# PANIMALAR ENGINEERING COLLEGE

**(An Autonomous Institution, Affiliated to Anna University, Chennai) Bangalore Trunk Road, Varadharajapuram, Poonamallee, Chennai – 600 123.**


## Department of Electronics and Communication Engineering

## B.E. Electronics and Communication Engineering

## Curriculum and Syllabus

## OPEN ELECTIVES

## Regulation 2023

# PANIMALAR ENGINEERING

# B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

# OPEN ELECTIVES - R2023

## List of Open Electives I

| Sl.No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1. | 23EE1008 | Energy Conservation and Management | OE | 3 | 3 | 0 | 0 | 3 |
| 2. | 23CS1001 | Fundamentals of Database Management Systems | OE | 3 | 3 | 0 | 0 | 3 |
| 3. | 23CS1003 | Cloud Computing | OE | 3 | 3 | 0 | 0 | 3 |
| 4. | 23EC1001 | Basic of Biomedical Instrumentation | OE | 3 | 3 | 0 | 0 | 3 |
| 5. | 23EC1005 | Intelligent Automation | OE | 3 | 3 | 0 | 0 | 3 |
| 6. | 23CB1001 | C++ Programming | OE | 3 | 3 | 0 | 0 | 3 |
| 7. | 23ML1001 | Data Structures and Algorithms | OE | 3 | 3 | 0 | 0 | 3 |
| 8. | 23ML1002 | Fundamentals of Machine Learning | OE | 3 | 3 | 0 | 0 | 3 |
| 9. | 23EC1007 | Product Design and Development | OE | 3 | 3 | 0 | 0 | 3 |
| 10. | 23ME1004 | Industrial Pollution and Prevention | OE | 3 | 3 | 0 | 0 | 3 |

## List of Open Electives II

| Sl. No. | Course Code | Course Title | Category | Contact Periods | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| 1. | 23GE1001 | Disaster Management | OE | 3 | 3 | 0 | 0 | 3 |
| 2. | 23GE1006 | Intellectual Property Rights | OE | 3 | 3 | 0 | 0 | 3 |
| 3. | 23EC1011 | Telehealth Technology | OE | 3 | 3 | 0 | 0 | 3 |
| 4. | 23CS1002 | Software Engineering | OE | 3 | 3 | 0 | 0 | 3 |
| 5. | 23EE1003 | Logic and Distributed Control Systems | OE | 3 | 3 | 0 | 0 | 3 |
| 6. | 23EC1008 | Robotics and Automation | OE | 3 | 3 | 0 | 0 | 3 |
| 7. | 23IT1001 | Web Design and Management | OE | 3 | 3 | 0 | 0 | 3 |
| 8. | 23CB1002 | Mobile Application Development | OE | 3 | 3 | 0 | 0 | 3 |
| 9. | 23EE1929 | Intelligent Control of Electric Vehicles | OE | 3 | 3 | 0 | 0 | 3 |
| 10. | 23ME1005 | Hospital Management | OE | 3 | 3 | 0 | 0 | 3 |

## Open Electives I (V SEMESTER)

| 23EE1008 | ENERGY CONSERVATION AND MANAGEMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES**:

- Understand and analyse the energy data of industries
- Carryout energy accounting and balancing
- Conduct energy audit and suggest methodologies for energy savings
- Utilise the available resources in optimal ways

**UNIT - I INTRODUCTION 9**

Energy - Power – Past & Present scenario of World; National Energy consumption Data – Environmental aspects associated with energy utilization – Energy Auditing: Need, Types, Methodology and Barriers. Role of Energy Managers. Instruments for energy auditing.

**UNIT - II ELECTRICAL SYSTEMS 9**

Components of EB billing – HT and LT supply, Transformers, Cable Sizing, Concept of Capacitors, Power Factor Improvement, Harmonics, Electric Motors - Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types of lighting, Efficacy, LED Lighting and scope of Encon in Illumination.

**UNIT - III THERMAL SYSTEMS 9**

Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency computation and encon measures. Steam: Distribution &U sage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators& Refractories.

**UNIT - IV ENERGY CONSERVATION IN MAJOR UTILITIES 9**

Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems –Cooling Towers – D.G. sets.

**UNIT - V ECONOMICS 9**

Energy Economics – Discount Rate, Payback Period, Internal Rate of Return, Net Present Value, Life Cycle Costing –ESCO concept.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Remember the knowledge for Basic combustion and furnace design and selection of thermal and mechanical energy equipment.
2. Study the Importance of Stoichiometry relations, Theoretical air required for complete combustion.
3. Skills on combustion thermodynamics and kinetics
4. Apply calculation and design tube still heaters.
5. Studied different heat treatment furnace.
6. Practical and theoretical knowledge burner design.

**TEXT BOOKS:**

1. Energy Manager Training Manual (4 Volumes) available at www.energymanagertraining.com. a website administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India, 2004.

**REFERENCES:**


1. Witte. L.C., P.S. Schmidt, D.R. Brown, “Industrial Energy Management and Utilisation” Hemisphere Publ, Washington, 1988.
2. Callaghn, P.W. “Design and Management for Energy Conservation”, Pergamon Press, Oxford, 1981
3. Dryden. I.G.C., “The Efficient Use of Energy” Butterworths, London, 1982
4. Turner. W.C., “Energy Management Hand book”, Wiley, New York, 1982
5. Murphy. W.R. and G. Mc KAY, “Energy Management”, Butterworths, London 1987


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | | | | | | | | 1 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 3 | | | | | | | | 1 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 3 | | | | | | | | 1 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 3 | | | | | | | | 1 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 3 | | | | | | | | 1 | 2 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
| **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Written Examinations** |
| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23CS1001 | FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the basic concepts and the applications of database systems.
- To understand the various data models
- To learn the relational database design principles.
- To know the basics of SQL and construct queries using SQL.
- To familiar with the basic issues of transaction processing and concurrency control.

**UNIT - I DATABASE FUNDAMENTALS 9**

Introduction: Database System Applications, Purpose of Database Systems, View of Data, components and structure, Database Users and Administrator, History of Database Systems.

**UNIT - II DATA MODELS 9**

ER model, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Enhanced E-R Model.

**UNIT - III RELATIONAL DATABASE 9**

Relational Data Model - Concept of relations, schema-instance distinction, keys, referential integrity and foreign keys, relational algebra operators, Normalization (1NF, 2NF, 3NF, BCNF).

**UNIT - IV STRUCTURED QUERY LANGUAGE 9**

Introduction, data definition in SQL, table, key and foreign key definitions, update behaviours. Querying in SQL, notion of aggregation, aggregation functions group by and having clauses, embedded SQL

**UNIT - V TRANSACTION MANAGEMENT AND CONCURRENCY 9**

Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Remember the Structure of a Database
2. Understand an Entity Relational Model for a database.
3. Apply Relational database concepts to design a database.
4. Analyze the importance of normalization and functional dependencies in database design
5. Understand transaction processing and concurrency control

6. Create a database design using Relational models

**TEXT BOOKS:**

**1.** Data base System Concepts, A. Silberschatz, Henry. F. Korth, S.Sudarshan, McGraw Hill India Private Limited, 7th edition.

**REFERENCES:**

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 3rd Edition.

**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
| **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Written Examinations** |
| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23CS1003 | CLOUD COMPUTING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To learn about the concept of cloud and utility computing.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

**UNIT - I INTRODUCTION TO CLOUD COMPUTING 9**

Introduction to Cloud Computing – Roots of Cloud Computing – Desired Features of Cloud Computing – Challenges and Risks – Benefits and Disadvantages of Cloud Computing.

**UNIT - II VIRTUALIZATION 9**

Introduction to Virtualization Technology – Load Balancing and Virtualization – Understanding Hypervisor – Types of Virtualization – Server, Desktop, Application Virtualization.

