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OBJECTIVE:
- To impart knowledge on the principle and design of control of Indoor/ particulate/ gaseous air pollutant and its emerging trends.

UNIT I INTRODUCTION 7
Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards.

UNIT II METEOROLOGY 6

UNIT III CONTROL OF PARTICULATE CONTAMINANTS 11

UNIT IV CONTROL OF GASEOUS CONTAMINANTS 11

UNIT V INDOOR AIR QUALITY MANAGEMENT 10
Sources, types and control of indoor air pollutants, sick building syndrome and Building related illness - Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have
- an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
- ability to identify, formulate and solve air and noise pollution problems
- ability to design stacks and particulate air pollution control devices to meet applicable standards.
- Ability to select control equipments.
- Ability to ensure quality, control and preventive measures.

TEXTBOOKS:

REFERENCES:
OBJECTIVES:

- To understand the construction and working principle of various parts of an automobile.
- To have the practice for assembling and dismantling of engine parts and transmission system.

UNIT I  AUTOMOTIVE ENGINE AUXILIARY SYSTEMS  9
Automotive engines- External combustion engines –Internal combustion engines -classification of engines- SI Engines- CI Engines- two stroke engines -four stroke engines-construction and working principles - IC engine components- functions and materials -valve timing –port timing diagram- Injection system -Unit injector system- Rotary distributor type - Electronically controlled injection system for SI engines- CI engines-Ignition system - Electronic ignition system -Transistorized ignition system, capacitive discharge ignition system.

UNIT II  VEHICLE FRAMES AND STEERING SYSTEM  9

UNIT III  TRANSMISSION SYSTEMS  9
Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints — Hotchkiss Drive and Torque Tube Drive- rear axle-Differential-wheels and tyres.

UNIT IV  SUSPENSION AND BRAKES SYSTEMS  9
Suspension Systems- conventional Suspension Systems -independent Suspension Systems –leaf spring – coil spring –taper-lite - eligo.s spring Types of brakes -Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control. Derive the equation of Forces acting while applying a brakes on plain surface - inclined road-gradient.

UNIT V  ALTERNATIVE ENERGY SOURCES  9

Note: Practical Training in dismantling and assembling of Engine parts and Transmission Systems should be given to the students.

OUTCOMES:

- Upon completion of this course, the students will be able to identify the different components in automobile engineering.
- Have clear understanding on different auxiliary and transmission systems usual.

TEXT BOOKS:

REFERENCES:

OBJECTIVES:
- To Introduce Fundamentals of Biomedical Engineering
- To study the communication mechanics in a biomedical system with few examples
- To study measurement of certain important electrical and non-electrical parameters
- To understand the basic principles in imaging techniques
- To have a basic knowledge in life assisting and therapeutic devices

UNIT I  HUMAN BODY SUBSYSTEM AND TRANSDUCERS
Brief description of muscular, cardiovascular and respiratory systems; their electrical, mechanical and chemical activities. Principles and classification of transducers for Bio-medical applications. Electrode theory, different types of electrodes; Selection criteria for transducers and electrodes.

UNIT II  NON ELECTRICAL PARAMETERS MEASUREMENT

UNIT III  ELECTRICAL PARAMETERS MEASUREMENT AND ELECTRICAL SAFETY

UNIT IV  IMAGING MODALITIES AND BIO-TELEMETRY

UNIT V  LIFE ASSISTING AND THERAPEUTIC DEVICES

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to understand communication mechanics in a biomedical system.
- Ability to understand and analyze measurement of certain electrical and non-electrical parameters.
- Ability to understand basic principles of imaging techniques, life assisting and therapeutic devices.

TEXT BOOKS:
REFERENCES:

OIT552        CLOUD COMPUTING       L T P C

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

UNIT II       VIRTUALIZATION

UNIT III      CLOUD ARCHITECTURE, SERVICES AND STORAGE

UNIT IV       RESOURCE MANAGEMENT AND SECURITY IN CLOUD

UNIT V        CASE STUDIES

OUTCOMES:
On Completion of the course, the students should be able to:
- Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- Learn the key and enabling technologies that help in the development of cloud.
- Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- Explain the core issues of cloud computing such as resource management and security.
- Be able to install and use current cloud technologies.
- Choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
TEXT BOOKS:

OIT551 DATABASE MANAGEMENT SYSTEMS L T P C
3 0 0 3

OBJECTIVES
- To learn the fundamentals of data models
- To learn conceptual modeling using ER diagrams.
- To study SQL queries and database programming
- To learn proper designing of relational database.
- To understand database security concepts
- To understand Information retrieval techniques

UNIT I DBMS AND CONCEPTUAL DATA MODELING

UNIT II DATABASE QUERYING

UNIT III DATABASE PROGRAMMING
Database programming with function calls, stored procedures - views – triggers. Embedded SQL. ODBC connectivity with front end tools. Implementation using ODBC/JDBC and SQL/PSM, implementing functions, views, and triggers in MySQL / Oracle.

UNIT IV DATABASE DESIGN

UNIT V ADVANCED TOPICS

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:
- understand relational data model, evolve conceptual model of a given problem, its mapping to relational model and Normalization
- query the relational database and write programs with database connectivity
- understand the concepts of database security and information retrieval systems
TEXT BOOKS:

REFERENCES:

OME551 ENERGY CONSERVATION AND MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:
At the end of the course, the student is expected to
• understand and analyse the energy data of industries
• carryout energy accounting and balancing
• conduct energy audit and suggest methodologies for energy savings and
• utilise the available resources in optimal ways

UNIT I INTRODUCTION

UNIT II ELECTRICAL SYSTEMS

UNIT III THERMAL SYSTEMS

UNIT IV ENERGY CONSERVATION IN MAJOR UTILITIES
Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems – Cooling Towers – D.G. sets

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

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students can able to analyse the energy data of industries.
• Can carryout energy accounting and balancing
• Can suggest methodologies for energy savings

TEXT BOOKS:
REFERENCES:

OAI551 ENVIRONMENT AND AGRICULTURE

OBJECTIVE:
- To emphasize on the importance of environment and agriculture on changing global scenario and the emerging issues connected to it.

UNIT I ENVIRONMENTAL CONCERNS
- Environmental basis for agriculture and food – Land use and landscape changes – Water quality issues – Changing social structure and economic focus – Globalization and its impacts – Agro ecosystems.

