about the process of deploying ML model.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Able to use specific frameworks as per applications need.
2.	Design java application using design pattern techniques.
3.	Process available data using python libraries and predict outcomes usingMachine Learning algorithms to solve given problem.
4.	Able to estimate Machine Learning models efficiency using suitable metrics.

Syllabus

Unit No	Title with Contents	No. of Lectures
	Software Architecture & Design Pattern List of Assignments	
UNIT I	Write a JAVA Program to implement built-in support (java.util.Observable) Weather station with members temperature, humidity, pressure and methods mesurmentsChanged(), setMesurment(), getTemperature(), getHumidity(), getPressure()	15
	Write a Java Program to implement I/O Decorator for converting uppercase letters to lower case letters.	
	Write a Java Program to implement Factory method for Pizza Storewith createPizza(), orederPizza(), prepare(), Bake(), cut(), box(). Use this to create variety of pizza's like NyStyleCheesePizza, ChicagoStyleCheesePizza etc.	
	Write a Java Program to implement Singleton pattern for multithreading.	
	Write a Java Program to implement command pattern to test Remote Control.	
	Write a Java Program to implement undo command to test Ceilingfan	
	Write a Java Program to implement Adapter pattern for Enumeration iterator.	
	Write a Java Program to implement Iterator Pattern for DesigningMenu like Breakfast, Lunch or Dinner Menu.	
	Write a Java Program to implement State Pattern for Gumball Machine. Create instance variable that holds current state from there, we just need to handle all actions, behaviors and state transition that can happen. For actions we need to implement methods to insert a quarter, remove a quarter, turning the crank and display gumball.	
	Write a java program to implement Adapter pattern to design HeartModel to Beat Model.	

	Write a python program to Prepare Scatter Plot (Use Iris Dataset)	
UNIT II	Write a python program the Categorical values in numeric format for agiven dataset.	15
	Write a python program to implement simple Linear Regression for predicting house price	
	Write a python program to implement multiple Linear Regression for agiven dataset.	
	Write a python program to implement Polynomial Regression for givendataset.	
	Write a python program to Implement Naïve Bayes.	
	Write a python program to Implement Decision Tree whether or not toplay tennis.	
	Write a python program to implement linear SVM.	
	Write a python program to transform data with Principal ComponentAnalysis (PCA)	
	Write a python program to implement k-nearest Neighbors ML algorithm to build prediction model (Use Forge/Iris/housing Dataset)	
	Write a python program to find all null values in a given data setand remove them.	

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Grade

Course/ Paper Title	Research Methodology
Course Code	23SMCS11RM
Semester	I
No. of Credits	4
Course Type	RM

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Understand some basic concepts of research and its methodologies.
2.	Identify appropriate research topics.
3.	Select and define appropriate research problem and parameters.
4.	Prepare a project proposal.
5.	Organize and conduct research in a more appropriate manner.
6.	Write a research report and thesis.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students who complete this course will be able to understand and comprehend the basics in research methodology and applying them in research/ project work.
2.	This course will help them to select an appropriate research design.
3.	With the help of this course, students will be able to take up and implement a research project/ study.

| 4. | The course will also enable them to collect the data, edit it properly and analyse it accordingly. Thus, it will facilitate students' prosperity in higher education |
| 5. | Students will be able to demonstrate the ability to choose methods appropriate to research objectives. |

Syllabus		
Unit I	**Introduction to Research Methodology**	**10 hours**
	1. Meaning of Research 2. Objectives of Research 3. Motivation in Research 4. Types of Research 5. Research Approaches 6. Significance of Research 7. Researcher and Characteristics of Researcher 8. Research Ethics and Integrity 9. Plagiarism and types of plagiarism 10. Introduction to Plagiarism check tools 11. Research Methods versus Methodology 12. Research and Scientific Method 13. Importance of Knowing How Research is Done 14. Criteria of Good Research	
Unit II	**Literature Review and Formulation of Research Problems**	**8 h ours**

	1. Research Process
	2. Reviewing the literature: the purpose of a literature review
	3. Literature resources
	4. The Internet and a literature review
	5. The Internet and research strategies and methods
	6. Conducting and Evaluating literature reviews
	7. Formulation of research problem
	    7.1 What is a Research Problem?
	    7.2 Selecting the Problem
	    7.3 Necessity of Defining the Problem
	    7.4 Technique Involved in Defining a Problem	

Unit III	Research Design	10 hours

	1. Meaning of Research Design
	2. Need for Research Design
	3. Features of a Good Design
	4. Important Concepts Relating to Research Design
	5. Different Research Designs/Methods
	    5.1 Pure and Applied Research
	    5.2 Exploratory or Formulation Research
	    5.3 Descriptive Research
	    5.4 Diagnostic Research
	    5.5 Evaluation Studies
	    5.6 Action Research
	    5.7 Experimental Research
	    5.8 Analytical Study or Statistical Method
	    5.9 Historical Research
	    5.10 Surveys
	    5.11 Case Study
	    5.12 Field Studies	

