# LIST OF OPEN ELECTIVES
TO BE OFFERED IN THE ODD SEMESTER (CEG / ACT / SAP CAMPUS)
R-2019

## FACULTY OF CIVIL ENGINEERING

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## FACULTY OF MECHANICAL ENGINEERING

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## DEPARTMENT OF INDUSTRIAL ENGINEERING

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## DEPARTMENT OF PRINTING TECHNOLOGY

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## FACULTY OF INFORMATION AND COMMUNICATION ENGINEERING

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### B.E. Biomedical Engineering

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### DEPARTMENT OF INFORMATION SCIENCE AND TECHNOLOGY

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### FACULTY OF TECHNOLOGY

#### Department of Applied Science and Technology

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#### B.Tech. Leather Technology

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#### B.Tech. Industrial Biotechnology

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### FACULTY OF SCIENCE AND HUMANITIES

#### DEPARTMENT OF ENGLISH

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### FACULTY OF ARCHITECTURE AND PLANNING

#### Department of Architecture

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OBJECTIVE:
To understand the basics of traffic engineering, planning, operation and its latest developments

UNIT I  INTRODUCTION  9
Introduction to Traffic Management - Importance and scope, Road characteristics, classification of urban and rural roads - overall view of road geometric elements

UNIT II  TRAFFIC CHARACTERISTICS  9
Road User Characteristics - Vehicle characteristics - Pedestrian Flow - Facilities - Cycle traffic - Facilities

UNIT III  ROAD ACCIDENTS  9
Road Accidents - Causes and Prevention - Conflict points - Case study

UNIT IV  TRAFFIC CONTROL  9
Traffic signs and Road Marking - Channelizing Islands - Rotary Intersection - Traffic Signals - Grade separation

UNIT V  ADVANCED TRAFFIC MANAGEMENT  9
Traffic signal coordination - Area traffic control - Command and control center - Intelligent Transportation System (ITS) - Parking - Advanced Traveller Information System - Electronic Toll Collection - Traffic Security

TOTAL: 45 PERIODS

COURSE OUTCOME
CO1  Understand the principles and standards adopted in planning and Design of Traffic system
CO2  Understand the behavior of Traffic characteristics
CO3  Gain Information and knowledge about the causes of road accidents and prevention measures to ensure the safety of road users
CO4  Designing various types of control and regulatory measures to meet an efficient traffic network
CO5  Understand various traffic management measures in addressing the demand, pricing and ITS application

TEXTBOOKS
3. Srinivasa Kumar, "Introduction to Traffic Engineering", Universities Press, 2018

REFERENCES:
1. Indian Roads Congress (IRC) Specifications: Guidelines and special publications on Traffic Planning and Management
CO-PO MAPPING

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CE5792 ENVIRONMENTAL REMEDIATION TECHNOLOGIES

OBJECTIVE:
- To impart knowledge on the technological profile, merits, challenges, success stories and recent advancements of the conventional and innovative technologies that are most commonly deployed for the restoration of contaminated sites.

UNIT I ENVIRONMENTAL POLLUTANTS
Definition of the term environmental pollution - Broad categories of environmental pollutants including chemical, physical and biological pollutants with examples - Classes of chemical pollutants with examples - Organic Vs Inorganic pollutants - Priority organic pollutants (POPs) Vs. Emerging pollutants - Potential pollutant sources - Occurrence and distribution of chemical pollutants in soils, sediments, air and biota.

UNIT II ENVIRONMENTAL REGULATIONS AND SELECTION OF SUITABLE REMEDIAL MEASURES
Existing global regulatory frameworks and policies for hazardous pollutants - Environmental and health challenges due to pollutants beyond permissible limits - Defining remediation goals using risk assessment guided by bioavailability concepts - Factors that affect the selection and suitability of remedial approaches - In-situ Vs. ex-situ remediation technologies.

UNIT III EXISTING PHYSICAL AND CHEMICAL REMEDIATION TECHNOLOGIES
UNIT IV

CONVENTIONAL BIOREMEDIATION APPROACHES FOR THE MANAGEMENT OF CONTAMINATED ENVIRONMENTS

Natural attenuation - Land farming - Biopiles - Bioaugmentation - Biostimulation - Composting - Bioreactors – Biofilters for air purification - Solidification/stabilization - Phytoremediation - Biosorption - Constructed wetlands – Technology suitable to specific contaminant - Advantages – Disadvantages – Case studies

UNIT V: EMERGING REMEDIATION TECHNOLOGIES

Microbial fuel cells - Nanoremediation - Transgenic plants and microbes - Microbial consortia in photo-hetero microbial system - Ultrasonic technology - Advanced photocatalytic oxidation – Biocatalysis - Hybridisation of different technologies to suit site specific needs - Sustainable remediation

OUTCOMES:
On completion of the course, the student is expected to be able to:

CO1: Explain about the different types of environmental pollutants, their sources, and distribution in different environmental compartments

CO2: Explain about the impacts of environmental pollutants, existing regulations/policies factors to be considered for selecting right remediation technology for successful risk based clean-up of a problematic site

CO3: Select an appropriate physical and/or chemical clean-up option for environments contaminated with different types of pollutants in order to achieve the target remedial endpoints

CO4: Select a suitable bioremediation technology to achieve clean up goals

CO5: Possess a detailed knowledge of the emerging techniques that could successfully overcomes the challenges faced in remediating different groups of contaminants and suit site specific needs

REFERENCES:

CO's- PO's & PSO's MAPPING

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1.low, 2-medium, 3-high, '-'-no correlation
OBJECTIVES:

- To understand the Earth’s Climate System and the concept of Global Warming.
- To comprehend the impact of climate change on society and its mitigation measures.

UNIT I  EARTH’S CLIMATE SYSTEM  9

UNIT II  OBSERVED CHANGES AND ITS CAUSES  9

UNIT III  IMPACTS OF CLIMATE CHANGE  9

UNIT IV  CLIMATE CHANGE ADAPTATION AND MITIGATION MEASURES  9

UNIT V  CLEAN TECHNOLOGY AND ENERGY  9

TOTAL : 45 PERIODS

OUTCOMES:

On completion of the course, the student is expected to be able to
CO1: Understand the basics and causes of climate change
CO2: Comprehend the latest IPCC climate scenarios
CO3: Gain in-depth knowledge on vulnerability of climate change
CO4: understand the adaptation measures to overcome the climate change impacts
CO5: Gain knowledge to mitigate climate change impacts in an ecofriendly manner

REFERENCES:

3. IPCC Fourth Assessment Report – The AR4 Synthesis Report,
GI5791  COMPUTER VISION AND SATELLITE IMAGE PROCESSING  L T P C
3 0 0 3

OBJECTIVE:
• The objective of the course is to describe about the fundamentals of computer vision and concepts of satellite data acquisition and analysis.

UNIT I  FUNDAMENTALS OF COMPUTER VISION 9
Image Formation and Coordinate Transformations - Camera Matrix - Motion/Stereo Pin-hole model - Human eye / cognitive aspects of colour / 3D space; Illumination; Sampling and Quantization - Coordinate transformations and camera parameters - Satellite data acquisition Whisk and push broom scanning: data products - Data formats: Image Display systems

UNIT II  IMAGE DEGRADATION AND RESTORATION 9
Sensor model; Sensor parameters – Spectral, Spatial, temporal and radiometric resolution; Image Representation-domains, frequency and feature space domain - geometry and Radiometry – Colour concepts – Sources of Image degradation and Correction procedures- Atmospheric, Radiometric, Geometric Corrections- Image Geometry Restoration-Interpolation methods and resampling techniques.

UNIT III  IMAGE ENHANCEMENT 9
Histograms – types, scope, Univariate and multi variate statistics; Scattergrams; operators – point, local and regional operators; Contrast manipulation - contrast, spatial feature and multi image manipulation techniques - Fourier transform - principle component analysis - Optimal Rotation Transformation – Scale-space transform, wavelet transform. Multi-image fusion

UNIT IV  IMAGE CLASSIFICATION 9

UNIT V  IMAGE ANALYSIS 9
Pattern recognition - boundary detection and representation - textural and contextual analysis decision concepts: Fuzzy sets - evidential reasoning - Expert system – Features, ArchitectureRule based expert system; Artificial Neural Network- Architecture- Types: Adaline, Madaline, SOM and BPN networks – Case studies

OUTCOME:
• On completion of this course, the student shall be able to get familiarized about various fundamentals of computer vision, image enhancement and image processing techniques.
TEXT BOOKS:

REFERENCES:

GI5792 REMOTE SENSING CONCEPTS

OBJECTIVES:
- To introduce the concepts of remote sensing processes and its components.
- To expose the various remote sensing platforms and sensors and to introduce the elements of data interpretation

UNIT I REMOTE SENSING AND ELECTROMAGNETIC SPECTRUM

UNIT II EMR INTERACTION WITH ATMOSPHERE
Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of radiation with atmosphere - Scattering (Rayleigh, Mie, non-selective scattering) absorption and refraction – Atmospheric effects on visible, infrared, thermal and microwave spectrum – Atmospheric windows.

UNIT III EMR INTERACTION WITH EARTH

UNIT IV PLATFORMS AND SENSORS

UNIT V DATA PRODUCTS, VISUAL AND DIGITAL IMAGE PROCESSING

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course the student will be able to understand
• The characteristics of electromagnetic radiation and its interaction with earth features
• The types and configuration of various satellites and sensors
• The elements of data interpretation

TEXT BOOKS:

REFERENCES:

ME5791 ENERGY AUDITING AND CONSERVATION

OBJECTIVES:
• To understand the various methods of energy auditing and management.
• To carryout energy accounting and balancing
• To impart knowledge on the various energy conservation opportunities of utilities.