UNIT II ENVIRONMENTAL IMPACTS
- Irrigation development and watersheds – mechanized agriculture and soil cover impacts – Erosion and problems of deposition in irrigation systems – Agricultural drainage and downstream impacts – Agriculture versus urban impacts.

UNIT III CLIMATE CHANGE

UNIT IV ECOLOGICAL DIVERSITY AND AGRICULTURE

UNIT V EMERGING ISSUES
- Global environmental governance – alternate culture systems – Mega farms and vertical farms – Virtual water trade and its impacts on local environment – Agricultural environment policies and its impacts – Sustainable agriculture.

TOTAL: 45 PERIODS

OUTCOMES:
- Students will appreciate the role of environment in the current practice of agriculture and concerns of sustainability, especially in the context of climate change and emerging global issues.
- Ecological context of agriculture and its concerns will be understood

TEXTBOOKS:

REFERENCES:
OPT551  FIBRE REINFORCED PLASTICS

OBJECTIVES:
To enable the students
- To introduce the various materials for composite structure.
- To equip with the knowledge of sandwich structure technology.
- To provide knowledge in fracture mechanics of composites.
- To impart knowledge in fatigue and damping capacity of composite materials.
- To provide understanding of various manufacturing/fabricating techniques for composite structures

UNIT 1
Introduction: Definition, Reason for composites, Classifications of composites, Thermosets - Epoxy; Unsaturated polyester resin; vinyl ester,polymides etc.,- preparation, properties, and uses.

UNIT II
Reinforcements: Types, Properties, chemistry and applications of fillers such as silica, titanium oxide, talc, mica etc., Manufacturing process, Properties, structure and uses of Glass fiber-. Carbon, Aramid, Boron, jute, sisal, cotton

UNIT III
Fabrications of Thermoset composites – Hand lay up method, compression and transfer moulding, pressure and vacuum bag process, filament winding, protrusion, reinforced RIM, RRIM, Injection moulding, of thermosets, SMC and DMC, Advantages and disadvantages of each method.

UNIT IV
Testing of composites- destructive and non-destructive tests; Destructive- tensile, compression, flexural, impact strength, Hardness – Fatigue- toughness HDT ,basic concepts of fracture mechanisms

UNIT V
Applications of composites – aerospace, land transport, marine, structural, chemical plants and corrosion resistant products, mechanical engineering and energy applications sports, electrical, electronic and communication applications, biomedical applications, repairs and maintenance etc.,

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students will be able to
- Select various materials for designing composite structures.
- Apply knowledge of fracture mechanics of composites during designing of composite structures.
- Analyze critically the damping capacity of composite materials.
- Correlate various manufacturing/fabricating techniques for composite structures based on design
REFERENCES:
2. Polymers and Polymer Composites in Construction by L.C. Holleway, 1990
7. Fiber glass Reinforce Plastics – Nicholas P. Cheremisinoff and Composites Paul N. Cheremmisinoff.,

OCE552  GEOGRAPHIC INFORMATION SYSTEM  L T P C
3 0 0 3

OBJECTIVES :
- To introduce the fundamentals and components of Geographic Information System
- To provide details of spatial data structures and input, management and output processes.

UNIT I  FUNDAMENTALS OF GIS

UNIT II  SPATIAL DATA MODELS

UNIT III  DATA INPUT AND TOPOLOGY

UNIT IV  DATA ANALYSIS
Vector Data Analysis tools - Data Analysis tools - Network Analysis - Digital Education models - 3D data collection and utilisation.

UNIT V  APPLICATIONS

TOTAL: 45 PERIODS

OUTCOMES:
This course equips the student to
- Have basic idea about the fundamentals of GIS.
- Understand the types of data models.
• Get knowledge about data input and topology.
• Gain knowledge on data quality and standards.
• Understand data management functions and data output

TEXT BOOKS:

REFERENCE:

OME553 INDUSTRIAL SAFETY ENGINEERING L T P C
3 0 0 3

OBJECTIVES:
• To provide in depth knowledge in Principles of Environmental safety and its applications in various fields.
• To provide the knowledge of air and water pollution and their control.
• To expose the students to the basics in hazardous waste management.

UNIT I SAFETY IN METAL WORKING AND WOOD WORKING MACHINES
General safety rules, principles, maintenance, Inspections of turning machines, boring machines, milling machine, planning machine and grinding machines, CNC machines, Wood working machinery, types, safety principles, electrical guards, work area, material handling, inspection, standards and codes - saws, types, hazards. Inspection of material handling equipments.

UNIT II SAFETY IN WELDING AND GAS CUTTING
Gas welding and oxygen cutting, resistances welding, arc welding and cutting, common hazards, personal protective equipment, training, safety precautions in brazing, soldering and metalizing – explosive welding, selection, care and maintenance of the associated equipment and instruments – safety in generation, distribution and handling of industrial gases-colour coding – flashback arrestor – leak detection-pipe line safety-storage and handling of gas cylinders.

UNIT III SAFETY IN COLD FORMING AND HOT WORKING OF METALS
Cold working, power presses, point of operation safe guarding, auxiliary mechanisms, feeding and cutting mechanism, hand or foot-operated presses, power press electric controls, power press set up and die removal, inspection and maintenance-metal sheers-press brakes - Hot working safety in forging, hot rolling mill operation, safe guards in hot rolling mills – hot bending of pipes, hazards and control measures - Safety in Gas Furnace Operation, Cupola, Crucibles, Ovens, Foundry Health Hazards, Work Environment, Material Handling in Foundries, Foundry Production Cleaning And Finishing Foundry Processes.

UNIT IV SAFETY IN FINISHING, INSPECTION AND TESTING
Heat treatment operations, Electro Plating, Paint Shops, Sand And Shot Blasting, Safety In Inspection And Testing, Dynamic Balancing, Hydro Testing, Valves, Boiler Drums And Headers, Pressure Vessels, Air Leak Test, Steam Testing, Safety In Radiography, Personal Monitoring Devices, Radiation Hazards, Engineering And Administrative Controls, Indian Boilers Regulation.
UNIT V INDUSTRIAL SAFETY
Advances in Industrial Ergonomics and safety, Work and protective clothing, Theory and practice of Industrial safety, Industrial Noise and Vibration, Machine Guarding and Industrial machine safety, Manual material handling, Modeling for safety and health.