UNIT IV	Hypothesis and Sampling	12 hours
	1. What is a Hypothesis? 2. Nature & Characteristics of Hypothesis 3. Significance of Hypothesis 4. Types of Hypothesis 5. Sources of Hypothesis 6. Characteristics of Good Hypothesis 7. What is sampling? 8. Aims of Sampling 9. Characteristics of Good Sample 10. Basis of Sampling 11. Merits and demerits of Sampling 12. Sampling Techniques or Methods 13. Probability Sampling Methods 14. Non-Probability Sampling Methods 15. Sample Design and Choice of Sampling Technique	
UNIT V	Data Collection, Processing, and Analysis of Data	12 hours

	1. Collection of Primary Data 2. Method of Data Collection - Observation, Interview, Questionnaires, andSchedules 3. Difference between Questionnaires and Schedules 4. Some Other Methods of Data Collection 5. Collection of Secondary Data 6. Selection of Appropriate Method for Data Collection 7. Case Study Method 8. Processing Operations and Some Problems in Processing 9. Elements/Types of Data Analysis 10. Statistics in Research 11. Measures of Central Tendency, Dispersion, Asymmetry (Skewness) 12. Measures of Relationship - Chi-Square, t-test, ANOVA a. (f-test),Z-test 13. Simple Regression Analysis, Multiple Correlation, and Regression 14. Partial Correlation and Association in Case of Attributes 15. Quantitative and Qualitative Data Analysis Tools	
UNIT VI	**Report Writing**	08
	1. Significance of Report Writing 2. Different Steps in Writing Report 3. Layout of the Research Report 4. Types of Reports (Research Proposal/Synopsis, Research Paper, and Thesis) 5. Oral Presentation 6. Mechanics of Writing a Research Report 7. Precautions for Writing Research Reports	

References:

1. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
2. Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press.
3. Research Methodology – C.R.Kothari
4. B A Prasad Sharma and P. Satyanarayan. Ed.(1983): Research Methods in Social Sciences,New Delhi: Sterling
5. Bridget Somek and Cathy Lewin (2005): Research Methods in the Social Sciences, New Delhi: Sage

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Grade

Course/ Paper Title	NoSQL Database Technologies
Course Code	23SMCS11MEA
Semester	I
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Provide an overview of the concept of NoSQL technology.
2.	Provide an insight to the different types of NoSQL databases
3.	Make the student capable of making a choice of what database technologies to use, based on their application needs.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will know almost all concepts of NoSQL
2.	Student will able to compare various types of NoSQL databases.
3.	Student will able to decide what database technology to use for particular application.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	**Introduction to NOSQL (Core concepts)**	**15**
	1. Why NoSQL 2. Aggregate Data Models 3. Data modeling details 4. Distribution Models 5. Consistency 6. Version stamps 7. Map-Reduce	
Unit II	**Implementation with NOSQL databases**	**10**
	1. Key-Value Databases (Risk) 2. Document Databases (Mongodb) 3. Column-Family stores(Cassandra) 4. Graph databases (Neo4j)	
Unit III	**Schema Migrations**	**3**
Unit IV	**Choosing your database**	**2**

References:

1. NoSQL Distilled, Pramod Sadalge, Martin Fowler
2. NoSQL for Dummies, A Willy Brand
3. http://nosql-database.org

Course/ Paper Title	Practical Based on NoSQL Database Technologies
Course Code	23SMCS12MEA
Semester	I
No. of Credits	2
Course Type	**Elective**

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand basic concepts of NoSQL Database Technologies
2.	To understand how to develop Neo4j database
3.	To understand structure of MongoDB

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will know basics of NoSQL Database Technologies
2.	Students will able to develop database using Neo4j.
3.	Students will able to use MongoDB for developing solution to particular problem.

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Practical Assignments
MongoDB Practical Assignment 1 **MongoDB Practical Assignment 2** **MongoDB Practical Assignment 3** **Neo4J Practical Assignment 4** **Neo4J Practical Assignment 5**

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Course/ Paper Title	Soft computing
Course Code	23SMCS11MEB
Semester	I
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To introduce the ideas of soft computational techniques based on human experience.
2.	To generate an ability to design, analyze and perform experiments on real life problems using various Neural Learning Algorithms.
3.	To conceptualize fuzzy logic and its implementation for various real world applications.
4.	To apply the process of approximate reasoning using Neuro- Fuzzy Modeling.
5.	To provide the mathematical background to carry out optimization using genetic algorithms.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will able to design experiments on real life problems usingNeural Learning Algorithm
2.	Students will able to analyze experiments on real life problems using Neural Learning Algorithm
3.	Students will able to perform experiments on real life problems using Neural Learning Algorithm

Syllabus

Unit No.	Title with Contents	No. of Lectures
Unit I	**Introduction to Soft Computing**	**02**
	1. Neural Networks: i.Definition ii. Advantages iii. Applications iv. Scope. 2. Fuzzy logic: i.Definition ii. Applications. 3. Genetic Algorithms: i.Definition ii.Applications.	**01** **01**
Unit II	**Neural Network**	**15**

