GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY

Unit of USHODAYA EDUCATIONAL SOCIETY

An ISO 9001:2015 certified Institution: Recognized under Sec. 2(f)& 12(B) of UGC Act, 1956

3rd Mile, Bombay Highway, Gangavaram (V), Kovur(M), SPSR Nellore (Dt), Andhra Pradesh, India- 524137

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Semester-7 (Theory-6, SC-1)							
Sl. No.	**Category**	**Course Code**	**Course Title**	**Hours per week**			**Credits**
				L	**T**	**P**	**C**
1	HSC	22A0023T 22A0024T 22A0025T	**Humanity Science Elective – I:** 1. Management Science 2. Entrepreneurship and Innovation 3. Business Environment	3	0	0	3
2	PEC	22A0534Ta 22A0534Tb 22A0534Tc	**Professional Elective-III:** 1. Software Project Management 2. Big Data Technologies 3. Internet of Things	3	0	0	3
3	PEC	22A0535Ta 22A0535Tb 22A0535Tc	**Professional Elective-IV:** 1. Agile Methodologies 2. Information Retrieval Systems 3. Adhoc and Wireless Sensor Networks	3	0	0	3
4	PEC	22A0536Ta 22A0536Tb 22A0536Tc	**Professional Elective-V:** 1. Design Patterns 2. Deep Learning 3. Block Chain Technology	3	0	0	3
5	OEC	22A0241T 22A0432T 22A0151T 22A0329Tc	**Open Elective-III:** 1. Smart Grid 2. Basic VLSI Design 3. Disaster management 4. Measurements and Mechatronics	3	0	0	3
6	OEC	22A0236T 22A0433T 22A0152T 22A0333Tb	**Open Elective-IV:** 1. Hybrid Electric Vehicles 2. Industrial Electronics 3. Construction Management 4. Introduction to Robotics	3	0	0	3
7	SC	22A0537P	**Skill Advanced Course:** Mobile Application Development	1	0	2	2
Industrial / Research Internship 2 Months (Mandatory) after Third year (to be evaluated during VII semester)				0	0	0	3
				Total credits			**23**

Category	Credits
Professional Elective Courses (PEC)	9
Humanities and Social Science Course (HSC)	3
Open Elective Courses (OEC)	6
Skill Advanced Course (SC)	2
Industrial / Research Internship	3
Total	23

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MANAGEMENT SCIENCE
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0023T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSC

Course Objectives:

This course will enable students to:

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts.
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management.
- To make the students aware of the contemporary issues in management.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concepts & principles of management and designs of organization in a practical world(L2)
- Apply the knowledge of Work-study principles & Quality Control techniques in industry(L3)
- Analyze the concepts of HRM in Recruitment, Selection and Training & Development.(L4)
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.(L3)
- Create Modern technology in management science.(L3)

Syllabus		Total Hours:48
Module – I	**INTRODUCTION TO MANAGEMENT**	**10 Hrs**

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles -Eltan Mayo's Human relations - Systems Theory - Organizational Designs - Line organization –Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of Organization-Social responsibilities of Management.

Module – II	**OPERATIONS MANAGEMENT**	**10 Hrs**

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production),Work Study-Statistical Quality Control-Deming's contribution to Quality. Material Management - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - Marketing Management - Concept - Meaning-Nature-Functions of Marketing-Marketing Mix-Channels of Distribution-Advertisement and Sales Promotion-Marketing Strategies based on Product Life Cycle.

Module – III	**HUMAN RESOURCES MANAGEMENT**	**10 Hrs**

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP)- Employee Recruitment-Sources of Recruitment-Employee Selection -Process and Tests in Employee Selection –Employee Training and Development-On-the-job & Off-the-job training methods-Performance Appraisal Concept- Methods of Performance Appraisal – Placement- Employee Induction –Wage and Salary Administration.

Module – IV	STRATEGIC & PROJECTMANAGEMENT	10 Hrs
Definition & Meaning-Setting of Vision -Mission -Goals –Corporate Planning Process-Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis – Project Management-Network Analysis-Program Evaluation and Review Technique(PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project with in given time-Project Cost-Analysis-Project Crashing (Simple problems).		
Module – V	**CONTEMPORARY ISSUES IN MANAGEMENT**	**8 Hrs**
The concept of Management Information System (MIS)-Materials Requirement Planning (MRP)-Customer Relations Management (CRM)-Total Quality Management (TQM) –Six Sigma Concept-Supply Chain Management (SCM)-Enterprise Resource Planning (ERP)-Performance Management-Business Process Outsourcing (BPO)-Business Process Re-engineering and Bench Marking-Balanced Score Card-Knowledge Management.		

Text Books:

1. A. RAryasri, "Management Science",TMH,2 013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi,2012.

Reference Books:

1. Koontz & Weihrich, "Essentials of Management", 6th edition, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich, "Management Principles and Guidelines", Biztantra.
3. Kanishka Bedi, "Production and Operations Management", Oxford University Press, 2004.
4. Samuel C.Certo, "Modern Management",9th edition, PHI, 2005

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ENTREPRENEURSHIP AND INNOVATION
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0024T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSC

Course Objectives:

This course will enable students to:

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of New enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs / women entrepreneurs
- To encourage the student in creating and designing business plans

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concept of Entrepreneurship and challenges in the world of competition.(L2)
- Apply the Knowledge in generating ideas for New Ventures.(L3)
- Analyze various sources of finance and subsidies to entrepreneur / women Entrepreneurs.(L4)
- Evaluate the role of central government and state government in promoting entrepreneurship.(L3)
- Create and design business plan structure through incubations.(L3)

Syllabus		Total Hours:48
Module – I	**STARTING UP NEW VENTURE**	**10 Hrs**

Entrepreneurship-Concept, knowledge and skills requirement-Characteristics of successful entrepreneurs-Entrepreneurship process-Factors impacting emergence of entrepreneurship-Differences between Entrepreneur and Intrapreneur-Understanding individual entrepreneurial mind set and personality-Recent trends in Entrepreneurship.

