B. Tech. 5th Semester

Course Code	**:**	**CHOE301**			
Course Title	**:**	**Green Chemistry**			
Number of credits	**:**	**L**	**T**	**P**	**Total**
		3	**0**	**0**	**3**
Prerequisites (Course code)	**:**	**Enrolling students must have studied one Chemistry Paper in B. Tech. First Year**			
Course Type	**:**	**OE**			

Course Learning Objectives:

- To discuss various concepts of Green Chemistry.
- To discuss about generation of wastes, challenging problems of waste and its treatments.
- To impart knowledge about various catalysts, their role in Green Chemistry and other environmentally benign conditions.
- To discuss about important renewable resources and role of various green technologies in day to day life.

Course Content:

Unit 1

Principles and concepts of green chemistry (Introduction, sustainable development-green engineering, atom economy, atom economic reactions, atom uneconomic reactions, reducing toxicity). **(8L)**

Unit 2

Waste: Production, problems and prevention, problems caused by waste, sources of waste form industry, waste minimization techniques, on-site treatment: physical, chemical and bio-treatment; design for degradation, polymer recycling**.** **(8L)**

Unit 3

Measuring and controlling environmental performance (importance of measurement, life cycle assessment, green process metrices, and environmental management system). **(6L)**

Unit 4

Catalysis and Environmentally benign organic solutions: introduction, heterogeneous catalysis, homogeneous catalysis, phase transfer catalysis, bio-catalysis, photo-catalysis; organic solvents and volatile organic solvents, solvent free systems, supercritical fluids, water as reaction solvent, ionic liquids, fluorous biphasic solvent, comparing greenness of solvents. **(10L)**

(Open Elective Courses)
(V, VI, VII, and VIII Semester)

DEPARTMENT OF PHYSICS
(B. TECH: V Sem.)
(OPEN ELECTIVE)

PHOE301: INDUSTRIAL PHYSICS

L	T	P	Credits	Total contact hours
3	0	0	3	36

Pre-requisite: **PHIC101**

Brief Description about the course: This course includes the energy generation techniques their environmental effects and their industrial impact. The development of basic techniques behind various nano and microscale industrial devices and processes for designing of emerging nano and microscale sensors and transducers.

Course Content

UNIT-I

Energy- environment and its industrial impact: Energy and power- principles, demands outlook, transformation of energy and its cost, thermal pollution, electrical energy from fossil fuels, hydroelectric generation- principles and problems, storage, reserves, new environmental effects, electrical energy from nuclear reactors, fusion power, solar power, biomass, Fuel Cells.

UNIT-II

Elemental Analysis instrumentation: Instrumentation of spectroscopic analytical system, UV-VIS absorption spectrophotometers (single and double beam), Flame emission and atomic absorption spectrophotometer, Laminar flow burner, Grating monochromator, Photomultiplier tube, Atomic emission spectrophotometer, X-ray fluorescence, Energy dispersive X-ray spectroscopy, Laser Induced Breakdown Spectroscopy.

UNIT- III

Transducers: Design of transducers, Nano-Mechanical, Chemical and magnetic transducers, Thermoelectric sensors, Piezoelectric sensors, Pyroelectric sensors, Photovoltaic sensors, Optical sensors.

UNIT-IV

Applications: Elemental analysis and application of transducers in sustainable technologies, case studies from the Indian knowledge systems.

Text Books/Reference Books

T-1: Kenneth J. Skipka, Louis Theodore, Energy Resources: Availability, Management, and Environmental Impacts, CRC Press, 2014.

T-2: Sugiyama, Masakazu, Fujii, Katsushi, Nakamura, Shinichiro (Eds.), Solar to Chemical Energy Conversion- Theory and Application, Springer, 2016.

T-3: Sergy Edward Lyshevski, Micro-Electromechanical and Nano-Electromechanical Systems, CRC Press, 2005.

Course Outcomes

CO1: Student will understand various energy generation techniques, environmental effects and its economics.

CO2: Student will be able to solve technical problems on various nano and microscale industrial devices and processes.

CO3: Student will be able to gain knowledge in designing of emerging sensors and transducers.

CO4: Student will be able to gain knowledge of various elemental analysis instrumentations used in various engineering branches.

DEPARTMENT OF PHYSICS

(B. TECH: V Sem.)
(OPEN ELECTIVE)

PHOE302: NUCLEAR TECHNOLOGY

L	T	P	Credits	Total contact hours
3	0	0	3	36

Pre-requisite: **PHIC101**

Brief Description about the course: This course includes the concept of nuclear physics and instrumentation in various field of science and technology to implement their concept in energy generation. Nuclear radiations and their detection to understand the properties of materials and biological samples.