TOTAL: 45 PERIODS

OUTCOMES:
Students will be able to
1. Illustrate and familiarize the basic concepts and scope of engineering safety.
2. Understand the standards of professional conduct that are published by professional safety organizations and certification bodies.
3. Illustrate the importance of safety of employees while working with machineries.

REFERENCES:
7. Dr. Vincent Matthew Ciriello (Prediction of the maximum acceptable weight of lift from the frequency of lift, journal of industrial ergonomics, (2014), pg .225–237

OAT552 INTERNAL COMBUSTION ENGINES  L  T  P  C
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OBJECTIVE:
• To impart the basic fundamental knowledge on IC engines and its working along with some of the recent trends in IC engine

UNIT I INTRODUCTION IC ENGINE
Introduction, Types of IC engines, Constructional details IC engine, working, principles – 2 & 4 stroke engines, Cycles – Air standard cycles, Fuel air cycles and actual cycles, Actual Indicator diagram for four stroke and two stroke engines, General fuel properties, ignition properties – octane and cetane rating, Materials for engine components

UNIT II PETROL ENGINES
Working and constructional details of petrol engines, Carburetor – constructional and working, types of carburetors, additional features in modern carburetor, A/F ratio calculation, Petrol Injection - introduction, Ignition – introduction and requirements, Battery and magneto coil ignition system, Electronic ignition system, Stages of combustion in petrol engines, Combustion chambers for petrol engine, formation of knock in petrol engine

UNIT III DIESEL ENGINES
Working and constructional details of diesel engines, fuel injection – requirements, types of injection systems – inline, distributor pumps, unit injector, Mechanical and pneumatic governors. Fuel injector, Types of injection nozzles, Spray characteristics. Injection timing, Split and multiple injection, Stages of combustion in Diesel engines, direct and indirect combustion chambers for diesel engine, knocking in diesel engine, Introduction on supercharging and turbocharging
UNIT IV COOLING AND LUBRICATION
Requirements, Types- Air cooling and liquid cooling systems, forced circulation cooling system, pressure and Evaporative cooling systems, properties of coolants for IC engine. Need of lubrication, Lubricants for IC engines - Properties of lubricants, Types of lubrication – Mist, Wet and dry sump lubrication systems.

UNIT V MODERN TECHNOLOGIES IN IC ENGINES
HCCI Engines – construction and working, CRDi injection system, GDI Technology, E - Turbocharger, Variable compression ratio engines, variable valve timing technology, Fuel cell, Hybrid Electric Technology

TEXT BOOKS:

REFERENCES:

OML551 INTRODUCTION TO NANOTECHNOLOGY

OBJECTIVE:
Make the students to understand about the nanomaterials, synthesis and its characterization.

UNIT I BASICS AND SCALE OF NANOTECHNOLOGY

UNIT II DIFFERENT CLASSES OF NANOMATERIALS
Classification based on dimensionality-Quantum Dots,Wells and Wires- Carbon- based nano materials (buckyballs, nanotubes, graphene)--Metalbased nano materials (nanogold, nanosilver and metal oxides) -Nanocomposites- Nanopolymers –Nanoglasses –Nano ceramics -Biological nanomaterials.

UNIT III SYNTHESIS OF NANOMATERIALS

UNIT IV FABRICATION AND CHARACTERIZATION OF NANOSTRUCTURES
UNIT V APPLICATIONS
Solar energy conversion and catalysis - Molecular electronics and printed electronics - Nanoelectronics - Polymers with special architecture - Liquid crystalline systems - Linear and nonlinear optical and electro-optical properties, Applications in displays and other devices - Nanomaterials for data storage - Photonics, Plasmonics - Chemical and biosensors - Nanomedicine and Nanobiotechnology - Nanotoxicology challenges.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

OIM552 LEAN MANUFACTURING

OBJECTIVES:
• To study the various tools for lean manufacturing (LM).
• To apply the above tools to implement LM system in an organization.

UNIT I INTRODUCTION TO LEAN MANUFACTURING

UNIT II CELLULAR MANUFACTURING, JIT, TPM
Cellular Manufacturing – Types of Layout, Principles of Cell layout, Implementation. JIT – Principles of JIT and Implementation of Kanban. TPM – Pillars of TPM, Principles and implementation of TPM.

UNIT III SET UP TIME REDUCTION, TQM, 5S, VSM
Set up time reduction – Definition, philosophies and reduction approaches. TQM – Principles and implementation. 5S Principles and implementation - Value stream mapping - Procedure and principles.

UNIT IV SIX SIGMA
Six Sigma – Definition, statistical considerations, variability reduction, design of experiments – Six Sigma implementation

UNIT V CASE STUDIES
Various case studies of implementation of lean manufacturing at industries.

TOTAL: 45 PERIODS
OUTCOMES:
The students will be able to identify waste in any process, reduce the waste using proper kaizens and other methods thereby improving the productivity of the organisation using LM tools.

REFERENCES:
3. Rother M. and Shook J., 1999 _Learning to See: Value Stream Mapping to Add Value and Eliminate Muda_, Lean Enterprise Institute, Brookline, MA.

OBM552 MEDICAL PHYSICS L T P C 3 0 0 3

OBJECTIVES:
- To study the complete non-ionizing radiations including light and its effect in human body.
- To understand the principles of ultrasound radiation and its applications in medicine.
- To learn about radioactive nuclides and also the interactions of radiation with matters and how isotopes are produced.
- To study the harmful effects of radiation and radiation protection regulations.

UNIT I NON-IONIZING RADIATION AND ITS MEDICAL APPLICATIONS 9

UNIT II ULTRASOUND IN MEDICINE 9

UNIT III PRINCIPLES OF RADIOACTIVE NUCLIDES AND DECAY 9

UNIT IV INTERACTION OF RADIATION WITH MATTER 9

UNIT V RADIATION EFFECTS AND REGULATIONS 9

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to:
• Analyze the low frequency and high frequency effects of non-ionizing radiation and physics of light.
• Define various clinical applications based on ultrasound wave.
• Explain the process of radioactive nuclide production using different techniques.
• Analyze radiation mechanics involved with various physiological systems.
• Outline the detrimental effects of radiation and regulations for radiation safety.

TEXT BOOKS:

REFERENCES:

OML552 MICROSCOPY L T P C 3 0 0 3

OBJECTIVE:
This course will cover the basic principles and techniques of optical and electron microscopy. This course also deals with the sample preparation techniques for the microstructural analysis.