Module – II	**STARTING UP NEW VENTURE**	**10 Hrs**

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas-Opportunity recognition-Feasibility study-Market feasibility, technical / operational feasibility - Financial feasibility - Drawing business plan - Preparing project report – Presenting business plan to investors..

Module – III	**SOURCES OF FINANACE**	**10 Hrs**

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India- NBFC's in India - theirway of financingin India for small and medium business -Entrepreneurship development programs in India – The entrepreneurial journey- Institutions in aid of entrepreneurship development

Module – IV	**WOMEN ENTREPRENEURSHIP**	**10 Hrs**

Women Entrepreneurship-Entrepreneurship Development and Government-Role of Central Government and State Government in promoting women Entrepreneurship

Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available -Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India-Issues & Challenges-Entrepreneurial motivations.

Module – V	**INTRODUCTION TO INCUBATION & INNOVATION**	**8 Hrs**

Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation – Types, Advantages and Disadvantages of incubation.

Innovation Meaning & Definition - Forms of innovation - Innovation, features and characteristics - Factors initiating innovations - Innovation process and its stages.

Text Books:

1. D F Kuratko and T V Rao, "Entrepreneurship**"**- A South-Asian Perspective–Cengage Learning, 2012. (For PPT,Case Solutions Faculty may visit: login.cengage.com)
2. Nandan H, "Fundamentals of Entrepreneurship", PHI, 2013

Reference Books:

1. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2. Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3. B.Janakiram and M.Rizwana ‖ "Entrepreneurship Development: Text & Cases", Excel Books, 2011.
4. Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

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BUSINESS ENVIRONMENT
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0025T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	HSC

Course Objectives:

This course will enable students to:

- To make the student understand about the business environment.
- To enable the min knowing the importance of fiscal and monitory policy.
- To facilitate the min understanding the export policy of the country.
- Impart knowledge about the functioning and role of WTO.
- Encourage the student in knowing the structure of stock market..

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand various types of business environment. (L2)
- Evaluate fiscal and monitory policy (L3)
- Analyze India's Trade Policy (L4)
- Understand the role of WTO (L2)
- Apply the knowledge of Money markets in future investment (L3)

Syllabus		Total Hours:48
Module – I	**AN OVERVIEW OF BUSINESS ENVIRONMENT**	**10 Hrs**

Overview of Business Environment – Types of Environments - Internal & External –Micro and Macro environment- Competitive structure of industries - Environmental analysis - Scope of business-Characteristics of business-Process & limitations of environment alanalysis.

Module – II	**FISCAL POLICY & MONETARY POLICY**	**10 Hrs**

FISCAL POLICY-Public Revenues-Public Expenditure-Public debt Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - MONETARY POLICY - Demand and Supply of Money – RBI –Objectives of monetary and credit policy-Recent trends-Role of Finance Commission.

Module – III	**INDIA'S TRADE POLICY & BALANCE OF PAYMENTS**	**10 Hrs**

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade – Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - BALANCE OF PAYMENTS–Structure & Major components-Causes for Disequilibrium in Balance of Payments-Correction measures–WTO - Nature and Scope - Organization and Structure – Role and functions of WTO in promoting world trade

Module – IV	**MONEY MARKETS AND CAPITAL MARKETS**	**10 Hrs**

Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets -Reforms and recent development– SEBI - Stock Exchanges - Investor protection and role of SEBI.

Module – V	INTRODUCTION TO INFLATION	8 Hrs

Inflation – Meaning & Definition – Causes – Effects – Types – Advantages & Disadvantages
Deflation – Meaning & Definition - Causes & Effects.

Text Books:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.
2. K.Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition. HPH 2016.

Reference Books:

1. K.V.Sivayya,V.B.MDas (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari.S.N (2009), International Business, Wiley India.
4. E.Bhattacharya (2009), International Business, Excel Publications, New Delhi.

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SOFTWARE PROJECT MANAGEMENT

(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534Ta	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Understanding the specific roles within a software organization as related to Project and process management.
- Study the improving software processes and the principles of conventional software engineering.
- Learn the Software Life Cycle Phases and Artifact.
- Understand the Iterative Process Planning and Process Automation.
- Learn the basic steps of project planning, project management, quality assurance, and process management and their relationships.

Course Outcomes(CO):

On completion of this course, student will be able to

- Describe the purpose of project management from the perspectives of planning, tracking and completion of project.
- Determine the conventional software Management and Software Economics.
- Use the improving software processes and modern software management.
- Use the software Life Cycle Phases and artifact sets.
- Determine the Iterative Process Planning and Process Automation.
- Apply the quality indicators and Core Metrics

Syllabus — **Total Hours:48**

Module-I	Conventional Software Management	10 Hrs

The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Module-II	Improving Software Economics	9 Hrs

Reducing Software product size, improving software processes, improving team effectiveness, Improving automation, Achieving required quality, peer inspections.

The old way and the new: The principles of conventional software engineering, principles of modern software management.

Module-III	Life Cycle Phases And Artifacts Of The Process	10Hrs

Engineering and production stages, inception, Elaboration, construction, transition phases.
The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

Module-IV	Work Flows Of The Process , Project Organizations And Responsibilities	10 Hrs

Checkpoints of the Process, Iterative Process Planning, Line-of-Business Organizations, Project Organizations.
Process Automation: Tools, The Project Environment.

Module-V	Project Control And Process Instrumentation	09 Hrs

The seven core Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates.
The Command Center Processing and Display System-Replacement (CCPDS-R),Process overview, Core Metrics.

Text Books:

1. Software Project Management, Walker Royce, Pearson Education..

Reference Books:

2. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O"Reilly, 2006
3. Head First PMP, Jennifer Greene & Andrew Stellman, O"Reilly,2007
2. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, second edition,Wiley India, 2004.
3. Agile Project Management, Jim Highsmith, Pearson education, 2004
4. The art of Project management, Scott Berkun, O"Reilly, 2005.
5. Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2002.