	1. Fundamental Concept:
	i.Artificial Neural Network
	ii. Biological Neural Network,
	2. Brain vs. Computer
	     i. Comparison Between Biological Neuron and Artificial Neuron (Brain vs. Computer)
	     ii. Artificial Neurons,
	3. Neural Networks and Architectures:
	     i. Neuron Abstraction
	     ii. Neuron Single Functions
	     iii. Mathematical Preliminaries
	4. Neural Networks Defined,Architectures:
	     i. Feed forward and Feedback
	     ii. Salient Properties of Neural Networks
	5. Geometry of Binary Threshold Neurons and
	     Their Networks:
	     i. Pattern Recognition and Data Classification
	     ii. Convex Sets
	     iii. Convex Hulls and Linear Separability
	     iv. Space of Boolean Functions
	     v. Binary Neurons are Pattern Dichotomizers
	     vi.Non-linearly Separable Problems
	     vii. Capacity of a Simple Threshold Logic
		01
		
		01
		
		02
		
		02
		
		04

	viii. Neuron Revisiting
	ix. the XOR Problem
	x. Multilayer Networks
	xi. How Many Hidden Nodes are enough?
	
	6. Learning and Memory:
	   i. An Anecodatal Introduction
	   ii. Long Term Memory
	   iii. The Behavioral Approach to Learning
	   iv. The Molecular Problem of Memory
	   v. Learning Algorithm
	   vi. Error Correction and Gradient
	   vii. Descent Rules
	   viii. Learning Objective for TLNs
	   ix. Pattern Space and Weight Space
	   x. Linear Seperabilty
	   xi. Hebb Network
	   xii. Perceptron Network
	   xiii. α- Least Mean Square Learning.
		05

Unit III	**Fuzzy Set Theory**	**09**
	1. Brief Review of Conventional Set Theory	
	2. Introduction to Fuzzy Sets	**01**
	3. Properties of Fuzzy Sets 4. Operations on Fuzzy Sets	**01**
	5. Crisp Relation	**01**
	6. Fuzzy Relation	**01**
	7. Tolerance and equivalence relation	**01**
	8. Fuzzy Tolerance and equivalence relation	
	9. Fuzzy Max-Min and Max-Product Composition Membership Functions 10. Fuzzification, Defuzzification to crisp sets	**01** **01** **01** **01**
	11. λ-Cuts for fuzzy Relations	
	12. Fuzzy (Ruled-Based) system	
	13. Graphical technique of inference	
	14. Membership value assignment-Intuition	
	15. Inference	
Unit IV	**Genetic Algorithms**	**04**
	1. What are Genetic Algorithms?	
	2. Why Genetic Algorithms?	

	3. Traditional Optimization and Search Techniques	
	4. Simple GA	
	5. Terminologies and Operators in GA	
	i. Encoding ii.Selection iii.Crossover iv.Mutation v.Search vi.Termination vii.Constraintsin GA	

References:

1. Fuzzy Logic With Engineering Applications, Timothy Ross, Wiley Publication
2. Introduction to Soft Computing, Deepa & Shivanandan, Wiley Publication
3. Genetic Algorithms in Search, Optimization and Machine Learning, David E. Goldberg, Pearson Education
4. Fundamentals of Neural Networks – Architectures, Algorithms, And Applications, Laurene Fausett, Pearson Education
5. Neural Networks, Satish Kumar, Tata McGrawHill

Course/ Paper Title	Practical based on Soft computing
Course Code	23SMCS12MEB
Semester	I
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To implement Fuzzy operations using any Technology
2.	To generate an ability to design, analyze and perform experiments onreal life problems using various Neural Learning Algorithms.
3.	To Build simple Artificial Neural Network

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will able to implement Fuzzy operations.
2.	Students will able to analyze experiments on real life problems using Neural Learning Algorithm
3.	Students will able to perform experiments on real life problems using Neural Learning Algorithm.

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Syllabus

Unit No.	Title with Contents	No. of Practical Sessions
UNIT I	Write a program to implement Fuzzy Operations Union Intersection Complement Algebraic sum Algebraic product Cartesian product	**15**
	Write a program to implement De Morgans law.	
	Write a program to implement Max-Min Composition and Max-Product Composition.	
	Write a program to implement lambda cut	
	Write a program to implement Activation Function.	
	Write a program to implement Perceptron Learning Rule	
	Write a program to implement Hebb's Rule	
	Write a program to implement Feed Forward Network	
	Write a program for building an Artificial Neural Network by implementing the Back propagation Algorithm and test the same using appropriate data sets.	
	Write a program for solving linearly separable problem using Perceptron Model.	
	Write a program to develop supervised learning algorithm	
	Write a program to study and analyze genetic life cycle	

Course/ Paper Title	React JS
Course Code	23SMCS11MEC
Semester	I
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To provide Basic knowledge to the students on React JS
2.	To understand React component lifecycle and different lifecycle methods
3.	To build interactive user interfaces and web applications
4.	To implement flux pattern in React applications

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	By using libraries it will help students to build interactive UIs
2.	Students will be able to create React Components
3.	Students will able to learn react JS plugins
4.	Students will able to solve practical problems by using react JS

