

(Approved by AICTE, New Delhi and Permanently Affiliated to Andhra University, Visakhapatnam)
Madhurawada :: Visakhapatnam – 530 048

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

(With effect from 2024-25 admitted batch)

I Year - II Semester								
Course Code	Category	Course Title	Hours per Week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
24BM11RC02	BS	Linear Algebra and Vector Calculus	3	0	30	70	100	3
24HE11RC01	HSS	English	3	0	30	70	100	3
24CT11RC02	ES	Problem Solving Using C	3	0	30	70	100	3
24EE11RC03	ES	Electrical Circuits – 1	3	0	30	70	100	3
24EE11RC04	ES	Thermal & Hydro Prime Movers	3	0	30	70	100	3
24HE11RC02	HSS	Communication Skills Lab	0	3	50	50	100	1.5
24CT11RC04	ES	Problem Solving Using C Lab	0	3	50	50	100	1.5
24EE11RC05	ES	Electrical Engineering Workshop	0	3	50	50	100	1.5
Total Credits								19.5

CALCULUS AND DIFFERENTIAL EQUATIONS

I Year B. Tech. I Semester

[Common to EEE, ECE, CSE, IT, CSE (AI&ML)]

Course Code: 24BM11RC01

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to

- CO1:** Examine the functional dependency and utilize Taylor's theorem to expand the function of two variables. (L3)
- CO2:** Determine extrema of multivariable functions. (L5)
- CO3:** Utilize double and triple integrals to evaluate areas of plane curves and the volumes of solids. (L5)
- CO4:** Solve the first order differential equations and higher order differential equations with constant coefficients, apply the techniques to solve problems related to various engineering fields. (L3)
- CO5:** Find the Laplace Transforms of various functions and apply it to solve ordinary differential Equations with initial conditions. (L3)

UNIT-I:

8 Lectures

Partial Differentiation: Functions of two or more variables: Introduction - Partial derivatives - Total derivative - Change of variables - Jacobians – Functional dependence - Taylor's theorem for function of two variables. [Sections: 5.1, 5.2, 5.5, 5.6, 5.7, 5.9 of Textbook]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Examine the functional dependencies using the Jacobian. (L3)
2. Make use of Taylor's theorem to write series expansion of function of two variables. (L3)

UNIT-II:

7 Lectures

Applications of Partial Differentiation: Maxima and minima of function of two and three variables - Constrained maximum/minimum problems using Lagrange's method of multipliers. [Sections: 5.11, 5.12 of Textbook]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Determine the critical points, maxima and minima of functions several variables. (L5)

UNIT-III:

11 Lectures

Integral Calculus: Introduction - Double integrals - Change of order of integration - Double integrals in polar Coordinates - Triple integrals - Change of variables.

Applications: Area enclosed by plane curves - Volumes of solids. [Sections: 7.1 – 7.7 of Textbook]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Evaluate double integrals and triple integrals in Cartesian and polar coordinates also over the given region. (L5)
2. Evaluate the double integrals by change of order of integration. (L5)
3. Evaluate double and triple integrals by change of variables. (L5)
4. Determine the areas and volumes using multiple integrals. (L5)

UNIT-IV:

11 Lectures

Differential Equations and its Applications: Exact differential equations - Equations reducible to exact equations - Solutions of higher order linear ordinary differential equations with constant coefficients - Method of variation of parameters.

Applications: Orthogonal Trajectories - Newton's law of cooling - Law of Natural growth and decay. [Sections: 11.11, 11.12, 12.3, 12.6, 12.8, 13.1 – 13.8 of Textbook]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Solve the first-order differential equations and higher order Linear differential equations with constant coefficients. (L3)
2. Apply the techniques to solve problems related to various engineering fields. (L3)

UNIT-V:

11 Lectures

Laplace Transforms: Introduction - Existence conditions - Transforms of elementary functions - Properties of Laplace transforms - Transforms of derivatives - Transforms of integrals - Multiplication by t - Division by t – Evaluation of integrals by Laplace

transforms - Laplace transforms of Unit step function, Unit impulse function and Laplace transforms of periodic functions - Inverse Laplace transforms - Convolution theorem - Second shifting theorem.

Applications: Laplace Transforms to ordinary differential Equations. [Sections: 21.1 – 21.5, 21.7 – 21.15, 21.17, 21.18 of Textbook]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Find the Laplace transform of the function. (L1)
2. Find the Inverse Laplace transform of a function. (L1)
3. Make use of convolution theorem to find the Inverse Laplace transform of a function. (L3)
4. Apply Laplace transform to solve ordinary differential equations. (L3)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 45th Edition, Khanna Publishers, 2024.

Reference Books:

1. R K Jain and SRK Iyengar, Advanced Engineering Mathematics, Narosa Publishers, 5th Edition, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley & Sons, 2011.
3. Peter V. O'Neil, Advanced Engineering Mathematics, 7th edition, Cengage Learning, 2011.
4. Greenberg, Advanced Engineering Mathematics, 2nd Edition, Pearson, 2017.

Web References:

1. <https://nptel.ac.in/courses/111104125>
2. <https://nptel.ac.in/courses/111105160>

ENGINEERING PHYSICS

I Year B. Tech. I Semester

[Common to ECE, EEE, CSE (AI&ML)]

Course Code: 24BP11RC01

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to:

- CO1:** Apply the principles of interference, diffraction, and polarization in wave optics, and utilize optical instruments for practical applications. (L3)
- CO2:** Familiarize the basic concepts of Thermodynamics relevant to engineering applications. (L2)
- CO3:** Outline the knowledge of basic principles of Electromagnetism and EM Waves. (L2)
- CO4:** Describe the basic principles of lasers, optical fibres and their use in technological applications. (L2)
- CO5:** Understand the basic principles of Quantum mechanics, Quantum computing. (L2)

UNIT-I

10 Lectures

Interference: Principle of superposition, Young's Experiment (qualitative treatment), Coherence, Interference in thin films (reflected light), Newton's Rings, Michelson's Interferometer and its applications (thickness of thin sheet, determination of wavelength).

Diffraction: Introduction, Differences between Interference and Diffraction, Differences between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit (Qualitative and Quantitative treatment)

Polarization: Introduction - types of Polarization. Polarization by reflection, Brewster's law, refraction and double refraction in uniaxial crystals, Nicol Prism, Quarter wave plate and Half wave plate, Applications of Polarization. [Text Book 1: 5.16,5.17,5.18, 5.20, 6.1, 6.2, 6.8.(1-3), 6.11, 6.13, 6.14.1, 6.14.3, 7.1, 7.2, 7.3, 7.4, 7.5, 8.1, 8.2,8.5, 8.6,8.11,8.12, 8.16,8.20]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the principles of interference patterns and apply Michelson's Interferometer to measure physical quantities such as thickness and wavelength. (L2)

2. Distinguish between interference and diffraction and perform qualitative and quantitative analysis of Fraunhofer diffraction at a single slit. (L2)
3. Apply polarization concepts through various optical devices to explore and solve problems related to polarized light. (L3)

UNIT-II

7 Lectures

Thermodynamics: Heat and Work, First law of thermodynamics and its applications, Reversible and Irreversible process, Carnot cycle and Efficiency, Second law of thermodynamics, Carnot's Theorem, Entropy, Second law in terms of Entropy, Entropy and disorder, Third law of thermodynamics (statement only). [TextBook-1: 16.3,16.5.1,16.6,16.8,16.11,16.12,16.14,16.16,16.17, 16.17.1, 16.18]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Apply the first and second laws of thermodynamics to analyse energy transformations and process efficiencies. (L3)
2. Understand the Carnot cycle and its efficiency and calculate entropy changes to explain thermodynamic processes. (L2)
3. Differentiate between reversible and irreversible processes and relate entropy to disorder. (L2)
4. State the third law of thermodynamics and understand its implications for materials at absolute zero. (L2)

UNIT-III

11 Lectures

Electromagnetism: Concept of electric flux, Gauss' law, applications of Gauss' law (wire, sheet, sphere), Magnetic Field, Gauss' law in magnetostatics, Faraday's law of induction, Lenz's law, Induced magnetic fields, Displacement current, Maxwell's equations (no derivation, qualitative treatment), Electromagnetic wave equations, Introduction to EM waves, The Biot-Savart's law, magnetic field near a long wire, magnetic field for a circular Current loop, Ampere's law. [TextBook-1: 2.12,2.14,2.18, 3.5, 3.8, 3.9,3.12, 3.13,3.14, 3.10, 3.12, 3.3,3.4]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Apply Gauss's law and Faraday's law of induction to solve problems involving electric and magnetic fields. (L3)
2. Use Maxwell's equations to understand electromagnetic wave phenomena. (L2)

3. Analyse magnetic fields using Biot-Savart's law, Ampere's law, and apply e magnetostatic field distributions. (L3)

UNIT-IV

10 Lectures

Lasers: Characteristics of laser beam, Spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, Semiconductor laser (homojunction), Applications of lasers.