E-resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs70/preview
2. https://archive.nptel.ac.in/courses/106/105/106105218/

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BIG DATA TECHNOLOGIES
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534Tb	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Understand the basic concepts and importance of Big Data
- Familiarize with the installation of Hadoop and how to analyze the Big Data
- Understand the design concepts of HDFS
- Provide good insight for developing a MapReduce applications
- Understand Hadoop environment.
- Explore the concepts of Pig, Hive, Spark and HBase

Course Outcomes(CO):

After the completion of the course students will able to

- Understand the concepts and tools of big data.
- Analyzing the Data with Hadoop
- Develop MapReduce application
- Illustrate the Anatomy of MapReduce and Hadoop environment Determine why existing technologies are inadequate to analyze the large data
- Apply large-scale analytic tools to solve some of the open big data problems.
- Analyze analytic tools

Syllabus		Total Hours:48
Module-I	**Introduction to Big Data**	**10Hrs**

Introduction to Big Data: Big data fundamentals, importance of big data, Structuring Big Data, Big Data Analytics, Meet Hadoop: Data, Data Storage and Analysis, History of Apache Hadoop, Hadoop Ecosystem, Installation of Hadoop, Analyzing the Data with Hadoop, Scaling Out.

Module-II	HDFS and Map Reduce	9Hrs

HDFS: HDFS Concepts, HDFS Architecture, The Command-Line Interface, Data flow: Anatomy of a file read and Anatomy of a file write.

Map Reduce: Developing a Map Reduce application: The Configuration API, setting up the Development Environment, Running Locally on Test Data, Running on a Cluster.

Module-III	How Map Reduce Works and Hadoop Environment	10Hrs

How MapReduce Works: Anatomy of a Map ReduceJob Run, Failures, Shuffle and Sort.

Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration.

Module-IV	Data Analyzation using Pig as a tool	9Hrs

Pig: Pig Concepts**,** Apache Pig Architecture, Installing and Running Pig, Comparison with Databases, Pig Latin, User Defined Functions, Data Processing Operators.

Module-V	Open Source tools for Big Data: Hive, Spark and HBase	10Hrs

Hive: Hive concepts, Hive Architecture, Installing Hive, Comparison with traditional Databases, HiveQL, Tables, Querying Data.

Spark: Spark Concepts, Architecture of Spark, Installing Spark, Anatomy of a Spark Job Run.

HBase: Introduction to HBase, HBase Architecture, Installation.

Text Books:

1. Tom White, "Hadoop: The Definitive Guide"Fourth Edition, O'reilly Media, 2015.

Reference Books:

1. Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, Wiley Cio Series
2. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden,Big Data Glossary, O'Reilly, 2011.
3. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
4. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing, 2012.
5. Anand Rajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012.
6. Big Data Black Book, DT Editorial services ,Dreamtech Press

Web References:

1. https://onlinecourses.swayam2.ac.in/arp19_ap60/preview
2. https://onlinecourses.nptel.ac.in/noc20_cs92/preview

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INTERNET OF THINGS

(Common to CSE,AI&ML,DS,CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0534Tc	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Introduce the fundamental concepts of IoT and physical computing; Expose the student to a variety of embedded boards and IoT Platform, Create a basic understanding of the communication protocols in IoT communications. Familiarize the student with application program interfaces for IoT and Enable students to create simple IoT applications.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the Basic sensors and actuators for an IoT application.
- Select protocols for a specific IoT application
- Utilize the cloud platform and APIs for IoT applications
- Experiment with embedded boards for creating IoT prototypes.
- Design a solution for a given IoT application
- Able to understand the application areas of IOT.

Syllabus		Total Hours:48
Module-I	**Overview of IoT**	**10Hrs**

The Internet of Things: An Overview, The Flavor of the Internet of Things, The Internet of Things, The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?

Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community

Module-II	Embedded Devices	9Hrs

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always – on Internet of Things

Module-III	Communication in the IoT	9Hrs

Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

Prototyping Online Components:

Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol

Module-IV	Business Models	10Hrs

Business Models: A short history of business models, The business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups.

Manufacturing: What are you producing, Designing kits, Designing printed circuit boards.

Module-V	Manufacturing Process	10Hrs

Manufacturing continued: Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software.

Ethics: Characterizing the Internet of Things, Privacy, Control, Environment, Solutions.

Text Books:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012

Reference Books:

1. Arshdeep Bahga, Vijay Madisetti – Internet of Things: A Hands – On Approach, Universities Press,2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C.Raman, CRCPress.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs53/preview
2. https://nptel.ac.in/courses/106105166
3. https://archive.nptel.ac.in/courses/106/105/106105166/

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AGILE METHODOLOGIES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0535Ta	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- to ensure that development teams complete projects on time and within budget.
- improve communication between the development team and the product owner. Additionally, Agile development methodology can help reduce the risks associated with complex projects

Course Outcomes (CO):

On completion of this course, student will be able to

- understand the practices and philosophies of agile methods.
- apply critical thinking in analyzing a software engineering method.
- understand and apply Scrum
- tailor an agile method to the needs of the project.

Syllabus		Total Hours:48
Module-I	**Fundamentals of Agile**	**10Hrs**

The Genesis of Agile - Introduction and background, Agile Manifesto and Principles Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing Agile Tools.

Module-II	Agile Scrum Framework	9Hrs

Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles, Product Owner Scrum Master, Scrum Team, Scrum Case Study, Tools for Agile project management.

Module-III	Agile Testing	9Hrs

The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), Unit framework and tools for TDD, Testing user stories acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation-Tools to support the Agile tester

Module-IV	Agile Software Design and Development	10Hrs

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version

Module-V	Industry Trends	10Hrs
Market Scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on cloud, Balancing Agility with Discipline, Agile rapid development technologies		
Text Books: **1.** Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", International Edition, Pearson. **2.** Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", First International Edition, Prentice Hall.		
Reference Books: 1. Andrew stellman, Jennifer Green, Head first Agile, O'Reilly, 2017. 2. Rubin K, Essential Scrum : A practical guide to the most popular Agile process, Addison-Wesley, 2013.		