UNIT I INTRODUCTION

UNIT II ENERGY COSTING AND ECONOMICS

UNIT III ELECTRICAL SYSTEMS

UNIT IV THERMAL SYSTEMS

UNIT V ENERGY CONSERVATION IN MAJOR UTILITIES

TEXT BOOKS:
REFERENCES:

ME5792 PRINCIPLES OF SUSTAINABLE ENGINEERING

OBJECTIVES:
Upon completion of this course, the students will able to:
- To educate the need for sustainability and the basic principles on sustainability
- To perform sustainable assessment using LCA approaches
- To perform sustainable assessment using LCIA approaches
- To be aware of ethical concerns in sustainable Engineering
- To study various solutions to achieve sustainability

UNIT I INTRODUCTION

UNIT II SUSTAINABILITY ASSESSMENT - I

UNIT III SUSTAINABILITY ASSESSMENT - II
Steps in LCIA, software of sustainability Assessment, case studies.

UNIT IV MACROETHICS OF SUSTAINABLE ENGINEERING
Framing ethics, level of ethics, Golden rule, Ethical theories, Analysing ethical situations, challenges, case studies.

UNIT V SOLUTIONS FOR SUSTAINABILITY
Designing sustainable processes and products, Ecosystem ecology, Industrial symbiosis, circular economy, ecosystem in engineering, economic policies, societal development, case studies.

OUTCOMES:
- Understand and apply the basic principles of sustainability
- Conduct of Life cycle assessment using different approaches
- Conduct LCIA using softwares
- Understand the ethical part of sustainable engineering
- Design sustainable processes for various applications

REFERENCES
ME5793  FUTURE ENERGY RESOURCES AND MOBILITY  L T P C  3 0 0 3

UNIT I  CURRENT AND FUTURISTIC ENERGY RESOURCES  9

UNIT II  ALTERNATE ENERGY RESOURCES  9

UNIT III  CURRENT AND FUTURE INTERNAL COMBUSTION ENGINES(ICE) FOR MOBILITY  9

UNIT IV  ALTERNATE ENERGY RESOURCES POWERED MOBILITY  9
Fuel Cell Powered Vehicle Technologies, Battery Powered Electric Vehicle Technologies, Requirements of fuelling and charging Infrastructures, Comparison of Merits and Demerits, Life cycle analysis and Carbon credit gained between Alternate and Conventional Fuel powered mobility.

UNIT V  DATA ANALYSIS OF CURRENT AND FUTURE MOBILITY APPLICATIONS  9
Student should analyse and present the case study report by observing the market trends and predictions by reading reports, magazines, research articles, books, chapters, and online tools. Evaluation of student case study report can be performed by Power Point Presentation or Correcting Hard Copy Reports.

TOTAL : 45 PERIODS

BOOKS FOR REFERENCE:
4. HCCI Diesel Engines - Nptel - https://nptel.ac.in/courses/112104033/34
5. HCCI and CAI Engines – Nptel - https://nptel.ac.in/courses/112104033/33 CO PO PS

ME5794  HYDROGEN AS A FUEL FOR POWERTRAINS  L T P C  3 0 0 3

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students:

• To acquaint with the benefits, properties and availability of hydrogen as an energy source in many engineering applications
• To develop an understanding of using hydrogen as a fuel for spark ignition (S.I.) internal combustion engines
• To develop an understanding of using hydrogen as a fuel for compression ignition (C.I.) internal combustion engines
• To acquaint with the basic principle of operation of hydrogen fuel cells and its environment impacts
• To appreciate the application and limitations of using hydrogen fuel cells in vehicles
UNIT I  HYDROGEN AS ENERGY SOURCE  9

UNIT II  HYDROGEN IN S.I. ENGINE SYSTEM  9

UNIT III  HYDROGEN IN C.I. ENGINE SYSTEM  9
Design modification of Engine, Combustion Characteristics - Dual Fueling, Direct Injection of Gaseous and Liquefied Hydrogen. Hydrogen enrichment

UNIT IV  FUEL CELLS  9
Fuel Cells: Description, working principle, anodic, cathodic and cell reactions - fabrication of electrodes and other components- applications - advantages, disadvantages and environmental aspects - Fuels for Fuel Cells: Hydrogen - Sources and preparation, reformation processes for hydrogen - clean up and storage of the fuels - use in cells, advantages and disadvantages of using hydrogen as fuel.

UNIT V  FUEL CELL FOR VEHICLES  9
Operating Principle - Fuel Cell Stack Assembly - Drive Train details- Safety Aspects of a Hydrogen Fuel Cell - FCVs vs BEVS vs ICE - Challenges Ahead for FCVs

TOTAL: 45 PERIODS

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

- Understand the benefits, properties and availability of hydrogen as an energy source in many engineering applications
- Analyse the hydrogen’s performance as a fuel for spark ignition (S.I.) internal combustion engines
- Analyse the hydrogen’s performance as a fuel for compression ignition (C.I.) internal combustion engines
- Understand the basic principle of operation of hydrogen fuel cells and its environment impacts
- Appreciate the application and limitations of using hydrogen fuel cells in vehicles

REFERENCES:
2. Pasquale Corbo, Fortunato Migliardini and Ottorino Veneri, Hydrogen Fuel Cells for Road Vehicles (Green Energy and Technology), Spinger, 2011.

ME5795  CONCEPTS OF COMPETITIVE MANUFACTURING  L T P C
3 0 0 3

COURSE OBJECTIVES:
1. To explain the lean principles and the need to follow these principles in industries.
2. To give an overview of the various tools and techniques involved in lean manufacturing used in industries.
3. To learn the basics involved in Green manufacturing.
4. To give an understanding of the various tools used in a six sigma project for quality improvement.
5. To provide an overview of the DMAIC methodology in a six sigma project.
UNIT I  LEAN MANUFACTURING  9

UNIT II  LEAN MANUFACTURING – TOOLS AND TECHNIQUES  9

UNIT III  GREEN MANUFACTURING  9

UNIT IV  SIX SIGMA – TOOLS AND TECHNIQUES  9
Cost of Quality – Conformance and Non-Conformance cost, Seven Basic Quality Control Tools, Seven Management tools, FMEA.

UNIT V  SIX SIGMA METHODOLOGY  9
Need for Six Sigma, Six Sigma Team, DMAIC Methodology - Define, Measure, Analyse, Improve and Control; Lean Six Sigma.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course the students would be able to
- Describe the importance and evolution of lean principles.
- Apply the various tools, techniques and methodology of lean manufacturing to improve the efficiency of an organization.
- Explain the need for green manufacturing techniques.
- Explain the various tools and techniques needed for a six sigma project.
- Apply six sigma methodology to improve quality in a given situation.

TEXTBOOKS:
2. Pascal Dennis, “Lean production Simplified: A plain language guide to the world’s most powerful Production system”, Productivity Press 2007

REFERENCES:
UNIT I  SOLAR DOMESTIC WATER HEATING  9
Solar flat plate collector - evacuated tubular collectors - concentrator collectors – Components of collectors – Collector performance – System layouts and installation solar water heating systems - Reduction of fuel bills and pollution.

UNIT II  SOLAR LIGHTING  9

UNIT III  SOLAR COOKING  9

UNIT IV  SOLAR DRYING AND SOLAR DESALINATION  9
Necessity for desalination - Basics of solar still – Components of solar still – Performance evaluation - Socioeconomic Benefits

UNIT V  SOLAR COOLING  9

ML5791  PLASTICS ENGINEERING  9
UNIT I  INTRODUCTION  9
Engineering plastics –. Basic concepts – Classification – Thermoplastics and Thermosets – Tacticity – Crystalline and Amorphous polymers – Molecular weights of polymers – Polydispersity – MWD -Glass transition temperature (Tg) – Polymerization methods and Techniques

UNIT II  PROCESS ENGINEERING  9

UNIT III  CHARACTERIZATION AND TESTING METHODS  9
Thermal – TGA, DSC, TMA, Mechanical – Tensile, Compressive, impact, Chemical - IR, NMR, Optical – Electrical - Molecular weight – GPC, melt index, Flammability

UNIT IV  COMPOSITES  9
Matrices and fiber reinforcements - Processing of polymer matrix composites – Thermoplastic matrix composites – injection moulding and thermoset matrix composites – Hand layup, filament winding, pultrusion, resin transfer moulding

UNIT V  SPECIALTY POLYMERS  9
Conducting polymers – Polymers for biomedical applications- controlled drug delivery systems, bones, dentistry, Lithography, Ionic polymers, polymer membranes for water treatment – High temperature performance polymers – Batteries and Energy – Construction and Transportation

TOTAL : 45 PERIODS
REFERENCES:


TEXT BOOKS:
OBJECTIVES:
- To understand the fundamental principles of Classical Design of Experiments (DoE) and Taguchi’s approach
- To develop skills to design and conduct experiments using DoE and Taguchi’s approach
- To develop competency for analysing the data to determine the optimal process/product parameters

UNIT I  CONCEPTS AND TERMINOLOGY  9

UNIT II  SINGLE FACTOR EXPERIMENTS  9
Completely randomized design, Randomized block design, effect of coding the observations, Latin Square design, comparison of treatment means.

UNIT III  FACTORIAL EXPERIMENTS  9
Main and interaction effects, two and three factor full factorial design, $2^k$ designs with two and three factors, Yate’s algorithm, practical applications.

UNIT IV  SPECIAL EXPERIMENTAL DESIGNS  9
Blocking and confounding in $2^k$ design, nested design, two level fractional factorial design, fitting regression models, introduction to response surface methods.

UNIT V  TAGUCHI TECHNIQUES  9
Introduction, Orthogonal designs, data analysis using ANOVA and response graph, parameter design – noise factors, objective functions (S/N ratios), Applications.

OUTCOMES:
CO1: To learn various design principles and steps involved in designing an experiment
CO2: To formulate objective(s) and identify key factors in designing experiments for a given problem.
CO3: To develop appropriate experimental design to conduct experiments for a given problem.
CO4: To analyze experimental data to derive valid conclusions.
CO5: To design robust products and processes using Taguchi’s parameter design approach.

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TEXT BOOKS:

REFERENCE:
OBJECTIVES:

- Impart knowledge in reliability engineering concepts.
- Conduct life data analysis
- Assess Reliability of a system
- Describe the maintenance policies and construct inspection decision models
- Impart knowledge in Maintenance management techniques.