**UNIT - III CLOUD ARCHITECTURE, SERVICES AND STORAGE 9**

NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – PaaS – SaaS – Architectural Design Challenges.

**UNIT - IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 9**

Inter Cloud Resource Management – Resource Provisioning Methods – Security Overview – Cloud Security Challenges – Data Security –Application Security – Virtual Machine Security.

**UNIT - V CASE STUDIES 9**

Google App Engine(GAE) – GAE Architecture – Functional Modules of GAE – Amazon Web Services(AWS) – GAE-Open Stack .

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
2. Learn the key and enabling technologies that help in the development of cloud.
3. Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
4. Explain the core issues of cloud computing such as resource management and security.
5. Be able to install and use current cloud technologies.

6. Choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

**TEXT BOOKS:**


1. Buyya R., Broberg J., Goscinski A., Cloud Computing: Principles and Paradigm, First Edition, John Wiley and Sons, 2011.
2. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. Rittinghouse, John W., and James F. Ransome, Cloud Computing: Implementation, Management, And Security, CRC Press, 2017.


**REFERENCES:**


1. RajkumarBuyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), OReilly, 2009.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
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| 40 | 60 | 40 | 60 | 100 |
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| 23EC1001 | BASIC OF BIOMEDICAL INSTRUMENTATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To study about the different biopotential and its propagation
- To understand the different types of electrodes and its placement for various recording
- To study the design of bioamplifier for various physiological recording
- To learn the different measurement techniques for non-physiological parameters.
- To familiarize the different biochemical measurements.

**UNIT - I BIOPOTENTIAL GENERATION AND ELECTRODES TYPES 9**

Origin of bio potential and its propagation.Types of electrodes -surface, needle and micro electrodes and their equivalent circuits. Recording problems - measurement with two electrodes.

**UNIT - II BIOSIGNAL CHARACTERISTICS AND ELECTRODE CONFIGURATIONS 9**

Biosignals characteristics frequency and amplitude ranges. ECG Einthoven's Triangle , standard 12 lead system. EEG –10-20 electrode system, unipolar, bipolar and average mode. EMG– unipolar and bipolar mode.

**UNIT - III SIGNAL CONDITIONING CIRCUITS 9**

Need for bio-amplifier - differential bio-amplifier, Impedance matching circuit, isolation amplifiers, Power line interference, Right leg driven ECG amplifier, Band pass filtering.

**UNIT - IV MEASUREMENT OF NON-ELECTRICAL PARAMETERS 9**

Temperature, respiration rate and pulse rate measurements. Blood Pressure: indirect methods - Auscultatory method, direct methods: electronic manometer, Systolic, diastolic pressure, Blood flow and cardiac output measurement: Indicator dilution, and dye dilution method, ultrasound blood flow measurement.

**UNIT - V BIO-CHEMICAL MEASUREMENT 9**

Blood gas analyzers and Non-Invasive monitoring, colorimeter, Sodium Potassium Analyser, spectrophotometer, blood cell counter, auto analyzer (simplified schematic description).

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Learn the different bio-potential and its propagation.
2. Get familiarize the different electrode placement for various physiological recording
3. Students will be able to design bio-amplifier for various physiological recording
4. Students will understand various technique on electrical physiogical measurements
5. Understand the different biochemical measurements

**TEXT BOOKS:**


1. Leslie Cromwell,"Biomedical Instrumentation and measurement", Prentice hall of India, New Delhi, 2012.
2. John G. Webster,"Medical Instrumentation Application and Design", John Wiley and sons, New York, 2014.


**REFERENCES:**


1. Myer Kutz, "Standard Handbook of Biomedical Engineering and Design", McGraw Hill Publisher, 2013.
2. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 2013.
3. Joseph J. Carr and John M. Brown, "Introduction to Biomedical Equipment Technology", Pearson Education, 2014.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 1 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 1 | 3 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 1 | 3 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 1 | 3 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 1 | 3 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
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| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23EC1005 | INTELLIGENT AUTOMATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To identify potential areas for automation and justify need for automation.
- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Apply the concept of AI to attain industrial automation.

**UNIT - I INTRODUCTION TO AUTOMATION (7+2 skill) 9**

Introduction to Industrial Automation - Automation in Production System- Principles and Strategies of Automation - Basic Elements of an Automated System- Advanced Automation Functions- Levels of Automations- Production Economics - Methods of Evaluating Investment Alternatives- Costs in Manufacturing- Break Even Analysis- Unit cost of production- Cost of Manufacturing Lead time and Work-in-process.

**UNIT - II INTRODUCTION TO ARTIFICAL INTELLIGENCE (7+2 skill )9**

Introduction to Artificial Intelligence -Introduction-Foundations of AI- History of AI- Intelligent agents: Agents and Environment- Reactive agent- deliberative- goal driven- utility driven and learning agents -Artificial Intelligence programming techniques. Introduction to ML and DL Concepts

**UNIT - III KNOWLEDGE AND REASONING (7+2 skill) 9**

Knowledge Representation and Reasoning - Ontologies-foundations of knowledge representation and reasoning-representing and reasoning about objects- relations- events-actions- time- and space- predicate logic-situation calculus- description logics- reasoning with defaults-reasoning about knowledge-sample applications- Representing Knowledge and reasoning in an Uncertain Domain- Bayes rule- Bayesian networks- probabilistic inference sample applications- Planning: planning as search- partial order planning- construction and use of planning graphs.

**UNIT - IV EXPERT SYSTEMS (7+2 skill) 9**

Expert systems -Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge- Heuristics. Typical expert systems – MYCIN – ART-XOON.

**UNIT - V AI IN CONTROL SYSTEMS (7+2 skill) 9**

Industrial AI applications and Case studies - Applications of Industrial AI in Monitoring- optimization and control- AI applications in Industry Automation using - natural language processing-computer vision-speech recognition-computer vision.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Understand the basics AI algorithms (L2).
2. Identify appropriate AI methods to solve a given problem (L1).
3. Illustrate about AI/ML/DL techniques in Industrial Automation (L3).
4. Summarize the levels of automation (L2).
5. Ability to apply AI concepts for industrial optimization and control. (L4).
6. Design the AI for various applications

**TEXT BOOKS:**


1. Rich and Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2014.
2. M.P.Groover, "Automation, Production Systems and Computer Integrated Manufacturing", 5th edition, Pearson Education, 2009.


**REFERENCES:**


1. Anuradha Srinivasaraghavan, Vincy Joseph "Machine Learning", Wiley, 2019.
2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 2nd Edition, Prentice Hall, 2003.
3. Rajiv Chopra, "Deep Learning", 1st Edition, Khanna Publishing House, 2018.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 2 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 2 | 3 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 2 | 3 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 2 | 3 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | 1 | | | | | 1 | 1 | 2 | 3 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
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| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
| **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Written Examinations** |
| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23CB1001 | C ++ PROGRAMMING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the need for high-level languages including C++ and programming paradigms.
- To understand the syntax of C++ and writing simple programs in C++
- To understand the need and role of object oriented programming for real-world applications.
- To enable the students to write simple programs using OOP concepts

**UNIT - I PRINCIPLES OF OOPS AND CONTROL STRUCTURES 9**

Object Oriented Programming Paradigm, Basic Concepts of Object Oriented Programming, Benefits of Object Oriented Programming, Object Oriented Languages, Applications of Object Oriented Programming, Beginning with C++,Tokens, Keywords, Identifiers and Constants, Data Types, Type Compatibility, Variables, Operators in C++,Implicit Conversions, Operator Precedence, Control Structures.

**UNIT - II OVERLOADING AND INHERITANCE 9**

String Handling – Copy Constructor –function overloading – Operators overloading – dynamic memory allocation – Abstract Class - Nested classes – Inheritance

**UNIT - III VIRTUAL FUNCTIONS AND POLYMORPHISM 9**

Virtual Functions and Polymorphism Virtual functions, pure virtual functions; Polymorphism, Categorization of polymorphism techniques: Compile time polymorphism, Run time polymorphism

**UNIT - IV EXCEPTION HANDLING AND GENERIC PROGRAMMING 9**

Exception handling – Standard libraries – Generic Programming – templates – class template – function template – STL – containers – iterators – function adaptors – allocators – Parameterizing the class – File handling concepts.