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INFORMATION RETRIEVAL SYSTEMS

(Common to CSE, AIML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0535Tb	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- learn the important concepts and algorithms in IRS
- understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course Outcomes(CO):

On completion of this course, student will be able to

- apply IR principles to locate relevant information large collections of data
- design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

Syllabus		Total Hours:48
Module-I	**INTRODUCTION TO INFORMATION RETRIEVAL SYSTEMS**	**10Hrs**

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities.

Module-II	CATALOGING AND INDEXING	9Hrs

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

Module-III	AUTOMATIC INDEXING	10Hrs

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.

Module-IV	USER SEARCH TECHNIQUES	9Hrs

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies.

Module-V	TEXT SEARCH ALGORITHMS	10Hrs

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval.

Text Books:

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

Reference Books:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

Web References:

1. https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/349

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ADHOC AND WIRELESS SENSOR METHODS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0535Tc	3:0:0:0	3	CIE:30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- To Appreciate the importance of Adhoc and sensor networks for applications like environment monitoring, habitat monitoring, health care and data acquisition systems.
- Understanding of data transmission technologies of the Adhoc and sensor devices with focus on channel access routing and security.
- The objective of this course is to study the fundamentals of Adhoc and Sensor Networks useful in data acquisition and IoT systems

Course Outcomes (CO):

On completion of this course, student will be able to

- Appreciate the importance of Adhoc and sensor networks for applications like environment monitoring, habitat monitoring, health care and data acquisition systems.
- Understanding of data transmission technologies of the Adhoc and sensor devices with focus on channel access routing and security.
- Appreciate the need and importance of converged networks, ubiquitous environment and Internet of things' in the context of Adhoc and sensor networks.
- Capable of model building ,new protocol design and strategies simulation of the systems.
- To understand the issues pertaining to sensor networks and the challenges involved in managing a sensor network.

Syllabus		Total Hours:48
Module-I	**AD HOC NETWORKS –INTRODUCTION AND ROUTING PROTOCOLS**	**10Hrs**

Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Example commercial applications of Ad hoc networking, Ad hoc wireless Internet, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV), On–Demand Routing protocols –Ad hoc On–Demand Distance Vector Routing (AODV).

Module-II	**SENSOR NETWORKS – INTRODUCTION & ARCHITECTURES**	**9Hrs**

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture – Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit.

Module-III	WSN NETWORKING CONCEPTS AND PROTOCOLS	9Hrs
MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts – S-MAC, The Mediation Device Protocol, Contention based protocols – PAMAS, Schedule based protocols – LEACH, IEEE 802.15.4 MAC protocol, Routing Protocols- Energy Efficient Routing, Challenges and Issues in Transport layer protocol.		
Module-IV	**SENSOR NETWORK SECURITY**	**10Hrs**
Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks.		
Module-V	**SENSOR NETWORK PLATFORMS AND TOOLS**	**10Hrs**
Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms – TinyOS, nesC, CONTIKIOS, Node-level Simulators – NS2 and its extension to sensor networks, COOJA, TOSSIM, Programming beyond individual nodes – State centric programming.		

Text Books:

1. "Ad Hoc Wireless Networks: Architectures and Protocols" by MURTHY.

Reference Books:

1."AD HOC Wireless Networks: A Communication-Theoretic Perspective" by Ozan K Tonguz, Gianluigi Ferrari

Web References:

https://archive.nptel.ac.in/courses/106/105/106105160/

https://nptel.ac.in/courses/106105160

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DESIGN PATTERNS
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0536Ta	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- To understand design patterns and their underlying object oriented concepts.
- To understand implementation of design patterns and providing solutions to real world software design problems.
- To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system.

Course Outcomes(CO):

On completion of this course, student will be able to

- Know the underlying object oriented principles of design patterns.
- Understand the creational patterns
- Understand the structural patterns
- Understand the behavioral patterns
- Understand the context in which the pattern can be applied.
- Understand how the application of a pattern affects the system quality and its tradeoffs.

Syllabus		Total Hours:48
Module-I	**Introduction to Design Patterns**	**10Hrs**

Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing the Catalog, Solving of Design Problems using Design Patterns, Selection of a Design Pattern, Use of Design Patterns.

Module-II	Designing A Document Editor	9Hrs

Design problems, Document structure, Formatting, Embellishing the User Interface, Supporting Multiple Look and Feel standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

Module-III	Structural Patterns	10Hrs

Structural Patterns-1: Adapter, Bridge, Composite.

Structural Patterns-2: Decorator, Facade, Flyweight, Proxy, Discuss of Structural Patterns

Module-IV	Behavioral Patterns	9Hrs

Behavioral Patterns-1: Chain of Responsibility, Command, Interpreter, Iterator.

Behavioral Patterns-2: Mediator, Memento, Observer.

Module-V	Behavioral Patterns	10Hrs

Behavioral Patterns-2(cont'd): State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns. What to Expect from Design Patterns.

Text Books:

1. Design Patterns By Erich Gamma, Pearson Education

Reference Books:

1. Pattern's in JAVA Vol-I By Mark Grand, Wiley DreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand, Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand, Wiley DreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly-spd
5. Design Patterns Explained By Alan Shalloway,Pearson Education.
6. Pattern Oriented Software Architecture, F.Buschmann&others, John Wiley & Sons

Web References:

1. https://nptel.ac.in/courses/106105224

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DEEP LEARNING
(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0536Tb	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Demonstrate the major technology trends driving Deep Learning
- Build, train, and apply fully connected deep neural networks
- Implement efficient neural networks
- Analyse the key parameters and hyper parameters in a neural network's architecture

Course Outcomes(CO):

On completion of this course, student will be able to

- Apply Mathematical Operations on Neural Network.
- Choose proper Hyperparameters.
- Examine architecture of Deep Neural Network.
- Apply Convolutional Neural Networks in Image Classifications.
- Use RNN and LSTMs in Real time applications.
- Analyze different types of Auto encoders.