UNIT I  RELIABILITY CONCEPT

Reliability definition – A priori and posteriori probabilities of failure -Reliability parameters- f(t), F(t) and R(t) functions- Mortality graph –Useful life.

UNIT II  FAILURE DATA ANALYSIS


UNIT III  RELIABILITY PREDICTION

Series parallel configurations – Parallel redundancy – m/n system – Standby system -Complex systems: RBD approach – Baye’s method – Minimal path and cut sets - Fault Tree analysis.

UNIT IV  MAINTENANCE STRATEGIES


UNIT V  MAINTENANCE DECISIONS


TOTAL: 45 PERIODS

OUTCOMES:

CO1: Able to acquire knowledge in Reliability Engineering.
CO2: Able to conduct failure data analysis.
CO3: Can carry out reliability assessment of any complex system.
CO4: Able to demonstrate the application of maintainability models
CO5: Manage effectively the maintenance related functions of an organization.

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TEXT BOOKS:

REFERENCES:

MF5791 ELECTRONICS PACKAGING TECHNOLOGY

OBJECTIVES:
- To impart knowledge on wafer preparation, PCB fabrication, through hole technology and surface mount technology
- To introduce the types of electronic components and their packaging
- To elaborate various steps in surface mount technology
- To be conversant with various testing and inspection methods of populated PCB’s
- To outline various defects, repair, rework and quality aspects of Electronics assemblies.

UNIT I INTRODUCTION TO ELECTRONICS PACKAGING
History, definition, wafer preparation - crystal growth, crystal trimming and grinding, wafer slicing, edge rounding, lapping, etching, policing, laser inspection - Printed circuit boards, types- single sided, double sided, multi layer and flexible printed circuit board, design, materials, manufacturing, inspection. Electronics Packaging - Through hole technology (THT), Surface mount technology (SMT) and Mixed technology

UNIT II ELECTRONIC COMPONENTS AND PACKAGING
Through hole components – axial, radial, multi leaded, odd form. Surface-mount components- active, passive. Interconnections - chip to lead interconnection, die bonding, wire bonding, TAB, flip chip, chip on board, multi chip module, direct chip array module, leaded, leadless, area array and embedded packaging, package marking and testing. Miniaturization and trends.

UNIT III SURFACE MOUNT TECHNOLOGY PROCESS
SMT equipment and material handling systems, handling of components and assemblies - moisture sensitivity and ESD, safety and precautions needed, IPC and other standards, stencil printing process - solder paste material, storage and handling, stencils and squeegees, process parameters, quality control. Component placement- equipment type, packaging of components for automated assembly, soldering- wave soldering, reflow process, process parameters, profile generation and control, lead free soldering, adhesive, underfill and encapsulation process

UNIT IV INSPECTION AND TESTING OF POPULATED PCBs

UNIT V REPAIR, REWORK, QUALITY AND RELIABILITY OF ELECTRONICS ASSEMBLIES
Repair tools, methods, rework criteria and process - coating removal, conductor repair, base board repair, Reliability fundamentals, reliability testing, failure analysis, design for manufacturability, assembly, testing, reliability, and environment.

TOTAL: 45 PERIODS
COURSE OUTCOMES:
At the end of this course, the students should be able to:
  CO1: Identify wafer preparation, PCB fabrication, through hole technology and surface mount technology.
  CO2: Recognize the importance of various electronic components and their packaging
  CO3: Demonstrate various steps in surface mount technology
  CO4: Identify various testing and inspection methods of populated PCB’s
  CO5: Discuss various defects, repair, rework and quality aspects of Electronics assemblies.

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TEXT BOOKS:

REFERENCES:
COURSE OBJECTIVES
- To introduce the relevance of this course to the existing technology through demonstration, case studies and contribution of scientists.
- To understand the most advanced applications and working principles of robotic systems.
- To understand the robotics programs for basic and advanced robots.
- To investigate animal locomotion principles such as ground locomotion, flapping flight, swimming, and water surface locomotion and adapting those principles to bio-inspired robotic platforms.
- To introduce latest state of the art in robotics.

UNIT I INTRODUCTION

UNIT II INDUSTRIAL ROBOTICS
Industrial Robotics definition and generations - anatomy - configuration and work envelop – Path control - end-effectors, grippers and tools - selection and design - collaborative robots – human robot interaction(HRI).

UNIT III INDUSTRIAL ROBOTPROGRAMMING

UNIT IV BIO-INSPIRED ROBOTS

UNIT V PRINCIPLES OFANIMALLOCOMOTION

COURSE OUTCOMES
Upon completing of the course students will be able to:
- CO1: Gain knowledge on the basics of robotics.
- CO2: Understand the various components of robotic systems.
- CO3: Develop robotics programming for basic and advanced robots.
- CO4: Analyse the various animal locomotion principles in bio-inspired robotic platforms.
- CO5: Acquire knowledge on various contemporary technologies in robotics.

TOTAL: 45 PERIODS

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PT7591  DIGITAL PHOTOGRAPHY  L T P C  3 0 0 3

OBJECTIVES
The students should be made to:
- To learn about the history of photography and different types of digital camera
- To understand the lights and lighting techniques used in photography
- To learn about the application of photography in journalism
- To gain knowledge of Image editing software and printing photographs
- To know about the various applications of digital photography

UNIT I  INTRODUCTION

UNIT II  LIGHT AND LIGHTING TECHNIQUES

UNIT III  PHOTOJOURNALISM
Introduction to photojournalism, Documenting, presenting news using photographs, Different types of photojournalism, Picture editing for Newspaper and magazines, Role of a photo editor, Telling stories through pictures, Ethics in Photojournalism.

UNIT IV  DIGITAL RETOUCHING AND DIGITAL OUTPUT
Image size and Resolution, Selection of Tools and Techniques for Digital Manipulation, Image compression and file formats. Selective Effects to images and filters, Image Processing and Editing software; Color and Tonal value correction, Ethics in image editing; Evaluating an image and imaging problems. Different types of printing media for hard copy, Different types of Printers with respect to their resolution.
UNIT V APPLICATIONS OF PHOTOGRAPHY

Psychology of Colour in Photography; Emotions of Different Colours; Genres of Photography - Black and white photography, Wildlife photography, Landscape, Cityscape, Architecture, Advertising, Fashion, Food, Automobile, Sports, Travel, Children, Natural photography; Portfolio making, Case studies and Photography in online applications.

OUTCOMES:
Upon completion of the course, the student should be able to:

- Choose camera settings and lenses for required photography.
- Use appropriate lights and lighting techniques for digital Photography.
- Tell stories and news articles through photographs.
- Edit and Retouch a digital Image.
- Design a portfolio with digital photography.

TEXT BOOKS:

REFERENCES:

PT5792 CONSUMER AND INDUSTRIAL PACKAGING

OBJECTIVES
- To learn about the automotive industry and the role of packaging in automotive industry.
- To understand the material handling and packaging design concepts
- To explain and perform transport worthiness tests for a given package
- To follow several package waste management systems in industry
- To understand the importance of hazardous material packaging

UNIT I INTRODUCTION
Automotive industry and various departments, automotive parts- electrical, mechanical, warehousing, sourcing, management practices-supply chain, Justin Time (JIT), scope of requirements. Packaging Materials-Plastics-films, containers, pallets, straps, cushions; Paperboard-cartons, corrugated boards, honeycomb, laminates; Wood-crates, boxes, pallets, Metal- crates, boxes.

UNIT II MATERIAL HANDLING AND PACKAGING
Introduction - Significance and dimension of Material Handling. Material Handling Systems- Planning, unitization, ergonomics, standardization, safety principle and space utilization Material Handling Equipment – storage equipment’s, engineered system, Industrial Trucks, Packaging Perspective, Loading & Unloading Techniques of Materials/ULDs on Vehicles, Ships etc.
UNIT III DISTRIBUTION CHANNELS & TRANSPORT MANAGEMENT

UNIT IV CORROSION PROTECTION AND PACKAGE WASTE MANAGEMENT

UNIT V RETURNABLE AND EXPANDABLE PACKAGING
Container classifications- bulk, intermediate (IBC), non-bulk; package labels; shipping papers; UN Package markings and design types; Drum Reconditioning-marking; Drum Re-manufacturing; Composite IBC marks; Closure notifications; Nominal steel Drum marks-size, tolerance; ISTA.

OUTCOMES:
On completion of course the student will be able to:
1. Summarize the intricacies and allied fields of automotive industry
2. Create specialized bulk packages for automotive industry.
3. Apply knowledge on Handling and storage of automotive and industrial products
4. Manage packaging waste effectively in the industry
5. Select and design package for bulk packaging

REFERENCES:
OBJECTIVES

- To understand the basic concepts and principles of cyber forensics
- To understand the importance of information in cyber forensics
- To correctly define and cite appropriate instances for the application of computer forensics
- To understand the tools and techniques to collect and analyze computer forensic evidence
- To understand the process of recovering electronic evidence in cyber forensics

UNIT I  DIGITAL INVESTIGATION


UNIT II  UNDERSTANDING INFORMATION

Methods of storing data: number systems, character codes, record structures, file formats and file signatures - Word processing and graphic file formats - Structure and Analysis of Optical Media Disk Formats - Recognition of file formats and internal buffers - Extraction of forensic artifacts - understanding the dimensions of other latest storage devices – SSD Devices.

UNIT III  COMPUTER BASICS FOR DIGITAL INVESTIGATORS

Computer Forensic Fundamentals - Applying Forensic Science to computers - Computer Forensic Services - Benefits of Professional Forensic Methodology - Steps taken by computer forensic specialists.

UNIT IV  FORENSIC TOOLS AND PROCESSING OF ELECTRONIC EVIDENCE - I

Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability Assessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information,

UNIT V  FORENSIC TOOLS AND PROCESSING OF ELECTRONIC EVIDENCE – II

Process of computer forensics and digital investigations, processing of digital evidence, digital images, damaged SIM and data recovery, multimedia evidence, retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files.