UNIT I INTRODUCTION 9

UNIT II MICROSCOPY 9

UNIT III ELECTRON MICROSCOPY 9

UNIT IV SAMPLE PREPARATION FOR MICROSTRUCTURAL ANALYSIS 9
UNIT V CHEMICAL ANALYSIS


OUTCOMES:
- Able to understand the physics behind the microscopy.
- Ability to describe the principle, construction and working of light microscopy.
- Ability to appreciate about electron microscopy.
- Ability to understand about the important of sample preparation technique.
- Ability to identify the appropriate spectroscopy technique for chemical analysis.

TEXT BOOKS

REFERENCES:

OAI552 PARTICIPATORY WATER RESOURCES MANAGEMENT

OBJECTIVE:
- To gain an insight on local and global perceptions and approaches on participatory water resource management

UNIT I FUNDAMENTALS: SOCIOLOGY AND PARTICIPATORY APPROACH 6
Sociology – Basic concepts – Perspectives- Social Stratification – Irrigation as a Socio technical Process - Participatory concepts– Objectives of participatory approach

UNIT II UNDERSTANDING FARMERS PARTICIPATION 10

UNIT III ISSUES IN WATER MANAGEMENT 9

UNIT IV PARTICIPATORY WATER CONSERVATION 10
UNIT V PARTICIPATORY WATERSHED DEVELOPMENT

Concept and significance of watershed - Basic factors influencing watershed development —
Principles of watershed management - Definition of watershed management – Identification of
problems - Watershed approach in Government programmes — People’s participation – Entry
point activities - Evaluation of watershed management measures.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to
- Gain knowledge on various processes involved in participatory water resource
management.
- Understand farmers participation in water resources management.
- Aware of the issues related to water conservation and watershed development
- Get knowledge in participatory water conservation
- Understand concept, principle, approach of watershed management.

TEXTBOOKS:
2. Uphoff.N., Improving International Irrigation management with Farmer Participation –
Getting the process Right – Studies in water Policy and management, No.11, Westview

REFERENCE:

OCH552 PRINCIPLES OF CHEMICAL ENGINEERING

OBJECTIVES
- To understand the overall view of the chemical engineering subjects

UNIT I
Chemistry, Chemical Engineering and Chemical Technology; Chemical process industries: History
and their role in Society; Role of Chemical Engineer; History and Personalities of Chemical
Engineering; Greatest achievements of Chemical Engineering.

UNIT II
Components of Chemical Engineering: Role of Mathematics, Physics, Chemistry and Biology;
Thermodynamics, Transport Phenomena, Chemical Kinetics and Process dynamics, design and
control.

UNIT III
Concept of Unit Processes and Unit Operations; Description of different Unit Processes and Unit
Operations; Designing of equipments; Flowsheet representation of process plants, Evolution of an
Industry – Sulphuric acid and Soda ash manufacture. Demonstration of simple chemical
engineering experiments; Plant visit to a chemical industry

UNIT IV
Role of Computer in Chemical Engineering; Chemical Engineering Software; Visit to Process
Simulation Lab; Relation between Chemical Engineering and other engineering disciplines;
Traditional vs. modern Chemical Engineering; Versatility of Chemical Engineering; Role of
Chemical Engineers in the area of Food, Medical, Energy, Environmental, Biochemical,
Electronics etc. Plant visit to an allied industry.
UNIT V
Paradigm shifts in Chemical Engineering; Range of scales in Chemical Engineering; Opportunities for Chemical Engineers; Future of Chemical Engineering.

OUTCOMES
- On completion of the course, students will attain knowledge in fluid behavior and solid properties.
- Understand the concept of chemical engineering principles

TEXT BOOKS:

REFERENCES:

OIM551 WORLD CLASS MANUFACTURING

OBJECTIVES
- Understanding of the concept and importance of strategy planning for manufacturing industries
- To apply principles and techniques in the identifiable formulation and implementation of manufacturing strategy for competitive in global context.

UNIT I INDUSTRIAL DECLINE AND ASCENDANCY
9 Manufacturing excellence - US Manufacturers - French Manufacturers - Japan decade – American decade - Global decade

UNIT II BUILDING STRENGTH THROUGH CUSTOMER – FOCUSED PRINCIPLES
9 Customer - Focused principles - General principles - Design - Operations - Human resources - Quality and Process improvement - Promotion and Marketing

UNIT III VALUE AND VALUATION
9 Product Costing - Motivation to improve - Value of the enterprises QUALITY - The Organization: Bulwark of stability and effectiveness - Employee stability – Quality Individuals Vs. Teams - Team stability and cohesiveness - Project cohesiveness and stability

UNIT IV STRATEGIC LINKAGES
9 Product decisions and customer service - Multi-company planning - Internal manufacturing planning - Soothing the demand turbulence

UNIT V IMPEDIMENTS
9 Bad plant design - Mismanagement of capacity - Production Lines - Assembly Lines – Whole Plant Associates - Facilitators - Teamsmanship - Motivation and reward in the age of continuous Improvement

TOTAL : 45 PERIODS
OUTCOMES:

- Able to understand the concept and the importance of manufacturing strategy for industrial enterprise competitiveness.
- Apply appropriate techniques in the analysis and evaluation of company's opportunities for enhancing competitiveness in the local regional and global context.
- Identify formulation and implement strategies for manufacturing and therefore enterprise competitiveness.

TEXT BOOKS:

OBT554 PRINCIPLES OF FOOD PRESERVATION

OBJECTIVE:

- The course aims to introduce the students to the area of Food Preservation. This is necessary for effective understanding of a detailed study of food processing and technology subjects.

UNIT I FOOD PRESERVATION AND ITS IMPORTANCE

- Introduction to food preservation. Wastage of processed foods; Shelf life of food products; Types of food based on its perishability. Traditional methods of preservation

UNIT II METHODS OF FOOD HANDLING AND STORAGE

- Nature of harvested crop, plant and animal; storage of raw materials and products using low temperature, refrigerated gas storage of foods, gas packed refrigerated foods, sub atmospheric storage, Gas atmospheric storage of meat, grains, seeds and flour, roots and tubers; freezing of raw and processed foods. retort pouch packing, Aseptic packaging.

UNIT III THERMAL METHODS

- Newer methods of thermal processing; batch and continuous; In container sterilization- canning; application of infra-red microwaves; ohmic heating; control of water activity; preservation by concentration and dehydration; osmotic methods

UNIT IV DRYING PROCESS FOR TYPICAL FOODS

- Rate of drying for food products; design parameters of different type of dryers; properties of air-water mixtures. Psychrometric chart, freezing and cold storage, freeze concentration, dehydro-freezing, freeze drying, IQF; calculation of refrigeration load, design of freezers and cold storages.

UNIT V NON-THERMAL METHODS

- Super Critical Technology for Preservation - Chemical preservatives, preservation by ionizing radiations, ultrasonics, high pressure, fermentation, curing, pickling, smoking, membrane technology. Hurdle technology,

TOTAL: 45 PERIODS
OUTCOMES:
On completion of the course the students are expected to
• Be aware of the different methods applied to preserving foods.

TEXT BOOKS:

REFERENCES:

OBJECTIVES:
• To make the students aware about the agricultural Finance, Banking and Cooperation.
• To acquaint the students with the basic concepts, principles and functions of management.
• To understand the process of finance banking and cooperation.

UNIT I AGRICULTURAL FINANCE - NATURE AND SCOPE
Agricultural Finance: Definition, Importance, Nature and Scope - Agricultural Credit: Meaning, Definition, Need and Classification - Sources of credit - Role of institutional and non - Institutional agencies: Advantages and Disadvantages - Rural indebtedness: consequences of rural indebtedness - History and Development of rural credit in India.

UNIT II FARM FINANCIAL ANALYSIS

UNIT III FINANCIAL INSTITUTIONS
Institutional Lending Agencies - Commercial banks: Nationalization, Agricultural Development Branches - Area Approach - Priority Sector Lending - Regional Rural Banks, Lead bank, Scale of finance - Higher financial institutions: RBI, NABARD, AFC, ADB, World Bank and Deposit Insurance and Credit Guarantee Corporation of India - Microfinance and its role in poverty alleviation - Self-Help Groups - Non -Governmental Organizations - Rural credit policies followed by State and Central Government - Subsidized farm credit, Differential Interest Rate (DIR), Kisan Credit Card (KCC) Scheme - Relief Measures and Loan Waiver Scheme and Know Your Customer (KYC).
UNIT IV  CO-OPERATION  9
Co-operation: Philosophy and Principles - History of Indian Cooperative Credit Movement: Pre and Post-Independence periods and Cooperation in different plan periods - Cooperative credit institutions: Two tier and three tier structure, Functions: provision of short term and long term credit, Strength and weakness of cooperative credit system, Policies for revitalizing cooperative credit: Salient features of Vaithiyananthan Committee Report on revival of rural cooperative credit institutions, Reorganisation of Cooperative credit structure in Andhra Pradesh and single window system and successful cooperative credit systems in Gujarat, Maharashtra, Punjab etc, - Special cooperatives: LAMPS and FSS: Objectives, role and functions - National Cooperative Development Corporation (NCDC) and National Federation of State Cooperative Banks Ltd., (NAFSCOB) - Objectives and Functions.

UNIT V  BANKING AND INSURANCE  9

OUTCOME:
After completion of this course, the students will
- Be familiar with agricultural finance, Banking, cooperation and basic concepts, principles and functions of management.

REFERENCES:

OEE751  BASIC CIRCUIT THEORY  L T P C  3 0 0 3

OBJECTIVES:
- To introduce electric circuits and its analysis
- To impart knowledge on solving circuit equations using network theorems
- To introduce the phenomenon of resonance in coupled circuits.
- To introduce Phasor diagrams and analysis of three phase circuits

UNIT I  BASIC CIRCUITS ANALYSIS  9

UNIT II  NETWORK REDUCTION AND THEOREMS FOR DC CIRCUITS  9

UNIT III  AC CIRCUITS  9
Introduction to AC circuits , inductance reactance, capacitive reactance, Phasor diagrams, real power, reactive power, apparent power, power factor, R-L R-C , RLC networks, Network
reduction: voltage and current division, source transformation — mesh and node analysis, Thevenins and Norton Theorems – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem – Millman's theorem.

UNIT IV THREE PHASE CIRCUITS
A.C. circuits – Average and RMS value - Phasor Diagram – Power, Power Factor and Energy.- Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power measurement in three phase circuits.

UNIT V RESONANCE AND COUPLED CIRCUITS

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to introduce electric circuits and its analysis
- Ability to impart knowledge on solving circuit equations using network theorems
- Ability to introduce the phenomenon of resonance in coupled circuits.
- Ability to introduce Phasor diagrams and analysis of three phase circuits

TEXT BOOKS:

REFERENCES

OGI751 CLIMATE CHANGE AND ITS IMPACT L T P C
3 0 0 3

OBJECTIVES:
- To understand the basics of weather and climate
- To have an insight on Atmospheric dynamics and transport of heat
- To develop simple climate models and evaluate climate changes using models
UNIT I  BASICS OF WEATHER AND CLIMATE:

UNIT II  ATMOSPHERIC DYNAMICS:

UNIT III  GLOBAL CLIMATE

UNIT IV  CLIMATE SYSTEM PROCESSES

UNIT V  CLIMATE CHANGE MODELS

OUTCOMES:
At the end of the course the student will be able to understand
• The concepts of weather and climate
• The principles of Atmospheric dynamics and transport of heat and air mass
• The develop simple climate models and to predict climate change

TEXT BOOKS:
OBJECTIVES:
- To understand the various algorithm design and analysis techniques
- To learn linear data structures – lists, stacks, and queues
- To learn different sorting and searching algorithms
- To understand Tree and Graph data structures

UNIT I  ALGORITHM ANALYSIS, LIST ADT

UNIT II  STACKS AND QUEUES

UNIT III  SEARCHING AND SORTING ALGORITHMS

UNIT IV  TREES

UNIT V  GRAPHS
Definition – Representation of Graph – Breadth-first traversal - Depth-first traversal – Dynamic programming Technique – Warshall’s and Floyd’s algorithm – Greedy method - Dijkstra’s algorithm – applications of graphs. Implementation of graph, graph traversal methods, finding shortest path using Dijkstra’s algorithm in C

TOTAL: 45 PERIODS

OUTCOMES:
At the end of this course, the students should be able to:
- Implement linear data structures and solve problems using them.
- Implement and apply trees and graphs to solve problems.
- Implement the various searching and sorting algorithms.

TEXT BOOKS:

REFERENCES:
OBJECTIVE:

- Understanding the various materials and its properties contribution towards electrical and electronics field. This course covers the properties of materials behind the electronic applications.