Syllabus		Total Hours:48
Module-I	**Linear Algebra**	**10Hrs**

Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

Module-II	Fundamentals of Neural Networks and Deep Learning	9Hrs

Neural Networks, Training Neural Networks, Activation Functions, Loss Functions, Hyper parameters, Building blocks of Deep Neural Networks.

Module-III	Convolutional Networks	10Hrs

The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks..

Module-IV	Recurrent and Recursive Neural Networks	9Hrs

Recurrent Neural Network: Modelling Time Dimension, 3D Volumetric Input, General Recursive Neural Network Architecture, LSTM Networks, Applications.

Recursive Neural Network: Architecture, Varieties of RNN, Applications of RNN.

Module-V	Auto Encoders	10Hrs

Undercomplete Autoencoders, Regularized Autoencoders, Representational Power, Layer Size and Depth, Stochastic Encoders and Decoders, Denoising Autoencoders..

Text Book:

1. Ian Goodfellow, YoshuaBengio, Aaron Courville, “Deep Learning”, MIT Press,2016.
2. Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017

Reference Books:

1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O’Reilly, Shroff Publishers, 2019.
2. Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O’Reilly, Shroff Publishers, 2019.

Web References:

1. https://keras.io/datasets/
2. http://deeplearning.net/tutorial/deeplearning.pdf
3. https://www.deeplearningbook.org
4. https://nptel.ac.in/courses/106105215

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BLOCK CHAIN TECHNOLOGY

(Common to CSE, AI&ML, DS, CS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0536Tc	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	PEC

Course Objectives:

This course will enable students to:

- Illustrate the fundamental concepts of black chain.
- Determine the crypto currency primitives.
- Compare and contrast the bit coins and Crypto currency
- Illustrate the different security features

Course Outcomes(CO):

On completion of this course, student will be able to

- Describe the basic concepts and technology used for block chain.
- Describe the primitives of the distributed computing and cryptography related to block chain.
- Illustrate the concepts of Bit coin and their usage.
- Implement Ethereum block chain contract.
- Apply security features in block chain technologies.
- Use smart contract in real world applications.

Syllabus — **Total Hours:48**

Module-I	Introduction	9Hrs

Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Nakamoto's concept with Block chain based crypto currency, Technologies Borrowed in Block chain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc

Module-II	Basic Distributed Computing & Crypto primitives:	10Hrs

Atomic Broadcast, Consensus, Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems

Module-III	Bitcoin basics	10Hrs

Bitcoin blockchain, Challenges and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use

Module-IV	Ethereum basics:	10Hrs

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

Module-V	Privacy, Security issues in Block chain:	9Hrs

Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Block chains: Sybil attacks, selfish mining, 51% attacks advent of algorand; Sharding based consensus algorithms to prevent these attacks

Text Books:

1. Josh Thompson, 'Block chain: The Block chain for Beginnings, Guild to Block chain Technology and Block chain Programming', Create Space Independent Publishing Platform, 2017.
2. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press.

Reference Books:

1. Imran Bashir, "Mastering Block chain: Distributed ledger technology, decentralization, and smart contracts explained", Packt Publishing.
2. Merunas Grincalaitis, "Mastering Ethereum: Implement Advanced Block chain Applications Using Ethereum-supported Tools, Services, and Protocols", Packet Publishing.

Web References:

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview
2. https://nptel.ac.in/courses/106104220

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SMART GRID
(Common **to CSE, AI&ML, CS, DS, ECE, EEE, ME**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0241T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

Student will be able to

- Overview of the technologies required for the smart grid
- Switching techniques and different means for data communication
- Standards for information exchange and smart metering
- Methods used for information security on smart grid
- Smart metering and protocols for smart metering
- Power quality management with upgraded technologies.

Course Outcomes(CO):

On completion of this course, student will be able to

- Understand the concepts and design of Smart grid.
- Understand the various communication technologies in smart grid.
- Understand the various measurement technologies in smart grid.
- Understand the analysis and stability of smart grid.
- Learn the renewable energy resources and storages integrated with smart grid.
- familiarize the high performance computing for Smart Grid applications

Syllabus		Total Hours: 48
Module-I	**INTRODUCTION TO SMART GRID**	**10 Hrs**

Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient &Self-Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives

Module-II	**SMART GRID TECHNOLOGIES**	**8 Hrs**

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration, Outage management, HighEfficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV).

Module–III	**SMART METERS**	**10 Hrs**

Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.

Module-IV	**POWER QUALITY MANAGEMENT IN SMART GRID**	**10 Hrs**

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

Module–V	HIGH PERFORMANCE COMPUTING	10 Hrs
Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN),Broadband over Power line (BPL), IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.		

Textbooks:

1. Smart Grid, JanakaEkanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, Wiley Publications, 2012, Reprint 2015.
2. Smart Grid: Fundamentals of Design and Analysis, James Momoh, Wiley, IEEE Press., 2012, Reprint 2016.