TOTAL: 45 PERIODS

OUTCOMES

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

- Illustrate the fundamentals of cyber forensics
- Analyze the importance of digital information for investigation
- Recognize the applications of computer forensics
- Apply tools and techniques to analyze computer forensic evidence
- The process of recovering electronic evidence

REFERENCES:


CS5792 AGILE METHODOLOGIES L T P C
3 0 0 3

OBJECTIVES:
• To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
• To provide a good understanding of software design and a set of software technologies and APIs.
• To do a detailed examination and demonstration of Agile development and testing techniques.
• To understand the benefits and pitfalls of working in an Agile team.
• To understand Agile development and testing.

UNIT I INTRODUCTION AND PRINCIPLES

UNIT II AGILE SOFTWARE PROCESS MODELS

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT

UNIT IV REQUIREMENTS AND TESTING AGILE REQUIREMENTS

UNIT V MEASUREMENT

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of the course, the students will be able to:
- Realize the importance of interacting with business stakeholders in determining the requirements for a software system.
- Perform iterative software development processes: how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Perform Software process improvement as an ongoing task for development teams. Show how agile approaches can be scaled up to the enterprise level.

TEXT BOOKS:
2) Mark Linesy and Scott W Ambler, "Introduction to Disciplined Agile Delivery", 2nd Edition: A Small Agile Team's Journey from Scrum to Disciplined DevOps, 2018

REFERENCES:
2) Mike Cohn” Succeeding with Agile: Software Development using Scrum” 2015, Pearson

EC5791 CONSUMER ELECTRONICS L T P C 3 0 0 3

COURSE OBJECTIVES:
- To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field Effect Transistors, Power control devices etc.,
- To know about the working principle of LED, LCD and other Opto-electronic devices.
- To introduce the concept of Sensors and voice controls.
- To provide the knowledge on Smart home devices.
- To gain knowledge on current communication technology.

UNIT I CONSUMER ELECTRONICS FUNDAMENTALS 9
UNIT II ENTERTAINMENT ELECTRONICS  

UNIT III SMART HOME - SENSORS  

UNIT IV HOME APPLIANCES  
Home Enablement Systems: RFID Home, Lighting control, Automatic Cleaning Robots, Washing Machines, Kitchen Electronics- Microwave, Dishwasher, Induction Stoves, Smart Refrigerators, Smart alarms, Smart toilet, Smart floor, Smart locks.

UNIT V INTRODUCTION TO SMART OS AND COMMUNICATION  
Introduction to Smart OS- Android and iOS. Video Conferencing Systems- Web/IP Camera, Video security, Internet Enabled Systems, Wi-Fi, IoT, Li-Fi, GPS and Tracking Systems. Cordless Telephones, Fax Machines, PDAs- Tablets, Smart Phones and Smart Watches.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
Upon successful completion of this course students will be able to

- Explain the V-I characteristic of diode, UJT and SCR. Describe the equivalence circuits of transistors.
- Operate the basic electronic devices such as PN junction diode, Bipolar and Field Effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices.
- Gain knowledge on sensors and controls.
- Emphasize the need for communication systems.
- Explore the current technology and apply on home applications.

TEXT BOOKS:

REFERENCES:
4. Nick vandome, Smart homes in easy steps, - Master smart technology for your home 2018.

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COURSE OBJECTIVES:

- To introduce the relevance of this course to the existing technology with a futuristic vision along with socio-economic impact and issues
- To understand the design of a cellular system
- To study the characteristic of wireless channel
- To enable the student to understand the necessity for satellite based communication, the essential elements involved and the transmission methodologies.
- To enable the student to understand the role of radar systems as navigational and landing aid.

UNIT I  FUNDAMENTALS OF COMMUNICATION  9
The evolution of electronic communication: From smoke signals to smart phones - History of communications: Theoretical Foundations, Development & Applications - Frequencies for communication - Frequency regulations - Overview of communication transmitter and receiver.

UNIT II  CELLULAR COMMUNICATION  9

UNIT III  WIRELESS COMMUNICATION  9
Wireless Communication: Introduction - Bluetooth - Infrared communication - IEEE Wireless LANs (Wi-Fi) - IEEE 802.16 (WiMAX) - Future mobile and wireless networks: Introduction to 5G- device to device communication- IoT.

UNIT IV  SATLLITE COMMUNICATION  9

UNIT V  INTRODUCTION TO RADAR AND NAVIGATION  9

TOTAL: 45 PERIODS

COURSE OUTCOMES:
CO1: Ability to comprehend and appreciate the significance and role of this course in the present contemporary world.
CO2: The student would be capable of designing a cellular system based on resource availability and traffic demands.
CO3: The student would be capable of characterizing a wireless channel and evolve the system design specifications.
CO4: The student would be able to demonstrate an understanding of the basic principles of satellite orbits and the communication system components.
CO5: The student would be able to demonstrate an understanding of the basic principles of radar design and identify suitable navigation systems.
TEXT BOOKS:
1. S.Haykin, A Communication Systems, 4Ce, John Wiley 2007

REFERENCES:
1. B.P.Lathi, A Modern Digital and Analog Communication Systems, 3Ce, Oxford University Press, 2007

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EC5793 COMPUTER VISION AND MACHINE LEARNING  
L T P C  
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COURSE OBJECTIVES:
- To provide the basic knowledge on computer vision.
- To understand simple image processing techniques, and algorithms.
- To give an exposure to selected machine learning models.
- To interrelate machine learning concepts and their application in computer vision problems.
- To impart knowledge on different learning algorithms.

UNIT I INTRODUCTION TO COMPUTER VISION  
9  
Point operators - Linear filtering - neighbourhood operators - Feature detection and matching

UNIT II SEGMENTATION  
9  
Active contours - Split and merge - Mean shift and mode finding - Normalized cuts - Graph cuts and energy-based methods

UNIT III MOTION ESTIMATION  
9  
Translational alignment - Parametric motion - Optical flow - Object detection - Face recognition - Instance recognition - Category recognition - Context and scene understanding

UNIT IV MACHINE LEARNING MODELS  
9  
Types - Supervised and Unsupervised - Parametric and non-parametric models - discrete and continuous distributions - Generative models for discrete data - Gaussian models

UNIT V LEARNING ALGORITHMS  
9  
Decision Trees - Multilayer Perceptrons - Kernel Machines - hidden Markov models - Deep learning - Applications of deep networks

TOTAL: 45 PERIODS
COURSE OUTCOMES:
Upon successful completion of this course, students will be able to:
- Comprehend and appreciate the ‘significance and role’ of this course in the present contemporary world.
- Explore the main challenges behind selected contemporary image processing and computer vision problems.
- Demonstrate the principles and applications of contemporary machine learning techniques.
- Implement machine learning algorithms on image and video-related problems.
- Ability to design and develop systems using learning models and algorithms.

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EC5794 ROBOTICS

OBJECTIVES:
- To introduce basic robotic terminologies
- To illustrate kinematics and path planning
- To illustrate various parts of robots
- To impart knowledge on machine vision systems
- To apply robot based concepts for automation

UNIT I INTRODUCTION TO ROBOTS
UNIT II  KINEMATICS OF ROBOTS

Link Description - Link-Connection Description - Convention for Affixing Frames To Links - Manipulator Kinematics- Actuator Space-Joint Space And Cartesian Space, Solvability, Algebraic Vs. Geometric, Jacobians, Singularities, Static Forces In Manipulators- Case Studies: Kinematics Of Two Industrial Robots, Inverse Manipulator Kinematics.

UNIT III  SENSORS AND ACTUATION SYSTEMS OF ROBOTS


UNIT IV  ARTIFICIAL INTELLIGENCE IN ROBOTICS


UNIT V  APPLICATIONS OF ROBOTS


TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1: Ability to comprehend and appreciate the significance and role of this course in the present contemporary world.

CO2: Ability to design and develop robotic based systems.

CO3: Integrate mechanical and electrical hardware for a real prototype of robotic device.

CO4: Ability to develop system for industrial automation and medical applications.

CO5: Ability to provide automatic solution for replacing humans in life threatening area.

TEXT BOOKS:


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OBJECTIVES:
- To have a clear understanding of the concepts of Telemedicine, including basic terminologies, services, impact and challenges of telemedicine.
- To understand the generic architecture of telemedicine systems and Constituents of each sub-system of telemedicine.
- To know the computer and networking technologies for telemedicine.
- To understand health records and data management for health care services.
- To implement and understand clinical cum technical aspects of telemedicine.

UNIT I INTRODUCTION TO TELEMEDICINE

UNIT II ARCHITECTURE OF TELEMEDICINE SYSTEMS

UNIT III COMPUTER AND NETWORKING TECHNOLOGIES FOR TELEMEDICINE

UNIT IV DATA AND INFORMATION STANDARDS IN TELEMEDICINE

UNIT V CLINICAL AND TECHNICAL ASPECTS OF TELEMEDICINE

TOTAL:45 PERIODS

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
CO1: Understand the important concepts of Telemedicine concepts and their evolution.
CO2: Perform the design of architecture of telemedicine system and their sub-system.
CO3: Evaluate the application of computer and networking technologies for telemedicine.
CO4: Assimilate the information of health record standards and data management for healthcare services.
CO5: Analyse & monitoring with respect to clinical and technical aspects of telemedicine in current senerio.

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BM5792 ELECTRONICS IN MEDICINE L T P C
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OBJECTIVES:
- To understand the various techniques and devices that are used in the field of cardiology
- To learn and understand the various methods and devices used for diagnosing the abnormalities of brain
- To gain knowledge on the various instruments used to treat the kidney disorders
- To understand the function of various devices used in circulatory system.
- To understand the principle, techniques and devices used to correct eye and ear problems.

UNIT I ELECTRONICS IN CARDIOLOGY
9
Physiology of Heart and its abnormalities, Cardiac Monitoring and Recording Devices- ECG, Pacemaker, Defibrillators, Counter pulsation technique, Intra aortic balloon pumping and prosthetic heart valves and Imaging for cardiovascular system.

UNIT II ELECTRONICS IN NEUROLOGY
9
Neurons and its abnormalities, EEG, Evoked response – Auditory and Visual sensory, Polysomnography, nerve stimulator and Imaging for brain disorders.