**UNIT - V STRUCTURES, UNIONS AND FILE MANAGEMENT 9**

Introduction to structures – Declaration – Initialization – Accessing the members – Nested Structures – Array of Structures – Structures and functions – Passing an entire structure – typedef – Union - Storage classes and Visibility. Exercise programs: Compute the age of a person using structure and functions (passing a structure to a function) – Compute the number of days an employee came late to the office by considering his arrival time for 30 days (Use array of structures and functions) - Defining and opening a file, closing a file, Input/output and Error Handling on Files

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Understand the C++ language features. Ability to implement the algorithms and flow chart for solving mathematical and engineering problems
2. Use the control structure and data types in C++.
3. Implement C programs using control structures
4. Write simple programs to implement overloading concepts.
5. Write simple programs to implement overloading concepts.
6. Design applications using sequential and random access file processing

**TEXT BOOKS:**

1. Object Oriented Programming with C++ , E.Balagurusamy ,MCGraw Hill Education , New Delhi 8th Edition 2020.
2. The C++ Programming Language , Stroustrup.B , Pearson Education , New Delhi 2015.
3. The C++ Programming Language , Stroustrup.B , Pearson Education , New Delhi 2015.
4. C++ Programming , Dr.Rajendra Kawale , Devraj Publications , 2018

**REFERENCES:**

1. Object Oriented Programming in C++ , Subburaj.R , VikasPublications New Delhi 2015.
2. Object Oriented Programming in C++ , Lafore . R , Sams Publication,New Delhi 2015.

**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | 2 | | | 2 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | 2 | | | 2 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | 2 | | | 2 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | 2 | | | 2 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | 2 | | | 2 | 1 | 1 | 3 | 3 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
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| 23ML1001 | DATA STRUCTURES AND ALGORITHMS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the concepts of ADTs
- To design linear data structures–lists, stacks, and queues
- To understand sorting algorithms
- To understand the concept of searching and hashing algorithms
- To apply Tree and Graph structures

**UNIT - I LINEAR DATA STRUCTURES – LIST 9**

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation —singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

**SUGGESTED ACTIVITES:**

Developing and application(student's choice using all the linear data structure

**SUGGESTED EVALUATION METHODS:**

Programs and Demonstration on applications of linear data structures.
Checking output of programs implemented.
Assignments.

**UNIT - II LINEAR DATA STRUCTURES – STACKS, QUEUES 9**

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue Priority Queue – deQueue – applications of queues- Job Scheduling- Josephus problem.

**SUGGESTED ACTIVITES:**

Demonstrating stack for Towers of Hanoi application.

**SUGGESTED EVALUATION METHODS:**

Programs on applications of Stacks and Queues
Quiz on various topics of the unit
Assignments

**UNIT - III NON LINEAR DATA STRUCTURES – TREES 9**

Tree ADT - Representation of Trees- Binary Tree -Tree traversal- expression trees - applications of trees - binary search tree ADT -Threaded Binary Trees- AVL Trees - B-Tree B+ Tree -Trie - Heap - Applications of heap.

**SUGGESTED ACTIVITES:**

Solving expressions using expression trees by determining infix, prefix and postfix expressions.

Developing any application using trees.

**SUGGESTED EVALUATION METHODS:**

Programs using tree traversal and binary tree

Programs on binary search trees.

Programs and Demonstration using AVL tree applications.

Assignments

**UNIT - IV NON LINEAR DATA STRUCTURES - GRAPHS 9**

Definition - Representation of Graph - Types of graph - Breadth-first traversal - Depth- first traversal - Topological Sort - Bi-connectivity - Cut vertex - Euler circuits - Applications of graphs- Shortest path algorithms- Minimum spanning trees- Prims and Kruskal Algorithms Applications of BFS: Graph Coloring.

**SUGGESTED ACTIVITES:**

External learning- Applications of graphs.

Practical- To choose and apply a suitable graph algorithm for solving a real time pr /scenario such as Network Routing.

**SUGGESTED EVALUATION METHODS:**

Assignments on representation of graphs for a given problem

Quizzes on basics of graphs.

Programs and Demonstration using application of graph and topological sort

**UNIT - V SEARCHING, SORTING AND HASHING TECHNIQUES 9**

**SUGGESTED ACTIVITES:**

External learning- Applications of graphs.

Practical-To choose and apply a suitable graph algorithm for solving a real time problem/scenario such as Network Routing.

**SUGGESTED EVALUATION METHODS:**

Tutorials on external sorting.

Tutorials on hashing.

Check output of programs implemented

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Implement abstract datatypes for linear data structures.
2. Apply the different linear data structures to problem solutions.
3. Model problems as Tree problems and implement efficient Tree algorithms to solve them.
4. Model problems as graph problems and implement efficient graph algorithms to solve them.
5. Critically analyze the various sorting algorithms.
6. Analyze the various searching and hashing algorithms

**TEXT BOOKS:**


1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson education, 2011.
2. Reema Thareja, 'Data Structures Using C', Second Edition , Oxford University Press, 2011.


**REFERENCES:**


1. Thomas H.Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms",Second Edition, McGraw Hill,2002.
2. Aho,HopcroftandUllman,"DataStructuresandAlgorithms",PearsonEducation, 1983.
3. StephenG.Kochan,"ProgramminginC",3rd edition, Pearson Education.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C",Second Edition,University Press,2008.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 1 | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | 1 | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | 1 | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | 1 | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | 1 | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
| **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Written Examinations** |
| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23ML1002 | FUNDAMENTALS OF MACHINE LEARNING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the Foundations of Machine Learning.
- To explore Different Types of Machine Learning and Address Challenges and Issues in Machine Learning.
- To develop expertise in selecting appropriate models for different machine learning tasks, understanding the principles behind model selection criteria.
- To Develop a comprehensive understanding of regression analysis, including simple linear regression and multiple linear regression, along with their assumptions and limitations.
- To develop a deep understanding of supervised learning algorithms for classification tasks, including their principles, applications, and learning steps.
- To explore the fundamentals of reinforcement learning, including Q Learning,and its applications in sequential decision-making problems.I

**UNIT I INTRODUCTION TO MACHINE LEARNING 9**

Introduction to Machine Learning - Introduction, Types of Machine Learning, Applications of Machine Learning, Issues in Machine Learning. Preparing to Model- Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing.

**UNIT - II MODELING AND EVALUATION 9**

Introduction, selecting a Model, training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model.
Basics of Feature Engineering- Introduction, Feature Transformation – Feature Construction, Feature Extraction, Principal Component Analysis (PCA), Singular Value Decomposition (SVD), Linear Discriminate Analysis (LDA), Feature Subset

**UNIT - III REGRESSION 9**

Introduction to regression analysis, Simple linear regression, Multiple linear regression, Assumptions in Regression Analysis, Main Problems in Regression Analysis, Improving Accuracy of the linear regression model, Polynomial Regression model, Logistic Regression, Regularization, Regularized Linear Regression, Regularized Logistic Regression.

**UNIT - IV SUPERVISED LEARNING AND CLASSIFICATION ALGORITHMS 9**

Supervised Learning: Classification- Introduction, Example of Supervised Learning, Classification Model, and Classification Learning Steps.
Common Classification Algorithms - k-Nearest Neighbor (kNN), Support vector Machines (SVM), Random Forest model.

**UNIT - V ENSEMBLE AND REINFORCEMENT LEARNING 9**

Ensemble Learning- Bagging, Boosting, Stacking and its impact on bias and variance, Ada Boost, Gradient Boosting Machines, XG Boost. Reinforcement Learning - Introduction, Q Learning.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

On successful completion of the course student will be able to:

1. Identify the characteristics of machine learning.
2. Understand the Model building and evaluation approaches.
3. Apply regression algorithms for real-world Problems.
4. Handle classification problems via supervised learning algorithms.
5. Learn advanced learning techniques to deal with complex data.
6. Demonstrate comprehensive understanding of advanced machine learning techniques and their impacts on model performance.

**TEXT BOOKS:**


1. Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, Fourth Edition, 2020.
2. Subramanian Chandra mouli, Saikat Dutt, Amit Kumar Das, “Machine Learning”, Pearson Education India ,1st edition,2018.
3. Stephen Marsland, “Machine Learning: An Algorithmic Perspective, “Second Edition”,CRC Press, 2014


**REFERENCES:**


1. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, “Foundations of
2. Sebastain Raschka, Vahid Mirjalili , “Python Machine Learning”, Packt publishing 3rd Edition, 2019.
3. Peter Harington, “Machine Learning in Action” , Cengage, 1st edition, 2012.
4. Peter Flach, “Machine Learning: The art and science of algorithms that make sense of data”, Cambridge university press,2012.
5. Jason Brownlee, “Machine Learning Mastery with Python Understand Your Data,Create Accurate Models and Work Projects End-To-End”, Edition: v1.4, 2011.
6. Tom Mitchell, “Machine Learning”, McGraw Hill, 3rd Edition, 1997.


**WEB LINKS:**

1. https://www.geeksforgeeks.org/introduction-machine-learning/
2. https://www.analyticsvidhya.com/blog/2021/10/evaluation-metric-for-regression- models/
3. https://towardsdatascience.com/introduction-to-linear-regression-and-polynomial- regression-f8adc96f31cb
4. https://www.javatpoint.com/k-nearest-neighbor-algorithm-for-machine-learning

| 23EC1007 | PRODUCT DESIGN AND DEVELOPMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To facilitate the knowledge about product design.
- To know about engineering and functions in product design.
- To explore the tools and product manufacturing using case studies.

**UNIT - I INTRODUCTION 9**

Introduction to course, Product life-cycle, Product policy of an organization. Selection of a profitable product, Product design process, Product analysis.

**UNIT - II ENGINEERING IN PRODUCT DESIGN 9**

Value engineering in product design; Advantages, Applications in product design, Problem identification and selection.

**UNIT - III FUNCTIONS IN PRODUCT DESIGN 9**

Analysis of functions, Anatomy of function. Primary versus secondary versus tertiary/unnecessary functions, Functional analysis: Functional Analysis System Technique (FAST), Case studies.

**UNIT - IV PRODUCT DESIGN TOOLS 9**

Introduction to product design tools, QFD, Computer Aided Design, Robust design, DFX, DFM, DFA,Ergonomics in product design.

**UNIT - V PRODUCT MANUFACTURING AND PROTOTYPE 9**

DFMA guidelines, Product design for manual assembly, Design guidelines for metallic and nonmetallic products to be manufactured by different processes such as casting, machining, injection molding etc., Rapid prototyping, needs, advantages, working principle of SLA, LOM and SLS.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Discuss the need for product life cycle.
2. Discuss the engineering and functions in the design of product.
3. Learn the significance of Engineering in product design
4. Explain the various tools used for design of a product.
5. Analyze the guidelines for manufacturing and prototype of a product.
6. Apply knowledge about various products in the present day scenario.

**TEXT BOOKS:**

1. Karl T. Ulrich, "Product Design and Development" Mc Graw -Hill International, 6th Edition.

**REFERENCES:**

1. Ulrich, Karl T., Eppinger, Steve D., and Yang, Maria C., Product Design and Development. 7th ed., McGraw-Hill Education, 2020.
2. Regalla, Srinivasa Prakash, "Product design and manufacturing", New Age International (P) Ltd.

## CO-PO MAPPING

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 2 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
| **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Written Examinations** |
| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23ME1004 | INDUSTRIAL POLLUTION AND PREVENTION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:** To impart Knowledge on the following topics:

- This course is designed to learn a variety of chemical, physical, biological treatment processes related to industrial pollution control.
- This course is to make pollution profiles of the industries, categorization, control methodologies and technologies, system design, ethic concepts and solving of the engineering problems on industrial systems.

**UNIT - I TYPES OF POLLUTION 9**

Types of emissions from chemical industries and effects of environment, environment legislation, Type of pollution, sources of wastewater, Effluent guidelines and standards

**UNIT - II CHARACTERISTICS OF POLLUTANTS 9**

Characterization of effluent streams, oxygen demands and their determination (BOD, COD, and TOC), Oxygen sag curve, BOD curve mathematical, controlling of BOD curve, self purification of running streams, sources and characteristics of pollutants in fertilizer, paper and pulp industry. General methods of control and removal of sulfur dioxide, oxides of nitrogen and organic vapors from gaseous effluent, treatment of liquid and gaseous effluent in fertilizer industry.

**UNIT - III CONTROL OF POLLUTION 9**

General methods of control and removal of sulfur dioxide, oxides of nitrogen and organic vapors from gaseous effluent, treatment of liquid and gaseous effluent in fertilizer industry.

**UNIT - IV POLLUTION MEASUREMENTS 9**

Air pollution sampling and measurement: Types of pollutant and sampling and measurement, ambient air sampling: collection of gaseous air pollutants, collection of particulate air pollutants. Stack sampling: sampling system, particulate sampling, and gaseous sampling. Analysis of air pollutants: Sulphur dioxide, nitrogen oxides, carbon monoxide, oxidants and Ozone, hydrocarbons, particulate matter.

**UNIT - V EMISSION CONTROL TECHNIQUES 9**

Air pollution control methods and equipments: Source collection methods: raw material changes, process changes, and equipment modification. Cleaning of gaseous equipments particulate emission control: collection efficiency, control equipment like gravitational settling chambers, Cyclone separators, fabric filters, scrubbers, packed beds and plate columns, venturi scrubbers, their design aspects. Control of gaseous emissions: absorption by liquids, absorption equipments, adsorption by solids.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

On successful completion of the course student will be able to:

1. Understanding of air/water pollution regulations and their scientific basis.
2. Apply knowledge for the protection and improvement of the environment.
3. Understanding the sources and characteristics of the pollutants.
4. Ability to monitor and design the air and water pollution control systems.
5. Ability to select and use suitable waste treatment technique

**TEXT BOOKS:**

1. Environmental pollution and control engineering, Rao C. S. - Wiley Eastern Limited, India, 1993.
2. Pollution control in process industries by S.P. Mahajan TMH.,1985.

**REFERENCES:**

1. Waste water treatment by M.Narayana Rao and A.K.Datta,Oxford and IHB publ. New Delhi.
2. Air pollution control by P.Prathap mouli and N.Venkata subbayya. Divya Jyothi Prakashan, Jodhpur
3. "Industrial Pollution Control and Engineering." Swamy AVN, Galgotia publications, 2005.Hyderabad

**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
| **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Written Examinations** |
| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

## Open Electives II (VI SEMESTER)

| 23GE1001 | DISASTER MANAGEMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability,
- disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction
- (DRR).
- To enhance awareness of institutional processes in the country.
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

**UNIT I INTRODUCTION TO DISASTERS 9**

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters –Earthquake, Landslide, Flood, Drought, Fire etc -Classification, Causes, Impacts including social,economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste,class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics,complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

**UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9**

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders institutional Processess and Framework at State and Central Level State Disaster Management Authority(SDMA)–Early Warning System– Advisories from Appropriate Agencies.

**UNIT III INTER-RELATIONSHIP BETWEEN DISASTER S AND DEVELOPMENT 9**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenariosin the context of India-Relevance of indigenous knowledge, appropriate technology and local resources.

**UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9**

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food,Sanitation,Shelter,Health,WasteManagement,Institutionalarrangements(Mitigation,ResponseandPreparedness, Disaster Management Act and Policy -Other related policies, plans, programmes and legislation– Role of GI Sand Information Technology Components in Preparedness, RiskAssessment, Response and Recovery Phases of Disaster–Disaster Damage Assessment.

**UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS** **9**

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Differentiate the types of disasters, causes and their impact on environment and society.
2. Assess vulnerability and various methods of risk reduction measures as well as mitigation.
3. Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

**TEXT BOOKS:**


1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427ISBN-13: 978-9380386423.
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India EducationPvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361].
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management,NIDM, New Delhi, 2011.
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers,New Delhi, 2010.


**REFERENCES:**


1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005.
2. Government of India, National Disaster Management Policy,2009.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 |

| Internal Assessment | | | | End Semester Examinations |
|---|---|---|---|---|
| Assessment I (100 Marks) | | Assessment II (100 Marks) | | |
| Individual Assignment / Case Study / Seminar / Mini Project | Written Test | Individual Assignment / Case Study / Seminar / Mini Project | Written Test | Written Examinations |
| 40 | 60 | 40 | 60 | 100 |
| 40% | | | | 60 % |

| 23GE1006 | INTELLECTUAL PROPERTY RIGHTS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To acquaint the learners with the basic concepts of Intellectual Property Rights.
- To develop expertise in the learners in IPR related issues and sensitize the learners with the emerging issues in IPR and the rationale for the protection of IPR

**UNIT - I INTRODUCTION 9**

Introduction to IPRs, Basic concepts and need for Intellectual Property – Meaning and practical aspects of Patents, Copyrights, Geographical Indications, IPR in India and Abroad. Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

**UNIT – II INTELLECTUAL PROPERTY RIGHTS 9**

The IPR tool kit, Patents, the patenting process, Patent cooperation treaties: International Treaties and conventions on IPRs: Trade Related Aspects of Intellectual Property Rights Agreement, Patent Cooperation Treaty, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

**UNIT – III INTELLECTUAL PROPERTY PROTECTIONS 9**

IPR of Living Species, protecting inventions in biotechnology, protections of traditional knowledge, biopiracy and documenting traditional knowledge, Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection. Case studies: The basmati rice issue, revocations of turmeric patent, revocation of neem patent.

**UNIT – IV EXERCISING AND ENFORCING OF INTELLECTUAL PROPERTY RIGHTS 9**

Rights of an IPR owner, licensing agreements, criteria for patent infringement. Case studies of patent infringement, IPR – contract, unfair competitions and control, provisions in TRIPS.

**UNIT – V ROLE OF PATENTS IN PRODUCT DEVELOPMENT COMMERCIALIZATION 9**

Recent changes in IPR laws impacting patents and copy rights, intellectual cooperation in the science and allied industry. Patentable and non-patentable research. Case studies

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

**CO1** Gain the knowledge of Intellectual Property and its protection through various laws.

**CO2** Apply the knowledge of IPR for professional development.

**CO3** Develop a platform for protection and compliance of Intellectual Property Rights & knowledge.

**CO4** Create awareness amidst academia and industry of IPR and Copyright compliance.

**CO5** Deliver the purpose and function of IPR and patenting.

**TEXT BOOKS:**

1. Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management.India, IN: Cengage Learning India Private Limited..
2. V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012.
3. Fundamentals of IP for Engineers: K.Bansl & P.Bansa

**REFERENCES:**

1. Ahuja, V K. Law relating to Intellectual Property Rights. India, IN: Lexis Nexis, 2017.
2. Prabuddha Ganguli,"Intellectual Property Rights: Unleashing the Knowledge Economy", McGraw Hill Education, 2011.
3. Neeraj, P., & Khusdeep, D. Intellectual Property Rights. India, IN: PHI learning Private Limited, 2014.
4. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

**WEB REFERENCES:**

1. Intellectual Property Rights and Development Policy: Report of the Commission on Intellectual Property Rights, London September 2002.
2. WIPO Intellectual Property Handbook. Policy, Law and Us.
3. Subramanian, N., &Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf
4. Cell for IPR Promotion and Management (http://cipam.gov.in/) .
5. Office of the Controller General of Patents, Designs & Trademarks (http://www.ipindia.nic.in/).

**ONLINE COURSES / RESOURCES:**

1. NPTEL Resource: Intellectual Property Rights (https://nptel.ac.in/courses/109106137)
2. Coursera Resource: Introduction to Intellectual Property (https://www.coursera.org/learn/introduction-intellectual-property)
3. Coursera Resource: Intellectual Property Law (https://www.coursera.org/specializations/introduction-intellectual-property)
4. Udemy Resource: Everything About Industrial Property Rights (https://www.udemy.com/course/everything-about-ipr-intellectual-property-rights/)

**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |

| Internal Assessment | | | | End Semester Examinations |
|---|---|---|---|---|
| Assessment I (100 Marks) | | Assessment II (100 Marks) | | |
| Individual Assignment / Case Study / Seminar / Mini Project | Written Test | Individual Assignment / Case Study / Seminar / Mini Project | Written Test | Written Examinations |
| 40 | 60 | 40 | 60 | 100 |
| 40% | | | | 60 % |

| 23EC1011 | TELEHEALTH TECHNOLOGY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To identify the basic principles used in telemedicine and telehealth.
- To describe the protocols behind encryption techniques for secure transmission of data in telemedicine.
- To apply multimedia technologies in telemedicine to enhance communication and diagnosis
- To analyze various telemedical standards and their application in telemedicine systems
- To evaluate patient information in a hospital setting for better management and treatment planning.
- To design telehealth solutions for improving healthcare delivery and patient care

**UNIT - I TELEMEDICINE AND HEALTH 9**

History and Evolution of telemedicine, Organs of telemedicine, Global and Indian scenario, Ethicaland legal aspects of Telemedicine - Confidentiality, Social and legal issues, Safety and regulatory issues, Advances in Telemedicine.

**UNIT - II TELEMEDICALTECHNOLOGY 9**

Principles of Multimedia - Text, Audio, Video, data, Data communications and networks, PSTN,POTS, ANT, ISDN, Internet, Air/ wireless communications Communication infrastructure for telemedicine – LAN and WAN technology. Satellite communication, Mobile communication.

**UNIT - III TELEMEDICAL STANDARDS 9**

Data Security and Standards: Encryption, Cryptography, Mechanisms of encryption, phases of Encryption. Protocols: TCP/IP, ISO-OSI, Standards to followed DICOM, HL7, H. 320 series Video Conferencing, Security and confidentiality of medical records, Cyber laws related to telemedicine

**UNIT - IV MOBILE TELEMEDICINE 9**

Tele radiology: Image Acquisition system Display system, Tele pathology, Medical information storage and management for telemedicine- patient information, medical history, test reports, medical images, Hospital information system.

**UNIT - V TELE MEDICAL APPLICATIONS 9**

Telemedicine – health education and self care. · Introduction to robotics surgery, Telesurger, Telecardiology, Teleoncology, Telemedicine in neurosciences, Business aspects-Project planning and costing, Usage of telemedicine.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

On successful completion of the course student will be able to:

1. Describe principles used for telemedicine and telehealth
2. Apply multimedia technologies in telemedicine.
3. Explain Protocols behind encryption techniques for secure transmission of data.
4. Explain various telemedical standards
5. Analyse patient information in hospital
6. Apply telehealth in healthcare.