UNIT I INTRODUCTION

UNIT II CONDUCTING MATERIALS
Introduction, factors affecting the conductivity of materials, classification based on conductivity of materials, temperature dependence of resistivity, Low resistivity materials (graphite, Al, Cu and steel) and its applications, high resistivity materials (manganin, constantin, nichrome, tungsten) and their applications. Superconductors: Meissner effect, classification and applications.

UNIT III SEMICONDUCTING AND MAGNETIC MATERIALS

UNIT IV DIELECTRIC AND INSULATING MATERIALS

UNIT V OPTOELECTRONIC AND NANO ELECTRONIC MATERIALS

TOTAL: 45 PERIODS

OUTCOME:

- With the basis, students will be able to have clear concepts on electronic behaviors of materials

TEXT BOOKS:


REFERENCES:

2. Eugene A. Irene, Electronic Materials Science, Wiley, 2005
OBJECTIVE:
- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects

UNIT I INTRODUCTION
Impacts of Development on Environment – Rio Principles of Sustainable Development

UNIT II ENVIRONMENTAL ASSESSMENT
Screening and Scoping in EIA – Drafting of Terms of Reference, Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction.

UNIT III ENVIRONMENTAL MANAGEMENT PLAN

UNIT IV SOCIO ECONOMIC ASSESSMENT
Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis-

UNIT V CASE STUDIES
EIA case studies pertaining to Infrastructure Projects – Roads and Bridges – Mass Rapid Transport Systems - Airports - Dams and Irrigation projects - Power plants. TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have ability to
- carry out scoping and screening of developmental projects for environmental and social assessments
- explain different methodologies for environmental impact prediction and assessment
- plan environmental impact assessments and environmental management plans
- evaluate environmental impact assessment reports

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
To make the student understand the fundamentals of combustion and to teach them combustion in different regions like basic flame to gas turbine engines to rocket engines and finally how it is done in supersonic speeds.

UNIT I INTRODUCTION TO COMBUSTION 9
Thermo-chemical equations – Heat of formation – Activation energy - Multi-step reactions - Heat of reaction - first order, second order and third order reactions – Calculation of adiabatic flame temperature

UNIT II BASICS OF CHEMICAL KINETICS AND FLAMES 9

UNIT III COMBUSTION IN GAS TURBINE ENGINES 9

UNIT IV COMBUSTION IN ROCKETS 9

UNIT V SUPERSONIC COMBUSTION (Qualitative Treatment only) 9

TOTAL: 45 PERIODS

OUTCOMES:
- The student will be in a position to understand the detailed mechanism of Aerospace Vehicles and Aircraft Engines.
- The student will be able to analyse and impart the combustion processes that occur in Aircraft Engines and Rocket Vehicles.

TEXT BOOK:

REFERENCES:
OBJECTIVES:
- To provide an insight to the basics of planetary Remote Sensing
- To demonstrate how the Remote Sensing technique is applied to explore the surface characteristics of the planets and its environ.

UNIT I PLANETARY SCIENCE

UNIT II SATELLITE ORBIT

UNIT III PROPERTIES OF EMR

UNIT IV RADIOMETRY AND SCATTEROMETRY

UNIT V PLANETARY APPLICATION
Planetary Imaging Spectroscopy- USGS Tetracoder and Expert system - Mars Global Surveyor Mission (MGS) – Digital Elevation Model(DEM) of Mars – Mars Orbiter Camera (MOC) – Stereo and photoclinometric techniques for DEM.

OUTCOMES:
On completion of the course, the students have
- Exposure to fundamentals of planetary science or orbital mechanics
- The principles of observing the planets
- Knowledge of Remote Sensing methods for determining surface elevation and mapping of planets.

REFERENCES:
UNIT I  ENVIRONMENTAL IMPLICATIONS OF BUILDINGS  9

UNIT II  IMPLICATIONS OF BUILDING TECHNOLOGIES EMBODIED ENERGY OF BUILDINGS  9

UNIT III  COMFORTS IN BUILDING  9

UNIT IV  UTILITY OF SOLAR ENERGY IN BUILDINGS  9

UNIT V  GREEN COMPOSITES FOR BUILDINGS  9

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
3. Fundamentals of Integrated Design for Sustainable Building By Marian Keeler, Bill Burke

OBJECTIVE:
- To introduce the students to the interdisciplinary analysis of water and conceptual design of intervention strategies.
- To develop a knowledge-base on capacity building on IWRM.

UNIT I  IWRM FRAMEWORK  9
Definition – Objectives – Principles - Evolution of IWRM - IWRM relevance in water resources management – Paradigm shift : Processes and prospective outcomes

UNIT II  CONTEXTUALIZING IWRM  9
UN formulations - SDG goals - IWRM in Global, Regional and Local water partnership – Institutional transformation - Bureaucratic reforms - Inclusive development
UNIT III  EMERGING ISSUES IN WATER MANAGEMENT  9
Emerging Issues — Drinking water management in the context of climate change - IWRM and irrigation - Flood – Drought – Pollution – Linkages between water, health and poverty

UNIT IV  IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA  9
Rural Development - Ecological sustainability- Watershed development and conservation - Ecosystem regeneration – Wastewater reuse - Sustainable livelihood - Food security

UNIT V  ASPECTS OF INTEGRATED DEVELOPMENT  9
Capacity building - Conceptual framework of IWRM – Problems and policy issues - Solutions for effective integrated water management - Case studies

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to
- Understand objectives, principles and evolution of integrated water resources management.
- Have an idea of contextualizing IWRM
- Gain knowledge in emerging issues in water management, flood, drought, pollution and poverty.
- Understand the water resources development in India and wastewater reuse.
- Gain knowledge on integrated development of water management.

TEXTBOOKS:

REFERENCES:

OEI751  INTRODUCTION TO EMBEDDED SYSTEMS  L T P C
3 0 0 3

OBJECTIVES:
- To introduce the Building Blocks of Embedded System
- To Educate in Various Embedded Development Strategies
- To Introduce Bus Communication in processors, Input/output interfacing.
- To impart knowledge in Various processor scheduling algorithms.
- To introduce Basics of Real time operating system and example tutorials to discuss on one real-time operating system tool

UNIT I  INTRODUCTION TO EMBEDDED SYSTEMS

UNIT II  EMBEDDED NETWORKING
UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT
Embedded Product Development Life Cycle - objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN
Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication-shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance, comparison of Real time Operating systems: Vx Works, µC/OS-II, RT Linux.