UNIT III ELECTRONICS IN NEPHROLOGY
9
Nephrons and its abnormalities, Principle of Haemodialysis, Membrane, Dialysate, Different types of heamodialysers, Artificial kidney, Lithotripsy.
UNIT IV  ELECTRONICS IN CIRCULATORY SYSTEM

UNIT V  ELECTRONICS IN VISUAL AND AUDITORY SYSTEM
Anatomy of eye and its abnormalities, Laser in ophthalmology, Ear and it abnormalities Types of Deafness, Audiometer, Hearing Aids and cochlear implants.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course the students will be able to
CO1: Apply different medical devices in the measurement of parameters related to cardiology
CO2: Describe the various brain abnormalities and different techniques that are used to identify it.
CO3: Ability to comprehend the various aspects of haemodialysis and lithotripsy
CO4: Measure various nonelectrical physiological parameters
CO5: Elucidate the effectiveness of modern medical devices and technology that are used to tackle the various visual and auditory disorders.

TEXT BOOKS:

REFERENCES:

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<th>COURSE OUTCOMES</th>
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OBJECTIVES:

- To know the underlying structure behind intelligence mathematically.
- To know the logical implications in computational intelligence.
- To know the automated learning techniques.
- To study the techniques of knowledge representation.
- To explore the adoption of artificial intelligence techniques in real-time scenarios.

UNIT I  INTELLIGENT AGENTS AND SEARCH TECHNIQUES  12

SUGGESTED ACTIVITIES:

- Flipped classroom on structure of agents.
- Uninformed search - Searching with costs.
- Solve puzzles with uninformed and informed searches.
- Practical - Implementation of search through Python/other languages.

SUGGESTED EVALUATION METHODS:

- Tutorials on various topics of the unit.
- Assignments on puzzles with uninformed and informed searches.
- Quizzes on agents, environments and search
- Evaluation of the programming exercises.

UNIT II  REASONING WITH LOWER ORDER LOGICS  9

SUGGESTED ACTIVITIES:

- Reasoning methods through puzzles and real life scenarios.
- Practical - Inference through Prolog/Python.
- Practical - Programming through Prolog/ Python for various topics such as reasoning through resolution.

SUGGESTED EVALUATION METHODS:

- Tutorials on reasoning methods.
- Assignment problems on different topics of the unit.
- Quizzes on inference techniques in logic.
- Evaluation of the programming exercises.

UNIT III  KNOWLEDGE REPRESENTATION  6
SUGGESTED ACTIVITIES:
1. Examples of knowledge representation through different methods and reasoning.
2. Practical - Ontology creation using a tool like Protégé.

SUGGESTED EVALUATION METHODS:
- Tutorials on different topics of the unit.
- Assignments on knowledge representation through different methods and reasoning.
- Quizzes on different methods of knowledge representation.
- Evaluation of the programming exercise.

UNIT IV AI PLANNING AND NATURAL LANGUAGE PROCESSING


SUGGESTED ACTIVITIES:
- Flipped classroom on planning types and the background of plan.
- Out of class activity – Classical Planning, Boolean satisfiability.
- In class – Graph plan.
- Practical - Programming through PDDL/Python to develop a plan for block world, cargo world etc.

SUGGESTED EVALUATION METHODS:
- Tutorials on planning types and the background of plan.
- Assignments on graph plan.
- Quizzes on planning and natural language processing basics.
- Evaluation of the programming exercise.

UNIT V LEARNING AND APPLICATIONS


SUGGESTED ACTIVITIES:
- Flipped classroom on knowledge in learning.
- Assignments on problem solving in learning techniques.
- Practical - Programming exercises using Python/other programming languages such as: Programming for HMM.
- Explore the available Chatbot models such as Watson and adapt to a specific domain such as Education or Customer relations.

SUGGESTED EVALUATION METHODS:
- Tutorials on knowledge in learning.
- Evaluation of the programming exercise.
- Quizzes on knowledge in learning.

TOTAL: 45 PERIODS
OUTCOMES:
On completion of the course, the student will be able to:
CO1: Understand the search techniques.
CO2: Apply the search techniques to real-time problems.
CO3: Apply the reasoning techniques to real world problems.
CO4: Understand the representation of knowledge.
CO5: Understand the learning techniques.
CO6: Apply AI techniques in developing real world applications.

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IT5792 IOT BASED SMART SYSTEMS L T P C 3 0 0 3

OBJECTIVES:
- To understand smart objects and IoT Architectures.
- To learn about various IoT related protocols.
- To build simple IoT systems using open hardware such as Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT.
- To build IoT based smart systems.
UNIT I   FUNDAMENTALS OF IoT


Suggested Activities:
- Survey of different real world IoT applications.
- Assignments on operational principles of sensors and actuators.
- Mini project on building a smart system - Identify the sensors required for the system, connect sensors (such as temperature, pressure, light) to a suitable IoT hardware platform and take measurements.

Suggested Evaluation Methods:
- Evaluation of survey for breadth and depth - pair-wise comparison.
- Quiz on sensors and actuators.
- Demonstration of practical setup on connecting sensors.

UNIT II   IoT PROTOCOLS - I


Suggested Activities:
- Assignment on access technologies (simulator could be used).
- Flipped classroom on 6LoWPAN.
- Mini project on building a smart system - Choose appropriate access technology and connect the hardware to the Internet.

Suggested Evaluation Methods:
- Quiz on access technologies.
- Quiz on 6LoWPAN.
- Demonstration of practical setup on connecting to the Internet.

UNIT III   IoT PROTOCOLS - II

Routing over Low Power and Lossy Networks (RPL) – Application Transport Methods: Application Layer Not Present, Supervisory Control and Data Acquisition (SCADA) – Application Layer Protocols: CoAP and MQTT – Service discovery – mDNS.

Suggested Activities:
- Assignment on RPL (simulator could be used).
- Mini project on building a smart system - Choose appropriate application protocol and connect to the cloud using available open platforms (such as IBM Bluemix).

Suggested Evaluation Methods:
- Quiz on RPL for different topologies.
- Demonstration of practical setup on connecting to the cloud.

UNIT IV   CLOUD, FOG AND DATA ANALYTICS FRAMEWORKS

Suggested Activities:
- Use a simulator such as FogSim to study the characteristics of fog computing.
- Mini project on building a smart system - Choose appropriate analytics mechanisms to analyze the data collected, and build the application.

Suggested Evaluation Methods:
- Quiz on fog characteristics.
- Demonstration of application with analytics.

UNIT V APPLICATIONS
9
Smart and Connected Cities: Street Layer, City Layer, Data Center Layer and Services Layer, Street Lighting, Smart Parking Architecture and Smart Traffic Control – Smart Transportation – Connected Cars.

Suggested Activities:
- Design the architecture and use cases for various smart systems (eg., agriculture, home automation, smart campus, smart hostel).
- Mini project on building a smart system - Enhance the system with additional smart features.

Suggested Evaluation Methods:
- Report and presentation of architecture solutions.
- Demonstration of complete smart system.

OUTCOMES:
On completion of the course, the student will be able to:
1. Explain the concept and architecture of IoT.
2. Choose the right sensors and actuators for an application.
3. Analyze various protocols for IoT.
4. Apply data analytics and use cloud/fog offerings related to IoT.
5. Analyze applications of IoT in real time scenario.
6. Design an IoT based smart system using open hardware platforms and open cloud offerings.

TOTAL: 45 PERIODS

TEXTBOOK:

REFERENCES:
OBJECTIVES:
- To learn the fundamentals of data science and big data.
- To gain in-depth knowledge on descriptive data analytical techniques.
- To gain knowledge to implement simple to complex analytical. Algorithms in big data frameworks.
- To develop programming skills using required libraries and packages to perform data analysis in Python.
- To understand and perform data visualization, web scraping, machine learning and natural language processing using various Data Science tools.

UNIT I: INTRODUCTION TO DATA SCIENCE AND BIG DATA


Suggested Activities:
- Case studies on big data application domain.
- Real world domain specific problems involving big data and listing out the challenges.
- Demonstration on data analytics tools.

Suggested Evaluation Methods:
- Student assignment on case studies related to healthcare, climate change, e-commerce, retail business, manufacturing etc.
- Group presentation on big data applications with societal need.
- Quizzes on topics like big data terminologies, big data applications, etc.
UNIT II DESCRIBATIVE ANALYTICS USING STATISTICS


Suggested Activities:
- Solving numerical problems based on statistics and probability.
- Demonstration of descriptive analysis using Python.
- Demonstrate PCA using Iris data set in Python.

Suggested Evaluation Methods:
- Assignment on data understanding using open source tools.
- Student Presentation of real world applications and the required descriptive analysis.
- Quiz on all topics in descriptive analytics using statistics.

UNIT III PREDICTIVE MODELING AND MACHINE LEARNING


Suggested Activities:
- Solve numerical problem solving using linear regression models.
- Demonstrate data cleaning using WEKA tool.
- Demonstration of data preprocessing and machine learning features in Python.

Suggested Evaluation Methods:
- Simple lab based activities for machine learning in Python using small benchmark datasets.
- Tool based assignments on linear, polynomial and multivariate regression using real world case studies.
- Assignment on comparative analysis of two or more data sets using their features.

UNIT IV DATA ANALYTICAL FRAMEWORKS


Suggested Activities:
- Case studies on applications involving usage of data analytical frameworks.
- Demonstration of Installation and configuring Hadoop and MapReduce.
- Design and develop algorithms to be executed in Map Reduce involving numerical methods for analytics.
- Installation of MongoDB and simple data management.
Suggested Evaluation Methods:
- Mini Project (Group) – Real time data collection, saving in Hive, implement analytical techniques using Map-Reduce Tasks and Result Projection.
- Practical – Programming assignments in MongoDB.
- Quiz on Hive query language.

UNIT V DATA SCIENCE USING PYTHON

Suggested Activities:
- Demonstration of simple Python scripts using NumPy and SciPy Package.
- Demonstration on NumPy arrays and matrix operations.
- Simple lab activities on dimensionality reduction and feature selection using Python.
- Demonstration of experiments on data visualization using matplotlib functions.