**TEXT BOOKS:**


1. Norris, A.C. “Essentials of Telemedicine and Telecare”,Wiley,2012.


**REFERENCES:**


1. Wootton,R.,Craig,J.,Patterson,V.(Eds.),“IntroductiontoTelemedicine.RoyalSociety of Medicine” Press Ltd, Taylor & Francis 2016
2. O'Carroll, P.W., Yasnoff, W.A.,Ward,E., Ripp,L.H., Martin, E.L.(Eds), “Public Health Informatics and Information Systems”, Springer, 2013.
3. Simpson, W. Video over IP. A practical guide to technology and applications. Focal Press Elsevier, 2006
4. Bemmel, J.H. van, Musen, M.A. (Eds.) Handbook of Medical Informatics. Heidelberg, Germany: Springer, 1997 MohanBansa l, “MedicalInformatics”, TataMcGraw-Hill,2014.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 3 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
| **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Individual Assignment / Case Study / Seminar / Mini Project** | **Written Test** | **Written Examinations** |
| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23EC1002 | SOFTWARE ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the phases in a software project
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies, software testing, software process models
- To learn various testing and maintenance measures
- To understand the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects

**UNIT - I SOFTWARE PROCESS MODELS 9**

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Waterfall model – Spiral Model – V shaped model – RAD model – Iterative Model – Prototype model. Introduction to Agility : Extreme programming.

**UNIT - II REQUIREMENTS ANALYSIS AND SPECIFICATION 9**

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis.

**UNIT - III SOFTWARE DESIGN 9**

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

**UNIT - IV TESTING AND MAINTENANCE 9**

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

**UNIT - V PROJECT MANAGEMENT 9**

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning– Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Decompose the given project in various phases of a lifecycle.
2. Choose appropriate process model depending on the user requirements.
3. Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.

4. Know various processes used in all the phases of the product.
5. Apply the knowledge, techniques, and skills in the development of a software product.
6. Estimate the size of the software product.

**TEXT BOOKS:**


1. Roger S. Pressman, Bruce R.Maxim-Software Engineering - A Practitioner's Approach, Eight Edition, McGraw-Hill International Edition, 2015.
2. IanSommerville,-Software Engineering, 9th Edition, Pearson Education Asia, 2011.


**REFERENCES:**


1. Rajib Mall,Fundamentals of Software Engineering, Third Edition, PHI Learning PrivateLimited,2009.
2. PankajJalote, Software Engineering, A Precise Approach, Wiley India, 2010.
3. Kelkar S.A., Software Engineering, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, Software Engineering, Tata McGraw-Hill Publishing Company Limited,2007.
5. http://nptel.ac.in


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
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| **CO5** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |

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| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23EE1003 | LOGIC AND DISTRIBUTED CONTROL SYSTEM | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To give an overview of the automation technologies such as PLCs, SCADA and DCS used in industries
- To provide a fundamental understanding of the different languages used for PLC Programming
- To provide insight into some of the advanced principles those are evolving for present and future automation.

**UNIT - I PLC & SCADA 9**

PLC: Evolutions of PLCs – Programmable Controllers – Architecture, I/O modules – Comparative study of Industrial PLCs. SCADA: Remote terminal units- Master station - Communication architectures.

**UNIT - II BASICS OF PLC PROGRAMMING(LADDER) 9**

Basics of PLC programming – Ladder Logic – Relay type instructions – Timer/Counter instructions – Program control instructions – Data manipulation and math instructions – Programming Examples

**UNIT - III PLC PROGRAMMING (OTHER LANGUAGES) 9**

Functional block programming - Sequential function chart – Instruction list – Structured text programming – PLC controlled sequential Process Examples.

**UNIT - IV DISTRIBUTED CONTROL SYSTEM 9**

DCS: Evolution & types – Hardware architecture – Field control station – Interfacing of conventional and smart field devices (HART and FF enabled) with DCS Controller – Communication modules – Operator and Engineering Human interface stations – Study of any one DCS available in market.

**UNIT - V ADVANCED TOPICS IN AUTOMATION 9**

Introduction to Networked Control systems – Plant wide control – Internet of things – Cloud based Automation – OLE for Process Control – Safety PLC – Case studies: PLC - SCADA - DCS.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

On successful completion of the course student will be able to:

1. Understand all the important components such as PLC, SCADA, DCS,I/O modules and field devices of an industrial automation system
2. Develop PLC program in different languages for industrial sequential applications.
3. Select and use most appropriate automation technologies for a given application.
4. Gain knowledge on the recent developments in industrial automation.

**TEXT BOOKS:**


1. F.D. Petruzella, Programmable Logic Controllers, Tata Mc-Graw Hill, Third edition, 2010
2. Michael P. Lukas, Distributed Control Systems: Their Evaluation and Design, Van Nostrand Reinhold Co., 1986
3. D. Popovic and V.P.Bhatkar,' Distributed computer control for industrial Automation' Marcel Dekker, Inc., Newyork ,1990.


**REFERENCES:**


1. Clarke, G., Reynders, D. and Wright, E., "Practical Modern SCADA Protocols: DNP3,4. 60870.5 and Related Systems", Newnes, 1st Edition, 2004.
2. Hughes, T.A., "Programmable Logic Controllers: Resources for Measurements and Control Series", 3rd Edition, ISA Press, 2004.
3. McMillan, G.K., "Process/Industrial Instrument and Controls Handbook", 5th Edition, McGraw- Hill handbook, New York, 1999.
4. NPTEL Notes on, "Programmable Logic Control System" by Department of Electrical Engg., IIT Kharagpur.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| **CO2** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | | | | | 1 | 1 | 1 | 2 | 2 | 2 |
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| **Internal Assessment** | | | | **End Semester Examinations** |
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| 23EC1008 | ROBOTICS AND AUTOMATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To introduce basic robotic terminologies.
- To study about the sensors of robot.
- To understand the kinematics of robot.
- To illustrate about robotic vision.
- To apply robot based concepts in AI

**UNIT - I INTRODUCTION TO ROBOTS 9**

Introduction – Robotics -Definition and origin of robotics –components and structure of robots- different types of robot – various generations of robots – degrees of freedom – Robot classifications and specifications – Asimov's laws of robotics.

**UNIT - II POWER SOURCES, SENSORS AND ACTUATORS 9**

Hydraulic, pneumatic and electric drives: Design and control issues – determination of HP of motor and gearing ratio – variable speed arrangements – path determination – micro machines in robotics- machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors.

**UNIT - III KINEMATICS OF ROBOTS 9**

Link Description - Link-Connection Description - Convention for Affixing Frames to Links - Manipulator Kinematics- Actuator Space-Joint Space and Cartesian Space Case Studies: Kinematics Of Two Industrial Robots - frames with standard names-computational considerations.

**UNIT - IV ROBOTIC VISION 9**

Industrial application of vision controlled robotic system-process of imaging-architecture of robotics vision system-image acquisition-description of other components of vision systems-image representation - image processing.

**UNIT - V AI ROBOTICS 9**

Intelligent systems- elements of artificial intelligence- system architecture-applications of advanced robot-fuzzy logic control-advanced concept and procedures-future development-impact on employment.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Understand the evolution of robot technology and mathematically represent different types of robot.
2. Familiarize various electrical drive systems and sensors used in robotics for various applications.
3. Understand the kinematics of robotic device.
4. Understand the vision controlled robotic system.
5. Realize the description of components of vision systems.
6. Understand the applications of robotics in AI.

**TEXT BOOKS:**


1. Introduction to Robotics: Mechanics and control : J. Craig , Pearson,2008.
2. R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi, 4th Reprint, 2005.
3. James G. Keramas , Robot Technology Fundamendals India Edition.


**REFERENCES:**


1. Robotics Engineering : R. Klafter, PHI learning, 2009.
2. John M. Holland, "Designing Autonomous Mobile Robots-Inside the mind of an Intelligent Machine", Newnes Publication, 2004.
3. Robot : Dynamics and Control, Spong&Vidyasagar, McGraw Hill 2008.
4. Matthew T. Mason , Mechanics of Robotic Manipulation (Intelligent Robotics and Autonomous Agents) , MIT press 2022.
5. Groover, M.P., Weiss, M., Nagel, R.N., & Odrey, N.G. Industrial robotics - technology, programming, and applications.
6. Robotics and Control , Mittal R K & Nagrath I J , TMH.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| **CO2** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 1 | 2 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
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| **40%** | | | | **60 %** |

| 23IT1001 | WEB DESIGN AND MANAGEMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To Learn the basic concepts in HTML, CSS, JavaScript.
- To Understand the responsive design and development.
- To highlight the web frameworks in Web 2.0.
- To Design a Website with HTML, JS, CSS / CMS - Word press.
- To implement the project using CSS and open source.

**UNIT - I WEB DESIGN - HTML MARKUP FOR STRUCTURE AND CSS** **9**

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Addi Links -Adding Images - Table Markup - Forms - HTML5, CSS - Formatting text - Colours a Background - Padding, Borders and Margins - Floating andpositioning - Page Layout with CSS Transition, Transforms and Animation – Javascript - Using JavaScript

**SUGGESTED ACTIVITIES:**

Create HTML web page using CSS and JS
Create colorful web page design using CSS box model

**SUGGESTED EVALUATION METHODS:**

Quiz on HTML basic tags and CSS layout
Assignment submission on creating web page for different application.

**UNIT - II RESPONSIVE WEB DESIGN** **9**

Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or Desktop- First –CSSGrids, CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger -Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design.

**SUGGESTED ACTIVITIES:**

Create a simple web design using /Java /any language
Design small UI

**SUGGESTED EVALUATION METHODS:**

Build a responsive SaaS web page design
Create a Code for responsive web design videos.

**UNIT - III WEB FRAMEWORK** **9**

Django Template System - Interacting with a Database (Modules) - Django Administration Site, Form Processing, Advanced Views and Urlconfs, Generic Views - Extending the Template Engine - Generating Non-HTML Content, Sessions, Users, Registration, Caching, Other Contributed Sub Frameworks, Middleware, Integrating with Legacy Databases and Applications, Extending Django's Admin Interface, Internationalization, Security and Deploying Django.The Model Definition Reference, The Data Base API Reference, Generic Views Reference, Settings, Built-In Template Tags and Filters,

**SUGGESTED ACTIVITIES:**

Use web application framework software like Django, Flask to design and support the web application. Build web application using Ruby language.

**SUGGESTED EVALUATION METHODS:**

Assignment on web framework tool.

**UNIT - IV WEB PROJECT MANAGEMENT 9**

Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting- Running the project - Technical Documentation - Development , Communication, Documentation – QAand testing -Deployment - Support and operations.

**SUGGESTED ACTIVITIES:**

Case studies on Technical documentation

Real world domain specific problems involving project life cycle.

**SUGGESTED EVALUATION METHODS:**

Student assignment on case studies related to healthcare, climate change, ecommerce, retail business, manufacturing etc.

**UNIT - V PRODUCTION, MAINTENANCE AND EVALUATION 9**

Design and Construction – Testing, Launch and Handover – Maintenance – Review and Evaluation – Case Study: Using the Skills and Concepts Learn with the ADOBE IMAGE READY,DREAM WEAVER, FLASH, and Scripts, Develop Portfolios in the Form of Web Pages which have to be uploaded in Free Public Domains.

**SUGGESTED ACTIVITIES:**

Case studies on applications involving concept of adobe image ready.

Demonstration of develop portfolio in form of web page.

**SUGGESTED EVALUATION METHODS:**

Quiz on Testing and develop portfolio.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Design Website using HTML CSS and JS.
2. Design Responsive Sites.
3. Identify the suitable web framework to support the development of web applications.
4. Manage, Maintain and Support Web Apps.
5. Write and demonstrate simple web applications involving CSS.
6. Create and maintain responsive websites and employ strategies with user-centered design methodologies.

**TEXT BOOKS:**


1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition.
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015.
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011.


**REFERENCES:**


1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014.
2. Jon Duckett, Jack Moore,"JavaScript & JQuery: Interactive Front-End Web Development".
3. John Wiley and Sons, edition 2014.

## CO-PO MAPPING

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | 1 | | | | 1 | 1 | 3 | 2 | 2 | 2 |

| **Internal Assessment** | | | | **End Semester Examinations** |
|---|---|---|---|---|
| **Assessment I (100 Marks)** | | **Assessment II (100 Marks)** | | |
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| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23CB1002 | MOBILE APPLICATION DEVELOPMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To demonstrate their understanding of the fundamentals of Android operating systems.
- To learn how to utilize rapid prototyping techniques to design and develop
- sophisticated Android application.
- To understand the platform for developing mobile application.
- To show their ability to deploy software to mobile devices.
- To exhibit their ability to debug programs running on mobile devices.

**UNIT - I INTRODUCTION TO ANDROID OPERATING SYSTEM 9**

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes.

**SUGGESTED ACTIVITIES:**

- Understanding the Android OS
- Acquire knowledge on basic building blocks of Android programming required for App development.

**SUGGESTED EVALUATION METHODS**

- Quizzes
- Assignments

**UNIT - II CONTROLS AND USER INTERFACE 9**

Measurements – Device and pixel density independent measuring units - Layouts – Linear, Relative, Grid and Table Layouts - User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers -Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities.

**SUGGESTED ACTIVITIES:**

- Acquire the knowledge on Android devices and Platform
- Understanding the UI components.

**SUGGESTED EVALUATION METHODS**

- Pedagogical tools

Assignments

**UNIT - III INTENTS AND BROADCASTS 9**

Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS -Broadcast Receivers –Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts- Accessing Databases.

**SUGGESTED ACTIVITIES:**

- Understanding the working principle of Android for app development.
- Develop and publish Android applications in to Android Market

**SUGGESTED EVALUATION METHODS**

- Quizzes
- Crossword puzzles

**UNIT - IV INTRODUCTION TO iOS 9**

Introduction to iPhone, MVC Architecture, View Controller - Building the UI and Event handling, Application life cycle, Tab Bars, Story Boards and Navigation Controllers, Table View, Push Notification, Database handling, Introduction to icloud, Webkit framework in iOS8, Deploying and publishing application.

**SUGGESTED ACTIVITIES:**

- Understand the concepts of iOs.
- Develop and publish applications using iOS

**SUGGESTED EVALUATION METHODS**

- Assignments
- Crossword puzzles

**UNIT - V WINDOWS MOBILE APP DEVELOPMENT 9**

. Introduction to Windows Phone 8, Application Life cycle, UI Designing and events, Building, Files and Storage, Network Communication, Push Notification, Background Agents, Maps and Locations, Data Access and storage, Introduction to Silverlight and XAML, Data Binding, Deploying and Publishing

**SUGGESTED EVALUATION METHODS**

- Assignments
- Quizzes

**TOTAL: 45 PERIODS**

**OUTCOMES:**

On successful completion of the course student will be able to:

1. Learn and understand the technology and business trends impacting mobile application.
2. Understand and remember the components of android, iOS, and windows mobile application.
3. Learning the techniques for developing mobile applications.
4. Create the mobile applications with compelling user interface and database connectivity for real time applications.
5. Apply and develop mobile application with iOS platform.
6. Develop and deploy mobile applications using Silverlight.

**TEXT BOOKS:**

1. Reto Meier, “Professional Android Application Development”, Wrox, 2010.
2. David Mark, Jack Nutting and Jeff LaMarche, “Beginning iOS 6 Development Exploring the iOS SDK”, Apress, 2013.

**REFERENCES:**

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.
2. Baijian Yang, Pei Zheng, Lionel M. Ni, “Professional Microsoft Smartphone Programming”, Wrox Edition.

**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | 1 | 1 | | 1 | 1 | 1 | 3 | 1 | 2 | 2 |
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| 40 | 60 | 40 | 60 | 100 |
| **40%** | | | | **60 %** |

| 23EE1929 | INTELLIGENT CONTROL OF ELECTRIC VEHICLES | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 2 | 3 |

**OBJECTIVES:** To impart Knowledge on the following topics:

- To design and drive the mathematical model of a BLDC motor and its characteristics.
- To learn the different control schemes for BLDC motor.
- To study the basics of fuzzy logic.
- To study the FPGA & VHDL basics.
- To implement fuzzy logic control of BLDC motor in real time.