UNIT V EMBEDDED SYSTEM APPLICATION DEVELOPMENT
Case Study of Washing Machine- Automotive Application- Smart card System Application.,

OUTCOMES:
1. Ability to understand and analyse, linear and digital electronic circuits.

TEXT BOOKS:
2. Peckol, ”Embedded system Design”, John Wiley & Sons,2010

REFERENCES:

OMF751 LEAN SIX SIGMA

OBJECTIVE:
• To gain insights about the importance of lean manufacturing and six sigma practices.

UNIT I LEAN & SIX SIGMA BACKGROUND AND FUNDAMENTALS
Historical Overview – Definition of quality – What is six sigma -TQM and Six sigma - lean manufacturing and six sigma- six sigma and process tolerance – Six sigma and cultural changes – six sigma capability – six sigma need assessments - implications of quality levels, Cost of Poor Quality (COPQ), Cost of Doing Nothing – assessment questions

UNIT II THE SCOPE OF TOOLS AND TECHNIQUES
UNIT III       SIX SIGMA METHODOLOGIES
Design For Six Sigma (DFSS), Design For Six Sigma Method - Failure Mode Effect Analysis (FMEA), FMEA process - Risk Priority Number (RPN) - Six Sigma and Leadership, committed leadership – Change Acceleration Process (CAP) - Developing communication plan – Stakeholder

UNIT IV       SIX SIGMA IMPLEMENTATION AND CHALLENGES
Tools for implementation – Supplier Input Process Output Customer (SIPOC) – Quality Function Deployment or House of Quality (QFD) – alternative approach – implementation – leadership training, close communication system, project selection – project management and team – champion training – customer quality index – challenges – program failure. CPQ vs six sigma, structure the deployment of six sigma – cultural challenge – customer/ internal metrics

UNIT V       EVALUATION AND CONTINUOUS IMPROVEMENT METHODS
Evaluation strategy – the economics of six sigma quality, Return on six Sigma (ROSS), ROI, poor project estimates – continuous improvement – lean manufacturing – value, customer focus, Perfection, focus on waste, overproduction – waiting, inventory in process (IIP), processing waste, transportation, motion, making defective products, underutilizing people – Kaizen – 5S

TOTAL: 45 PERIODS

OUTCOME:
- The student would be able to relate the tools and techniques of lean sigma to increase productivity

REFERENCES:
3. Fred Soleimannejad, Six Sigma, Basic Steps and Implementation, Author House, 2004

OTM751        MEMS AND NEMS

OBJECTIVE:
To develop the basic knowledge about the MEMS system and to know about the concepts and principles of MEMS & NEMS with various applications.

UNIT I       INTRODUCTION

UNIT II       MICRO FABRICATION AND MANUFACTURING TECHNIQUES
UNIT III  MECHANICS FOR MICRO SYSTEM DESIGN AND APPLICATIONS  
Basic concepts – Bending of thin plates – Mechanical vibration – Thermo mechanics - Fracture mechanics – Fluid mechanics at micro systems- Design considerations - Process design-mask layout design – Mechanical design-Applications of micro system in automotive industry, biomed, aerospace and telecommunications.

UNIT IV  NANO ELECTRONICS  

UNIT V  ARCHITECTURE AND APPLICATIONS  

OUTCOMES:
CO1: Understand the Fundamentals and working principles of microsystems and microelectronics
CO2: Knowledge on both micro fabrication and manufacturing techniques
CO3: Acquiring knowledge about micro system design and its various applications
CO4: Study about the basic concepts of Nano electronics with various devices and also discusses with its applications
CO5: Realizing the various application of NEMS and Architecture of MEMS

TEXT BOOKS:

REFERENCES

OTL751  TELECOMMUNICATION SYSTEM MODELING AND SIMULATION  
L  T  P  C  
3  0  0  3

OBJECTIVES:
• To gain knowledge in modeling of different communication systems.
• To know the techniques involved in performance estimation of telecommunication systems.
• To learn the use of random process concepts in telecommunication system simulation.
• To study the modeling methodologies of a telecommunication system.
• To study about the QAM digital radio link environment.
UNIT I  SIMULATION OF RANDOM VARIABLES RANDOM PROCESS
Generation of random numbers and sequence – Gaussian and uniform random numbers

UNIT II  MODELING OF COMMUNICATION SYSTEMS
Radio frequency and optical sources – Analog and Digital signals – Communication channel and model – Free space channels – Multipath channel and discrete channel noise and interference.

UNIT III  ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION
Quality of estimator – Estimation of SNR – Probability density function and bit error rate – Monte Carlo method – Importance sampling method – Extreme value theory.

UNIT IV  SIMULATION AND MODELING METHODOLOGY
Simulation environment – Modeling considerations – Performance evaluation techniques – Error source simulation – Validation.

UNIT V  CASE STUDIES
Simulations of QAM digital radio link environment – Light wave communication link – Satellite system.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, students would be able to
- Apply the constituents of a telecommunication systems.
- Analyze various modeling methodologies and simulation techniques.
- Estimate the performance measures of telecommunication systems.
- Apply system modeling in telecommunication.
- Demonstrate light wave communication and satellite communication systems.

TEXTBOOKS:

REFERENCES:

ORO751  NANO COMPUTING  L T P C 3 0 0 3

OBJECTIVES:
The student should be made to:
- Learn nano computing challenges
- Be familiar with the imperfections
- Be exposed to reliability evaluation strategies
- Learn nano scale quantum computing
- Understand Molecular Computing and Optimal Computing
UNIT I  NANOCOMPUTING-PROSPECTS AND CHALLENGES

UNIT II  NANOCOMPUTING WITH IMPERFECTIONS

UNIT III  RELIABILITY OF NANOCOMPUTING

UNIT IV  NANOSCALE QUANTUM COMPUTING

UNIT V  QCADESIGNER SOFTWARE AND QCA IMPLEMENTATION

TOTAL: 45 PERIODS

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

- Discuss nano computing challenges.
- Handle the imperfections.
- Apply reliability evaluation strategies.
- Use nano scale quantum computing.
- Utilize Molecular Computing and Optimal Computing.