Optical fibres: principle of propagation of light in optical fibres, Acceptance Angle and cone of a fibre, Numerical aperture, Modes of propagation, Classification of fibres based on refractive index profile and modes, Losses in optical fibres- scattering and bending losses, Fibre optics in communication- Block diagram, Applications of optical fibres. [TextBook-1: 24.12, 24.2, 24.5,24.6, 24.7, 24.11.1, 24.11.3, 24.11.5.1, 24.13, 10.2, 10.3, 10.4, 10.5, 10.6, 10.10, 10.11, 10.19,10.20 (only for list of applications)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the principles of laser operation, including spontaneous and stimulated emission, and analyse various types of lasers such as Ruby, He-Ne, and Semiconductor lasers. (L2)
2. Describe the fundamentals of optical fibre technology, including light propagation, acceptance angle, numerical aperture, and classification of fibres. (L2)
3. Apply these concepts to fibre optics communication systems and explore their practical applications. (L2)

UNIT-V

10 Lectures

Quantum Physics: de Broglie concept of matter waves, Heisenberg's uncertainty principle, Schrödinger time independent wave equation, Physical significance of wave function, particle in a one-dimensional box.

Quantum Computing Quantum bits, Introduction to Pauli spin matrices, Bloch sphere, Entanglement, Qubit Vs classical bit, Single Qubit gates, Quantum Teleportation – Basic Idea. [Textbook-1 20.5, 20.11, 20.17, 20.18, 20.22; Textbook -3 Sec 1.8, 1.9, 1.10.1]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the concepts quantum mechanics such as the de Broglie wavelength and Heisenberg's uncertainty principle and use the Schrödinger equation (L2).

2. Describe the fundamentals of quantum computing (L2)

Textbooks:

1. M. N. Avadhanulu, P. G. Kshirsagar, and T. V. S. Arun Murthy, A textbook of Engineering Physics, 11th edition, S. Chand and Company Ltd., 2019.
2. H. K. Malik and A. K. Singh, Engineering Physics, 2nd Edition, McGraw Hill Education Pvt Ltd. ,2018.
3. P.K. Palanisamy, Engineering Physics, SCITECH Publications, 2011.

Reference Books:

1. Modern Engineering Physics by A.S. Vasudeva S. Chand and Company Ltd., 2010
2. University Physics by Young and Freedman Pearson Education, 2010.
3. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information Cambridge University Press, 10 th Ed., 2010.

Web References:

1. <https://nptel.ac.in/courses/115105537> (Wave optics)
2. <https://nptel.ac.in/courses/115106122> (Electromagnetism)
3. <https://nptel.ac.in/courses/112102255> (Thermodynamics)
4. <https://nptel.ac.in/courses/115107095> (Fiber Optics)
5. <https://nptel.ac.in/courses/104104085> (Lasers)
6. <https://nptel.ac.in/courses/104104082> (Quantum Computing)
7. <https://www.intechopen.com/online-first/73811> (Quantum Computing)
8. <https://lewisla.gitbook.io/learning-quantum/quantum-circuits/single-qubit-gates>
(Quantum Computing)
9. <https://profmcrz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf> (Quantum Computing)

GREEN CHEMISTRY

I Year B. Tech. I semester
[Common to CSE, EEE, IT]

Course Code: 24BC11RC01

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to

- CO1:** To develop knowledge about water and its treatment for industrial and potable purpose. (L3)
- CO2:** Utilize the theory of construction and discharge reactions of various types of batteries are used in commercial society. (L3)
- CO3:** Explain the importance of working principle, fabrication of electrodes and other components, advantages, disadvantages and environmental aspects of fuel cells. (L4)
- CO4:** Classify the corrosion mechanism of metals and factors influenced by rate and extent of corrosion and categorize the reasons for corrosion control methods. (L4)
- CO5:** Apply green chemistry technology processes the knowledge for solving existing challenges faced in various engineering and societal areas. (L5)

UNIT-I

10 Lectures

Water-Technology: Sources of Water – Impurities and their influence of living systems – WHO Limits – Hardness and its Determination – Boiler Troubles and their removal – Water Softening Methods – Lime-Soda, Zeolite and Ion Exchange - Municipal Water Treatment-Break Point Chlorination – Desalination of Sea Water –Reverse Osmosis Method Electro-dialysis. Chemical analysis of water. [TB1: Chapter1]

Learning Outcomes:

At the end of the unit the student will be able to

1. Explain the principles of reverse osmosis (L4)
2. Compare the quality of drinking water with BIS and WHO standards (L4)
3. Illustrate problems associated with Boiler Troubles (L2)
4. Demonstrate the estimation of hardness of water (L3)

UNIT-II

10 Lectures

Batteries: Primary batteries: The Chemistry-Types: Zinc-carbon (Leclanche type), zinc alkaline (Duracell), zinc/air batteries; Lithium primary cells and lithium-ferrous sulphide cells.

Secondary batteries: Lead acid and VRLA (valve regulated (sealed) lead acid), nickel cadmium, nickel-zinc, nickel- metal hydride batteries, lithium-ion batteries, ultrathin lithium polymer cells. Advanced Batteries for electric vehicles, requirements of the battery – sodium-beta and redox batteries. [TB1: Chapter6]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Deduct the working mechanism of various types of cells (L5)
2. Illustrate difference between primary and secondary cells (L2)
3. List the environmental applications of Various types of batteries (L4)
4. Utilize the manufacturing methods of advanced batteries for electric vehicles (L3)

UNIT-III

8 Lectures

Fuel Cells: Description, working principle, anodic, cathodic and cell reactions, fabrication of electrodes and other components, applications, advantages, disadvantages and environmental aspects of the following types of fuel cells: Proton Exchange Membrane Fuel Cells, alkaline fuel cells, phosphoric acid, solid oxide, molten carbonate, direct methanol fuel cells- Membranes and Fuels, Electrochemical Sensors and Optical fibres. [TB1: Chapter 6]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Explain the fundamental theories of fuel cells (L2)
2. Classify types of fuel cells (L4)
3. Make use of the various components fabrication of fuel cells (L3)
4. Distinguish the advantages, disadvantages and environmental aspects of fuel cells(L4)

UNIT-IV

10 Lectures

Corrosion: Origin and Theory – Types of Corrosion: Chemical and Electrochemical; Pitting, inter granular, Waterline, Stress – Galvanic Series – Factors Effecting Corrosion. Corrosion Controlling Methods, Protective Coatings, Electroplating and Electroless Plating, Paints, Varnishes, Lacquers, Enamels. [TB1: Chapter 7]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Explain the Mechanism of corrosion (L4)
2. List the various types of Corrosion (L4)
3. Describe the Factors Effecting Corrosion (L5)
4. Differentiate between Paints Lacquers Enamels (L4)

UNIT-V

10 Lectures

Green-Chemistry and Technology: Introduction and significance of green chemistry, Goals of green chemistry, 12 principles of green chemistry, toxicity of chemicals, concept of zero pollution technologies; Aqueous phase method, Super critical fluid method, Phase transfer catalytic method, atom economy, functional toxicity vs non- functional toxicity, functional group approaches to green chemistry, Elimination of toxic functional group, optimization of frameworks for the design of greener synthetic pathways -Green synthesis of Adipic acid and Paracetamol- energy minimization-Microwave synthesis, ultra sound assisted method Bio catalyzed reaction and Only explanation with examples Processes involving solid catalysts – zeolites, ion exchange resins, applications of Green Chemistry, Green solvents, green fuels & propellants. [TB2: Chapter- 2,3,4&5]

Learning Outcomes:

At the end of the unit the student will be able to

1. Processes involving Green Chemistry and apply the knowledge for solving existing
2. Challenges faced in various engineering and societal areas (L-5)
3. Differentiate between functional toxicity vs non- functional toxicity (L-4)
4. Explain the green chemistry, 12 principles (L-2)

Textbooks:

1. Engineering Chemistry – PC Jain and M. Jain –15th Edition, Dhanpath Rai and Sons, New Delhi.
2. Anastas, P. T., Warner, J. C. Green Chemistry: Theory and Practice, Oxford University Press Inc., New York, 1998.

Reference Books:

1. M. Aulice Scibioh and B. Viswanathan ‘Fuel Cells – principles and applications’, University Press India (2006).

2. A Textbook of Engineering Chemistry – S. S. Dara – S. Chand & Co. New Delhi
3. Handbook of Green Chemistry and Technology; by James Clarke and Duncan Macquarrie; Blakwell Publishing.

Web References:

1. <https://archive.nptel.ac.in/course.html>
2. <https://nptel.ac.in/courses/engineering>

BASIC ELECTRONICS ENGINEERING

I Year B. Tech I semester

[EEE]

Course Code: 24EC11RC03

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to

CO1: Brief evolution and impact of electronics. (L2)

CO2: Comprehend the characteristics of semiconductors, devices, and their applications. (L2)

CO3: Analyze the transistor operation with different biasing techniques. (L4)

CO4: Understand the characteristics of FET. (L2)

CO5: Outline the basic concepts and applications of op-amps. (L2)

UNIT-I

10 Lectures

Introduction: Evolution and Impact of Electronics in industries and in society, Familiarization of Resistors, Capacitors, Inductors, Transformers and Cathode ray oscilloscope. [TB3: Chapter -1, RB1: Chapter -1]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Explain the importance of Electronics. (L2)
2. Illustrate the basic elements of Electronics. (L1)
3. Understand the basic construction and working operation of CRO. (L1)

UNIT-II

10 Lectures

Semiconductor Diodes: Semiconductor materials- intrinsic and extrinsic types, Ideal Diode, Terminal characteristics of diodes: p-n junction under open circuit condition p-n junction under forward bias and reverse bias conditions p-n junction in breakdown region, Diode small signal model, Zener diode and applications, Rectifier Circuits. [TB1: Chapter -4,5,6]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Explain the energy band theory of solids (insulators, semiconductors, and metals) based on their band structures. (L1)
2. Describe the transport phenomena in semiconductors. (L1)

3. Understand the band structure representation of PN junction, interpret the Volt-Ampere characteristics along with the temperature effects. (L2)

UNIT-III

10 Lectures

Bipolar Junction Transistors (BJTs): Physical structure and operation modes, Active region operation of transistor, D.C. analysis of transistor circuits, Transistor as an amplifier, Transistor as a switch: cut-off and saturation modes.

Biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias. Basic BJT amplifier configuration: common emitter, common base and common collector amplifiers. [TB1: Chapter -7, Chapter -8]

Learning Outcomes:

At the end of the unit, the student will be able to

1. List the various amplifier configurations. (L1)
2. Interpret the frequency response and relationship between gain and bandwidth in amplifiers. (L2)
3. Design and analyze different amplifier configurations. (L4)

UNIT-IV

10 Lectures

Field Effect Transistor (FET): Junction Field-Effect Transistor (JFET), structure and physical operation, current-voltage characteristics, Enhance type MOSFET, Depletion-type MOSFET, D.C. operation of MOSFET circuits, Biasing in MOSFET amplifiers, Basic JFET amplifier configuration: common source, common gate and common drain types. [TB1: Chapter -12]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Comprehend the characteristics of BJT and FET. (L1)
2. Explain the construction of JFET and MOSFETs. (L2)
3. Describe the characteristics of JFET and MOSFET. (L2)
4. Understand various biasing methods for FETs. (L2)

UNIT-V

8 Lectures

Operation Amplifier (Op-amps): Ideal Op-amp, Differential amplifier: differential and common mode operation common mode rejection ratio (CMRR), Practical op-amp circuits: inverting amplifier, non -inverting amplifier, weighted summer, integrator, differentiator. [RB 3: Chapter -1,2]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the basic parameters of Op-amp. (L1)
2. Illustrate the applications of Operation Amplifiers. (L2)

Text Books:

1. Integrated Electronics, Jacob Millman and C.C.Halkias, McGraw Hill, 1972.
2. Bell, D. A., Electronic Devices and Circuits, Oxford University Press.20013.

Reference Books:

1. Electronic Devices and Circuits by Salivahanan, N.Suresh Kumar andA.Vallava Raj, TMH, 2nd Edition, 1998.
2. Electronic Devices and Circuits – G.K.Mithal, Khanna Publishers, 23rd Edition, 2004.
3. Linear integrated circuit 2nd edition D. Roy Choudhary, 2017.
4. Principles of Electronics, V.K.Mehta, S.Chand Publications,2022.

Web References:

1. https://onlinecourses.nptel.ac.in/noc24_ee143/preview
2. https://onlinecourses.nptel.ac.in/noc24_ee73/preview

FUNDAMENTALS OF ELECTRICAL ENGINEERING
I Year B. Tech. I semester
[EEE]

Course Code: 24EE11RC01

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to

- CO1:** Summarize the basic concepts in electric circuits.(L2)
- CO2:** Apply the fundamental laws in Electrical Engineering. (L3)
- CO3:** Summarize the operation of various measuring instruments. (L2)
- CO4:** Summarize the concepts of various magnetic and dielectric materials.(L2)
- CO5:** Design the wiring schemes for house hold appliances using appropriate wiring components. (L2)

UNIT-I

10 Lectures

Electrical Engineering Fundamentals: Electrical circuit elements, DC sources (independent and dependent), Ohm's law, effect of temperature on resistance, temperature coefficient, Kirchhoff's laws, Power and Energy Calculations for DC circuits, Series-parallel connection of elements, Concept of Potential difference, Star - Delta conversion with R only. [TextBook-1: Chapter 1 (Pg. 1-31), Chapter 2 (Pg. 32-75), Chapter 4 (Pg. 130-147)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the concepts of active and passive elements. (L2)
2. Determine the power and energy for the given electrical elements. (L2)

UNIT-II

10 Lectures

Fundamental Laws of Electrical Engineering: Coulombs law of Electrostatics (1st and 2nd laws), Faradays laws of Electromagnetic induction, Concepts of self and mutual induced emfs, Fleming Left hand and Right-hand rules, Lenz's law, Biot - Savart's law, Ampere circuital law, Maxwell's corkscrew rule. [TextBook-1: Chapter 5 (Pg. 151), Chapter 7 (Pg. 217-219, 224-225), Chapter 9 (Pg. 255-270)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Summarize the Basic Laws of electrostatics. (L2)

2. Understand the concepts of self and mutual induced emfs. (L2)
3. Summarize the Basic Laws of electromagnetic induction. (L2)
4. Analyse the Basic Electric Circuits. (L3)

UNIT-III

10 Lectures

Fundamentals of Electrical Measurements (no need to explain types of errors and compensations): Classification of measuring instruments, various forces in indicating instruments (deflection, control and damping), construction and operation of MC and MI type instruments for voltage and current measurement, Construction and operation of single-phase electro dynamometer type wattmeter, Construction and operation of single-phase induction type energy meter, basic concept of digital energy meter. [TextBook-1: Chapter 25 (Pg. 670-718)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Summarize different types of the Measuring Instruments. (L2)
2. Understand the operation of Measuring Instruments. (L2)
3. Summarize the various operating forces involved in the Measuring instruments. (L2)

UNIT-IV

10 Lectures

Dielectric and Magnetic Materials: Dielectric as an electric field medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, effects of breakdown, Ferroelectric materials, properties of ferroelectric materials, spontaneous polarization, piezoelectric materials, pyroelectric materials. classification of magnetic materials, properties of ferromagnetic materials, spontaneous magnetization, magnetic anisotropy, characteristics of soft and hard magnetic materials, ageing of magnets. [TextBook-2: Chapter 5 (S-5.1-5.4), Chapter 7 (S-7.4-7.18)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the dielectric materials and their properties. (L2)
2. Understand the magnetic materials and their properties. (L2)
3. Summarize the knowledge on materials used in electrical applications. (L2)

UNIT-V

8 Lectures

Electric Wiring: Symbols of various electrical equipment, Various types of conductors, conductor sizes and current ratings, Service mains, meter board and distribution board,

Types of wirings and their Installations, House wiring (one lamp-one switch, Stair case, Corridor wiring, Power wiring), Basic LT panel wiring diagram, Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's). [TextBook-3: Chapter 2 (Pg.19-102), Chapter 7 (Pg. 181-220)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Identify and interpret various electrical wiring symbols. (L2)
2. Acquire knowledge on different types of wiring and their installations. (L2)
3. Learn about various types of protective devices. (L2)

Text Books:

1. V. K. Mehta, Rohit Mehta, Principle of electrical Engineering and electronics, 3rd edition, S. Chand Publishing, New Delhi, 2016.
2. R.K. Rajput, A course in Electrical Engineering Materials, Laxmi Publications 2009.
3. S L Uppal and G C Garg, "Electrical Wiring, Estimating & Costing", Khanna Publishers, 2015.

Reference Books:

1. Fundamentals of Electrical Engineering Rajendra Prasad PHI Third Edition 2014.
2. V. N. Mittal and Arvind Mittal, "Basic Electrical Engineering" McGraw Hill.
3. A.K. Sawhney, A Course in Electrical and Electronics Measurements and Instruments Dhanpat Rai and Sons, Delhi, 2005.

Web References:

1. <https://archive.nptel.ac.in/courses/108/105/108105153/>
2. <https://archive.nptel.ac.in/courses/108/105/108105112/>
3. <http://182.160.97.198:8080/xmlui/handle/123456789/853?show=full>

ENGINEERING PHYSICS LAB

I Year B. Tech I Semester

[Common to ECE, EEE, CSE(AI&ML)]

Course Code: 24BP11RC02

L	T	P	C
0	0	3	1.5

Course Outcomes: At the end of the course the student will be able to

- CO1:** Interpret the physical parameters based on optical phenomena. (L2)
- CO2:** Verify the behaviour of double refraction in birefringent material like quartz. (L2)
- CO3:** Demonstrate the concepts of diffraction through experiments. (L3)
- CO4:** Calibrate instruments like low range voltmeters and ammeters. (L3)
- CO5:** Design temperature sensors based on diodes and thermistors. (L3)

List of Experiments: (Any TEN of the following experiments shall be conducted)

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Thickness Given Paper Strip or hairline by Wedge Method.
3. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer in minimum deviation position
5. Determination of Refractive Index of Ordinary ray and Extra-ordinary ray in quartz prism
6. Laser- Diffraction – determination of wavelength of laser source using diffraction grating
7. Determination of wavelength of laser source using Fraunhofer single slit diffraction
8. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
9. Study of Intensity Variation of the Magnetic Field along the axis of circular Current Carrying conductor using Stewart and Gee apparatus
10. Calibration of Low Range Voltmeter using Potentiometer Bridge
11. Calibration of Low Range Ammeter using Potentiometer Bridge
12. Determination of dielectric constant of material using charging discharging method with a parallel plate capacitor

13. Determination of energy band gap of semiconductor using PN junction diode in reverse bias
14. Determination of thermo electric coefficients for thermistor
15. Determination of Planck's constant using LED.

Textbooks:

1. Practical physics by CL Arora, S.chand publishing company, 1995.
2. Advanced Practical Physics For Students by B.l.worsnop And H.t.flint, 1923

Web References:

1. http://lo-au.vlabs.ac.in/laser-optics/Newtons_Rings_Wavelength_of_light/
2. http://ov-au.vlabs.ac.in/optics/Spectrometer_Refractive_Index/
3. http://ov-au.vlabs.ac.in/optics/Diffraction_Grating/
4. http://htv-au.vlabs.ac.in/heat-thermodynamics/Characteristics_of_Thermistor/
5. <https://bop-iitk.vlabs.ac.in/exp/energy-band-gap/simulation.html>

GREEN CHEMISTRY LAB

I Year B. Tech I semester

[EEE]

Course Code: 24BC11RC02

L	T	P	C
0	0	3	1.5

Course Outcomes: At the end of the Course, the student shall be able to:

- CO1:** Make use of experimental skills for quantitatively with accuracy analysis in acid-base titrations using suitable indicators. (L3)
- CO2:** Apply the principals of redox titrations Chromium (VI) by Mohr's Salt Solution in different samples. (L3)
- CO3:** Utilize with complex metric titrations to determine hardness of water and estimate the amount of impurities present in the samples. (L3)
- CO4:** Perform experiments with instrument novel materials to be used as zeolite for removal of hardness of water to acquire skills of different methods of chemical analysis. (L3)
- CO5:** Develop the skills of green synthesis through the preparation of a polymer/ drug. (L3)

TITLE OF THE EXPERIMENTS

1. Determination of Sodium Hydroxide with HCl (Na_2CO_3) Primary Standard)
2. Determination of Alkalinity (Carbonate and Hydroxide) of water sample
3. Determination of Chromium (VI) by Mohr's Salt Solution
4. Determination of Hardness of Water sample by EDTA method
5. Zeolite column for removal of hardness of water/ Ion exchange-Method
6. Green Synthesis of Polymer/ drug
7. Determination of Oxalic Acid by Permanganometry
8. Determination of the concentration of strong acid vs strong base (by conductometric method)
9. Determination of Fe(II)/Mohr's Salt by Potassium dichromate (by redox-method)
10. Determination of Cu^{+2} using standard hypo solution (Iodometry)
11. Estimation of chlorine by using bleaching powder
12. Estimation of vitamin-C

Of the above experiments at-least 10 assessment experiments should be completed in a semester.

Text Books:

1. Vogel's Quantitative Chemical Analysis – V – Edition – Longman.
2. Experiments in Applied Chemistry (For Engineering Students) – Sirita Rattan – S. K. Kataria & Sons, New Delhi.

IT ESSENTIALS LAB

I Year B. Tech I semester

[EEE]

Course Code: 24CT11RC05

L	T	P	C
0	0	3	1.5

Course Outcomes: At the end of the Course, the student shall be able to:

- CO1:** Identify the peripherals of a computer. (L3)
- CO2:** Demonstrate the installation process of operating systems like MS Windows, LINUX. (L3)
- CO3:** Make use of Office suite that comprises with various applications to create documents, and captivating presentations. (L3)
- CO4:** Make use of Office suite that comprises with various applications to organize & analyse data. (L3)
- CO5:** Categorize various UNIX/LINUX Commands to work on a modern operating system and Make use of LaTeX tool to prepare research articles. (L3)

Module-1: Hardware Concepts

1. Identify the peripherals of a computer, components in a CPU and its functions.
2. Draw the block diagram of the CPU along with the configuration of each peripheral.
3. Disassemble and assemble the PC back to working condition.

Module-2: Software Installations and configurations

1. Install operating systems like LINUX and MS windows on a personal computer.
2. The system should be configured as dual boot with both MS windows and LINUX.

Module-3: Word and PowerPoint

1. Creating Documents: Formatting Fonts/Texts, page layout, Applying Text effects, Character Spacing, Borders and Colors, Inserting Header and Footer, equation editor.
2. Creating Power Point: Student should work on basic power point utilities and tools to create basic power point presentation. PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting Images, Tables and charts.

Module-4: Spreadsheets

1. Spreadsheet Orientation: Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler, Gridlines, Format Cells, Summation, auto fill, Formatting Text, Renaming and Inserting worksheets, Hyper linking.
2. Excel Calculation: Calculating Average, Cell Referencing, Excel Formula, std. deviation, Charts, Count Function, Sorting, Conditional formatting, Excel Advanced-sumif, VLOOKUP, and Pivot Table.
3. Software as a service (SaaS): Usage of online office suite.

Module-5: UNIX/LINUX Commands and LaTeX

1. Study and practice on file system, handling files with commands, syntax, usage, application.
2. Installation of LaTeX and preparation of research article.

Reference Books:

1. IT Essentials: PC Hardware and Software Companion Guide, Third Edition, David Anfinson, Ken Quamme.
2. UNIX concepts and applications by Sumitabha Das, TMH Publications.

Web References:

1. <https://www.javatpoint.com/>

LINEAR ALGEBRA AND VECTOR CALCULUS

I Year B. Tech. II Semester

[Common to EEE, ECE, CSE, IT, CSE (AI&ML)]

Course Code: 24BM11RC02

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to

- CO1:** Test for consistency and solve linear system of equations, also determine unknown currents in the electrical circuits. (L5)
- CO2:** Find the Eigen values and Eigen vectors of a matrix and apply Cayley-Hamilton theorem to find the inverse of a matrix. (L3)
- CO3:** Reduce quadratic form to canonical form and examine the nature of quadratic form. (L4)
- CO4:** Interpret the meaning and evaluate gradient of a scalar valued, curl and divergence of vector valued functions. (L5)
- CO5:** Apply line integrals, surface integrals, volume integrals and their relations using Green's theorem, Stoke's theorem, Gauss Divergence theorems in various engineering applications. (L3)

UNIT-I:

10 Lectures

Matrix Algebra: Rank of a matrix- Echelon form, Normal Form - Solution of Linear System of Equations - Consistency of Linear System of Equations – Gauss elimination and Gauss Jordan methods, LU Factorization method.

Applications: Finding the current in electrical circuits. [Sections: 2.7, 2.10, 28.6 of Textbook]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Find the rank of a matrix. (L1)
2. Test for consistency and solve a system of linear equations. (L4)
3. Apply Gauss elimination and Gauss Jordan methods, LU factorization to solve linear systems. (L3)
4. Determine unknown currents in electrical circuits. (L5)

UNIT-II:

10 Lectures

Eigen Values and Eigen Vectors: Eigen Values and Eigen Vectors of a real Matrix – Properties - Cayley- Hamilton theorem (without proof) - Inverse and Powers of a Matrix using Cayley-Hamilton's theorem – Pseudo inverse of a matrix, Singular value decomposition. [Sections: 2.13 - 2.15 of Textbook]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Find eigenvalues and corresponding eigenvectors of a matrix. (L1)
2. Apply Cayley-Hamilton theorem to find powers and the inverse of a matrix. (L3)
3. Calculate the Pseudo Inverse of a matrix. (L3)
4. Calculate the singular values of a matrix. (L3)

UNIT-III:

9 Lectures

Quadratic Forms: Inner Product – Orthogonal Vectors – Orthogonal matrix – Diagonalization of a Matrix-Quadratic Forms - Reduction of Quadratic Form to Canonical Form (Orthogonal Transformation) - Nature of a Quadratic Form. [Sections: 2.16 - 2.18 of Textbook]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Make use of Eigen values and eigen vectors to diagonalize the matrix. (L3)
2. Reduce the Quadratic form to canonical form examine the nature of a quadratic form. (L4)

UNIT-IV: Vector Differentiation

9 Lectures

Introduction - Scalar and Vector point functions, General rules for vector differentiation - Vector operator ∇ applied to scalar point functions- Gradient, ∇ applied to vector point functions- divergence and curl. Physical interpretation of gradient, divergence and curl (i.e., ∇f , $\nabla \cdot \vec{F}$, $\nabla \times \vec{F}$). Irrotational and Solenoidal fields, Vector Identities.

(Sections: 8.1, 8.4 - 8.9 of Text Book)

Learning Outcomes:

At the end of the unit, the student will be able to

1. Find the gradient of a scalar point function, divergence and curl of a vector point function. (L1)
2. Determine the directional derivative of scalar point function. (L5)

UNIT-V: Vector Integration

10 Lectures

Integration of vectors - Line integral – Circulation - work done - surface integral-flux - Green's theorem in the plane - Stoke's theorem - Volume integral - Gauss Divergence theorem (All theorems without proofs).

(Sections: 8.10 - 8.16, 8.18 of Text Book)

Learning Outcomes:

At the end of the unit, the student will be able to

1. Determine the work done in a moving particle along a path. (L5)
2. Interpret surface and volume integrals. (L2)
3. Apply vector integral theorems to multiple integral. (L3)

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 45th Edition, Khanna Publishers, 2024.

Reference Books:

1. David Poole, Linear Algebra- A modern introduction, 4th edition, 2015.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley & Sons, 2011.
3. Peter V. O'Neil, Advanced Engineering Mathematics, 7th edition, Cengage Learning, 2011.
4. Greenberg, Advanced Engineering Mathematics, 2nd Edition, Pearson, 2017.

Web References:

1. <https://nptel.ac.in/courses/111107112>

ENGLISH
I Year B. Tech II Semester
[Common to ECE, EEE & CSE(AI&ML)]

Course Code: 24HE11RC01

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to

- CO1:** Develop moral values and inner peace(L3), Demonstrate the use of LSRW skills, Vocabulary and basic grammar concepts. (L3)
- CO2:** Identify the impact of different social backgrounds (L3), recognize the poet's insights. (L4) Demonstrate the use of LSRW skills, Vocabulary and basic grammar concepts. (L3)
- CO3:** Analyse socio-cultural context(L4), Establish effective interpersonal and communication skills(L3), Demonstrate the use of LSRW skills, Vocabulary and basic grammar concepts(L3)
- CO4:** Focus on value of education(L4), Relate to the poet's nostalgia(L4), Demonstrate the use of LSRW skills, Vocabulary and basic grammar concepts (L3)
- CO5:** Determine the central idea of the text(L3), Identify one's resilience(L3), Demonstrate the use of LSRW skills, Vocabulary and basic grammar concepts (L3)

UNIT-I

10 Lectures

Prose:	Swami Vivekananda: The Secret of Work
Poetry:	Grenville Kleiser: Stay Calm
Grammar & Vocabulary:	Synonyms & Antonyms
Listening:	Listening for Context and Specific Information
Speaking:	Introducing Oneself and Others
Writing:	Basics of writing

Learning Outcomes:

At the end of the unit, the student will be able to

1. Interpret the spiritual growth and capacity building of the individual in the 21st century. (L3)
2. Use appropriate synonyms and antonyms to communicate effectively. (L3)
3. Listen and understand for specific information in the audio(L2)

4. Establish connections between oneself and others(L3)
5. Apply appropriate punctuation marks for clarity and organization of written text (L3)

UNIT-II

10 Lectures

Prose:	Katherine Mansfield: The Doll's House
Poetry: Rabindranath Tagore:	Where the Mind Is Without Fear
Grammar & Vocabulary:	Phrasal Verbs
Listening:	Listening for Main Idea and Supporting Ideas
Speaking:	Getting Someone's Attention and Interrupting
Writing:	Formal Letters

Learning Outcomes:

At the end of the unit, the student will be able to

1. Relate to the world through adult & child's points of view (L3)
2. Identify the sense of self dignity & rationality in the poem (L4)
3. Utilize appropriate phrasal verbs for effective communication(L3)
4. Listen & identify main and supporting ideas in the audio(L3)
5. Practice conversational etiquette(L3)
6. Write formal letters(L3)

UNIT-III

10 Lectures

Prose:	O. Henry: The Last Leaf
Poetry:	Rudyard Kipling: If
Grammar & Vocabulary:	Idiomatic Expressions
Listening:	Listening for Global Comprehension
Speaking:	Asking for Information and Giving Information
Writing:	Note-Making

Learning Outcomes:

At the end of the unit, the student will be able to:

1. Analyze strategies to face challenges in life (L4)
2. Develop one's own personality (L3)
3. Use idiomatic expressions in oral & written communication (L3)
4. Listen & Interpret the audio for Global Comprehension (L3)
5. Ask & provide information (L3)

6. Practice note making study skills(L3)

UNIT-IV

10 Lectures

Prose:	Francis Bacon: Of Studies
Poetry:	Toru Dutt: Our Casuarina Tree
Grammar & Vocabulary:	Remedial Grammar I
Listening:	Listening to Make Inferences
Speaking:	Expressing Opinions, and Agreeing and Disagreeing with Opinions
Writing:	Essay Writing

Learning Outcomes:

At the end of the unit, the student will be able to

1. Prioritize the habits of continuous learning(L4)
2. Recognize the significance of Indian philosophy (L4)
3. Identify and correct common errors in English grammar and usage(L3)
4. Draw inferences from the audio(L3)
5. Articulate one's own opinions(L3)
6. Develop different types of essays (DEAN)(L3)

UNIT-V

8 Lectures

Prose:	Mark Twain: Whitewashing the Fence
Poetry:	William Ernest Henley: Invictus
Grammar & Vocabulary:	Remedial Grammar II
Listening:	Listening for Key Ideas
Speaking:	Telephone Etiquette
Writing:	E-mail Etiquette

Learning Outcomes:

At the end of the unit, the student will be able to

1. Discover the humour & moral lessons in the text (L3)
2. Show resilience in adverse situations. (L3)
3. Modify sentences with appropriate grammar, vocabulary and usage (L3)
4. Identify key ideas (L3)
5. Practice telephone Etiquette (L3)
6. Apply the knowledge of E-mail Etiquette (L3)

Text Books:

1. English for Engineers: Theory to practice. Board of Editors, Orient Black Swan Publishers, India.2024.

Reference Books:

1. English Grammar in Use by Raymond Murphy
2. Oxford English Grammar Course by Michael Swan
3. Word Power Made Easy by Norman Lewis
4. Cambridge Vocabulary for IELTS by Pauline Cullen
5. The Elements of Style by William Strunk Jr. and E.B. White
6. English Vocabulary in Use by Michael McCarthy and Felicity O'Dell
7. Practical English Usage by Michael Swan
8. The Only Grammar Book You'll Ever Need by Susan Thurman
9. Advanced English Grammar: A Linguistic Approach by Ilse Depraetere and Chad Langford

PROBLEM SOLVING USING C
I Year B. Tech. II semester
[EEE]

Course Code: 24CT11RC02

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to

- CO1:** Explain the basic constructs of C through the use of simple applications. (L2)
- CO2:** Demonstrate the utilization of arrays and strings in the development of C programs. (L2)
- CO3:** Utilize functions and pointers to construct various applications in C. (L3)
- CO4:** Apply concepts of structures and unions to build and implement C applications. (L3)
- CO5:** Develop applications using sequential and random-access file processing techniques. (L3)

UNIT-I

10 Lectures

Introduction to C: Basic structure of C program, Constants, Variables and data types, Operators and Expressions, Arithmetic Precedence and associativity, Type Conversions. Managing Input and Output Operations Formatted Input, Formatted Output. [TextBook-1: Chapter 2 (S-2.1 – S-2.12)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Outline the Basic Structure and Components of C Programs. (L2)
2. Demonstrate Variables, Data Types, Operators, and Expressions. (L2)
3. Illustrate Input and Output Operations. (L2)

UNIT-II

11 Lectures

Decision Making, Branching, Looping: Decision making with if statement, Simple if statement, The if...else statement, Nesting of if...else statement, the else.. if ladder, switch statement, the (? :) operator, the goto statement, The while statement, the do statement, the for statement, Jumps in Loops.

Arrays & Strings: One, Two-dimensional Arrays, multi-dimensional Arrays, Character Arrays. Declaration and Initialization of Strings, reading and writing of strings, string

handling functions. [TextBook-1: Chapter 3 (S-3.1 – S-3.8), TextBook-2: Chapter 13,14,15,16 (PP:215-283)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Classify Decision Making and Branching (L2)
2. Interpretation of Looping Constructs (L2)
3. Summarize Arrays and Strings (L2)

UNIT-III

10 Lectures

Function and Dynamic Memory Allocation: Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, recursion.

Introduction to Pointers, Pointer Arithmetic, Pointers for Inter-Function Communication, passing pointers to functions, call by reference, Dynamic Memory Allocation. [TextBook-1: Chapter 4 (S-4.1 – S-4.11), Chapter 5 (S-5.1 – S-5.12)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Utilize Functions (Understand and Implement Functions, Utilize Various Function Types, Advanced Function Techniques) (L3)
2. Experiment with Pointers (Basic Pointer Operations, Pointers and Data Structures) (L3)
3. Explain Advanced Pointer Usage (Pointers in Functions, Pointers to Complex Data Types) (L2)

UNIT-IV

9 Lectures

Structure and Unions: Defining a structure and union, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, arrays within structures, structures within structures, definition and usage of union, structures and unions using functions, size of structures and bit-fields. The Type Definition (Type def), Enumerated Types. [TextBook-1: Chapter 6 (S-6.1 – S-6.9)]

Learning Outcomes:

1. At the end of the unit, the student will be able to
2. Define Structures and Build C programs using Structures. (L3)

3. Explain Complex Data Structures. (L2)
4. Explain Unions and Bit-Fields. (L2)

UNIT-V

8 Lectures

File handling: Introduction to Files, Modes of File operations, Text and Binary Files, Defining and opening a file, closing a file, Input/ Output operations on files, Error handling during I/O operations, random access to files and Command Line Arguments, user defined header files. [TextBook-2: Chapter 19 (PP:325-348)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Outline File Operations. (L2)
2. Summarize Error Handling and Random Access. (L2)
3. Utilize Command Line Arguments. (L3)

Text Books:

1. Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
2. Yashavant P. Kanetkar, “Let Us C”, 16th Edition, 2019, BPB Publications, ISBN: 978-93-8728-449-4.

Reference Books:

1. N. B. Venkateswarlu, E. V. Prasad, “C and Data Structures”, 1st Edition, S. Chand Publishing, 2010, ISBN: 978-93-525-3356-5.
2. Pradip Dey, Manas Ghosh, “Programming in C”, 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
3. Jacqueline A. Jones and Keith Harrow, “Problem Solving with C”, Pearson Education. ISBN: 978-93-325-3800-9.
4. E. Balagurusamy, “Programming in ANSI C”, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

Web References:

1. <https://nptel.ac.in/courses/106105171>
2. <https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/pages/lecture-notes/>

3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384323703937433634517_shared/overview
4. <https://cse02-iiith.vlabs.ac.in/List%20of%20experiments.html>

ELECTRICAL CIRCUITS - 1

I Year B. Tech. II semester
[EEE]

Course Code: 24EE11RC03

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to:

- CO1:** Analyse the electrical networks using mesh and nodal analysis techniques. (L2)
- CO2:** Analyse Electrical circuits with AC excitation. (L2)
- CO3:** Summarize the applications of network theorems. (L2)
- CO4:** Summarize the concept of resonance and understand bandwidth, Q factor, and locus diagrams. (L2)
- CO5:** Analyze magnetic circuits and understand the concepts of graph theory. (L2)

UNIT-I

10 Lectures

Introduction to Electrical Circuits: concepts of electrical circuit elements and their V-I relations; source transformation and Network Simplification Techniques (Series, Parallel, Series-Parallel, Star-delta transformations), Nodal analysis method, Mesh analysis method including super node and super mesh analysis. Concept of duality and dual networks. [TextBook-1: Chapter 1 (S-1.1 – S-1.6), Chapter 2 (S-2.1 – S-2.7), Chapter 3 (S-3.1- S-3.5)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Summarize the basic electrical elements and different fundamental laws. (L2)
2. Apply the Kirchhoff's Laws in solving series, parallel, non-series-parallel configurations in DC networks. (L2)
3. Understand the principle of duality and dual networks. (L2)

UNIT-II

10 Lectures

Single Phase A.C Circuits: Periodic and non-periodic wave forms, R.M.S, Average Values and Form Factor for Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, j-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation. Phasor diagrams - Concept of Reactance, Impedance, Susceptance and Admittance. Power

triangle - Apparent Power, Active and Reactive Power, Concept of Power Factor Examples. [TextBook-1: Chapter 11 (S-11.1 – S-11.7) , Chapter 9 (S-9.1 – S-9.7)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Analyse the periodic and non-periodic waveforms. (L2)
2. Perform steady-state analysis of R, L, and C circuits with sinusoidal excitation. (L2)
3. Determine the power factor, reactance, impedance, and power types. (L2)

UNIT-III

10 Lectures

Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (DC & AC with dependent and independent Excitations).