Course Content

UNIT-I (9 Hours)

General Properties of Atomic Nucleus: Properties of nucleus, binding energy, nuclear stability, radioactivity: Natural and artificial, Alpha, Beta and Gamma radiations and their applications, half-life, mean life, laws of radioactivity, radioactive equilibrium.

UNIT-II (9 Hours)

Interaction and Detection of Nuclear Radiation: Interaction of radiations with matter (Charge particle, Electromagnetic and Neutron), stopping power, cross section, gas filled radiation detectors, scintillation detectors, semiconductor detectors, photomultiplier tube, SSNTDs and their applications.

UNIT-III (9 Hours)

Nuclear Reactors: Nuclear reaction and their type, conservation laws, direct and compound nucleus reaction, nuclear fission, fission products, mass and energy distribution of fission products, nuclear fission reactors, fast Breeder reactor, nuclear fuel, control rods, nuclear fusion–controlled thermonuclear reactions.

UNIT-IV (9 Hours)

Accelerators and their applications: Accelerators: Cyclotron, Tandem, LINAC and Pelletron, Ion source, Role of accelerators in research and Technology.

Radiation dosimetry: Radiation monitoring and dosimeters, Physical and biological effects, applications of radiations in medical and forensic sciences, radiation therapy, oncology and radionuclide therapy, radiation safety, applications in sustainable technologies.

Course Outcomes

At the end of the course students will be able to:

CO1: Understand the nuclear processes and reactions in various phenomena.

CO2: Apply nuclear physics in nuclear reactors and devolvement for science and technology.

CO3: Aware of latest developments in accelerators and detectors and their applications in science, technology and research.

Text Books/Reference Books

1. Glenn F Knoll, Jhon Wiley & Sons Inc. Singapore, Radiation detection and measurement, 2012
2. R M Singru, Wiley Eastern Pvt. Ltd , New Delhi, Experimental Nuclear Physics, 2011
3. Roy and Nigam, Himalaya Publishing House, Nuclear Physics: Theory and Experiment, 2016
4. D C Tayal, John Wiley & Sons Ltd; Nuclear Physics, 2015

MEOE429: LOGISTICS & SUPPLY CHAIN MANAGEMENT

Pre-requisite: Nil

L	T	P	Credits	Total contact hours
03	00	00	03	40

Brief Description about the course

To understand concept of Supply chain management and apply this knowledge to understand the working of corporate world.

Unit-I

Understanding the Supply Chain, Performance, Drivers and Obstacles: Objectives of supply chain, Stages of supply chain, Supply chain process cycles, Push/pull view of supply chain processes, Importance of supply chain flows, Examples of supply chain, Strategic decisions in supply chain management. Supply Chain Performance, Supply chain strategies, achieving strategic fit, Product life cycle, Supply Chain drivers and Obstacles, four drivers of supply chain – inventory, transportation, facilities, and information, Obstacles to achieve strategic fit.

(10 hrs)

Unit-II

Planning Demand and Supply in a Supply Chain: Role of forecasting in a supply chain, Forecasting methods in a supply chain, Basic approach to demand forecasting, Aggregate planning resources. Managing economies of scale in a supply chain, Role of cycle inventory in a supply chain. **(10 hrs)**

Unit-III

Transportation and Coordination in a Supply Chain: Facilities affecting transportation decisions, Transport selection, Modes of transportation and their performance characteristics, Trade-offs in transportation decision, Making transportation decisions in practice, Models for transportation and distribution, Third party logistics (3PL). Coordination in a Supply chain, Lack of supply chain coordination and the Bullwhip effect, Effect of lack of coordination on performance, Obstacles to coordination, Achieving coordination in practice.

(10 hrs)

Unit-IV

Source Management and IT in Supply Chain: Inventory management in supply chain, Information technology in supply chain, Typical IT solution, Reverse supply chain, Reverse supply chain Vs. Forward supply chain

Advanced topics in SCM: Green, Lean, Sustainable, Global and Agile supply chain Management, Quality in Supply Chain. Integration and Collaborative Supply Chain, Circular Supply Chain Management.

Cases in Supply Chain: Case Studies such as Newspaper, Mumbai Tiffanwala, Disaster Management, Organic Food, Fast Food, Hostel Mess etc. **(10 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text/Reference Books:

1. Christopher Martin, "*Logistics and Supply Chain Management*", Pearson Education Asia.
2. Chopra Sunil and Meindl Peter, "*Supply Chain Management – Strategy, planning and operation's"*, Pearson Education, Asia.
3. Kapoor K K, KansalPurva, "*Marketing logistics: A Supply Chain Approach*", Pearson Education Asia.
4. Mohanty, R.P and Deshmukh, S.G., "*Supply Chain Management*", Pearson Education Asia.
5. Fawcett, S. E., Ellram, L. M and Ogden, J. A., "Supply Chain Management" Pearson Education Asia.
6. Dixit Garg, Sunil Luthra and Sachin Mangla., "Supply Chain and Logistics Management". New Age International Publishers

Course Outcomes:

CO 1: Understand the decision phases and apply competitive & supply chain strategies.
CO 2: Understand drivers of supply chain performance.
CO 3:. Analyze factors influencing network design and forecasting in a supply chain.
CO 4: Understand the role of aggregate planning, inventory, IT and coordination in a supply chain.