Reference Books:

1. The Smart Grid – Enabling Energy efficiency and demand response, Clark W. Gellings, P.E., CRC Press, Taylor & Francis group, First Indian Reprint. 2015.
2. Smart Grid – Applications, Communications, and Security Edited by Lars Torsten Berger, Krzysztof Iniewski, WILEY, 2012, Reprint 2015.
3. Practical Electrical Network Automation and Communication Systems, Cobus Strauss, ELSVIER, 2003

Web References:

1. https://onlinecourses.nptel.ac.in/noc22_ee82/preview

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BASIC VLSI DESIGN
(Common **to CSE, AI&ML, CS, DS, ECE, EEE, ME**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0432T	3:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- To give exposure to different steps involved in fabrication Process of PMOS & NMOS transistors, CMOS & BICOM Inverters.
- To provide knowledge on electrical properties of MOS & BICMOS devices to analyze the behaviour of inverters designed with various loads.
- To provide knowledge on Basic Circuit Concepts of VLSI Design
- To apply the design Rules and draw layout of a given logic circuit and basic circuit concepts to MOS circuits.
- To Apply the design for testability methods for combinational & sequential CMOS circuits

Course Outcomes:

After the completion of the course students will able to:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Understand the concept of Basic Electrical Properties of MOS/Bi-CMOS Devices
- Apply the basic circuit concepts to MOS circuits.
- Understand the concept of Scaling of MOS circuits and Limitations of Scaling
- Apply the design Rules to draw the Stick diagram &layout of a given logic circuit.
- Interpret the need for testability and testing methods in VLSI.

Syllabus		**Total Hours: 48**
Module–I:	**Introduction to Fabrication Process**	**10 Hrs**

Introduction: Brief Introduction to IC technology, Moore's Law, Different modes MOSFET operation, Fabrication Process of PMOS, NMOS, CMOS & Bi-CMOS devices, Comparison between CMOS and Bi-polar Technologies.

Fabrication Steps: Wafer Preparation, Oxidation, Photolithography, Etching, Ion Implantations, Metallization, Testing.

Module– II	**Basic Electrical Properties of MOS/BiCMOS devices**	**10 Hrs**

Basic Electrical Properties: Ids Vs Vds relationships, MOS transistor Threshold Voltage-VT, figure of merit-ω0, Transconductance - gm, Output conductance-gds, Pass transistor logic, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter, and through one or more pass transistors Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Module– III	**Basic Circuit Concepts**	**9 Hrs**

Basic Circuit Concepts: Sheet Resistance Rs and concepts to MOS, Area Capacitances calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out

Module– IV	VLSI Circuit Design Processes	10 Hrs
VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Lambda(λ)-based design rules for wires, contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters Logic Gates and Various MOS Circuits. Scaling of MOS circuits, Limitations of Scaling.		
Module– V	**CMOS Testing**	**9 Hrs**
CAD Tools for Design and Simulation, Aspects of Design Tools, Design for Testability, Testing Combinational Logic, Testing Sequential Logic, Practical Design for Test (OFT) Guidelines, Scan Design Techniques, Built-In-Self-Test (BIST), Future Trends.		

Text Books:

1. Kamran Eshraghian, "Essentials of VLSI Circuits and Systems", Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. Behzad Razavi , "Design of Analog CMOS Integrated Circuits", McGraw Hill, 2003

References Books:

1. Modern VLSI Design – Wayne Wolf, 3 Ed., 1997, Pearson Education.
2. Jan M. Rabaey, "Digital Integrated Circuits", AnanthaChandrakasan and Borivoje Nikolic, Prentice-Hall of India Pvt.Ltd, 2nd edition, 2009.
3. John P. Uyemura, "Introduction to VLSI Circuits and Systems", John Wiley & Sons, reprint 2009
4. CMOS VLSI Design-A Circuits and Systems Perspective, Neil H.E Weste, David Harris, Ayan Banerjee, 3rd Edn, Pearson, 2009.

Web References:

1. https://nptel.ac.in/courses/117106092
2. https://www.digimat.in/nptel/courses/video/108107129/L01.html

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DISASTER MANAGEMENT
(Common **to CSE, AI&ML, CS, DS, ECE, EEE, ME**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0151T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations
- Describe the three planning strategies useful in mitigation
- Describe public awareness and economic incentive possibilities
- Understand the tools of post-disaster management

Course Outcomes:

On completion of this course, student will be able to

- To know about the natural hazards and its management
- To know about the fire hazards and solid waste management
- To understand about the emerging infectious diseases and aids their management
- To know about the regulations of building codes and land use planning related to risk and vulnerability.
- To impart the education related to risk reduction in schools and communities

Syllabus		Total Hours: 48
Module-I	**NATURAL HAZARDS AND DISASTER MANAGEMENT**	**9 Hrs**

Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides

Module-II	**MAN MADE DISASTER**	**9 Hrs**

Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

Module–III	**RISK AND VULNERABILITY**	**10 Hrs**

Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

Module –IV	**ROLE OF TECHNOLOGY IN DISASTER MANAGEMENTS**	**10 Hrs**

Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations roads and bridges- mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

Module–V	EDUCATION AND COMMUNITY PREPAREDNESS	10 Hrs
Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.		

Text Books:

1. Rajib shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009),
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill Education Pvt. Ltd., New Delhi

Reference Books:

1. Harsh. K . Gupta "Disaster Management edited", Universities press, 2003.

Web References:

1. https://www.youtube.com/watch?v=DExlZTfKZAM&list=PLC4PaTsQiLcbejXqJR7S59Ohk2OK1rgEG

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MEASUREMENTS AND MECHATRONICS
(Common **to CSE, AI&ML, CS, DS, ECE, EEE, ME**)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0329Tc	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- To instruct the principles of interchangeable manufacture.
- To introduce basic principles of mechanical measurements.
- To impart knowledge on mechatronics systems.

Course Outcomes:

Upon successful completion of the course, the students will be able to

- design the limit gauges for interchangeable manufacture.
- apply the basic principles of mechanical measurements for engineering practice.
- illustrate the role of mechatronics systems in manufacturing.
- explain principles of mechanical, hydraulic, pneumatic and electrical actuating systems.

Syllabus		Total Hours: 48
Module - I	**Limtis & Fits**	**10 Hrs**

Introduction, terminology pertaining to limits and fits – unilateral and bilateral tolerance system, hole and shaft basis systems – Interchangeability, deterministic & statistical tolerance, selective assembly. International Standard system of limits and fits

Limit Gauges: Taylor's principle – Classification and design of limit gauges.