Syllabus		
Unit I	**Introduction to React**	**06**
	1. What is React? 2. Why React? 3. React version history 4. Work flow of React JS 5. Scope of React JS 6. React 16 vs React 15 7. Just React – Hello World 8. Using create-react-app 9. Anatomy of react project 10. Running the app 11. Debugging first react app	1 1 1 1 1 1 1
Unit II	**React Components & React JS Environment Setup**	**06**
	1. React component Properties 2. Types of components 3. Component Lifecycle 4. Updating Components 5. Writing your first React.js component 6. Mounting Components 7. Node setup 8. How to use NPM? 9. How to create package.json and purpose of it? 10. Best IDE for React JS and How to write optimized code in React JS?	1 1 1 2 1
Unit III	**JSX**	**06**
	1. Introduction of Virtual DOM. 2. Expressions & Attributes 3. JSX Basics 4. Difference between JS and JSX. 5. Containers and components 6. What is Child Components? 7. What is Namespaced components? 8. What are the JavaScript expressions available in JSX?	1 2 2 1
Unit IV	**REACT JS FORMS AND UI**	**06**
	1. Lists of Form components. 2. Setup Controlled and Uncontrolled form components. 3. Control Input elements. 4. How to set default values on all formats of Input elements. 5. React JS Form validations. 6. How to write Styles? 7. Keeping components stateless	1 2 2 1

	8. Event Delegation		
	9. React Stateful Components Auto binding		
UNIT V	**FLUX , REDUX**		**06**
	1. What is Flux Architecture?		
	2. What are the Flux Components available?	1	
	3. Stores, Dispatchers, View Controllers, Actions, Views.		
	4. How Flux works?	1	
	5. Introduction to One Store.		
	6. Provider Component , Actions, Reducers, Sagas , Selector	1	
	7. What is redux		
	8. Why redux	2	
	9. Redux principles		
		1	

References

1. https://blog.hubspot.com/website/react-js

2. https://legacy.reactjs.org/docs/components-and-props.html

3. https://legacy.reactjs.org/docs/introducing-jsx.html

4. https://www.tutorialspoint.com/reactjs/reactjs_flux_concept.htm#:~:text=Flux%20is%20a%20pr ogramming%20concept,is%20rendered%20on%20the%20screen.

6. https://react-redux.js.org/introduction/getting-started

7. https://coreui.io/react/docs/forms/overview/

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Course/ Paper Title	Practical Based on React JS
Course Code	23SMCS12MEC
Semester	I
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To provide Practical knowledge to the students on React JS
2.	To build interactive user interfaces and web applications

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	By using libraries it will help students to build interactive UIs
2.	Students will able to learn react JS plugins

Practical Assignments
1. NPM Installation by locally and Globally 2. Create a Basic App with React JS and other Supported NPM 3. Create a React Form. 4. Client-side form validation. 5. Applying form components. 6. Submit and Rest the form.

Course/ Paper Title	DOTNET
Course Code	23SMCS21MM
Semester	II
No. of Credits	4
Course Type	**Major (MJ)**

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the DOT NET framework
2.	To understand C# language features
3.	To understand Web development using ASP.NET

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to develop application using DOT NET
2.	Student will able to develop application using C#
3.	Student will able to build web application using ASP.NET

Syllabus

Unit No	Title with Contents	No. of Lectures
	Part I : C#	
Unit I	**DOTNET Framework**	**10**

	1. Introduction to DOTNET
	2. DOT NET class framework
	3. Common Language Runtime :
	
	    i. Overview
	    ii. Elements of .NET application
	    iii. Memory Management
	    iv. Garbage Collection
		02
		02
		06

Unit II	**Introduction to C#**	**12**

	1. Language features :
	    i. Variables and Expressions
	    ii. type conversion
	    iii. Flow Control
	    iv. Functions
	    v. Delegates
	    vi. Debugging and error handling
	    v. exception handling (System Defined and User Defined)
	2. Object Oriented Concepts
	    i. Defining classes
	    ii. class members
	    iii. Interfaces, properties
	    iv. Access modifiers
	    v. Implementation of class
	    vi. interface and properties
	    vii. Overriding
	    ix. Event Handling
	3. Collections, Comparisons and Conversions
	    i. Defining and using collections
	    ii. Indexers, iterators
	    iii. Type comparison
	    iv. Value Comparison
	    v. Overloading
		04
		
		04
		
		04

Unit III	**Window Programming**	**10**

	1. Window Controls
	   i. Common Controls
	   ii. Container Controls (Group box and Tab controls)
	   iii. Menus and Toolbars
	   iv. Printing
	   v. Dialogs
		06

	2. Deploying Window Application: i. Click Once deployment	**04**
Unit IV	**Data Access**	**06**
	1. File System Data 2. XML	**02**
	3. Databases and ADO.NET	**02**
	4. Data Binding	**02**
	Part II : ASP . NET	
Unit I	**Introduction to ASP.NET**	**08**
	1. Control Structures & Functions : 2. Forms, web pages, HTML forms, Web forms 3. Request & Response in Non-ASP.NET pages 4. Using ASP.NET Server Controls 5. Overview of Control structures 6. Functions : web controls as parameters	**01** **01** **01** **01** **02** **02**
Unit II	**Even Driven Programming and Post Back**	**04**
	1. HTML events	**02**
	2. ASP.NET page events 3. ASP.NET Web control events	**01**
	4. Event driven programming and post back	**01**
Unit III	**Reading from Databases**	**04**
	1. Data Source and Data binding controls	**02**
	2. ADO.NET	**02**

Unit IV	ASP.NET Server Controls	06
	1. ASP.NET Web Controls	02
	2. HTML Server Controls	02
	3. Web Controls	02

References:

1. Beginning Visual C#, Skinner, Kemper, Nagel, Wrox Publication
2. Professional C#, Nagel, Glynn, Skinner, Wrox Publication
3. Beginning ASP.NET 3.5, Jesse Liberty, Dan Hurwitz, and Dan Maharry, Wrox Publication
4. Programming ASP.NET 3.5, Jesse Liberty, Dan Maharry, Dan Hurwitz, O'Reilly Publication

Course/ Paper Title	Paradigm of Programming Language
Course Code	23SMCS22MM
Semester	II
No. of Credits	4
Course Type	Major (MJ)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To Prepare student to think about programming languages analytically
2.	Separate syntax from semantics
3.	Compare programming language designs, understand their strengths and weaknesses
4.	Learn new languages more quickly
5.	Understand basic language implementation techniques
6.	Learn small programs in different programming Languages

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will acquire thinking of different programming language.
2.	Students will become aware of basic language implementation techniques.
3.	Students will understand the Significance of learning new programming language.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	**Introduction**	**04**
	1. The Art of Language Design 2. The Programming Language Spectrum 3. Why Study Programming Languages? 4. Compilation and Interpretation 5. Programming Environments	02 02
Unit II	**Names ,Scopes ,and Bindings**	**08**
	1. The Notion of Binding Time 2. Object Lifetime and Storage Management 3. Static Allocation, Stack-Based Allocation,Heap-Based Allocation, Garbage CollectionScopeRules 4. Static Scoping, Nested Subroutines,Declaration Order, Dynamic Scoping The meaning of Names in a Scope 5. Aliases, Overloading, Polymorphism and Related Concepts, the Binding of Referencing Environments 6. Subroutine Closures, First-Class Values and Unlimited Extent, Object Closures MacroExpansion	01 01 02 02 02
Unit III	**Control Flow**	**05**
	1. Expression Evaluation , Precedence and Associativity, Assignments, Initialization, Ordering Within Expressions, Short-Circuit Evaluation 2. Structured and Unstructured Flow, Structured Alternatives to go-to sequencing 3. Selection - Short-Circuited Conditions, Case/Switch Statements Iteration 4. Iteration- Enumeration-Controlled Loops, Combination Loops, Iterators, Logically Controlled Loops Recursion 5. Recursion- Iteration and Recursion, Applicative-and Normal-Order Evaluation	02 02 01
Unit IV	**Data Types**	**10**
	1. Introduction 2. Primitive Data Types 3. Numeric Types : Integer, Floating point, Complex, Decimal,	02

	Boolean Types, Character Types	
	4. Character String Types	
	5. Design Issues, Strings and Their Operations, String Length Operations, Evaluation, Implementation of Character String Types	02
	6. User defined Ordinal types Enumeration types,Designs Evaluation Sub range types, Ada'sdesign Evaluation Implementation of user defined ordinal types	02
	7. Array types	02
	8. Design issues, Arrays and indices, Subscript bindings and array categories, Heterogeneous arrays, Array initialization, Array operations,Rectangular and Jagged arrays, Slices, Evaluation, Implementation of Array Types	
	9. Associative Arrays	
	10. Structure and operations, Implementing associative arrays,	
	11. Record types	
	12. Definitions of records, References to record fields, Operations on records, Evaluation, Implementation of Record types	
	13. Union Types	
	14. Design issues, Discriminated versus Freeunions, Evaluation, Implementation of Union types	
	15. Pointer and Reference Types	
	16. Design issues, Pointer operations, Pointer problems, Dangling pointers, Lost heap dynamic variables, Pointers in C and C++, Reference types, Evaluation	02
	17. Implementation of pointer and reference types	
	18. Representation of pointers and references Solution to dangling pointer problem Heap management	
Unit V	**Subprograms and Implementing Subprograms**	**05**
	1. Introduction	02
	2. Fundamentals of Subprograms	
	3. Design Issues for subprograms	
	4. Local Referencing Environments	
	5. Parameter-Passing Methods	
	6. Parameters That Are Subprograms	
	7. Overloaded Subprograms	
	8. Generic Subroutines, Generic Functions in C++	
	9. Design Issues for Functions	
	10. User-Defined Overloaded Operators	03
	11. Coroutines	
	12. Implementing Subprograms	
	13. The General Semantics of Calls and Returns	
	14. Implementing "Simple" Subprograms	
	15. Implementing Subprograms with Stack-Dynamic Local Variables	

	16. Nested Subprograms 17. Blocks 18. Implementing Dynamic Scoping		
Unit VI	**Data Abstraction and Object Orientation**	**08**	
	1. Object-Oriented Programming	01	
	2. Encapsulation and Inheritance Modules, Classes, Nesting(Inner Classes), Type Extensions, Extending without Inheritance	02	
	3. Initialization and Finalization Choosing a Constructor, References and Values, Execution Order, Garbage Collection	03	
	4. Dynamic Method Binding		
	5. Virtual- and Non-Virtual Methods, Abstract Classes, Member Lookup, Polymorphism, Object Closures		
	6. Multiple Inheritance	01	
	7. Semantic Ambiguities, Replicated Inheritance, Shared Inheritance, Mix-Inheritance	01	
Unit VII	**Concurrency**	**05**	
	1. Introduction : Multiprocessor Architecture Categories of concurrency, Motivations for studying concurrency	02	
	2. Introduction to Subprogram-level, concurrency Fundamental concepts, Language Design for concurrency, Design Issues	02	
	3. Semaphores - Introduction Cooperation synchronization, Competition Synchronization ,Evaluation	01	
Unit VIII	**Functional Programming in Scala**	**15**	
	1. Introduction to Scala 2. Scala Data type 3. Scala variables	05	
	4. Scala operators and ControlStructures 5. Scala Classes and objects 6. Scala Function	05	

	7. Array
	8. Scala Collection(List,Set,Map)
	9. Scala as FunctionalProgramming
	   i. Function call by name
	   ii. Anonymous Function
	   iii. Higher order function
		05	

References:

1. Programming Language Pragmatics, 3e, Michel L. Scott, Kaufmann Publishers, An Imprint of Elsevier, USA
2. Concepts of Programming Languages, Eighth Edition, Robert W. Sebesta, Pearson Education
3. Scala Cookbook, Alvin Alexander, O'REILLY publication

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Course/ Paper Title	Software Project Management
Course Code	23SMCS23MM
Semester	II
No. of Credits	2
Course Type	Major (MJ)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To covers skills that are required to ensure successful medium and large scale software projects.
2.	To examines Requirements Elicitation, Project Management, Verification &Validation and Management of Large Software Engineering Projects.
3.	To select and apply project management techniques for process modeling, planning, estimation, process metrics and risk management

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to collect requirements of project.
2.	Student will able to perform verification and validation of software projects
3.	Student will able to select particular technique for project management.
4.	Student will able to apply selected technique for project.

Syllabus

Unit No.	Title with Contents	No. of Lectures
Unit I	**Introduction to Project Management and Project Management Components**	**05**
	1. What is a Project?	**01**
	2. What is Project management? Project phases and project life cycle	**01**
	Organizational structure	**01**
	3. Qualities of Project Manager	
	4. WBS	
	5. Project Integration Management-Project plan development and execution	**02**
	6. Change control and CCB	
	7. Configuration management	
Unit II	**Scope Management**	**04**
	1. Strategic planning	**01**
	2. Scope planning	**01**
	3. Definition	**01**
	4. Verification and control	**01**
Unit III	**Time management and Cost Management**	**05**
	1. Activity planning	**01**
	2. Schedule development and control	**02**
	3. GANTT Chart	
	4. Cost estimation and Control	**01**
	5. COCOMO model	**01**
	6. BASIC COCOMO NUMERICALS	
Unit IV	**Quality Management Human Resource Management**	**3**
	1. Quality planning and assurance,	**03**
	2. Organizational planning	
	3. Staff acquisition	
Unit V	**Risk Management and Procurement Management**	**03**
	1. Risk identification	**01**
	2. Quantification and control	**01**
	3. Solicitation management and control	**01**
	4. Contract administration	

Unit VI	Software Metrics and Software Reliability	05
	1. The scope of software metrics	01
	2. Size- oriented metrics and Function oriented metrics	01
	3. Software metrics data collection	01
	4. Analyzing software data	
	5. Measurement and prediction	
	6. Resource measurement	02
Unit VII	Planning a measurement program	05
	1. What is metrics plan?	
	2. Developing goals, questions and metrics	02
	3. Where and When: Mapping measures to activities	02
	4. How: Measurement tools	01

References :

1. Software Engineering, Roger Pressman, McGraw-Hill
2. Software Metrics for Project Management and process improvement, Robert B. Grady, Prentice hill

Course/ Paper Title	Practical based on DOTNET
Course Code	23SMCS24MM
Semester	II
No. of Credits	4
Course Type	Major (MJ)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To familiar with the functions and Framework of DOT NET Technology.
2.	To build a simple application using DOT NET Framework

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student can build a simple application using C#
2.	Student can build application using ASP .NET

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Syllabus

Sr. No.	Practical Assignments
1.	Assignment 1
2.	Assignment 2
3.	Assignment 3
4.	Assignment 4
5.	Assignment 5

Course/ Paper Title	Advanced Operating System
Course Code	23SMCS21MEA
Semester	II
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the programming interface to the Unix/Linux system – the system call interface.
2.	To understand the functions of Operating Systems.
3.	To get an insight into functional modules of Operating Systems.
4.	To understand the concepts underlying in the design and implementation of Operating Systems.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to implement various system call interfaces.
2.	Student will able to design functional modules of operating system.
3.	Student will able to use systems calls for implementing various functions in programs.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	**Introduction to UNIX/Linux Kernel**	**05**
	1. System Structure,User Perspective 2. Assumptions about Hardware 3. Architecture of UNIX Operating System (TextBook-1:ChapterTopics:1.2,1.3,1.5,2.1) 4. Concepts of Linux Programming i. Files and the File system ii. Processes iii. Users and Groups iv. Permissions v. Signals vi. Inter process Communication (TextBook-3: Chapter 1- relevant topics)	**01** **01** **01** **02**
Unit II	**File and Directory I/O**	**8**
	1. Buffer headers 2. Structure of the buffer pool 3. Scenarios for retrieval of a buffer 4. Reading and writing disk blocks 5. Inodes 6. Structure of regular file i. Open ii. Read iii. Write iv. Lseek v. Close vi. Pipes vii. dup (TextBook- 1: Chapter Topics: 3.1-3.4, 4.1, 4.2, 5.1-5.3, 5.5-5.7, 5.12,5.13) viii. creat ix. file sharing	**02** **02** **02** **02**

	x. atomic operations xi. dup2 xii. sync xiii. fsync and fdatasync xiv. fcntl xv. /dev/fd stat, fstat, lstat xvii. file types xviii. Set-User-ID and Set-Group-ID xix. file access permissions xx. ownership of new files and directories xxi. access function	
Unit III	**Process Environment, Process Control and Process Relationships**	**9**
	1. Process states and transitions 2. layout of system memory	**02**

	3. the context of a process
	  i. saving the context of a process
	  ii. sleep
	  iii. process creation
	  iv. signals
	  v. process termination
	  vi. awaiting process termination
	  vii. invoking other programs
	  viii. the user id of a process
	  ix. changing the size of the process
		03

	4. The Shell, Process Scheduling (TextBook-1: Chapter Topics: 6.1-6.4, 6.6, 7.1-7.8,8.1)	**02**

	5. Process termination
	6. environment list
	7. memory layout of a C program
	  i. shared libraries
	  ii. environment variables
	  iii. setjmp and longjmp
	  iv. getrlimit and setrlimit
	  v. process identifiers
		01

	8. Fork 9. Vfork 10. Exit 11. wait and waitpid 12. waited 13. wait3 and wait4 14. race conditions i. exec	**02**

Unit IV	Memory Management	08
	1. The Process Address Space	01
	2. Allocating Dynamic Memory	
	3. Managing Data Segment	
	4. Anonymous Memory Mappings	01
	5. Advanced Memory Allocation	
	6. Debugging Memory Allocations	
	7. Stack-Based Allocations	01
	8. Choosing a Memory Allocation Mechanism	01
	9. Manipulating Memory	
	10. Locking Memory	01
	11. Opportunistic Allocation (TextBook-3: Chapter8)	02
	12. Swapping	
	13. Demand Paging (TextBook-1: Chapter Topics: 9.1, 9.2)	01

References:

1. The Design of the UNIX Operating System, Maurice J. Bach., PHI
2. Advanced Programming in the UNIX Environment, Richard Stevens, Addison-Wesley
3. Linux System Programming, Robert Love, O'Reilly

Course/ Paper Title	Practical based on Advanced Operating System
Course Code	23SMCS22MEA
Semester	II
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To get familiar with the Shell commands on LINUX in AOS.
2.	To get the knowledge of file handling using LINUX commands.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will be familiar with the Shell commands on LINUX using AOS.
2.	Student will get the knowledge of file handling using LINUX

Practical Assignments
Assignment 1 **Assignment 2** **Assignment 3** **Assignment 4** **Assignment 5**

Course/ Paper Title	Android
Course Code	23SMCS21MEB
Semester	II
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the Android Operating System and develop application usingAndroid open source platform.
2.	To understand the Android Operating System and develop application usingAndroid open source platform.
3.	To develop android Apps.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	To Create simple GUI applications, use built-in widgets and components on the Android Platform
2.	To Design and implement mobile applications involving data storage in SQLite database
3.	To Demonstrate their skills of using Android software development tools
4.	To understand the concepts of SQLite Database

Syllabus		
Unit I	**Introduction To Android Programming**	**06**
	1. Overview 2. History and Versions 3. Features of Android 4. Architecture of Android 4. Components of an Android Application, Manifest file 5. Android Environment Setup- Tools – (JDK, SDK,Eclipse/Android Studio, ADT, AVD, Android Emulator) 6. First Hello World Program	1 1 1 2 1
Unit II	**Activity, Intent and Layout**	**07**
	1. Introduction to Activities 2. Activity Life cycle 3. Service Life cycle 4. Fragments, Life cycle of fragments 5. Adding Fragments dynamically 6. Introduction to Intents 7. Types of Intent 8. Linking Activities using Intents	**1** **1** **2** **2** **1**
Unit III	**Android User Interface**	**06**
	1. Layout Manager 2. View and ViewGroup 3. Linear Layout 4. RelativeLayout 5. AbsoluteLayout 6. TableLayout 7. GridLayout 8. Constraint Layout 9. FrameLayout 10. Scroll Layout	1 2 1 1 1
Unit IV	**Designing User Interface with Views**	**06**
	1. Basic Views 2. Button(Push Button, Check Box, Radio Button, Toggle Button, Image Button) All components (e.g Button , Slider, Image view,Toast) 3. Text Fields 4. Spinner 5. ListView 6. Toast	2 1

	7. ScrollView	2
	8. Progress BarView	
	9. Auto Complete TextView	
	10. Alert Dialog	1
	11. DatePickerDialog.	
	12. TimePickerDialog	
	13. CustomDialog	
	14. Using Menus with Views – Options Menu, Context Menu andPop up menu	
UNIT V	**Databases – SQLite**	**05**
	1. Introduction to SQLite	1
	2. SQLiteOpenHelper and SQLiteDatabase	2
	3. Creating , opening and closing database	
	4. Working with cursors, Insert, Update, Delete	2
	5. Building and executing queries	

References

1. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India Edition WROX Publication
2. Professional Android 4 Application Development, By Reto Meier WROX Publication
3. –https://developer.android.com
4. https://www.javatpoint.com/android-tutorial
5. https://www.tutorialspoint.com/android/index.htm
6. https://www.geeksforgeeks.org/introduction-to-android-development/

Course/ Paper Title	Practical based on Android
Course Code	23SMCS22MEB
Semester	II
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To develop application using Android open source platform.
2.	To develop android Apps.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will be able to Create simple GUI applications, use built-in widgets and components on the Android Platform
2.	To practically understand the concepts of SQLite Database

Practical Assignments
Assignment 1 **Assignment 2** **Assignment 3** **Assignment 4** **Assignment 5**

Course/ Paper Title	Project
Course Code	23SMCS21MEC
Semester	II
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To allow students to demonstrate the personal abilities and skills requiredto produce and present an extended piece of work
2.	To allow students to engage in personal inquiry, action and reflection onspecific topics and issues.
3.	To allow students to focus on, and demonstrate an understanding of, the areas of interaction.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will have abilities and skills skills required to produce and present an extended piece of work in corporate sectors.
2.	Students will know how to interact with team members while working on project.
3.	Students will able to share their knowledge and views.

Unit No	Title with Contents	No. of Sessions
Unit I	**Guidelines:** • Students should work in a team of minimum 2 andmaximum 3 students. • Students can choose a project topic without anyrestriction on technology or domain. • The student group will work independently throughout the project work including: problem identification, information searching, literature study, design and analysis, implementation, testing, and thefinal reporting. • Project guide must conduct project presentations (minimum 2) to monitor the progress of the project groups. • At the end of the project, the group should prepare a report which should conform to international academic standards. The report should follow the style in academic journals and books, with clear elements such as: abstract, background, aim, design and implementation, testing, conclusion and full references, Tables and figures should be numbered and referenced to in the report. The final project presentation with demonstration (UE) will be evaluated by the project guide (appointed by the college) and one external examiner (appointed by the University).	15

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Course/ Paper Title	Project Related Assignments
Course Code	23SMCS22MEC
Semester	II
No. of Credits	2
Course Type	Elective

Aims & Objectives of the Course

Sr. No.	Objectives
1.	The project assignments are a compulsory part of the project course and should be carried out by each project group.
2.	Project assignments are to be given by the guide for continuous internal evaluation.
3.	The project assignments are to be allotted to each group separately by the project guide on the basis of the implementation technology.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to understand the flow of system development
2.	Student will able to form the content of documentation
3.	Student will able to understand documentation of testing of a project

Syllabus

Unit No	Title with Contents	No. of Practical Sessions
Unit-I	Project Time management: plan (schedule table), Gantt chart, Roles and responsibilities, data collection, Implementation	15
	Simple assignments to evaluate choice of technology	
	Assignments on UI elements in chosen technology	
	Assignments on User interfaces in the project	
	Assignments on event handling in chosen technology	
	Assignments on Data handling in chosen technology	
	Online and offline connectivity	
	Report generation	
	Deployment considerations	
	Test cases	

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Course/ Paper Title	Internship
Course Code	23SMCS21OJ
Semester	II
No. of Credits	4
Course Type	OJT/FP

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To provide to students the feel of the actual working environment.
2.	To gain practical knowledge and skills, which in turn will motivate, develop and build their confidence
3.	To provide the students the basis to identify their key operational area of interest.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will able to communicate efficiently.
2.	Student can acquire Industrial experiences and at the same time familiarize themselves with the real working environment at the Industrial training site.
3.	Student will take a hold on profession ethical values as basis to venture into professional career in the future.

Syllabus

Unit No	Title with Contents	No. of Sessions
Unit I	**Guidelines:** • Each student must individually complete minimum 1.5monthsfull time Industrial training / Institutional project • College should assign a student mentor to every student. The mentor will monitor the progress of the student throughout the semester for continuous assessment. • Student should submit a valid offer letter and synopsis within two weeks of starting the internship. • There will be continuous assessment of the work done by thestudent during the internship period. • Continuous assessment guidelines: 1. Student should submit a weekly report in the college to the mentor. 2. The report should contain the following details: Name of student, project title, company name, company mentor, daily activities and results/output, proposed work for next week. 3. The weekly report should be duly signed by the student and company mentor/ institute guide (CM). 4. Student Mentor should maintain weekly attendance record forevery student. 5. Two presentations should be conducted for each student 6. Student Mentor should take feedback from the Companymentor regarding overall performance of the student. • At the end of the internship period, each student should preparea report which should conform to international academic standards. • The report should follow the style in academic journals and books, with contents such as: abstract, background, aim, designand implementation, testing, conclusion and full references, Tables and figures should be numbered and referenced to in thereport.	**12**