MEOE430: INDUSTRIAL ENGINEERING AND MANAGEMENT

Pre-requisite:**Nil**

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief description about the course

Industrial Engineering Management course focuses on optimizing complex systems and processes in various industries. It combines engineering principles with business management techniques to improve overall productivity and performance. Industrial engineers analyze and evaluate various factors, and manage business/industrial systems involving people, materials, methods, and machines.

UNIT-I

Definition, role, and scope of industrial engineering, industrial engineering approach and techniques, principles of organization, elements of organization, types of organization.

Plant layout, site selection, types of plant layout, factors affecting layout, plant building, flexibility and expansion. **(8hrs)**

UNIT-II

Materials Management: Introduction, inventory, inventory costs, inventory cost relationship, inventory control models, ABC analysis MRP, elements of MRP.
Work study: Method study, method study techniques, work measurement techniques, time study, observed time, basic time, normal time, allowances, standard time.

(10 hrs)

UNIT III

Sales Forecasting Introduction, objectives of sales forecasting, types of forecasting, methods of sales forecasting; collective opinion method, Delphi technique, moving average method, time series analysis, simple exponential smoothing, measurement of forecasting errors.

Quality Management: Quality, dimensions of quality, quality control, basic QC tools, introduction to statistical quality control, quality assurance six-sigma introduction. **(12 hrs)**

UNIT-IV

Basics of project management, network analysis, Critical path method, Program evaluation and review technique, Comparison between CPM and PERT

Advancement in Industrial Management: Industry 4.0, lean management, sustainable industrial practices, case studies pertains to advanced industrial practices. **(10 hrs)**

NOTE:

The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books / Reference

1. Production and operations management by S.N.Chary Publication Tata Mc Graw Hill (TMH)
2. Industrial Engineering and Organization Management by S.K. Sharma & Savita Sharma Publication Kataria & sons
3. Industrial Engineering and Production management by Martland T Telsang Publication S. chand
4. Modern Production Management by Elwood S. Buffo Rakesh K. Sarin Publication John Wiley & Sons
5. Jocobs, C.A., “Production and Operations Management”, Tata McGraw Hill
6. Handbook of Industrial Engineering: Technology and Operations Management, by Gavriel Salvendy, publication John Wiley & Sons
7. Mitra, A., “Fundamentals of Quality Control and Improvement”, John Wiley & Sons, Inc.

Course Outcomes

CO1: Understand industrial engineering concepts to optimize the industrial resources
CO2: Use plant layout concepts to develop and expand the industrial layouts.
CO3: Apply forecasting and materials management for smooth functioning of industry on shop floors
CO4: Analyze the quality of product and services in industrial scenario with concept of quality management

Course Code	**:**	**ITOE 301**
Course Title	**:**	**Data Structures**
Number of Credits	**:**	**3 and 3/0/0**
Prerequisites	**:**	**Problems Solving and Programming Skills**
Course Type	**:**	**OE**

Course Learning Objectives

1. This course introduces the concept of Data Structures used in various computer science applications
2. The students are introduced to understand and efficiently apply various data structures such as stacks, queues, linked lists, trees and graphs for solving various computing problems using C programming language.

Course Content

Unit 1: Pointers & File Handling:

Revision of Pointers and Dynamic Memory, Files and related operations.
Searching techniques: Linear and Binary, Sorting techniques: Selection, Bubble, Insertion, Merge sort, Quicksort.

Unit 2: Simple Data Structures

Arrays based Linear Data Structures: Array storage, sparse arrays; Transpose, addition, and multiplication of sparse matrices, Stacks and Queues and their applications, multiple stacks and queues in an array.

Unit 3: Linked Data Structures

Singly, Doubly & Circular Linked Lists; representation, operations and applications, linked stacks and queues. linked lists based polynomial addition.

Unit 4: Advanced Data Structures

Trees, Basic concepts and definitions of a tree and binary tree and associated terminology, Binary tree traversal techniques, some more operations on binary trees, Heaps and heapsort.

Reference Books:

1. E Horowitz and S. Sahni: Fundamentals of Data Structures in C, Second Edition, Universities Press, Hyderabad.
2. R.L. Kruse: Data Structures & Program Design in C, PHI.
3. D.F. Knuth: The art of Computer Programming Vol-1, Narosa Publications, 1985.
4. Byron S. Gottfried & J K Chhabra: Theory and Problems of Programming with C Language, Schaum's Outlines Series, TMH, 2005.