TEXT BOOK:

REFERENCES:

OAE752  PRINCIPLES OF FLIGHT MECHANICS

OBJECTIVE:
- To make the student understand the performance of airplanes under various flight conditions like take off, cruise, landing, climbing, gliding, turning and other maneuvers.
UNIT I: GENERAL CONCEPTS
International Standard atmosphere, IAS, EAS, TAS, Propeller theory- Froude momentum and blade element theories, Propeller co-efficients, Use of propeller charts, Performance of fixed and variable pitch propellers, High lift devices, Thrust augmentation

UNIT II: DRAG OF BODIES
Streamlined and bluff body, Types of drag, Effect of Reynold's number on skin friction and pressure drag, Drag reduction of airplanes, Drag polar, Effect of Mach number on drag polar. Concept of sweep- effect of sweep on drag.

UNIT III: STEADY LEVEL FLIGHT
General equation of motion of an airplane. Steady level flight, Thrust required and Power required, Thrust available and Power available for propeller driven and jet powered aircraft, Effect of altitude, maximum level flight speed, conditions for minimum drag and minimum power required, Effect of drag divergence on maximum velocity, Range and Endurance of Propeller and Jet aircrafts. Effect of wind on range and endurance.

UNIT IV: GLIDING AND CLIMBING FLIGHT
Shallow and steep angles of climb, Rate of climb, Climb hodograph, Maximum Climb angle and Maximum Rate of climb- Effect of design parameters for propeller jet and glider aircrafts, Absolute and service ceiling, Cruise climb, Gliding flight, Glide hodograph

UNIT V: ACCELERATED FLIGHT
Estimation of take-off and landing distances, Methods of reducing landing distance, level turn, minimum turn radius, maximum turn rate, bank angle and load factor, Constraints on load factor, SST and MSTR. Pull up and pull down maneuvers, V-n diagram.

TOTAL: 45 PERIODS

OUTCOMES:
Students will be able to
• Understand concepts of take-off, climb, cruise, turn, descent and landing performance.
• understand the performance characteristics of the different types of power plants
• Understand and predict the behavior of fixed wing aircraft undertaking a typical flight profile
• Understand the factors that influence aircraft design and limit aircraft performance.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To provide the students a basic knowledge about various types of marine vehicles
- To provide the students basic theory behind the design and development of marine vehicles

UNIT I MARINE VEHICLES
Types – general – by function – commercial marine vehicles- passenger ship, cargo ships, oil and chemical tankers, cattle carriers, harbor crafts, off shore platform, container ships

UNIT II REEFERS AND GAS CARRIERS
Introduction – Types, design considerations, safety – operation and controls, precaution during bunkering

UNIT III REMOTELY OPERABLE VEHICLE (ROV), UMS SHIPS

UNIT IV SUBMERSIBLES AND AUTONOMOUS UNDERWATER VEHICLE (AUV)

UNIT V MANNED AND UN MANNED SUBMERSIBLE

TOTAL: 45 PERIODS

OUTCOMES:
- Students will be able understand the types of marine vehicles
- Students should get a preliminary knowledge in marine vehicle design, construction and its components

TEXT BOOKS:
1. Jonathan M. Ross, human factors for naval marine vehicle design and operation
3. R. Frank Busby, Manned Submersibles, Office of the oceanographer of the Navy, 1976

REFERENCES
OBJECTIVES:
The student should be made:
- To understand the concept about Wireless networks, protocol stack and standards
- To understand and analyse the network layer solutions for Wireless networks
- To study about fundamentals of 3G Services, its protocols and applications
- To have in depth knowledge on internetworking of WLAN and WWAN
- To learn about evolution of 4G Networks, its architecture and applications

UNIT I  WIRELESS LAN  9

UNIT II  MOBILE NETWORK LAYER  9

UNIT III  3G OVERVIEW  9

UNIT IV  INTERNETWORKING BETWEEN WLANS AND WWANS  9
Internetworking objectives and requirements, Schemes to connect WLANS and 3G Networks, Session Mobility, Internetworking Architecture for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multichannel Multipoint Distribution System.

UNIT V  4G & BEYOND  9

TOTAL:45 PERIODS

OUTCOMES:
Upon completion of the course, the student would be able to:
- Conversant with the latest 3G/4G networks and its architecture
- Design and implement wireless network environment for any application using latest wireless protocols and standards
- Ability to select the suitable network depending on the availability and requirement
- Implement different type of applications for smart phones and mobile devices with latest network strategies

TEXT BOOKS:
REFERENCES:

OBJECTIVE
- To introduce students to the principles of Microbiology, to emphasize the structure and biochemical aspects of various microbes.

Microbial classification, Diseases,

UNIT I INTRODUCTION TO MICROBIOLOGY
- classification and nomenclature of microorganisms, microscopic examination of microorganisms: light, fluorescent, dark field, phase contrast, and electron microscopy.

UNIT II MICROBES- STRUCTURE AND REPRODUCTION
- Structural organization and multiplication of bacteria, viruses (TMV, Hepatitis B), algae (cyanophyta, rhodophyta) and fungi (Neurospora), life history of actinomycetes (Streptomyces), yeast (Saccharomyces), mycoplasma (M. pneumoniae) and bacteriophages (T4 phage, λ phage)

UNIT III MICROBIAL NUTRITION, GROWTH AND METABOLISM
- Nutritional classification of microorganisms based on carbon, energy and electron sources, Definition of growth, balanced and unbalanced growth, growth curve and different methods to quantify bacterial growth: (counting chamber, viable count method, counting without equipment), different media used for bacterial culture (defined, complex, selective, differential, enriched), themathematics of growth-generation time, specific growth rate.

UNIT IV CONTROL OF MICROORGANISMS
- Physical and chemical control of microorganisms, Definition of sterilization, dry and moist heat, pasteurization, tyndalization; radiation, ultrasonication, filtration. Disinfection sanitization, antiseptics sterilants and fumigation. mode of action and resistance to antibiotics; clinically important microorganisms

UNIT V INDUSTRIAL MICROBIOLOGY
- Microbes involved in preservation (Lactobacillus, bacteriocins), spoilage of food and food borne pathogens (E.coli, S.aureus, Bacillus, Clostridium). Industrial use of microbes (production of penicillin, alcohol, vitamin B-12); biogas; bioremediation (oil spillage leaching of ores by microorganisms, pollution control); biofertilizers, biopesticides. Biosensors.

TOTAL: 45 PERIODS

OUTCOMES:
- To provide to the students the fundamentals of Microbiology, the scope of microbiology and solve the problems in microbial infection and their control.

TEXT BOOKS: