



Subject Code: - MAT020

Subject Name: - Introduction to Engineering Mathematics with Applications–II

Semester: II

L	T	P	C
3	1	-	4

Course Objectives:

- Basic knowledge of various types of Matrices, properties and its basic theorems.
- To know about the uses of Second-Order linear differential equations in practical problems.
- To know about the differentiation of multivariate functions and uses.
- To learn about the various types of Partial differential equations with different methods.
- To learn about the various types of Second and Higher Orders Homogeneous and Non-Homogeneous Partial differential equations.

Matrices

Rank of a Matrix (By reducing it to Elementary Transformation, Echelon & Normal Forms), Solution of Simultaneous equations by Elementary Transformation Methods, Consistency & Inconsistency of Equations, Eigen Values & Eigen Vectors, Cayley- Hamilton Theorem.

Second-Order Linear Differential Equations with Variable Coefficients Solution by Method of Undetermined Coefficients, Removal of First Derivative, Change of Independent Variable and Variation of Parameters, Solution by series method.

Partial Derivatives

Definition, Euler’s Theorem for Homogeneous functions, Differentiation of implicit functions, Total differential coefficient, Transformations of independent variables, Jacobians, Approximation of errors, Maxima and Minima of functions of two variables.

Partial Differential Equations

Definition, Formulation, Solution of PDE (By Direct Integration method & Lagrange’s method), Non-Linear Partial differential equation of first order {Standard I, II, III & IV), Charpit’s general method of solution for Partial differential equations.

Partial Differential Equations with Constant Coefficients

Second and Higher Orders Homogeneous and Non- Homogeneous equations, Partial differential equations reducible to equations with constant coefficients, The Method of Separation of Variables, One Dimensional Heat and Wave equation and its solution

Course Outcomes:

- Useful for field of MATLAB and Image processing.
- Student will learn about the basic application of differential equations in various practical problems and further uses. Useful for transforms and series type problems.
- Student will learn about the application of Partial differentiation in various fields like EMT and Physics.
- Useful for the field of EMT, Co-relation, and solution of Heat and Wave equation.

References:-

1. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press.
2. Potter, Goldberg & Edward, Advanced Engineering Mathematics, Oxford University Press.
3. Probability and Statistics by Ravichandran, Wiley.
4. Fundamental of Mathematical Statistics, S. Chand & Co.



Subject Code: - CVE010

Subject Name: - Environmental Sciences

Semester: II

L	T	P	C
4	-	-	4

Course Objectives:

This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it, environmental ethics and its protection.

Unit I

Introduction: Domestic and global environmental concerns, principles of sustainable development, sustainable agriculture, organic farming, bio-fuels, threats for sustainability.

Unit II

Environmental Ethics & Legislations: Enforcement of environment laws in India- the water act, the air (prevention and control of pollution) act 1981, the environment (protection) act 1986, environmental auditing, value education: HIV/AIDS- women and child welfare.

Unit III

Environmental Pollution: Air pollution- sources, types of air pollutants, national ambient air quality standards, controlling air pollution. Water pollution: sources, types of water pollutants, water quality indicators and water quality standards. Soil pollution- types of soil pollutants: industrial wastes, pesticides, fertilizers and manures, salinization of soil, controlling soil pollution. Noise: sources of noise pollution measurements of noise and indices, effect of metrological parameters on noise propagation, noise exposure levels and standards. Noise control and battement measures. Impact of noise on human health.

Unit IV

Environmental Challenges: Local challenges- solid waste – impact of solid waste on natural resources, deforestation; global challenges - climate change and global warming, Kyoto Protocol, greenhouse gases, ways to reduce greenhouse gases emissions, carbon footprint, ways to reduce carbon footprint, carbon trading.

Unit V

Sustainable Habitat, Industrialization and Urbanization: Concept of green building, volatile organic compounds (VOC), GRIHA rating, LEED rating, HVAC, hybrid car technology, industrial ecology, India’s renewable energy capacity. Green technology & green business: green business, green computing, e-waste management.

Course Outcomes:

- Students will understand and analyze the current local and global environmental issues; looking at the theory behind them, the economics involved, and the policies regarding them.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

- Understanding the character of environmental problems and ways of addressing them.

References:-

1. R. Rajagopalan, Environmental Studies, Oxford IBH Pub, 2011.
2. Kogent Learning Solutions Inc., Energy, Environment, Ecology and Society, Dreamtech, 2012.
3. Rag, R. L, Ramesh, Lekshmi Dinachandran, Introduction to sustainable engineering.



Subject Code: - EEE170

Subject Name: - Sustainable Energy

Semester: II

L	T	P	C
2	1	2	4

Course objectives:

- Introduce to the scientific background of energy conversion, storage and consumption.
- Understand solar and wind energy sources.
- Gain knowledge on geothermal, biomass, ocean and wave energy.

Unit-I

Introduction: Various non-conventional energy resources- introduction, availability, classification, relative merits and demerits.

Unit-II

Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

Solar Cells: Theory of solar cells, solar cell materials, solar cell array, solar cell power plant, limitations.

Unit-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.

Magneto-hydrodynamics (MHD): Principle of working of MHD power plant, performance and limitations.

Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

Unit-IV

Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. Performance and limitations of energy conversion systems.

Unit-V

Bio-mass: Availability of bio-mass and its conversion theory, Bio-gas plants.

Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations.

Wave and Tidal Wave: Principle of working, performance and limitations. Waste recycling plants.

Course Outcomes:

After studying this course, you should be able to:

- List and generally explain the main sources of energy and their primary applications in the world.

- Demonstrate an overview of the main sources of renewable energy.
- Understand and be aware of the importance of sustainable energy.

References:-

1. Raja et al, "Introduction to Non-Conventional Energy Resources" Scitech Publications.
2. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, 2006.
3. M.V.R. Koteswara Rao, " Energy Resources: Conventional & Non Conventional " BSP Publications,2006.
4. D.S. Chauhan,"Non-conventional Energy Resources" New Age International.
5. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI Learning.
6. Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.

Suggested List of Experiment:

1. Study of bio gas plant.
2. Study of V/I, V/P and MPP characteristics of solar module.
3. Study of V-I characteristics of fixed solar panel, i.e. without tracking the sun.
4. Study of V-I characteristics of solar panel according to incident angle of rays of light keeping light source at fixed position and moving solar panel in manual mode.
5. Measurement of voltage and current of wind energy based DC supply with change in angle of lades.
6. Study of solar cooker.
7. Study of solar water heater.
8. Study of solar photo-voltaic cells.



Subject Code: - EEE180

Subject Name: - Introduction to Electrical Machines

Semester: II

L	T	P	C
2	1	2	4

Course Objectives:

- To learn the conversion principle of magnetic, electrical and mechanical energy.
- To know the working principles of transformer, Induction machine, DC machine and synchronous machine.
- To know the construction of transformer, Induction machine, DC machine and synchronous machine and their applications.

Unit-I

Classification of electrical machines on basis of working principle, supply and applications.

Unit II

Single phase induction motor: Working principle of single phase induction motor, types of single phase induction motor, starting methods, losses and efficiency, applications.

Unit III

Three phase induction machine: Construction of induction machine, working principle of induction motor and generator, starting methods of induction motors, losses and efficiency, applications.

Unit IV

DC Machine: Construction of dc machines, working principle of dc motor and generator, e.m.f. equation, 2 point, 3 point and 4 point starters of dc motors, losses and efficiency, applications.

Unit V

Synchronous Machine: Constructional features, working principle of synchronous motor and generator, starting methods of synchronous motors, excitation system including brushless excitation, generated e.m.f, losses and efficiency, applications.

Course Outcomes:

The students will be able to

- Understand the basics of energy conversion and identify the different features of transformer, Induction machine, DC machine and synchronous machine
- Choose suitable machines for specific applications.

References:-

1. M. G. Say, 'Alternating Current Machines', (5th Ed.) ELBS, 1986.
2. V. Del Toro, "Electrical Machines & Power Systems", 1985, Prentice-Hall, Inc., Englewood Cliffs.
3. V. Del Toro, "Electromechanical Devices for Energy Conversion & Control Systems", PHI Pvt. Ltd., 1975.
4. Electrical Machines by Dr. P. S. Bimbhra (Khanna).
5. Electrical Machines by Ashfaq Hussain. (Dhanpat Rai).

6. Electrical Machines by Nagrath and Kothari (TMH).
7. A.C. Machines by Langsdorf (McGraw-Hill).

Suggested List of Experiment:

1. To study construction and working principle of single phase induction motor.
2. Study of construction and working principle of 3-phase induction motor.
3. To study construction and working principle of dc motor and dc generator.
4. To study the 2- point, 3- point and 4- point starter of dc motor.
5. Speed control of d. c. motor (armature and field control method).
6. To study the Commutator, commutation process and slip ring.
7. To perform testing of welding machine.



Subject Code: - ECE010

Subject Name: - Transition from Physics to Electronics

Semester: II

L	T	P	C
2	1	2	4

Course Objective:

To bridge the gap between conventional physics and applied electronics.

Unit-I

The Circuit Abstraction & Resistive Networks:

Lumped circuit abstraction, limitations of the lumped circuit abstraction, practical two-terminal elements, ideal two-terminal elements, another ideal two-terminal element, Kirchhoff's laws, circuit analysis: basic method, intuitive method of circuit analysis: series and parallel simplification.

Unit-II

Network Theorems

Nodal analysis and mesh analysis, superposition theorem, Thevenin's theorem and Norton's theorem.

Unit-III

The Digital Abstraction

Voltage levels and the static discipline, Boolean logic, combinational gates, standard sum-of-products representation, simplifying logic expressions, number representation.

Unit-IV

MOSFET Switch & Amplifier

The switch, logic functions using switches, MOSFET switch implementation of logic gates, signal amplification, review of dependent sources, actual MOSFET characteristics, the switch-current source (SCS) MOSFET model, MOSFET amplifier.

Unit-V

Energy Storage Elements

Constitutive laws, series and parallel connections, special examples, transformers, energy, charge and flux conservation.

Course Outcomes:

Ability to understand the basics concept of electronics. Ability to design and analyze electrical and digital circuits.

Suggested List of Experiment:

1. To Study and verify Kirchhoff's current law.
2. To Study and verify Kirchhoff's voltage law.
3. To Study and verify Thevenin's theorem.
4. To Study and verify Norton's theorem.
5. To Study and verify maximum power transfer theorem.

6. To Study various digital logic gates.
7. To Study and verify MOS as an inverter.
8. To Study and verify MOS as an OR gate.
9. To Study and verify MOS as an AND gate.
10. To study series and parallel connections of resistors.

References:

1. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education
2. Anant Agrawal and Jeffrey H. Lang: Foundations of AD Circuits
3. Donald A Neamen: Electronic Circuits Analysis and Design, TMH
4. M. Mano : Digital Logic and Computer Design, Pearson Education
5. Salivahanan and Ari Vahagan : Digital Circuits and Design, Vikas Publishing House



Subject Code: - EEE190

Subject Name: - Electrical Workshop

Semester: II

L	T	P	C
2	-	4	4

Course Objectives:

The objective of this course is to familiarize the students with commonly used components, accessories and measuring equipment in Electrical installations. The course also provides hands on experience in setting up of simple wiring circuits.

Unit-I

Methods of electrical wiring systems, joint box or tee or jointing system, loop-in or looping system, advantages of loop-in method of wiring, disadvantages of loop-in method of wiring, different types of electrical wiring systems, cleat wiring, casing and capping wiring, batten wiring, lead sheathed wiring, conduit wiring, surface conduit wiring, concealed conduit wiring, types of conduit , metallic conduit, non-metallic conduit, size of conduit and its advantage and disadvantage. Comparison between different types of wiring.

Unit-II

Earthing and types of electrical earthing, electrical grounding installation (step by step), grounding and earthing, the difference between earthing, grounding and bonding. Need of earthing or grounding. Importance of earthing, different terms used in electrical earthing, components of earthing system, size of the earthing lead, earthing electrode or earth plate, earth plate or earth electrode size for small installation, methods of earthing, types of earthing, specification for earthing, effects of not earthing, IS 3043 (1987) : Code of practice for earthing. Electrical and electronics components, color coding of resistor and capacitor.

Unit-III

Electrical shock, safety around water, safe work practices, electrical emergencies, electrical accidents, electrical rescue techniques, basic rule(s), working on or near energized conductors, electrical power tool safety. Safety regulations, treatment of shock, fire extinguishers.

Course Outcomes:

- Identify and understand importance of various electrical and electronics components.
- Understand basic construction and operation of various laboratory equipments.
- Perform basic maintenance and troubleshooting of house hold equipments, energy saving etc.

Suggested List of Experiment:

1. Identify different types of cables/wires and switches and their uses.
2. Identify different types of fuses & fuse carriers, MCB and ELCB, MCCB with ratings and usage.
3. Wiring of simple light circuit for controlling light/fan point (PVC conduit wiring).
4. Wiring of light/fan circuit using two ways switches (staircase wiring).
5. Wiring of fluorescent lamps and light sockets (6 A).
6. Wiring of power circuit for controlling power device (16A socket)

7. Go-down wiring / tunnel wiring
8. Wiring of power distribution arrangement using single phase MCB distribution board with ELCB,
9. Main switch and energy meter.
10. Measurement of voltage, current and power in single phase circuit using a voltmeter, ammeter and watt meter.
11. Calculate the power factor of the circuit.
12. Wiring of a backup power supply including an inverter, battery and load for domestic installations.
13. Demonstration and measurement of power consumption of electric iron, mixer grinder, single phase pump, exhaust fan, etc.