Course Outcomes

1. Develop skill to identify and determine the usage of various data structures, operations, associated algorithms and implement their applications.
2. Apply knowledge of pointers, memory allocation and string handling for solving programming problems.
3. Understand the concept of trees and graphs, their implementation and applications.
4. Able to implement standard algorithms for searching and sorting.
5. Analyze efficiency of different algorithms using time and space complexity.

DEPARTMENT OF HUMANITIES &SOCIAL SCIENCES
B. Tech (Open Elective Course)
Course Title: Market Psychology & Consumer Behaviour

Course Category: OE
Course Code: HSOE 302
Credits: 3 (L-3)
Semester: 5th

Internal: 50 Marks
Theory: 50 Marks
Total: 100 Marks
Time: 3hrs

Course Objectives

To introduce the psychological issues in market &consumer psychology to the students and to acquaint them with advances in market &consumer psychology

Note: Six questions to be set covering all the units. The examinees shall have to attempt any five questions of their choice.

UNIT I

Concept, applications of market psychology, internal & external factors affecting consumer behavior. Applying consumer behavior knowledge; Application of Marketing Segmentation in Consumer Behaviour; Consumer society in the twenty-first century. Group influences on consumer behavior. Marketing regulations and consumer behavior.

UNIT II

Reference Groups & Opinion Leader; Importance of cultures, sub-cultures, marketer's concern. Cross cultural consumer's behavior. Dynamics of relationship between brands and identity, how products prime social networks, consumer socialization.

UNIT III

Decision making process and problem recognition, types of decisions. The effect of personal influence and opinion leadership. Diffusion of innovations. Organizational buying behavior: Concept & differences with consumer buying behaviour.

UNIT IV

The implicit consumer cognition, consumer attitudes and behavior; consumer needs-wants, motivation and goals in consumption, personality and consumer behavior, consumer perception-marketers concern; perceptual risks; learning and consumer involvement. Consumer emotions.Information search. Alternative evaluation and selection. Outlet selection and purchase. Post purchase processes, consumer satisfaction, and consumer commitment.

Course Outcomes

By studying the course, the students will be able to apply knowledge of market psychology & consumer behavior patterns to the design of the marketing mix and to develop different positioning strategies for different target markets and behavior patterns.

Suggested Readings

1. Kotler, P., & Keller, K. L. (2018). Marketing Management. Pearson Prentice Hall.
2. Belk, R. W., Fischer, E & Kozinets R. V. (2013). *Qualitative Consumer and Marketing Research*. Los Angeles: SAGE Publications Ltd.
3. Howard, D. J., Kirmani, A., & Rajagopal, P. (Eds.) (2013). *Social Influence and Consumer Behaviour*. New York: The Psychology Press.
4. Kimmel, A. J. (2012). *Psychological Foundations of Marketing*. USA: The Psychology Press.
5. Priest, J., Carter, S., & Statt, D. A. (2013). *Consumer Behaviour*. UK: Edinburgh Business School.

ELECTRICAL ENGINEERING DEPARTMENT

EEOE302 ELECTRICAL MACHINES

Pre-requisite:EEPC101

L	T	P	Credits	Total contact hours
3	0	0	**3**	**42**

Brief Description: This course helps to understand different types of electrical machines, their basic operations and steady state analysis. Focus on the study of electro mechanical energy conversion & different parts of electrical machine, address the underlying concepts & methods behind electrical machines and their applications.

Course Content

Unit - I Introduction to Transformer: **(10)**

Basics of Magnetic Circuits, history, operation of ideal transformer, Dot convention, Phasor diagram, equivalent circuit of ideal transformer, Analysis of practical transformer, Losses, voltage regulation and efficiency of practical transformer, various tests and their uses for practical transformer.

Unit – II DC Machines: **(10)**

Introduction to DC machine, Single conductor DC machine basic operation, Construction features, Types of DC generator, Characteristics, armature reaction, losses and power flow, Types of DC motors, Characteristics and control of DC motors, losses and efficiency calculations, Brief of Armature windings.

Unit – III Induction Machines: **(12)**

Introduction to rotating magnetic fields, Synchronous speed and induced voltage in a coil, introduction to 3-phase induction motor, equivalent circuit and phasor diagram, air-gap power, torque expression, torque-slip characteristics, starting methods and speed control of IM, Basic operation and equivalent circuit of 1-phase IM, types of 1-phase IM.

Unit – IV Synchronous Machines: **(10)**

Synchronous machine construction, Introduction of synchronous generator, basic operation, OC and SC characteristics, voltage regulation methods, analysis of cylindrical and salient pole synchronous machines, phasor diagrams, expressions for load angle and power.