[TextBook-1: Chapter 4 (S-4.1 – S-4.8), Reference Book-2: Chapter 4 (S-4.1 – S-4.10)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Analyse the circuits using theorems for DC Excitation. (L2)
2. Analyse the circuits using theorems for AC Excitation. (L2)
3. Summarize the applications of theorems. (L2)

UNIT-IV

10 Lectures

Resonance and locus Diagrams: Series and parallel resonance circuits, concept of band width and Q factor.

Locus diagram: RL, RC, RLC with R, L and C variables. [TextBook-2: Chapter 16 (S-16.1– S-16.4)]

<https://ggsestc.digimat.in/nptel/courses/video/108105065/L06.html>

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the principles of series and parallel resonance in electrical circuits. (L1)
2. Apply the resonance concepts to analyse the electrical circuits. (L2)
3. Interpret the locus diagrams for RL, RC, and RLC circuits. (L2)

UNIT-V

8 Lectures

Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of Series and Parallel Magnetic Circuits with mutual inductance.

Network Topology: Basic concepts of Graph theory, incident matrix, tie-set matrix and cut-set matrix. [TextBook-1: Chapter 13 (S-13.1 – S-13.6), Reference Book-2: Chapter 9 (S-9.1 – S-9.6), Chapter 3 (S-3.1 – S-3.8)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the self and mutual inductance and apply the dot convention in coupled circuits. (L1)
2. Analyse series and parallel magnetic circuits with mutual inductance. (L2)
3. Apply Graph Theory to solve the electrical circuits. (L2)

Text Books:

1. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill, 6th Edition, 2017.
2. Engineering circuit analysis William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 8th Edition, 2012.

Reference Books:

1. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition.
2. Circuit Theory Analysis & Synthesis A. Chakrabarti, Dhanpat Rai & Sons, 7th Revised Edition, 2018.
3. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2010, Fifth Edition.

Web References:

1. <https://archive.nptel.ac.in/courses/108/105/108105159/>
2. <https://nptel.ac.in/courses/108104139>

THERMAL AND HYDRO PRIME MOVERS

I Year B. Tech. II semester

[EEE]

Course Code: 24EE11RC04

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the Course, the student shall be able to

- CO1:** Classify internal combustion engines & boilers and assess the performance. (L2)
- CO2:** Analyse the various Vapour Power Cycles. (L3)
- CO3:** Analyze the different methods for improving the efficiency of gas turbines. (L4)
- CO4:** Determine the forces acting on the stationary & moving vanes and summarize the operation of pumps. (L3)
- CO5:** Summarize the working of various types of hydraulic turbines. (L2)

UNIT-I

10 Lectures

I.C Engines: Classification, Basic idea of IC engine, Parts in IC engine, working principle of 2-stroke & 4-Stroke engines, Valve Timing Diagram, Port Timing Diagram, Comparison of 4 Stroke & 2 Stroke engine, Petrol Engine and Diesel Engine, Engine performance evaluation.

Boilers: Classification of Boilers, Simple Vertical Boiler, Cochran Boiler, Babcock and Wilcox Boiler, Benson Boiler. Difference between Fire Tube and Water Tube Boilers, Boiler Mountings and Accessories. [Text Book-1: Chapter 23 (S-23.1 – S-23.14, S-23.39), Chapter 11 (S-11.1 – S-11.3, S-11.6-11.8), Chapter 12 (S-12.1 – S-12.3)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the construction and working principles of 2 stroke and 4 stroke I. C engines using petrol and diesel. (L2)
2. Evaluate the performance parameters of I. C. engines. (L3)
3. Summarize the construction and working principles of fire tube and water tube boilers. (L2)

UNIT-II

10 Lectures

Properties of Steam and use of Steam Table: T-S and H-S Diagrams. Analysis of Various Thermodynamic Processes undergone by Steam.

Vapour Power Cycles: Carnot Cycle-Rankine Cycle- Thermodynamic Variables Effecting Efficiency and output of Rankine Cycle-. Analysis of simple Rankine Cycle.

Schematic layout of steam power plant. [Text Book-1: Chapter 2 (S-2.1 – S-2.18), Chapter 15 (S-15.1 – S-15.2)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Analyse the properties of Steam by using Steam Tables- T-S and H-S Diagrams. (L3)
2. Understand the working of various vapour power cycles, layout of steam power plant. (L2)
3. Summarize the variables effecting the efficiency and output of rankine cycle (L3)

UNIT-III

10 Lectures

Gas Turbines: Simple gas turbine plant-ideal cycle, closed cycle, open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle. Actual cycle, analysis of simple cycles & cycles with inter cooling, reheating and Regeneration. [Text Book-1: Chapter 25 (S-25.1 – S-25.6)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the working of various gas turbine plant cycles. (L2)
2. Analyse the performance parameters for gas turbine cycle. (L3)
3. Summarize the different methods for improving the efficiency of gas turbines. (L4)

UNIT-IV

10 Lectures

Impact of Jets on Vanes: Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved).

Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps, Performance and Characteristic curves. [Text Book-2: Chapter 17 (S-17.1 – S-17.4.4), Chapter 19 (S-19.1 – S-19.2, S-19.6, S-19.10)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Apply impulse momentum equations to find the forces acting on the vanes. (L3)
2. Understand the working of centrifugal pump and its types. (L2)
3. Summarize the Performance Characteristics of the pumps. (L2)

UNIT-V

8 Lectures

Hydraulic Turbines: Classifications of turbines; Working principle of Pelton turbine, Francis turbine, Kaplan turbine, Efficiency calculation, Governing of turbines,

Performance and characteristic curves, working of hydroelectric power plant. [Text Book-2: Chapter 18 (S-18.1 – S-18.9, S-18.13 – S-18.14)]

Learning Outcomes:

At the end of the unit, the student will be able to

1. Understand the working of hydroelectric power plant, hydraulic turbines. (L2)
2. Evaluate the performance parameters of hydraulic turbine. (L3)
3. Summarize the performance characteristics of hydraulic turbine. (L2)

Text Books:

1. Thermal Engineering by Rajput, Lakshmi publications.
2. R.K. Bansal, Fluid Mechanics and Hydraulic Machines, 10th Edition, Laxmi Publications, 2018.

Reference Books:

1. A Textbook of Thermal Engineering By RS Khurmi | JK Gupta.
2. “Hydraulics & Fluid Mechanics”, P.N. Modi and S.M. Seth, text books House, Delhi.

Web References:

1. https://onlinecourses.nptel.ac.in/noc20_me33/
2. <https://archive.nptel.ac.in/courses/112/103/112103249/>

COMMUNICATION SKILLS LAB

I Year B. Tech. II Semester

[Common to ECE, EEE, CSE (AI&ML)]

Course Code: 24HE11RC02

L	T	P	C
0	0	3	1.5

Course Outcomes: At the end of the Course, the student shall be able to

- CO1:** Identify and pronounce the sounds of English; choose the accurate stress in connected speech for proper intonation. (L3)
- CO2:** Apply the main theme and ideas of the audio/video to take notes and summarize. (L3)
- CO3:** Develop speaking skills by taking part in Just A Minute (JAM) – Picture Prompts-Narratives-Role Play. (L3)
- CO4:** Practice discussions and debates. (L3)
- CO5:** Demonstrate Presentation Skills. (L3)

ACTIVITY-I

Introduction to Phonetics: The Sounds of English (Speech sound – vowels and consonants) - Stress and Intonation - Accent and Rhythm.

Learning Outcomes:

At the end of the unit, the student will be able to

1. Apply the knowledge of Phonetics for better pronunciation and articulation. (L3)
2. Choose appropriate stress, intonation and rhythm of English language for clear communication. (L3)

ACTIVITY-II

Listening Skills: Listening for gist and specific information - listening for Note taking, Summarizing and for opinions - Listening to the speeches of eminent personalities.

Learning Outcomes:

At the end of the unit, the student will be able to

1. Develop effective listening skills for better comprehension of academic lectures and English spoken by native speakers. (L3).
2. Apply effective strategies for good writing. (L3)
3. Demonstrate writing skills in note taking and summarizing. (L3)

ACTIVITY-III

Speaking Skills: Just A Minute (JAM) session –Picture Prompts- Narrating stories and anecdotes-Role Play

Learning Outcomes:

At the end of the unit, the student will be able to

1. Make use of dialogues for different roles. (L3)
2. Develop communication skills in formal and informal situations. (L3)
3. Practice speaking skills through participation in activities such as narrating stories and role plays(L3)

ACTIVITY-IV

Speaking skills: Group Discussions-Arguments-Debates

Learning Outcomes:

At the end of the unit, the student will be able to

1. Organize one's own ideas for various Group-Discussion formats. (L3)
2. Develop ideas and arguments to debate. (L3)

ACTIVITY-V

Presentation skills: Verbal and non-verbal communication - Body Language - Making a Presentation

Learning Outcomes:

At the end of the unit, the student will be able to

1. Design presentations with PowerPoint slides(L3)
2. Apply appropriate body language (postures, gestures, facial expressions and eye contact) in formal presentations. (L3)

LIST OF LAB ACTIVITIES:

1. Identification and pronunciation of Vowel sounds and Consonant sounds (CO1)
2. Identification of word stress, Intonation and Rhythm (CO1)
3. Listening for specific information & Note taking (CO2)
4. Listening to the speeches of eminent personalities and summarizing (CO2)
5. Just A Minute sessions (CO3)
6. Picture Prompts (CO3)
7. Narrating Stories& anecdotes (CO3)
8. Role-Plays (CO3)

9. Group Discussions (CO4)
10. Debates (CO4)
11. Presentation Skills-I (CO5)
12. Presentation Skills-II (CO5)

Reference Books:

1. Language and Life: A Skills Approach Board of Editors, Orient Black swan Publishers, India.2018.
2. A Textbook of English Phonetics for Indian Students, T.Balasubramanian, Macmillan India Ltd.
3. Ashraf Rizvi. Effective Technical Communication. Tata McGraw Hill Education Private Limited, New Delhi.
4. Speak Well. Orient Black swan Publishers, Hyderabad.
5. Allan Pease. Body Language. Manjul Publishing House, New Delhi.

Web References:

1. <https://www.englishlanguageclub.co.uk>
2. <https://www.ted.ed.com/>
3. <https://learningenglish.voanews.com/>
4. <https://www.bbc.co.uk/learningenglish/>
5. <https://www.abc.net.au/education/learn-english>
6. NDTV News

PROBLEM SOLVING USING C LAB

I Year B. Tech. II semester

[EEE]

Course Code: 24CT11RC04

L	T	P	C
0	0	3	1.5

Course Outcomes: At the end of the Course, the student shall be able to:

- CO1:** Outline the use of basic constructs of C for simple applications. (L2)
- CO2:** Develop C programs for simple applications using Arrays and Strings. (L3)
- CO3:** Illustrate concepts such as functions, recursion, and pointers with suitable examples. (L2)
- CO4:** Build C programs involving Structures and Unions. (L3)
- CO5:** Develop applications using sequential and random-access file processing. (L3)

Module-1:

1. Write a C program to demonstrate Format Specifiers and Input/Output Statements.
2. Write a C program to demonstrate various Data Types.

Module-2:

1. Write a C program to demonstrate various Operators including Bitwise Operator.
2. Write a C program to demonstrate Arithmetic Expressions and Type Casting.

Module-3:

1. Write a C program to demonstrate decision making statements.
2. Write a C program to demonstrate iterative statements.
3. Write a C program to demonstrate break and continue Statement.

Module-4:

1. Write a C program to demonstrate arrays (one-dimensional and two-dimensional).
2. Write a C program to demonstrate string handling functions using built-in and user defined functions.

Module-5:

1. Write a C program to demonstrate user defined functions.
2. Write a C program to demonstrate nested functions.

Module-6:

1. Write a C program to demonstrate arithmetic expressions using pointers.
2. Write a C program to demonstrate Pointers to Arrays.

3. Write a C program to demonstrate manipulate strings using pointers.
4. Write a C program to demonstrate dynamic memory allocation.

Module-7:

1. Write a C program to demonstrate Call-by-value, Call-by-reference.
2. Write a C program to demonstrate recursive function.
3. Write a C program to demonstrate Functions with Storage Classes (Static).

Module-8:

1. Write a C program to demonstrate structures.
2. Write a C program to demonstrate structures within structures.
3. Write a C program to demonstrate pointer to a structure.
4. Write a C program to demonstrate unions.

Module-9:

1. Write a C program to demonstrate I/O operations on files.
2. Write a C program to demonstrate concatenating two files.
3. Write a C program to demonstrate copy content of one file to another file.

Case Study: Select any one application mentioned below.

Note: A report has to be submitted by every student at the end of the semester that includes design, coding, output, etc.

1. Develop a library management system to add, delete, and search for books efficiently.
2. Develop an ATM system to check balance, deposit money, and withdraw funds.
3. Develop a C program to calculate salary increments using a lookup table which stores the percentage of increment based on the current salary.
4. Develop a voting system where users can vote for candidates and view results.
5. Develop a basic calculator for arithmetic operations like addition, subtraction, multiplication, and division.
6. Develop a contact management system to store and manage details like name, phone number, and email.
7. Develop a banking system supporting multiple users for account management and transactions.
8. Develop a C program to calculate SGPA and CGPA based on students' marks across semesters.
9. Develop a registration page in C using file handling to securely store usernames and passwords.

10. Develop an encryption and decryption algorithm to securely transform and restore data by using the GNU C Library: crypt.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
2. Yashavant P. Kanetkar, “Let Us C”, 16th Edition, 2019, BPB Publications, ISBN: 978- 93- 8728-449-4.
3. E. Balaguruswamy, “Programming in ANSI C”, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
4. Pradip Dey, Manas Ghosh, “Programming in C”, 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
5. N.B. Venkateswarulu, “C programming”, 1st Edition, S.Chand Publishing, 2017, ISBN: 978-93-525-3356-5.
6. Jacqueline A Jones and Keith Harrow, “Problem Solving with C”, Pearson Education. ISBN: 978-93-325-3800-9.

Web References:

1. <https://nptel.ac.in/courses/106105171>
2. <https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/pages/lecture-notes/>
3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384323703937433634517_shared/overview
4. <https://cse02-iiith.vlabs.ac.in/List%20of%20experiments.html>

ELECTRICAL ENGINEERING WORKSHOP

I Year B. Tech. II semester

[EEE]

Course Code: 24EE11RC05

L	T	P	C
0	0	3	1.5

Course Outcomes: At the end of the Course, the student shall be able to:

- CO1:** Identity, select, and troubleshoots the house wiring components. (L3)
- CO2:** Troubleshoot electrical appliances such as tube light, fan and domestic pump. (L3)
- CO3:** Develop house wiring schemes using protective equipment like MCB and ELCBs. (L3)
- CO4:** Design Go-down wiring /Tunnel wiring and hospital wiring schemes. (L3)
- CO5:** Measure the Basic Electrical Parameters using suitable instruments. (L3)

List of experiments:

1. Demonstration of electrical safety measures
2. Identification of various electrical tools and symbols
3. Identification of various electrical cables/wires, switches, fuses, fuse carriers, MCB, ELCB, RCCB, and MCCB with their specifications and use.
4. Wiring of lighting circuit using two-way control (Stair case wiring)
5. Godown wiring / tunnel wiring.
6. Hospital wiring
7. Measurement of voltage, current, power in DC circuits.
8. Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and energy meter for calculating power and power factor.
9. Wiring of backup power supply for domestic installation including inverter, battery and load.
10. Troubleshooting of domestic electrical equipment's (tube light, fan)
11. Wiring and troubleshooting of domestic pump motor with DOL starter.
12. Demonstration of moving iron, moving coil, dynamometer, and induction type measuring instruments.
13. Identification of various types of resistors, and capacitors and understand the usage of digital multi-meter.