Module - II	**Linear and Angular Measurements**	**10 Hrs**

Line and end standards, slip gauges and length bars. bevel protractor – angle slip gauges – spirit levels and auto collimator.

Interferometry Applied to Measurement: NPL flatness interferometer and NPL gauge interferometer.

Surface Roughness Measurement: Differences between surface roughness and surface waviness- Numerical assessment of surface finish – CLA, R.M.S, Rz values, Methods of measurement of surface finish – Profilograph, Talysurf

Module - III	**Mechanical Measurements**	**10 Hrs**

Introduction to measurement: Elements of generalized measurement system
Displacement Measurement- Linear Variable Differential Transformer (LVDT), encoders, potentiometers.
Temperature Measurement - Pyrometers, Resistance Temperature Detector (RTD)
Strain Measurement-Electrical strain gauge – gauge factor method of usage of resistance strain gauge

Module - IV	**Mechatronics Systems**	**10 Hrs**

Mechatronics systems- Elements of mechatronics system, mechatronics design process, system - measurement systems, control systems, programmable logic controllers, case studies of mechatronic systems

Module - V	Actuating Systems:	8 Hrs
Hydraulic and pneumatic actuating systems - fluid systems, hydraulic systems, and pneumatic systems, components, control valves. mechanical actuating systems and electrical actuating systems – basic principles and elements.		

Textbooks:

1. R.K. Jain, "Engineering Metrology", Khanna Publishers.
2. BeckWith, Marangoni, Linehard, " Mechanical Measurements", 6th edition,PHI / PE.

Reference Books:

1. W. Bolton , "Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg.", 4th Edition, Pearson, 2012.
2. IC Guptha,"Engineering Metrology ",Danpath Rai Publications.
3. Doeblin Earnest. O. Adaptation by Manik and Dhanesh,"Measurement Systems: Application and Design", Tata Mc Graw Hill Publications.

Web References:

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HYBRID ELECTRIC VEHICLES
(Common to CSE, AI&ML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0236T	3:0:0:0	3	CIE:30 SEE:70	3 Hours	OEC

Course Objectives:

- Understand to Provide good foundation on hybrid and electrical vehicles.
- Understand To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles
- Familiarize energy storage systems for electrical and hybrid transportation
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the working of hybrid and electric vehicles
- Apply a suitable drive scheme for developing an hybrid and electric vehicles depending on resources
- Develop the electric propulsion unit and its control for application of electric vehicles.
- Understand the proper energy storage systems for vehicle applications
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles

Syllabus		Total Hours:50
Module – I	**Electric Vehicle Propulsion and Energy Sources**	**10 Hrs**

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Module – II	**Electric Vehicle Power Plant and Drives**	**10 Hrs**

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Module – III	**Hybrid And Electric Drive Trains**	**9 Hrs**

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

Module – IV	**Electric and Hybrid Vehicles - Case Studies**	**9 Hrs**

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications.

Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy-duty vehicles, fuel cell heavy duty vehicles.

Module – V	**Electric And Hybrid Vehicle Design**	**10 Hrs**

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Text Books:

1. Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", 2nd edition, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, "Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach", illustrated edition, John Wiley & Sons, 2014.

Reference Books:

1. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2004.
2. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.
3. John G. Hayes, G. Abas Goodarzi, "Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles", 1st edition, WileyBlackwell, 2018.

Web References:

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2. https://onlinecourses.nptel.ac.in/noc21_ee112/preview

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INDUSTRIAL ELECTRONICS
(Common to EEE,CSE, AI&ML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0433T	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- Describe semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- Understand the characteristics of AC to DC converters.
- Understand about the practical applications Electronics in industries.
- Describe the ultrasonic and its application.

Course Outcomes (CO):

On completion of this course, student will be able to

- Understand the semi-conductor devices and their switching characteristics.
- Apply the Ultrasonic waves with different applications.
- Understand the working of Transistor and its different configurations.
- Analyze the thermal effects of ultrasonic, soldering and welding by ultrasonic, ultrasonic Drying in the industry; interpret the characteristics of AC to DC converters.
- Develop the practical applications Electronics in industries.
- Apply the process of Resistance welding, Induction heating and Dielectric heating in the industry.

Syllabus		Total Hours:48
Module-I	**Scope of industrial Electronics**	**10 Hrs**

Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open circuited p-n junction, Diode resistance, Zener diode, Photo conductors and junction photo diodes, Photo voltaic effect, Light emitting diodes(LED).

Module-II	Junction Transistor	9 Hrs

Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

Module-III	AC to DC converters	10 Hrs

AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period .Accuracy of Voltage Regulator, Principle of automatic voltage Regulator,

Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

Module-IV	Resistance welding controls	10 Hrs

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, electronic welding control used in Resistance welding, Energy storage welding. Induction heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating. Dielectric heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

Module-V	Ultrasonics	9 Hrs

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasonic waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physio-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

Text Books:

1. Fundamentals of Industrial Electronics, Bogdan M Wilamowski, J David irwin, 2nd Edition, 2011.
2. Industrial and Power Electronics – G. K. Mithal and Maneesha Gupta, Khanna Publishers, 19th Ed., 2003.

References:

1. Integrated Electronics – J. Millman and C.C Halkias, McGraw Hill, 1972.
2. Electronic Devices and circuits – Theodore. H. Bogart, Pearson Education, 6thEdn., 2003.
3. Integrated Circuits and Semiconductor Devices – Deboo and Burroughs, ISE

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CONSTRUCTION MANAGEMENT
(Common to ME, CSE, AI&ML, CS, DS, ECE, EEE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0152T	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	OEC

Course Objectives:

This course will enable students to:

- To make the student familiar with various construction activities, preparing construction schedule and maintaining documents and records of those activities
- To teach the students about various terms and technologies involved in earthwork of construction activities
- To make the students familiar with concepts involved in project management like bar charts and milestone charts
- To teach the students the concepts of time estimates involved in CPM and PERT , float and slack, critical path calculations

Course Outcomes (CO):

On completion of this course, student will be able to

- Identify the various construction activities like preparing construction schedule and maintaining documents and records of those activities
- Understand the concepts and techniques involved in earthwork activities
- To understand about the emerging infectious diseases and aids their management
- Understand the steps involved in developing a project scheduling and management and the application of bar charts and milestone charts.
- Understand the various elements of a network diagram like event, activity and dummy.
- Understand the concepts of calculation of time estimates of CPM and PERT

Syllabus		Total Hours:48
Module-I	**FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY**	**9 Hrs**

Definitions and Discussion – Construction Activities –Construction Processes -Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

Module-II	**EARTHWORK**	**9 Hrs**

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting

Module-III	**PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS**	**10 Hrs**

Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts

Module-IV	ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK	10 Hrs
Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems.		
Module-V	**PERT AND CPM**	**10Hrs**
Time estimates – Frequency distribution – Mean, variance and standard deviation-Expected time Problems -Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problems.Introduction - Slack – Critical path-Illustrative examples Problems.		

Text Books:

1. Construction project management by Jha ,Pearsonpublications, New Delhi 2nd Edition 2015
2. Construction Technology by SubirK.Sarkar and SubhajitSaraswati – Oxford Higher EducationUniv.Press, Delhi 2008 edition

Reference Books:

1. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi 2022 editionDelhi
2. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
3. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

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INTRODUCTION TO ROBOTICS
(Common to EEE,CSE, AI&ML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0333Tb	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	OEC

Course Objectives:

The objectives of this course are Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.

Course Outcomes (CO):

After the completion of the course students will able to

- List and explain the basic elements of industrial robots
- Analyze robot kinematics and its control methods.
- Classify the various sensors used in robots for better performance.
- Summarize various industrial and non-industrial applications of robots

Syllabus		Total Hours:48
Module-I	**ROBOT BASICS**	**10 Hrs**

Automation and Robotics: Robot-Basic concepts, Need, Law, History, Anatomy, specifications. Robot configurations-cartesian, cylinder, polar and articulate. Robot wrist mechanism, Precision, accuracy, repeatability, work and volume of robot.

Module-II	**ROBOT ELEMENTS**	**10 Hrs**

End effectors-Classification- Types of Mechanical actuation, Gripper design, Robot drive system Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation

Module-III	**ROBOT KINEMATICS AND CONTROL**	**9 Hrs**

Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation-Scaling, Rotation, Translation Homogeneous transformation. Control of robot manipulators – Point to point, Continuous Path Control, Robot programming

Module-IV	**ROBOT SENSORS**	**9 Hrs**

Sensors in robot – Touch sensors -Tactile sensor – Proximity and range sensors. Force sensor-Light sensors, Pressure sensors, Introduction to Machine Vision and Artificial Intelligence.

Module-V	**ROBOT APPLICATIONS**	**10 Hrs**

Industrial applications of robots-Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management. Applications, Micro and Nanorobots, Future Applications.

Text Books:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, “Industrial Robotics Technology,
2. Programming and Applications”, Tata –McGraw Hill Pub. Co., 2008.

Reference Books:

1. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010.
2. Klafter.R.D, Chmielewski.T.A, and Noggin’s., “Robot Engineering: An Integrated Approach”’, Prentice Hall of India Pvt. Ltd., 1994.
3. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, “Robotics control, sensing, vision and intelligence”, Tata-McGraw Hill Pub. Co., 2008
4. Yu. “Industrial Robotics”, MIR Publishers Moscow, 1985

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MOBILE APPLICATION DEVELOPMENT (SKILL)
(common to CSE, AIML, CS, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
22A0537P	1:0:2:0	2	CIE: 30 SEE:70	3 Hours	SC

Course Objectives:

This course will enable students :

- To understand fundamentals of android operating systems.
- Illustrate the various components, layouts and views in creating android applications
- To understand fundamentals of android programming

Course Outcomes(CO):

On completion of this course, student will be able to:

- Define Android OS, gradle, Android Studio.
- Construct mobile application on physical device and emulator
- Develop mobile applications with various widgets
- Design mobile applications with various layouts
- Build mobile application along with Media
- Design and develop menus in mobile applications

Syllabus | **Total Hours:48**

Module 1:

Introduction to Android: Introduction**,** Understanding the Android Software Stack, installing the Android, Creating Android Virtual Devices, Creating the First Android Project, Using the Android Emulator, The Android Debug Bridge(ADB), Launching Android Applications on a Handset

Experiment 1:

Set Up Mobile Development Environment using Android

Experiment 2:

Create "Hello World" Application

1. Create a new Android Project
2. Run "Hello World" on the Emulator
3. On a Physical Device

Module 2:

Basic Widgets :Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Event Handling, Displaying Messages Through Toast, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons

Experiment 3:

Create an application using Text Edit control

Experiment 4:

Create an application by choosing Options with Checkbox

Experiment 5:

Create an application by choosing Mutually Exclusive Items Using Radio Buttons

Module 3:
Layouts: Introduction to Layouts, Linear Layout, Relative Layout, Using Image View, Frame Layout, Table Layout

Experiment 6:
Design an application using Relative Layout
Experiment 7:
Design an application using Frame Layout

Module 4:
Selection widgets: Using List View, Using the Spinner control
Experiment 8:
Create an application by choosing Options with List View
Experiment 9:
Create an application by choosing Options with Spinner

Module 5:
Utilizing Media: Switching States with Toggle Buttons, Creating an Images Switcher Application, Playing Audio, Playing Video
Experiment 10:
Create an application to play an Audio clip
Experiment 11:
Create an application to play the Video clip

Module 6:
Building Menus : Creating Interface Menus, Types of menus, Creating Menus Through XML
Experiment 12:
Create an application to display a Menu

Text Books:

1. Android Programming by B.M Harwani, Pearson Education, 2013.

Reference Books:

1. Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
2. Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013

Web References:

1. https://archive.nptel.ac.in/courses/106/106/106106156/