References/Textbooks:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2 P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
3. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
4. Stephen J. Chapman , "Electric Machinery Fundamentals," 5th Edition, McGraw Hill.

Course Outcomes:

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

CO 1 Understand the working of different types of transformers and rotating machines.

CO 2 Analyze the equivalent circuit of electrical machines andevaluate their performances.

CO 3 Evaluate the suitability of electrical machinesin different applications.

CO 4 Illustrate the characteristics&various tests to be performed to evaluate their performances.

ELECTRICAL ENGINEERING DEPARTMENT

EEOE303 CONTROL SYSTEM ENGINEERING

Pre-requisite: EEPC101, EEPC204, EEPC205, EEPC206

L	T	P	Credits	Total contact hours
3	0	0	3	42

Brief description: This course aims to provide fundamental concepts of control system problems and their solution possibilities, mathematical modeling of the various physical systems, analysis of the systems in time and frequency domain, stability analysis, controller and compensator design specifications.

Unit-I: **(12)**

Basics of control system: Control systems elements, concept of open-loop and closed-loop systems with applications.

Mathematical modeling: Electrical systems, mechanical systems, electro-mechanical systems, pneumatic and thermal systems, electrical analogues of dynamical systems, model simplification using block diagram reduction and signal flow methods, sensitivity analysis.

Control system components: concept of AC & DC servomotor, synchro, stepper motor and tachometer, etc.

Unit-II: **(10)**

Time domain analysis: Transient response analysis, first order systems, initial condition response, time response specifications of second order system for typical test signals, Response of higher order systems: steady state error and error constants, dynamic error constants. Routh-Hurwitz Stability Criterion, System analysis using Root-locus techniques.

Unit-III: **(10)**

Frequency Domain Analysis: Sinusoidal transfer functions, Frequency response specifications, Polar plot, Nyquist plot, and Bode plot for stability analysis, Concept of gain margin & phase margin, relative stability.

Unit-IV: **(10)**

Conventional Controller: Basic idea of feedback control systems, Concept of PID controller, Effect of P, PI, PD and PID controllers on system.

Case Studies and Numerical Simulations in MATLAB/SCILAB/LABVIEW, etc.

References/Textbooks:

1. Richard C. Dorf, Robert H. Bishop, "Modern Control Systems", Pearson, 13th Edition, 2016.
2. Kuo B.C., Automatic Control Systems, Prentice-Hall of India Pvt. Ltd., New Delhi, 6th Edition, 1991.
3. Ogata K., Modern Control Engineering, Prentice-Hall of India Pvt Ltd., New Delhi, 3rd edition, 2000.
4. M. Gopla, "Control System Principles and Design", McGraw Hill, 4th Edition, 2012.
5. William J. Palm III, Control Systems Engineering, John Wiley & Sons Inc., 1986
6. Joseph J. Distefano III, Allen R. Stubberud, Ivan J. Williams, "Control Systems", 3rd Edition, McGraw Hill, Special Indian Edition, 2010. (Schaums Outlines Series)
7. J. Nagrath & M. Gopal, "Control System Engineering", 6th Ed. New Age International Publishers, 4th Edition 2018.
8. Norman S. Nise, "Control Systems Engineering", 5th Ed., Wiley, 2009.

Course Outcomes:

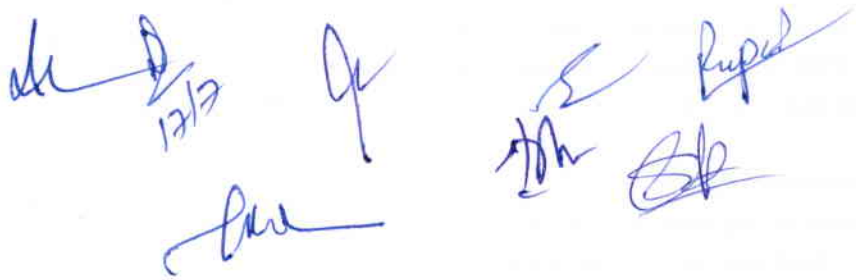
On successful completion of the course, students will be able to

CO1: Fundamental knowledge of control system, mathematical modelling of various physical systems

CO2: Determine the response of systems for various inputs, and transient and steady-state analysis of open-loop and closed-loop systems

CO3: Analyze the stability of the linear systems in time-domain and frequency-domain

CO4: Design and implementation of PID controller and various compensators



ECOE-301 COMMUNICATION SYSTEMS

Pre-requisite: None.

L	T	P	Credits	Total contact hours
3	-	-		42

Brief Description about the course:

The course will provide the fundamental concepts of signals, Fourier Transform and Modulation and Demodulation schemes. The effect of noise on AM and FM receivers will also be discussed.

Course Content:

UNIT - I 9 hrs.