Suggested Evaluation Methods:
- Mini Project using Python for data analytics with benchmark datasets.
- Quiz on data visualization functions.

TOTAL: 45 PERIODS

OUTCOMES:
On completion of the course, the student will be able to:
CO1: Identify the real world business problems and model with analytical solutions.
CO2: Solve analytical problem with relevant mathematics background knowledge.
CO3: Convert any real world decision making problem to hypothesis and apply suitable statistical testing.
CO4: Write and demonstrate simple applications involving analytics using Hadoop and MapReduce.
CO5: Use open source frameworks for modeling and storing data.
CO6: Perform data analytics and visualization using Python.

TEXT BOOKS:

REFERENCES:
AS5791 UNCONVENTIONAL HYDROCARBON

OBJECTIVES
The course is aimed to
- To understand the graphical distribution of unconventional hydrocarbon resources
- To understand the characterization of source and reservoir rock
- To understand methodology to produce these reserves
- To understand environmental consequences of producing reserves
- Demonstrate awareness related to environmental issues involved in the development of non-conventional hydrocarbon resources

UNIT I LOW PERMEABILITY (TIGHT) SANDS
Occurrences, Resources, Reservoir characteristics, Drilling and Completion methods, facilities, Reservoir Management, challenges, limitations on development and present activity

UNIT II COAL BED GAS
Occurrences, Resources, Reservoir characteristics, Drilling and Completion methods, facilities, Reservoir Management, challenges, limitations on development and present activity, Water and Environmental issues

UNIT III SHALE GAS AND OIL RESERVOIRS
Occurrences, Resources, Reservoir characteristics, Drilling and Completion methods, facilities, Reservoir Management, challenges, limitations on development and present activity, Water and environmental issues

UNIT IV HEAVY OIL
Occurrences, Resources, Reservoir characteristics, Drilling and Completion methods, facilities, Reservoir Management, challenges, limitations on development and present activity, environmental issues

UNIT V GAS HYDRATES
Occurrences, Resources, Reservoir characteristics, Recovery methods, facilities, challenges, limitations on development and present activity, environmental issues, gas storage, types and locations of gas storage reservoirs, technical issues and terminology, gas storage volume and economics

TOTAL: 45 PERIODS
COURSE OUTCOMES
On completion of the course students are expected to
CO1: Recognize and apply the concept of continuous accumulation of Low permeability region
CO2: Apply the concepts related to exploration and development of Coal Bed Gas
CO3: Apply the concepts related to exploration and development of Shale Gas and Oil Reservoir
CO4: Understanding the formation of Heavy oil
CO5: Apply different conversion for Formation of Gas Hydrates

TEXT BOOKS:
1. Unconventional Oil and Gas resource handbook – Y. Zee Ma, Stephen Holditch 1st Edition 2015

REFERENCE:

AS5792 INDUSTRIAL SAFETY MANAGEMENT

OBJECTIVE:
- To learn about importance of safety and its regulations
- To know about types of hazards and safety management to mitigate it
- To provide necessary assists to safety audits and techniques
- To realize about the requisite of safety education and training
- To know about the waste management system and its significance

UNIT I NEED FOR SAFETY IN INDUSTRIES AND REGULATION

UNIT II OCCUPATION HEALTH AND SAFETY MANAGEMENT
Physical hazard- chemical hazards- biological hazards-ergonomical hazards-Fire hazards-, Electrical hazards-safety management structure & its importance-safety philosophy & psychology- emergency planning-on site & off site emergency planning- work permit systems

UNIT III SAFETY AUDIT AND SAFETY DOCUMENTS
Objective of safety audit- elements of audits-, checklist, third party certifications- what if analysis, HIRA (Hazard Identification & risk Assessment) - Job Safety Analysis (JSA), safety – survey, Tool box talks, safety committee meeting-inspection, sampling- EMS models case studies
UNIT IV SAFETY EDUCATION AND TRAINING

UNIT V WASTE MANAGEMENT SYSTEM
Waste classification and regulatory requirements- waste identification, characterization and classification-Methods of collection and disposal of solid wastes-health hazards-toxic and radioactive wastes incineration and vitrification -source reduction and recycling- collection-transport and material recovery - biological and thermal processing of wastes- waste disposal

COURSE OUTCOME:
On successful completion of this course, the students will be able to

CO1: Recognize the value of safety role in industry and its regulations
CO2: Aware of the types of hazards dealt in industry and system to manage it
CO3: Understand about safety audit and safety techniques
CO4: Significance of safety education and training to employees
CO5: Importance of waste management system in industries and its procedure

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

LT5791 ORIENTATION TO LEATHER MANUFACTURE
AIM
- This course aims at introducing the fundamentals of chemistry and technology of leather manufacture.

UNIT I RAW MATERIALS AND PRESERVATION
Unique characteristics of leather; Raw materials used for leather manufacture - Origin and characteristics of hides and skins; Categories of livestock; Grading systems; Defects in hides and skins; Various preservation techniques and their principles.

UNIT II PRETANNING PROCESSES
Principles and objectives of beamhouse processes viz., soaking, liming, reliming, deliming, bating, pickling, depickling and degreasing.

UNIT III TANNING PROCESSES
Definition and objectives of tanning; Types and basic chemistry of vegetable tannins; Basic chemistry of basic chromium sulfate; Principles involved in vegetable and chrome tanning and their mechanism in brief; Combination tannages.
UNIT IV  POST TANNING PROCESSES  9
Types of syntans; Basic chemistry of phenolic and acrylic syntans; Types of fatliquors; Basic chemistry of fatliquors; Types of dyes; Basic chemistry of acid, basic, direct and metal complex dyes; Principles and objectives of post tanning processes viz., neutralisation, retanning, dyeing and fatliquoring; Various unit operations involved.

UNIT V  FINISHING TECHNIQUES  9
Types of binders; Basic chemistry of protein, resin and PU binders; Types of pigments; Basic characteristics of pigments; Basic theory of coating; Principles and objectives of finishing; Classification of finishing; Types of auxiliaries and finishes.

OUTCOMES :
CO1 : Understand the application and uniqueness of the leather.
CO2 : Have knowledge on pre-tanning and tanning processes
CO3 : Comprehend the process rationale for making specific leather.
CO4 : Have knowledge on post-tanning and finishing processes
CO5 : Aware of various preservation techniques of the skins / hides

TEXT BOOKS

REFERENCE

Course Articulation Matrix:

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1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively
AIM

- To understand the basic structure and function of skin and its components

UNIT I  STRUCTURE, CHARACTERISTICS AND FUNCTIONS OF SKIN  9
Organization of skin components in different animals; Structure and function of skin; epidermis, dermis, cutaneous and subcutaneous tissues; hair; fat tissue; nerve; erectopilli muscle; sweat glands.

UNIT II  COMPOSITION OF HIDES AND SKINS  9
 Constituents of hides and skins; Fibrous and non-fibrous proteins in skin; Structure, function and properties of amino acids Structure and properties of mono, di, iligo and polysaccharides; complex carbohydrates; Structure and properties of Fatty acids;

UNIT III  BIOSYNTHESES OF COLLAGEN  9

UNIT IV  MOLECULAR AND SUPRAMOLECULAR STRUCTURE OF COLLAGEN  9

UNIT V  APPLICATIONS OF COLLAGEN  9
Purification of collagen; Preparation of collagenous biomaterials; Gelatin extraction; Use of Collagen/gelatin in food and beverages; Collagen use in cosmetic and medical fields

TOTAL : 45 PERIODS

OUTCOMES:
CO1 : To understand various structural and functional features of skin
CO2 : To know about various constituents of skin
CO3 : To gain insights on the biosynthesis of collagen
CO4 : To be aware of the molecular and supramolecular structure of collagen
CO5: To know about various applications of collagenous protein

TEXT BOOK AND REFERENCES
COURSE ARTICULATION MATRIX:

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<td>CO3</td>
<td>To gain insights on the biosynthesis of collagen</td>
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<td>CO4</td>
<td>To be aware of the molecular and supramolecular structure of collagen</td>
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<td>CO5</td>
<td>To know about various applications of collagenous protein</td>
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1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

**TT5791**  
**BASICS OF TEXTILE TECHNOLOGY**  
**L T P C**  
**3 0 0 3**

**OBJECTIVES**
- To enable the students to learn about the basics of fibre forming, yarn production, fabric formation, coloration of fabrics and garment manufacturing

**UNIT I **  
**BASICS OF FIBRE SCIENCE AND SPINNING**  
Definition of fibre, classification of textile fibers; sequence of machineries in short staple yarn spinning from ginning to cone winding and their objectives; yarn numbering system

**UNIT II **  
**BASICS OF WOVEN FABRIC PRODUCTION**  
Woven fabric – warp, weft, weaving, path of warp; looms – classification, handloom and its parts, powerloom, automatic looms, shuttleless looms, special type of looms; preparatory machines for weaving process and their objectives; basic weaving mechanism - primary, secondary and auxiliary mechanisms
UNIT III        BASICS OF NON WOVEN AND KNITTED FABRIC PRODUCTION      5

UNIT IV        BASICS OF CHEMICAL PROCESSING    13
Objectives of the processes - singeing, desizing, scouring, bleaching, mercerization; dyeing classification of dyes, types of dyeing techniques; printing - types and styles of printing; finishing treatments – chemical and mechanical finishing.

UNIT V        BASICS OF GARMENT MANUFACTURING    5
Anthropometry, basic principles of pattern making and grading, marker planning, spreading, cutting, sorting, sewing, finishing and packing.