**UNIT - I MATHEMATICAL MODEL AND CHARACTERISTICS ANALYSIS OF THE BLDC MOTOR 6**

Structure and Drive Modes - Basic Structure, General Design Method, Drive Modes. Mathematical Model, Differential Equations, Transfer Functions, State-Space Equations. Characteristics Analysis, Starting Characteristics, Steady-State Operation, Dynamic Characteristics, Load Matching Commutation Transients

**UNIT - II SPEED CONTROL FOR ELECTRIC DRIVES 6**

Introduction -PID Control Principle, Anti windup Controller, Intelligent Controller. Vector Control. Control applied to BLDC motor.

**UNIT - III FUZZY LOGIC 6**

Membership functions: features, fuzzification, methods of membership value assignments Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems, overview of fuzzy expert system-fuzzy decision making.

**UNIT - IV FPGA AND VHDL BASICS 6**

Introduction – FPGA Architecture-Advantages-Review of FPGA family processors-Spartan 3, Spartan 6 and Spartan 7. VHDL Basics- Fundamentals-Instruction set-data type-conditional statements- programs like arithmetic, sorting, PWM generation, Speed detection.

**UNIT - V REAL TIME IMPLEMENTATION 6**

Inverter design, identifying rotor position via hall effect sensors, open loop and fuzzy logic control of 48 V BLDC motor using FPGA.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. To design the mathematical model of a BLDC motor and to discuss about its characteristics.
2. To demonstrate the PID control, ant windup controller, Intelligent Controller and Vector Control. Control applied to BLDC motor.
3. To illustrate the basics of fuzzy logic system.
4. To describe the basics of VHDL & FPGA applied to control of EVs.
5. To design and implement of fuzzy logic control scheme for BLDC motor using FPGA in real time.

6. Design and simulate controllers for induction motors in EV for steady sate and transient conditions.

**TEXT BOOKS:**

1. Electric Powertrain Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles, John G. Hayes, G. Abas Goodarzi, Wiley 1st Edition, 2018.
2. VHDL Primer, A (3rd Edition), Jayaram Bhasker, Prentice Hall, 1st Edition, 2015.

**REFERENCES:**


1. Iqbal Hussain, "Electric and Hybrid Vehicles: Design Fundamentals, Third Edition" CRC Press, Taylor & Francis Group, 2021, 1st Edition.
2. Chang-liang, Permanent Magnet Brushless DC Motor Drives and Controls, Xia Wiley, 2012, 1st Edition.
3. M.N. Cirstea, A. Dinu, J.G. Khor,M. McCormick, Neural and Fuzzy Logic Control of Drives and Power Systems, Newnes publications, 1st Edition, 2002.
4. Wei Liu, Hybrid Electric Vehicle System Modeling and Control, Wiley, 2017, 2nd Edition.
5. Electric and Plug-in Hybrid Vehicle Networks Optimization and Control, Emanuele Crisostomi • Robert Shorten, Sonja Stüdli • Fabian Wirth, CRC Press, 1st Edition, 2018.


**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | | | |
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| PSO1 | PSO2 | PS03 |
|---|---|---|

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| Assessment I (100 Marks) | | Assessment II (100 Marks) | | |
| Individual Assignment / Case Study / Seminar / Mini Project | Written Test | Individual Assignment / Case Study / Seminar / Mini Project | Written Test | Written Examinations |
| 40 | 60 | 40 | 60 | 100 |
| 40% | | | | 60 % |

| 23ME1005 | HOSPITAL MANAGEMENT | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**OBJECTIVES:**

- To understand the fundamentals of hospital administration and management.
- To know the market related research process.
- To explore various information management systems and relative supportive services.
- To learn the quality and safety aspects in hospital.

**UNIT - I OVERVIEW OF HOSPITAL ADMINISTRATION 9**

Distinction between Hospital and Industry, Challenges in Hospital Administration – Hospital Planning- Equipment Planning – Functional Planning.

**UNIT - II HUMAN RESOURCE MANAGEMENT IN HOSPITAL 9**

Principles of HRM – Functions of HRM – Profile of HRD Manager –Human Resource Inventory – Manpower Planning.

**UNIT - III RECRUITMENT AND TRAINING 9**

Different Departments of Hospital, Recruitment, Selection, Training Guidelines – Methods of Training – Evaluation of Training – Leadership grooming and Training, Promotion – Transfer.

**UNIT - IV SUPPORTIVE SERVICES 9**

Medical Records Department – Central Sterilization and Supply Department – Pharmacy – Food Services - Laundry Services.

**UNIT - V COMMUNICATION AND SAFETY ASPECTS IN HOSPITAL 9**

Purposes – Planning of Communication, Modes of Communication – Telephone, ISDN, Public Address and Piped Music – CCTV. Security – Loss Prevention – Fire Safety – Alarm System – Safety Rules.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

On successful completion of the course student will be able to:

1. Understand fundamentals of hospital administration and management and their importance in the globalized competitive world.
2. Understand the market related research process.
3. Explore various information management systems and relative supportive services.
4. Apply the quality and safety aspects in hospital.
5. Able to understand the communication and safety aspects in hospital.

**TEXT BOOKS:**

1. R.C.Goyal, “Hospital Administration and Human Resource Management”, PHI – Fourth Edition, 2006.
2. G.D.Kunders, “Hospitals – Facilities Planning and Management – TMH, New Delhi – Fifth Reprint 2007.

**REFERENCES:**

1. Cesar A.Caceres and Albert Zara, “The Practice of Clinical Engineering, Academic Press, New York, 1977.
2. Norman Metzger, “Handbook of Health Care Human Resources Management”, 2nd edition, Aspen Publication Inc. Rockville, Maryland, USA, 1990.
3. Peter Berman “Health Sector Reform in Developing Countries” - Harvard University Press, 1995.
4. William A. Reinke “Health Planning For Effective Management” - Oxford University Press.1988.
5. Blane, David, Brunner, “Health and SOCIAL Organization: Towards a Health Policy for the 21st Century”, Eric Calrendon Press 2002.
6. Arnold D. Kalcizony& Stephen M. Shortell, “Health Care Management”, 6th Edition Cengage Learning, 2011.

**WEB REFERENCES**

1. https://www.karexpert.com/blogs/what-is-hospital-management-system/
2. https://mocdoc.in/blog/a-detailed-view-of-hospital-management-system-hms
3. https://www.leadsquared.com/hospital-management-system-hms/
4. https://gloriumtech.com/hospital-management-software-development-key-features and benefits/

**ONLINE COURSES / RESOURCES:**

1. https://youtu.be/QDnU1q64vvw
2. https://youtu.be/EnN6zQ0fbBk
3. https://youtu.be/r6TfQtHvqX4
4. https://youtu.be/VS4olM_Y7aI

**CO-PO MAPPING**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | | 1 | 1 | | | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO2** | 3 | 3 | 2 | | 1 | 1 | | | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 2 | | 1 | 1 | | | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO4** | 3 | 3 | 2 | | 1 | 1 | | | 1 | 1 | 3 | 2 | 2 | 2 |
| **CO5** | 3 | 3 | 2 | | 1 | 1 | | | 1 | 1 | 3 | 2 | 2 | 2 |

| Internal Assessment | | | | End Semester Examinations |
|---|---|---|---|---|
| Assessment I (100 Marks) | | Assessment II (100 Marks) | | |
| Individual Assignment / Case Study / Seminar / Mini Project | Written Test | Individual Assignment / Case Study / Seminar / Mini Project | Written Test | Written Examinations |
| 40 | 60 | 40 | 60 | 100 |
| 40% | | | | 60 % |