Introduction

Signals: Continuous Signals, Discrete Signals, Digital Signals, Random Signals. Fourier Transform, Properties of Fourier Transform, Fourier Transforms of signals used in communications.

UNIT – II 12 hrs.

Amplitude Modulation

Concept of Modulation, Amplitude modulation: Double-Sideband Suppressed Carrier, Double-Sideband Full Carrier, Single Sideband and vestigial sideband modulation; Demodulation: Carrier Recovery in AM, Coherent Demodulation, Envelope Detector, Square-Law Demodulator; Integrated Super Heterodyne Receiver.

UNIT - III 12 hrs.

Angle Modulation

Frequency Modulation, Phase Modulation, Narrow Band Angle Modulation, Wideband FM, Modulators, Demodulators. Sampling, Pulse amplitude modulation, Pulse width modulation, Pulse position modulation.

Brief introduction about Digital modulation.

UNIT – IV 9 hrs.

Performance Analysis of Receivers under AWGN

Effects of Noise in Analog Modulation Systems. Case study of AM and FM Receivers. Analog and Digital Receiver performance in AWGN.

Text Books /Reference Books:

1. S. Haykin, "Communication Systems," John Wiley & Sons, 5th Ed., 2009.
2. B.P. Lathi and Z. Ding, "Modern Digital and Analog Communication Systems," 4th Ed., Oxford University Press, 2009.
3. Louis E. Frenzel, "Principles of Electronic Communication Systems," 3rd Ed., Tata McGraw-Hill, 2008.
4. Dennis Roddy and John Coolen, "Electronic Communications," 4th Ed., Pearson, 2008.
5. J. G. Proakis and M. Salehi, "Fundamentals of Communication Systems," Prentice Hall, 2004.
6. Leon W. Couch, Digital and Analog Communication Systems, 4th Ed., Macmillan Coll Div., 1993.

Course Outcomes:

At the end of the course, students will be able to:

CO1: Understand the basics of signals and Fourier transforms.

CO2: Understand the basics of Amplitude and Frequency Modulation and demodulations.

CO3: Apply Fourier transform to get the spectrum of different modulated signals and decide the requirement of bandwidth.

CO4: Analyze the effect of noise in AM and FM receivers.

Course Code	**:**	**CSOE 301**
Course Title	**:**	**Data Structures**
Number of Credits	**:**	**3 and 3/0/0**
Prerequisites	**:**	**Problems Solving and Programming Skills**
Course Type	**:**	**OE**

Course Learning Objectives

1. This course introduces the concept of Data Structures used in various computer science applications
2. The students are introduced to understand and efficiently apply various data structures such as stacks, queues, linked lists, trees and graphs for solving various computing problems using C programming language.

Course Content

Unit 1: Pointers & File Handling:

Revision of Pointers and Dynamic Memory, Files and related operations.
Searching techniques: Linear and Binary, Sorting techniques: Selection, Bubble, Insertion, Merge sort, Quicksort.

Unit 2: Simple Data Structures

Arrays based Linear Data Structures: Array storage, sparse arrays; Transpose, addition, and multiplication of sparse matrices, Stacks and Queues and their applications, multiple stacks and queues in an array.

Unit 3: Linked Data Structures

Singly, Doubly & Circular Linked Lists; representation, operations and applications, linked stacks and queues. linked lists based polynomial addition.

Unit 4: Advanced Data Structures

Trees, Basic concepts and definitions of a tree and binary tree and associated terminology, Binary tree traversal techniques, some more operations on binary trees, Heaps and heapsort.

Reference Books:

1. E Horowitz and S. Sahni: Fundamentals of Data Structures in C, Second Edition, Universities Press, Hyderabad.
2. R.L. Kruse: Data Structures & Program Design in C, PHI.
3. D.F. Knuth: The art of Computer Programming Vol-1, Narosa Publications, 1985.
4. Byron S. Gottfried & J K Chhabra: Theory and Problems of Programming with C Language, Schaum's Outlines Series, TMH, 2005.

Course Outcomes

1. Develop skill to identify and determine the usage of various data structures, operations, associated algorithms and implement their applications.
2. Apply knowledge of pointers, memory allocation and string handling for solving programming problems.
3. Understand the concept of trees and graphs, their implementation and applications.
4. Able to implement standard algorithms for searching and sorting.
5. Analyze efficiency of different algorithms using time and space complexity.

CEOE303 Flood Control & Drainage Engineering

L	T	P/D	Credits	Total contact hours
3	0	0	3	3

Pre-requisite: None

Brief description of the course: Students will be able to understand measurement techniques of various hydrologic data required for water resources projects.