TOTAL: 45 PERIODS

OUTCOMES:
On completion of this course, the students shall have the knowledge on
CO1: The basics of fibre science and yarn formation
CO2: The basics of weaving mechanism and woven fabric production
CO3: Nonwovens and knitted fabric production
CO4: Coloration and finishing of the fabrics
CO5: The basics of garment manufacturing

TEXT BOOKS

TT5792        TEXTILE FIBRES              L T P C
                          3 0 0 3

OBJECTIVES
• To enable the students to learn about different types of fibres, their production, physical and chemical characteristics

UNIT I
Classification of fibres; definition of fibres; cotton, jute, flax fibres – cultivation, physical and chemical properties
UNIT II
Protein fibres – wool, silk, production, physical and chemical properties

UNIT III
Synthetic fibres – polyester, nylon, acrylic, polyurethanes, polypropylene, polyethylene – production, physical and chemical properties

UNIT IV
Manmade fibres – Viscose, modified viscose, modal, tencel and other metallic and non metallic fibres – production, physical and chemical properties

UNIT V
Introduction to high performance fibres; Identification of textile fibres; specification of fibres.

TOTAL : 45 PERIODS

COURSE OUTCOMES:
On completion of this course, the student would know about
CO1: Classification of textile fibres; cultivation, physical and chemical properties of natural fibres
CO2: Production and properties of protein fibres
CO3: Production and properties of synthetic fibres
CO4: Production and properties of regenera
ted fibres
CO5: High performance fibres and identification of textile fibres

TEXT BOOKS

CH5791 INDUSTRIAL CORROSION AND PREVENTION L T P C 3 0 0 3

OBJECTIVES
The student can able to impart Knowledge on fundamental concepts of corrosion and its types and to create corrosion prevention plans in various industries.

UNIT I BASIC CONCEPTS OF CORROSION

UNIT II CORROSION CONTROL IN POWER INDUSTRIES
Corrosion & its control in Power industries: Introduction, frequent forms of corrosion, environment, case studies, prevention methodology, corrosion resistance materials.
UNIT III  CORROSION CONTROL IN PETROCHEMICAL INDUSTRIES

UNIT IV  CORROSION CONTROL IN MARINE INDUSTRIES
Corrosion & its control in ship building and marine industries: Introduction, Metallurgical properties influencing corrosion. Common forms of corrosion, environment, Passivity – design of corrosion resistant alloys. case studies, and corrosion resistance materials

UNIT V  CORROSION CONTROL IN FERTILIZER INDUSTRIES

TOTAL: 45 PERIODS

OUTCOMES:
On the completion of the course students are expected to
  CO1: Understand the fundamental concepts of corrosion and its types.
  CO2: Gain knowledge in corrosion damages in various industries like Power, Petroleum, Marine and Fertilizer industries.
  CO3: Analyze the corrosion prevention strategies in the industries.
  CO4: Evaluate the case histories according to the industries
  CO5: Able to Illustrate the causes and cures of corrosion problems

TEXT BOOKS:

REFERENCE BOOKS:
2.  Handbook of Materials Failure Analysis with Case Studies from the Oil and Gas Industries ASH Makhlof and Mahmood Aliofkhazraei, Elsevier Ltd
OBJECTIVES:
- To explain principles of treatment processes of pollutants
- To identify the best treatment strategy for treating water based on nature of Pollutant.

UNIT I  W A T E R T R E A T M E N T T E C H N O L O G I E S  9

Introduction- aeration-Coagulation- Neutralization-Precipitation- Ion exchange- Advanced oxidation process- Flocculation-adsorption- settling - Bioreactors for treatment- Advanced biological treatments

Membranes for water treatment - membrane separation process-ultra filtration- nanofiltration-nanomaterials as membrane filtration.

UNIT IV  D E S I G N A N D C O N S T R U C T I O N  9
Introduction- Design and construction of wastewater treatment plants on novel technology-nanofiltration and hybrid technologies- sustainable treatment technologies


TOTAL : 45 PERIODS

OUTCOMES:
On the completion of the course students are expected to
CO1:To recognize and understand the treatment technologies available for pollution treatment.
CO2:To identify different types of treatment technologies
CO3:To understand the newer technologies and its measures for future generations.
CO4:To recognize different forms of treatment processes and apply them for suitable applications in for technological advancement and societal development.
CO5:To demonstrate the knowledge attained for selection of process for environmental issues

TEXT BOOKS:

REFERENCES:

OBJECTIVES
- To make the students understand the principles of biosafety
- To give knowledge about the different types of biosafety levels and their features
- To make the students aware of the ethics and regulations
UNIT I  INTRODUCTION 9
Biosafety and biocontainment – concepts and strategies, risk assessment, biosafety programs, risk communication

UNIT II  WORKING ENVIRONMENT 9

UNIT III  SAMPLES 9
Animal, Plant, stem cells and genetically modified organisms – handling and maintenance, disinfection and decontamination, facility operation and maintenance, waste management.

UNIT IV  ETHICAL GUIDELINES 9
Bioethics, Regulations on place in India for research on animal, plant, stem cells and genetically modified organisms, regulations in other countries – US (FDA/ GMP), European standard levels, emergency planning and response

UNIT V  LAB PRACTICES 9
Good laboratory practices, quality systems in the laboratory, laboratory controls, safety hazards, documentation.

TOTAL : 45 PERIODS

OUTCOMES
- To make the students become aware of the principles of biosafety and risk assessment
- To understand the level of biosafety level required under different scenario
- To become aware of the differences in handling different types of organisms
- Understand the regulatory issues involved in handling GE organisms
- Become aware of the ethical guidelines and GLP involved

TEXTBOOKS
1. Biosafety in Microbiological and Biomedical Laboratories, 5th ed.US Department of Health and Human Services 2009

REFERENCES
2. Institutional Animal Care and Use Committee Guidebook, 2nd ed. NIH Guidelines For Research Involving Recombinant or Synthetic Nucleic Acid Molecules (2013)

FT5791  FOOD SAFETY  LT P C
3 0 0 3

COURSE OBJECTIVES:
This course is designed to:
1. present the rules of personal hygiene and the importance of adhering to safety rules and regulations.
2. introduce the causes and prevention of food poisoning and to introduce the requirements of safety in the workplace.
3. introduce local legislation relating to the food service industry

UNIT I  CONCEPTS OF FOOD SAFETY 9
Understanding what is safe food. Definition of food safety. Adultration of food. Contamination malnutrition, obesity and metabolic syndrome. Unhygiene preparation filter, coloured foods and cancer, pesticides in food and health issues, Physical hazards, migration, cross-contamination.
UNIT II  HAZARDS DUE TO FOOD PROCESSING
Trans fatty acids and Cardio vascular diseases. Plastics in packaging; presence of vinyl polymer packaged drinking water and hazard thermal decomposition during barbecuing pyrolytic products and cancer- non-nutritive sweeteners of hazards. Preservatives – chemical, sulphites phenolic antioxidants, fat substitutes antibiotics and veterinary drugs.

UNIT III  BIOLOGICAL HAZARDS

UNIT IV  HEALTH CLAIMS, LABELLING & SAFE FOOD
Sports nutrition, nutraceuticals, pKV formula foods, health claims, labelling of the label. HACCP, GMP consumer protection, responsibilities of the food service operator. Hygiene procedures. Cost of Illness.

UNIT V  GLOBALIZATION AND FOOD SAFETY
Genetically modified food (GM), Safety and labelling, Food audit, International food Standards ISO 9000, environmental issues in packaging.

TOTAL : 45 PERIODS

COURSE OUTCOMES:
At the end of the course the students will be able to,
CO1: Explain various types of food contamination and factors that contribute to foodborne illness
CO2: Identify the characteristics of potentially hazardous foods
CO3: Describe the dangers of foodborne illness
CO4: Demonstrate the ability to explore and apply proper food handling techniques that will eliminate possible foodborne illness.
CO5: Demonstrate the ability to discuss the importance of food safety training in the workplace

TEXT BOOKS
3. Mehta, Rajesh and J. George “Food Safety Regulation Concerns and Trade : The Developing Country Perspective”. Macmillan, 2005

REFERENCE BOOKS:
OBJECTIVES
- To make the students aware of the fundamentals of forensic science
- To make the students aware of the principles behind the various techniques used for evidence analysis
- To make the students aware of the various instrumental analysis involved in detection

UNIT I  INTRODUCTION
Forensic science: Definition, History and Development. Types of crime, crime scene management and investigation; Collection, Preservation and forwarding of physical and trace evidences for analysis. Legal and court procedures.

UNIT II  BLOOD BASED ANALYSES
Blood based analysis, analysis of body fluids, Disputed paternity and maternity problems. DNA profiling.

UNIT III  SAMPLE ANALYSIS
Analysis of liquor; petroleum products; Examination of insecticides and pesticides; Identification of poisons; identification of fibres. Physical analysis of soil, glass, paints, lacquers, cement, inks, paper, and tool marks, foot prints and shoe prints

UNIT IV  MATERIAL ANALYSIS
Examination of vehicles, tyre marks, Ballistics, cyber forensics, Identification of handwriting, signatures, anonymous, disguised writings and forgery detection. Age of documents. History, classification, search, lifting and examination of fingerprints.

UNIT V  INSTRUMENTATION
Microscopy, spectroscopy, X-rays, NMR, Chromatography, Electrophoresis.

TOTAL: 45 PERIODS

OUTCOMES
- To make the students aware of the importance of preserving the nature of crime field
- To make them aware of the science behind sample collection and the legality involved
- To make the students determine the contaminants or poisons present in liquor, food products
- To make the students aware of the different techniques involved in sample analysis
- To understand the instrumentation involved in the analysis

TEXTBOOKS:

REFERENCES:
3. Digital forensic for network internet and cloud computing clint garrison
5. Handbook of Fingerprint Recognition, Maltoni, Maio, Jain, Prabhakar, 2005
OBJECTIVES:
The Course will enable Learners with limited proficiency in English to,

- Learn the fundamental features of communicating in English.
- Develop the skills and sub skills of reading and comprehending the content read.
- Read and comprehend both short and longer texts in English.
- Listen and comprehend lectures in English.

UNIT I
Listening - Listening to individual phonemes in English, identification and practice of phonemes.
Reading - Reading aloud of texts - short stories/ scenes from plays.
Speaking - Self-introduction in informal contexts - (necessary expressions to be given)
Writing - Development of hints
Grammar - Use of articles - countable and uncountable nouns.

