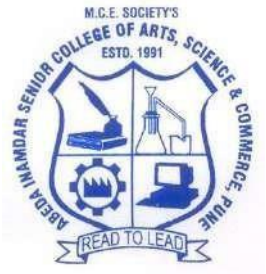
M. Sc. Computer Science

Syllabus



M.C.E. Society's

ABEDA INAMDAR SENIOR COLLEGE OF ARTS, SCIENCE AND COMMERCE (AUTONOMOUS), PUNE

With effect from 2023-2024

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Abeda Inamdar Senior College
Of Arts, Science and Commerce, Camp, Pune-1 (Autonomous)
Affiliated to Savitribai Phule Pune University NAAC accredited 'A' Grade

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

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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

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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.	

UNIT II	Write a python program to Prepare Scatter Plot (Use Iris Dataset)	
	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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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	**Foundations of Research**	**8 hours**
	1. Introduction 2. Meaning and Definitions of Research 3. Objectives of Research 4. Importance of Research 5. Characteristics of a Good Research 6. Scope of Research 7. Purpose of Research 8. Relevance of Research 9. Role of Research in Functional Areas 10. Classification of Research 11. Approaches to Research 12. Advantages and Limitations of Research 13. Research Methodology 14. Process of Research 15. Research Ethics: Definitions, Principles and Responsibilities.	
Unit II	**RESEARCH PROBLEM**	**12 hours**
	1. Introduction 2. Defining Research Problem 3. Components of Research Problem 4. Features of Research Problems 5. Criteria for Selecting the Research Problem 6. Sources of Problems for Research 7. Hypothesis 8. Characteristics of Good Hypothesis 9. Types of Hypothesis 10. Source of Hypothesis 11. Process of Formulating Hypothesis 12. Errors in Hypothesis 13. Research Design 14. Meaning of Research Design 15. Definitions of Research Design 16. Features of Research Design 17. Characteristics of Research Design 18. Nature of Research Design 19. Concepts of Research Design 20. Process of Research Design Preparation 21. Types of Research Design 22. Components of Research Design	

	23. Sampling 24. Sampling Techniques 25. Sampling Design 26. Characteristics of a Good Sampling Design 27. Elements of Sampling Design 28. Determination of Appropriate Sampling Design	
Unit III	**Collecting, Processing and Analysis of Data**	**10 hours**
	1. Data 2. Collection of Data 3. Methods of Data Collection 4. Processing of Data 5. Analysis of Data 6. Types of Data Analysis 7. Questionnaire 8. Design of Questionnaire 9. Testing of Hypothesis 10. Parametric and Non-parametric Tests 11. T-test 12. Z-test 13. Chi-square test	
UNIT IV	**Multivariate Analysis Techniques:**	**8 hours**
	1. Introduction 2. Multivariate Data Analysis 3. Multivariate Analysis Techniques 4. Multiple Regression Analysis 5. Discriminated Analysis 6. Factor Analysis 7. ANOVA	
UNIT V	**Interpretation and Report Writing**	**10 hours**
	1. Introduction 2. Meaning of Interpretation 3. Importance of Interpretation 4. Techniques of Interpretation 5. Meaning and Definitions of Report 6. Research Writing 7. Significance of Report Writing 8. Characteristics of Research Report 9. Purpose of Reports 10. Essentials of a Report 11. Principles of Drafting a Research Report 12. Basis of Reports 13. Methods of Research Report Writing 14. Steps in Writing Report 15. Layout of the Research Report 16. Types of Report 17. Important Parts of a Report 18. Precautions in Preparing Report	

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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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

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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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Syllabus

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 3. Properties of Fuzzy Sets 4. Operations on Fuzzy Sets 5. Crisp Relation 6. Fuzzy Relation 7. Tolerance and equivalence relation 8. Fuzzy Tolerance and equivalence relation 9. Fuzzy Max-Min and Max-Product Composition Membership Functions 10. Fuzzification, Defuzzification to crisp sets 11. λ-Cuts for fuzzy Relations 12. Fuzzy (Ruled-Based) system 13. Graphical technique of inference 14. Membership value assignment-Intuition 15. Inference	**01** **01** **01** **01** **01** **01** **01** **01** **01**
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

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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	

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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? 3. Stores, Dispatchers, View Controllers, Actions, Views. 4. How Flux works? 5. Introduction to One Store. 6. Provider Component , Actions, Reducers, Sagas , Selector 7. What is redux 8. Why redux 9. Redux principles	1 1 1 2 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%20programming%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.

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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 2. Deploying Window Application: i. Click Once deployment	**06** **04**
Unit IV	**Data Access**	**06**
	1. File System Data 2. XML 3. Databases and ADO.NET **4.** Data Binding	**02** **02** **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 2. ASP.NET page events 3. ASP.NET Web control events 4. Event driven programming and post back	**02** **01** **01**
Unit III	**Reading from Databases**	**04**
	1. Data Source and Data binding controls 2. ADO.NET	**02** **02**

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

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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 6. User defined Ordinal types Enumeration types,Designs Evaluation Sub range types, Ada'sdesign Evaluation Implementation of user defined ordinal types 7. Array types 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 17. Implementation of pointer and reference types 18. Representation of pointers and references Solution to dangling pointer problem Heap management	02 02 02 02
Unit V	**Subprograms and Implementing Subprograms**	**05**
	1. Introduction 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 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	02 03

	16. Nested Subprograms 17. Blocks 18. Implementing Dynamic Scoping	
Unit VI	**Data Abstraction and Object Orientation**	**08**
	1. Object-Oriented Programming 2. Encapsulation and Inheritance Modules, Classes, Nesting(Inner Classes), Type Extensions, Extending without Inheritance 3. Initialization and Finalization Choosing a Constructor, References and Values, Execution Order, Garbage Collection 4. Dynamic Method Binding 5. Virtual- and Non-Virtual Methods, Abstract Classes, Member Lookup, Polymorphism, Object Closures 6. Multiple Inheritance 7. Semantic Ambiguities, Replicated Inheritance, Shared Inheritance, Mix-Inheritance	01 02 03 01 01
Unit VII	**Concurrency**	**05**
	1. Introduction : Multiprocessor Architecture Categories of concurrency, Motivations for studying concurrency 2. Introduction to Subprogram-level, concurrency Fundamental concepts, Language Design for concurrency, Design Issues 3. Semaphores - Introduction Cooperation synchronization, Competition Synchronization ,Evaluation	02 02 01
Unit VIII	**Functional Programming in Scala**	**15**
	1. Introduction to Scala 2. Scala Data type 3. Scala variables 4. Scala operators and ControlStructures 5. Scala Classes and objects 6. Scala Function 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 05 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 2. Size- oriented metrics and Function oriented metrics 3. Software metrics data collection 4. Analyzing software data 5. Measurement and prediction 6. Resource measurement	**01** **01** **01** **02**
Unit VII	**Planning a measurement program**	**05**
	1. What is metrics plan? 2. Developing goals, questions and metrics 3. Where and When: Mapping measures to activities 4. How: Measurement tools	**02** **02** **01**

References :

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

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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

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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 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 4. The Shell, Process Scheduling (TextBook-1: Chapter Topics: 6.1-6.4, 6.6, 7.1-7.8,8.1) 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 8. Fork 9. Vfork 10. Exit 11. wait and waitpid 12. waited 13. wait3 and wait4 14. race conditions i. exec	**02** **03** **02** **01** **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

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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**

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

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/

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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**

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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 ofinterest.

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**