Course Content:

Unit-I (9 hrs)

1. Introduction:
   Indian rivers, flood, flood problems, river morphology, behaviour of river flow, role of sediments in rivers, changes in regimes, river gauging, causes of flood and losses, alleviation of flooding.
2. Flood Mitigation by River Protection:
   Basis of river engineering, flow types, resistance flow, energy slope, backwater effect, three-dimensional flow, circular and helicoidal flow, river improvement works, river survey, protection by embankment, discharge capacity, design of dyke, stability analysis of dykes, bank protection, bank recession, types of bank protection works, channel improvement, cutoffs diversion, bypass channel, cutoff channel, flood ways, flood plain zeroing, spreading grounds.

Unit-II (7 hrs)

3. Flood Mitigation by Reservoirs:
   Design factors, storage capacity determinations, sequent peak algorithm method, live storage, ripple mass curve flood routing, flood storage, dead storage, reservoir classification, reservoir sedimentation, distribution of sediments in reservoirs, measurement of sediment yields, sediment load measurement, Mood's method, life of reservoir, reservoir operation based on annual storage and regulation, single and multi-purpose reservoirs, gate operation schedule, maximum and minimum flow operation, multi-purpose reservoir operation, reservoir economics-cost benefit ratios, optimization of benefits.

Unit-III (11 hrs)

4. Flood Forecasting & Warning:
   Basic data, communication network, forecasting techniques and procedures, forecast of rainfall, runoff from rainfall, forecasting stages, peak travel time, forecast reporting flood warning, engineering methods for flood fighting
5. Engineering Economics of Flood Control:
   Estimation of flood damages, estimation of benefits of flood control, cost benefit analysis of flood control project.

Unit-IV (9 hrs)

6. Design of Subsurface Drainage System
   Introduction, necessity for drainage, removal of drainage water, design of closed underdrains, design of open underdrains. Design for leaching requirements.
7. Design of surface drainage systems
   Necessity of surface drainage, surface drainage channels design considerations, general design consideration of outfall culvert, design consideration of tidal channels and outfall sluices

8. Application of remote sensing technology for flood control
   Introduction, application for planning flood control measures, flood warnings
9. Disaster Management concepts and approaches
   Introduction, man-made disaster, Disaster management in India

Note: The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books/Reference:

1. Flood Control & Drainage Engineering by S. N. Ghosh
2. Hydrology & Flood Control Engg. by S. K. Garg
3. Hydrology & Water Resources Engg. by K. C. Patra
4. Disaster Management, Concepts and Approaches by D. Mondal & D. Basu
5. Elementary Hydrology by V. P. Singh

Course Outcomes:

Upon successful completion of the course, the students will be able to
CO1: know causes of flood and its problems
CO2: be familiar with flood mitigation techniques by river protection & reservoirs
CO3: know concept of flood forecasting techniques.
CO4: be acquainted with the surface and sub-surface drainage systems.

CEOE305 Building Planning and Drawing

L	T	P/D	Credits	Total contact hours
3	0	0	3	3

Pre-requisite: None

Brief description of the course: Drawing is the language of Engineers. Building Planning and Drawing is the foundation course for Civil Engineering students. This course will cover: Fundamentals of Building Drawing; Fundamentals of Buildings; Climate and Its Influence on Building Planning; Orientation of Buildings; Principles of Planning of Buildings; Building Bye-Laws; Planning of Residential Buildings; Planning of Public Buildings; Green Buildings; Standard Guidelines for Building Drawing; Guidelines for Planning and Drawing of Building; services needed for the building.

Course Content:

Unit I: Introduction to Building Construction and Masonry (06)

a) Introduction to building construction– definition, types of building as per National Building Code. Building components and their basic requirements, i.e. substructure and superstructure requirements. Introduction to automation in construction

b) Masonry– Introduction of stone masonry and brick masonry, characteristics of good building bricks, IS specification and tests, classification of bricks, types of bonds: English, Flemish, Header, Stretcher, construction procedure, supervision. Recent trends in light weight construction Form work and casting procedure for reinforced concrete columns, R.C.C. beams, R.C.C. slabs, Slip form work, introduction of underpinning and Scaffolding.

Unit 2: Building Components (06)

a) Doors and Windows: Definition of technical terms, installation of doors and window frames and their size specifications, fixtures and fastenings. Different types of doorsand windows: Ventilators: purpose and types.

b) Arches and Lintels – Introduction of arch construction, Lintels: necessity and types, chajja or weather shade necessity and types.

Functional requirement of flooring, types of floor finishes and their suitability, Types of flooring.

Roofing Materials – galvanized iron pre-coated aluminium sheets, fiber sheets. Roof construction types and their suitability, method of construction, Protective Coatings with plastering and finishing.

Unit 3: Building Bye Laws and Introduction to Architectural Drawing (08)

a) Building Byelaws Necessity of bye-laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), concept of V.P.R. Marginal distances, building line, control line, height regulations, room sizes, Area calculations (built-up area, carpet area etc.), Rules for ventilation, lighting, Vertical circulation, Sanitation and Parking of vehicles. Minimum Standard Dimensions

b) Introduction to Architectural drawing: Principles of Building Planning and Principles of Architectural design relation between form and function, utility, aesthetics, Concept of Line plan, Developed Plan, Elevation, Section, Selection of scales for various drawings, dimensioning, abbreviations, and symbols as per IS 962, Elements of perspective drawings, parallel and angular perspective of small building elements

Unit 4: Residential Buildings, Public Building and Green Buildings (10)

a) Residential Buildings- Functional requirements and dimensions of Residential Buildings like Bungalows, Twin bungalows, Row houses, Apartment. Prepare Developed Plan, Elevation and Sectional Elevation of above mentioned categories. Design of staircase: Dog legged /Quarter turn

b) Green Building -Salient features, benefits, planning concepts of Green Building (site selection, orientation, sun path and wind diagram etc.), introduction to Leadership in Energy and Environmental Design (LEED)
c) Planning of Public Buildings- Functional requirements and dimensions and planning of Public Buildings like industrial buildings, commercial buildings, School, Colleges, Hostel, Auditorium, Restaurant/ Hotel building, Primary Health Center/Hospital, Shopping complex, Sports complex, Vegetable market, Post office, and Bank buildings.

Unit 5: Building Services (06)

Safety aspects and services –Fire load, grading of occupancies by fire loads, Evacuation Time, fire escape elements, Need for earthquake resistant structures. Noise and Acoustics – Sound insulation, Acoustical defects, Reverberation time, Sabine's formula, sound absorbents, planning for good acoustics. Ventilation – Necessity and types of Ventilation.
Lighting -Principles of day lighting, Solar energy systems for lighting (BIPV). Plumbing - Types of plumbing system.

Note: The focus of concluding lectures should be to emphasize the value addition of the subject and also on how it impacts the environment. Further, the faculty may suggest possible sustainable solutions/emerging technologies/innovations towards sustainability in the subject domain.

Text Books/Reference:

1. Shah M.G. Kalec. M. & Patki SY Building Drawing, Tata Mcgraw Hill, New Delhi, 2000
2. Varghese P. C. Building construction, PHI Learning Pvt. Ltd., 2008.
3. Punmia B. C., Jain A. J. and Jain A. J. Building construction, Laxmi Publications, 2005.
4. Arora S. P., and Bindra S. P. The text book of building construction, Dhanpat Rai Publications, 2010.
5. Building Drawings with an integrated Approach to Built-Environment by M. G. Shah, C. M. Kale and S. Y. Patki, New Delhi, Tata McGraw Hill. (5th edition.)
6. Building Materials by S. K. Duggal, New Age International Publishers.
7. Building Construction by S.C. Rangwala, Charotdar Publications.
8. The construction of buildings; seventh edition, Vol.1 & Vol.2 by R. Barry, Oxford: Blackwell Science.
9. Building Materials Technology by Ruth T. Brantley & L. Reed Brantley, Tata McGraw Hill. 5. National Building Code (latest).
10. Building Design and construction by Frederick Merrit, Tata McGraw Hill.
11. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.
12. Development plan and DCP Rules of urban local body, New Delhi, Volume 12

Course Outcomes: On completion of the course, learner will be able to

1. Identify types of building and basic requirements of building components.
2. Make use of Architectural Principles and Building byelaws for building construction.
3. Plan effectively various types of Residential Building/public Building/Green Building forms according to their utility, functions with reference to National Building Code.
4. Understand different services and safety aspects.

Unit 5

Renewable sources and greener technologies: biomass as renewable source, energy from - biomass, fossil fuels, solar power, fuel cells, other form of renewable sources, alternative economics, hydrogen economy and syngas economy, bio-refinery; photochemical reactions, chemistry using microwaves, sonochemistry, electrochemical synthesis, approach to green chemical industry, designing of greener processes, industrial case studies, future of green chemistry. **(10 L)**

Reference Books:

1. V. K. Ahluwalia, M. Kidwai, New Trends in Green Chemistry, New Age Publications, 2004.
2. P.T. Anastas and J.C. Warner, Green Chemistry: Theory and Practice, Oxford University Press, 2000.
3. James H. Clark, Handbook of Green Chemistry and Technology, John Wiley, 2002.

Course Outcomes:

At the end of the course students will be able to:

CO-1	Understand the concepts of Green Chemistry.
CO-2	Appreciate generation of waste, challenging problems of waste and its treatments.
CO-3	Learn about catalysts and their role in Green Chemistry and other environmentally benign conditions.
CO-4	Gain knowledge of renewable resources and role of various green technologies in day to day life.