UNIT II
Listening - Listening to announcements in public places such as made on social media.
Reading - Short texts and answering questions.
Speaking - Asking and answering questions of a personal kind (hobbies, home, favourite sports person, ambitions,)
Writing - Using given expressions/ keywords to develop a story.
Grammar - Use of pronouns, verbs - regular & irregular, Adjectives - degrees of comparison.

UNIT III
Listening - Listening to lectures and summarizing information.
Speaking - Reporting flow of Events (Sequence)
Reading – Reading summaries
Writing - Writing a précis
Grammar and Vocabulary - Needs based Grammar

UNIT IV
Listening - Listening to description of a place/
Speaking –Role play (practicing conversations)
Reading - Newspaper Articles.
Writing - Dialogue Writing
Grammar and Vocabulary - Needs based Grammar

UNIT V
Listening - Listening to a process.
Speaking - Describing an experience.
Reading - Reading essays.
Writing –Short essays.
Grammar and Vocabulary - Needs based Grammar Teaching Methods:

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the Course, Learners will be able to,

- Listen and comprehend information being given in English.
- Read and comprehend English texts.
- Speak English with confidence
- Produce a well-organized essay with adequate support and details.
- Write comprehension answers in English.
TEXT BOOK:

REFERENCE BOOKS:

Suggested evaluation methods:
Assessment-25 (Listening & speaking)
Assessment -25 (Reading &Writing)
End semester-100
Teachers can use quizzes, visual inputs etc. to get their Learners to communicate in English

HS5792 INTRODUCTION TO CRITICAL THINKING L T P C 3 0 0 3

COURSE OVERVIEW
This is an open elective course offered for B.E/B.Tech/ M.E/M.Tech students who are interested in learning 21st Century skills that will help them in their academics and career.

COURSE OBJECTIVES:
The main objectives of this course is

- To distinguish between assumptions, fact and opinions
- To identify strong and weak points, reasons and claims in an argument.
- To infer and interpret evidence, verbal and visual materials etc.
- To analyse various perspective and learn to be objective.
- To evaluate the empirical data objectively that will help in honing problem-solving skills

UNIT I INTRODUCTION TO CRITICAL THINKING 9
Introduction to critical thinking - Defining critical thinking –Elements of critical thinking - Distinguishing between facts and opinions –Elenctic method (asking relevant questioning)– small group discussions

UNIT II INDUCTING & INDUCTIVE REASONING 9
Classification of content - Interpreting & Evaluating verbal and visual content (Infographics) – Reading comprehension – Drawing inferences – Blooms Taxonomy – Deductive & Inductive Reasoning

UNIT III ANALYZING VISUAL AND VERBAL MEDIA 9
Critically reviewing and analysing visual media like advertisement, news reports, documentaries & movies – Critical review writing of the visual media – Identifying and analysing symbols used in the content

UNIT IV IDENTIFYING FALLACIES 9
Rhetorical devices – Ambiguities in argument – Expressing opinions - Types of Fallacies – Discourse rules in group discussion – Group discussion – Components of Critical Thinking - Analyzing & solving problems- Case Study

58
UNIT V CRITICAL THINKING AND MEDIA

Critiquing an article – Electronic Media & Critical thinking – Online sources of information & critical thinking – Lateral thinking – Critical thinking in Social media - Writing an article after collecting and evaluating data

TOTAL: 45 PERIODS

LEARNING OUTCOMES:
By the end of the course students will be able to
- Accurately interpret evidence, statements, graphics, questions etc.
- Identify relevant arguments, reasons, claims, supporting arguments, pros and cons etc.
- Analyze and evaluate different perspectives and be more objective in decision making
- Distinguish between assumptions, facts and opinions and also to discern real news from fake news.
- Give importance to evidence and reason and be fair in making judgments.

REFERENCES

HS5793 READING FICTION

COURSE DESCRIPTION
This course is designed to give students an introduction to fiction in English from around the world.

COURSE OBJECTIVES
- To give students who are already proficient in the use of the English language some exposure to fiction from different parts of the world
- To help students appreciate the nuances of literary language.
- To help students understand the denotative and connotative meanings in literary texts.
- To provide students with the material to discuss common themes of human concern.
- To provide students with the opportunity to practice their reading skills

UNIT I HISTORICAL FICTION
Defining history and fiction and the intersection between the two - The language of historical fiction – historical truth vs literary truth - Text for study: The Diary of Anne Frank

UNIT II FANTASY / HORROR / GOTHIC FICTION
Introduction to Gothic fiction – Different sub genres of Gothic fiction – origins and development Text for study: Edgar Allan Poe – The Pit and the Pendulum

UNIT III WOMEN’S FICTION
Introduction to fiction by women writers – Women’s writing – characteristics - Text for study: Muriel Spark: The Driver’s Seat

59
UNIT IV  MYTHOLOGICAL FICTION  9
Introduction to mythological retellings in fiction - novel, short story, flash fiction, Drabble, 55 fiction

UNIT V  FICTION IN TRANSLATION  9
Translation and intertextuality – adaptation, stylistic equivalence, tranference of cultural information, literary conventions -Text for study: M.T. Vasudevan Nair: *Naalukettu: The House around the Courtyard* (translated by Gita Krishnankutty)

TOTAL: 45 PERIODS

LEARNING OUTCOMES
Students will be able to
- read texts with insight into their meaning and context
- use different reading strategies to identify construction of narratives
- identify and use the literary tools and strategies used by writers to communicate their meaning
- collect, organize and present details about the writers, the historical and general contexts of the texts.
- discuss, analyse and argue about general issues related to society.

REFERENCES:
7. http://oyc.yale.edu/english/engl-300/lecture-1
OBJECTIVES:
- To give awareness about art as a fundamental human activity, its characteristics and ways in which it can be understood.
- To give familiarity with the vocabulary of art.
- To enable the appreciation of art in particular contexts of time and place.

UNIT I  INTRODUCTION TO ART
Origin and need of art. Art as representation and expression. Role of art. Forms and categories of art in terms of media and technique- painting, sculpture, etc., Explaining the terms form/vocabulary, content/meaning and context/situation as a means of understanding and appreciating art.

UNIT II  VOCABULARY OF ART
Introduction to the vocabulary of art constituted by elements (line, shape, form, space, colour, light, value, texture) and principles (unity, variety, harmony, rhythm, balance, proportion, emphasis, contrast, movement) with at least one illustrative example for each.

UNIT III  APPRECIATING ART – FROM EARLY TIMES TO MODERN ART
Appreciating art works in terms of visual vocabulary and contextual importance with at least one example from the following periods- Prehistoric Art, Art of River Valley Civilisations- Egypt, Mesopotamia, Indus Valley civilisation. Greek and Roman art. Medieval art. Islamic Art. Buddhist and Hindu art. Mughal and Rajput miniature art. Indian folk art. Renaissance and Baroque art, Romanticism, Realism.

UNIT IV  APPRECIATING MODERN ART
Birth of modern art and its reasons. Appreciation of art from following movements with at least one example from each- Impressionism, Post Impressionism, Fauvism, Expressionism, Modern art, Abstract/ Non Objective art, Cubism, Dadaism, Surrealism, Futurism, Constructivism, Suprematism, De Stijl, Abstract Expressionism, Pop art, Op art.

UNIT V  APPRECIATING CONTEMPORARY ART
Outline of new forms and media in art from late 20th century. Installation art, land art, experiential art, digital art, etc., At least one example for each. New trends in Art field.

TOTAL: 45 PERIODS

OUTCOMES:
- An understanding of art as basic and varied human creation related to cognition and experience.
- Ability to appreciate art from different ages and contexts.

REQUIRED READING

REFERENCES
4. 'Indian Art since the early 1940s- A Search for Identity', Artists Handicrafts Association of Cholamandal Artists Village, Madras,1974.
OBJECTIVES:
- To give introduction to landscapes in history and enable their appreciation.
- To give familiarity about the elements in landscape design.
- To give knowledge about urban landscape.
- To give familiarity with plant material in local areas.

UNIT I  LANDSCAPES IN HISTORY I  9
Human civilisations and attitude to nature and landscapes across history and cultures. Outline of Japanese, Italian Renaissance and English gardens.

UNIT II  LANDSCAPES IN HISTORY II  9
Outline of landscape and garden design in Indian history. Gardens depicted in Sanskrit literature, Nandavanams and residential gardens of South India. Moghul gardens. Public parks and residential gardens of the colonial period.

UNIT III  ELEMENTS IN LANDSCAPE DESIGN  9
Introduction to hard and soft landscape elements in the design of landscapes. Different types of hard landscape elements. Plant materials, water and landform.

UNIT IV  URBAN LANDSCAPE  9
Urban open spaces and principle of urban landscape. Street landscaping, landscape design for waterfront areas and functional areas in urban centres. Sustainable principles in urban and regional landscapes.

UNIT V  INTRODUCTION TO PLANT MATERIAL  9
Introduction to flora of regions. Outline of flora of Chennai and local neighbourhoods. Understanding of their characteristics and context of use. Relationship between Flora & Fauna.

TOTAL: 45 PERIODS

OUTCOME
- Knowledge about landscape and landscape design as well as ability to appreciate them.

REFERENCES

UNIT I  INTRODUCTION  9
Introduction to concept of water management as a system as distinct from water harvesting. Importance of studying on a regional and watershed scale as the basis for water management systems. Introduction to traditional water management systems in India and the world. Types of traditional water management systems based on landform, vegetation and climate.

UNIT II  GLOBAL PERSPECTIVES  9
Traditional water management systems of other parts of the world, specifically, study of those in Asia. Case studies of conservation, preservation and restoration of such systems in Srilanka, Indonesia, China and Australia.
UNIT III COMPONENTS AND PROCESSES
Components of traditional water managements systems, Role of communities in these, including regulation of use, conservation of water storage areas, religious protection and practices. Community participation, role of hereditary regulators, and agricultural practices

UNIT IV NORTH INDIAN SCENARIO

UNIT V SOUTH INDIAN SCENARIO

TOTAL: 45 PERIODS

REQUIRED READING :
3. Village Tanks of South Asia, Papers and proceedings of the Regional workshop, Madurai, India, 2002.

REFERENCES: