GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous)

(Approved by AICTE, New Delhi and Permanently Affiliated to Andhra University, Visakhapatnam)

Madhurawada :: Visakhapatnam – 530 048

COURSE STRUCTURE

(Applicable for the Academic Year 2024-25 onwards)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. Electronics and Communication Engineering

SCHEME AND SYLLABI

(With effect from 2024-25 admitted batch)

I Year - I Semester

Course Code	Category	Course Title	Hours per Week		Internal Marks	External Marks	Total Marks	Credits
			L	P				
24BM11RC01	BS	Calculus and Differential Equations	3	0	30	70	100	3
24BP11RC01	BS	Engineering Physics	3	0	30	70	100	3
24EE11RC02	ES	Network Theory and Machines	3	0	30	70	100	3
24CT11RC02	ES	Problem Solving using C	3	0	30	70	100	3
24EC11RC01	ES	Electronic Devices and Circuits	3	0	30	70	100	3
24BP11RC02	BS	Engineering Physics Lab	0	3	50	50	100	1.5
24CT11RC04	ES	Problem Solving using C Lab	0	3	50	50	100	1.5
24EC11RC02	ES	Electronic Devices and Circuits Lab	0	3	50	50	100	1.5
							Total Credits	**19.5**

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
24BC11RC01	BS	Green Chemistry	3	0	30	70	100	3
24HE11RC01	HSS	English	3	0	30	70	100	3
24EC11RC05	ES	Digital Logic Design	3	0	30	70	100	3
24EC11RC06	ES	Electronic Circuit Analysis	3	0	30	70	100	3
24HE11RC02	HSS	Communication Skills Lab	0	3	50	50	100	1.5
24EC11RC07	ES	Digital Logic Design Lab	0	3	50	50	100	1.5
24EC11RC08	ES	Electronic Circuit Analysis Lab	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)]

L	T	P	C
3	0	0	3

Course Code: 24BM11RC01

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 Fraunhoffer diffraction, Fraunhoffer 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 Fraunhoffer 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://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf (Quantum Computing)

NETWORK THEORY AND MACHINES

I Year B. Tech. I semester

[ECE]

Course Code: 24EE11RC02

L	T	P	C
3	0	0	3

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

CO1: Analyze DC circuits using Kirchhoff's laws, nodal and mesh analysis methods. (L2)

CO2: Summarize network theorems and two-port network parameters. (L2)

CO3: Analyze circuits with AC excitations. (L2)

CO4: Determine the transient response of first and second-order circuits. (L2)

CO5: Understand the Construction and Principle of Operation of DC and AC machines. (L2)

UNIT-I **10 Lectures**

Introduction to Electrical Circuits: Circuit Concept – Types of elements and their V-I relations; Kirchhoff's laws, Network Reduction Techniques- Series, Parallel, Series-Parallel, Star-delta transformation, Source transformation, Nodal analysis method and Mesh analysis method including super node and super mesh analysis. [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. Understand the active and passive elements and their VI characteristics. (L2)
2. Analyse the electrical circuits using KVL and KCL. (L2)
3. Analyse the electrical circuits using mesh and nodal analysis. (L2)

UNIT-II **10 Lectures**

Network theorems: Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power transfer theorem and Reciprocity theorem (DC Excitations). Two-port Networks: Z-parameters, Y-parameters, Transmission line parameters, h- parameters, Parallel & series connection of two port networks, cascading of two port networks, problem solving using dependent sources also. [TextBook-1: Chapter 4 (S-4.1 – S-4.8), Chapter 19 (S-19.1 – S-19.6)]

Learning Outcomes:

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

1. Summarize various network theorems. (L2)
2. Summarize the various two-port networks parameters. (L2)
3. Analyze the interconnected two port networks. (L2)

UNIT-III **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, 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.

Resonance: Introduction, Series resonance and parallel resonance, Definition of Q, Bandwidth and selectivity. [TextBook-1: Chapter 11 (S-11.1 – S-11.7), Chapter 9 (S-9.1 – S-9.7), Chapter 16 (S-16.1– S-16.4)]

Learning Outcomes:

1. At the end of the unit, the student will be able to
2. Analyse periodic and non-periodic waveforms. (L2)
3. Analyze RLC circuits for AC excitations. (L2)
4. Determine bandwidth and selectivity in resonant circuits. (L2)

UNIT-IV **9 Lectures**

DC Transients: Evaluation of initial conditions, First order circuits, Definition of time constant, R-L circuit, R-C circuit with excitation, second order circuits, problem-solving. [TextBook-1: Chapter 7 (S-7.1– S-7.6), Chapter 8 (S-8.1– S-8.6)]

Learning Outcomes:

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

1. Evaluate initial conditions in electrical circuits. (L2)
2. Analyse first-order circuits. (L2)
3. Analyse second-order circuits. (L2)

UNIT-V **9 Lectures**

DC Machines:

Principle of operation of DC machines, Constructional Details, EMF equation, DC motor - Torque Equation, Speed control of shunt motor (Field and armature-controlled methods), Applications of DC Machines.

AC Machines:

Transformer construction Details, Principle of operation, EMF equation, Three phase Induction Motors-Construction Details, Principle of operation. Single phase induction motor - Constructional Details, Principle of operation, Double Field Revolving Theory. Applications. [TextBook-3: Chapter 26 (S-26.1 – S-26.10 & S-26.33), Chapter 29 (S-29.6 – S-29.8), Chapter 30 (S-30.1 – S-30.2), Chapter 32 (S-32.1 – S-32.6 & S-32.20-S-32.22), Chapter 34 (S-34.1 – S-34.6), Chapter 36 (S-36.1 – S-36.3)]

Learning Outcomes:

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

1. Understand the Construction and principle of operation of DC and AC machines. (L2)
2. Understand the speed control methods of electrical motors. (L2)
3. Summarize the applications of DC and AC machines. (L2)

Text Books:

1. Fundamentals of Electric Circuits Charles K. Alexander and Matthew. N. O. Sadiku, Mc Graw Hill, 5th Edition, 2013.
2. Engineering circuit analysis William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 7th Edition, 2006.
3. A Textbook of Electrical Technology: Ac and Dc Machines (volume - 2) by B L Theraja and A K Theraja.

Reference Books:

1. Circuit Theory Analysis & Synthesis A. Chakrabarti, Dhanpat Rai & Sons, 7th Revised Edition, 2018.
2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2010, Fifth Edition.
3. Electric Machines, D. P. Kothari, I. J. Nagrath Tata McGraw-Hill, 2004.

Web References:

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

PROBLEM SOLVING USING C

I Year B. Tech. I semester

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

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_013843237039374336 34517_shared/overview
4. https://cse02-iiith.vlabs.ac.in/List%20of%20experiments.html

ELECTRONIC DEVICES AND CIRCUITS

I Year B. Tech I semester

[ECE]

L	T	P	C
3	0	0	3

Course Code: 24EC11RC01

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

CO1: Outline the concepts of basic semiconductor devices(L2)

CO2: Understand the characteristics of different semiconductor diodes and their applications(L2)

CO3: Analyse the operation of BJT under different biasing methods(L4)

CO4: Analyse BJT amplifier circuits with small signal low frequency model(L4)

CO5: Understand the construction and working of FET(L2)

UNIT-I **10 Lectures**

Energy band theory of solids and transport phenomenon in semiconductors: Energy Band Theory of Solids, Insulators, Semiconductors, Metals, Intrinsic and Extrinsic Semiconductors, donor and acceptor impurities, band diagrams, mass action law, intrinsic carrier concentration, continuity equation, Hall effect, Carrier Mobility, Conductivity, Drift and Diffusion currents. Band structure of PN Junction, PN diode biasing, diode current equation, Volt – Amp. Characteristics, Temperature Dependence, Transition and Diffusion Capacitance of PN Junction. [Textbook 1: Chapter -1 Section 1.5 - 1.8, Chapter- 2 Section 2.1 - 2.3 & 2.6 – 2.10, Chapter -19 Section 19.5, Chapter -3 Section 3.1 - 3.9, Chapter -19 Section 19.10]

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(L2)
2. Describe the transport phenomena in semiconductors. (L2)
3. Understand the band structure representation of PN junction, interpret the Volt-Ampere characteristics along with the temperature effects. (L2)

UNIT-II **9 Lectures**

Rectifiers and special diodes: Half-wave, Full-wave, and Bridge Rectifiers with and without Filters: Series inductor filter and shunt capacitor filter, Ripple Factor and Regulation Characteristics. Zener and Avalanche Breakdowns, Characteristics of Zener diode, voltage

regulator, Tunnel Diode, Varactor Diode, Schottky Barrier Diode. [Textbook 3: Chapter-8 Section 8.2-8.6, Chapter-5 Section 5.3, 5.4, 5.6, 5.7]

Learning Outcomes:

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

1. Describe the operation of rectifiers and evaluate their performance metrics like ripple factor and regulation characteristics. (L2)
2. Explain the working principles of special diodes such as Zener diode, tunnel diodes, varactor diodes, and Schottky barrier diodes(L2)

UNIT-III **10 Lectures**

Transistor Characteristics and Transistor Biasing: Operation of NPN and PNP junction Transistor, Current components in a transistor, Input and Output Characteristics of CB, CE, CC, relation between α, β, γ, typical transistor junction voltages, Comparison of CE, CB, and CC Configurations. Junction Biasing for Saturation, Cutoff and Active Region, Biasing circuits analysis, fixed bias, collector to base bias, emitter bias, voltage divider bias, thermal runaway, thermal stability, stability factors. [Textbook 1: Chapter 5 Section 5.4 - 5.11, Textbook 3: Chapter 10 Section 10.1-10.8]

Learning Outcomes:

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

1. Describe the characteristics of transistor in CE, CB, and CC configurations. (L2)
2. Understand the principals of transistor biasing and stabilization(L2)
3. Analyse the transistor operation with different biasing techniques(L4)

UNIT-IV **10 Lectures**

Transistor at Low Frequencies: Small Signal: Transistor as an Amplifier, h – parameter model, Analysis of Transistor Amplifier Circuits using h –parameters, CB, CE and CC Amplifier configurations and performance factors, effects of Bypass and Coupling Capacitors. Multistage transistor Amplifier, RC Coupled Amplifier, Frequency Response and band width, Emitter – Follower. [Textbook 3: Chapter -11 Section 11.9 - 11.14 & 11.17 - 11.20

Learning Outcomes:

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

1. Represent transistor with its equivalent h parameter model(L2)
2. Analyse the performance of transistor amplifiers with h Models(L4)

UNIT-V **9 Lectures**

Field Effect Transistors:

Construction of JFET and its drain, transfer characteristics, pinch off Voltage, Drain Saturation Current, Construction of MOSFET –Enhancement and Depletion Modes, drain and transfer characteristics. JFET Configurations, Common Source JFET biasing, fixed bias, self-bias, voltage divider bias. [Textbook 2: Chapter 5 Section 5.1 - 5.3, 5.7, 5.8, Chapter 6 Section 6.2, 6.3, 6.4]

Learning Outcomes:

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

1. Comprehend the characteristics of BJT and FET(L2)
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)

Text Books:

1. Jacob Millman, Christos C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, McGraw-Hill.
2. Robert Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 7th Edition, Prentice Hall,1998
3. Sanjeev Gupta, Electronic Devices and Circuits, 2nd Edition, Dhanpat Rai Publications,2005.

Reference Books:

1. Thomas L. Floyd, Electronic Devices, 9th Edition, Prentice Hall, 2012.
2. B. V. Rao and K. Raja Rajeswari, Electronic Devices and Circuits 2nd Edition, Pearson Education,2010
3. Electronic Devices and Circuits, G. S. N. Raju, I. K. International Publications, New Delhi, 2006.
4. David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008.

Web References:

1. https://onlinecourses.nptel.ac.in/noc21_ee80/preview
2. https://be-iitkgp.vlabs.ac.in/

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

PROBLEM SOLVING USING C LAB

I Year B. Tech. I semester

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

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

ELECTRONIC DEVICES AND CIRCUITS LAB

I Year B. Tech I semester

[ECE]

L	T	P	C
0	0	3	1.5

Course Code: 24EC11RC02

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

CO1: Understand the operation of CRO for signal measurements. (L2)

CO2: Analyze the characteristics of P-N junction diode and special diodes. (L4)

CO3: Build the rectifier circuits and regulator circuits using diode. (L3)

CO4: Analyze the operation and characteristics of BJT and FET. (L4)

CO5: Construct and analyze the performance of BJT and FET amplifier circuits. (L4)

List of Experiments:

1. Study of CRO and Applications.
2. Characteristics of PN Junction Diode
3. Characteristics of Zener Diode and Zener Voltage regulator.
4. Characteristics of Photo diode
5. Half-wave and full-wave rectifiers with diodes
6. Half-wave and full-wave rectifiers with capacitor filter
7. Characteristics of BJT CE configuration, h-parameters
8. Characteristics of BJT CB configuration, h-parameters
9. Voltage gain, input impedance and output impedance of emitter follower
10. Drain and transfer characteristics of JFET
11. Frequency response of CE amplifier
12. Demonstration of virtual tool for simulation of electronic device characteristics.

Reference Books:

1. Thomas L.Floyd, “Laboratory Exercises for Electronic Devices”, 9th ed., Prentice Hall.
2. Robert Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 7th ed., Prentice Hall.
3. David A. Bell, “Laboratory manual for electronic devices and circuits”, 4th ed., 2001.

Web References:

1. https://be-iitkgp.vlabs.ac.in/
2. https://www.multisim.com/content/t6fPJvwcHYMD4qzJSYpGHQ/edc-lab1/

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, $\nabla . \overline{F}$, $\nabla \times \overline{F}$), 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 theoremswithout 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

GREEN CHEMISTRY

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

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 UniversityPress 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

ENGLISH

I Year B. Tech II Semester

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

L	T	P	C
3	0	0	3

Course Code: 24HE11RC01

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

DIGITAL LOGIC DESIGN

I Year B. Tech. II semester

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

Course Code: 24EC11RC05

L	T	P	C
3	0	0	3

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

CO1: Represent different number systems & binary codes and perform conversions & binary arithmetic (L2)

CO2: Apply different simplification methods for minimizing Boolean functions. (L3)

CO3: Model various combinational circuits using gates and PLD's. (L3)

CO4: Outline the concept of latches and flip-flops. Construct sequential logic circuits like counters and registers using flip-flops. (L3)

CO5: Categorize Mealy & Moore models and Design Synchronous Sequential machines. (L3)

UNIT-I **9 Lectures**

Number systems: Number systems, Base conversion methods, Representation of signed numbers and Binary Arithmetic.

Codes: Binary, Non binary, Decimal, Alphanumeric, XS-3, Gray. Error detecting and error correcting codes.

Logic Gates: AND, OR, NOT, NAND, NOR, XOR, EX-NOR. [Textbook1: Chapter1, Chapter 2: section 2.1 to 2.8]

Learning Outcomes:

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

1. Understand the advantages of using different number systems. (L2)
2. Describe the usefulness of different binary codes. (L2)
3. Summarize the error detection and correction concepts. (L2).

UNIT-II **10 Lectures**

Minimization of Boolean Functions: Fundamental postulates of Boolean algebra, Basic theorems, Simplification of Boolean equations, Min terms, Max terms, Standard form of Boolean functions. Simplification of functions using Karnaugh map method (2,3,4,5 variables) Don't care conditions, AOI implementation, NAND and NOR Realizations. [Textbook1: Chapter 2: Sections 2.11 to 2.19,2.21,2.22,2.23, Chapter 3: sections 3.2 to 3.6,3.7]

Learning Outcomes:

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

1. Apply basic laws and theorems to simplify Boolean expressions and construct logic circuits. (L3)
2. Understand concepts of sum-of-products and product-of-sums representations. (L2)
3. Apply K- Map for minimizing logic functions and build logic circuits. (L3)

UNIT-III **12 Lectures**

Combinational Logic-Circuit Design-I: Logic design of combinational circuits: Adders and Subtractors: Binary, BCD, Excess-3 and Look–ahead-carry adder, Code converters, Multiplexers, De multiplexers, Encoders, Decoders and priority encoders, Realization of Boolean functions using multiplexers and Decoders.

Combinational Logic-Circuit Design-II: Design of 4-bit comparator, Parity checker/Generator. Basics of PLDs: Basic structure of PROM, PAL, PLA, Realization of Boolean functions with PLDs and their merits and demerits. [Textbook1: Chapter 4: section 4.1 to 4.27, Chapter 5 Sections 5.1 to 5.11]

Learning Outcomes:

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

1. Apply Boolean algebra for describing combinational digital circuits (L3)
2. Describe standard combinational circuits such as adders, subtractors, comparators etc. (L2)
3. Develop the digital circuits using PLDs (L3)

UNIT-IV **10 Lectures**

Sequential Circuits: Classification of sequential circuits, SR-latch, Gated latches, Flip flops: RS, JK, D, T and Master slave flip flops, Excitation tables, flip flop conversion from one type to another. Design of counters: Ripple counters, Synchronous counters, asynchronous counters, up-down counters, Johnson counter, ring counter. Design of registers: Buffer registers, Shift registers, Bi directional shift registers, Universal shift register. [Textbook1: Chapter 6]

Learning Outcomes:

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

1. Understand the principle of Flip-Flops and Latches. (L2)
2. Summarize the concepts of Shift Registers and Counters. (L2)
3. Construct different sequential logic circuits using Flipflops. (L3)

UNIT-V **7 Lectures**

Analysis and Design of Synchronous Sequential Machines: Moore and Mealy machine models, State Equations, State Table, State diagram, State reduction & assignment, Synthesis of synchronous sequential circuits- sequence detector and generator. [Textbook1: Chapter 7 Sections 7.1 to 7.5]

Learning Outcomes:

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

1. Understand Moore and Mealy machine models (L2)
2. Discuss the concepts of State assignment & Reduction (L2)
3. Analyse the design and synthesis of synchronous sequential circuits (L3)

Textbooks:

1. Anand Kumar, Switching Theory and Logic Design. PHI, 2014.
2. M. Morris Mano and Michael D. Ciletti, Digital Design, 4th Edition, Pearson Education, 2013.

Reference Books:

1. Foundation of Switching theory and Logic Design, A k Singh, New age International Publishers,2008
2. Modern Digital Electronics, R P Jain, 4th Edition, Tata McGraw Hill Education Pvt. Ltd, New Delhi,2010
3. Fundamentals of Logic Design, Charles. R. Roth, Thomson Publications,5th edition,2004.

Web References:

1. https://nptel.ac.in/courses/108105132 (Digital Electronic Circuits)
2. https://onlinecourses.nptel.ac.in/noc24_ee147/preview (Digital Circuits)
3. https://nptel.ac.in/courses/117105080 (Digital Systems Design)
4. https://onlinecourses.swayam2.ac.in/nou24_ec07/preview (Digital electronic and System design)

ELECTRONIC CIRCUIT ANALYSIS

I Year B. Tech. II semester

[ECE]

Course Code: 24EC11RC06

L	T	P	C
3	0	0	3

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

CO1: Formulate small signal high frequency amplifiers using BJT and FET. (L3)

CO2: Classify multistage amplifiers. (L2)

CO3: Design different types of feedback amplifiers. (L3)

CO4: Interpret the condition for oscillations in oscillators and design different types of oscillators. (L3)

CO5: Analyse and examine different types of power amplifiers and Tuned amplifiers, compare them in terms of efficiency. (L4)

UNIT-I **10 Lectures**

Small Signal High Frequency Transistor Amplifier models: BJT: Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid-π conductance's, Hybrid-π capacitances, validity of Hybrid-π model, determination of high frequency parameters in terms of low frequency parameters, Millers Theorem and its Dual, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product. FET: Analysis of common source and common drain amplifier circuits at high frequencies. [Textbook 1: Chapter -11, Chapter -8: Section 8.11, Chapter -10:Section 10-10 & 10-11]

Learning Outcomes:

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

1. Explain the Hybrid-π model of BJT and FET. (L2)
2. Apply Hybrid-π model to BJT and FET amplifiers. (L3)
3. Analyze BJT and FET amplifiers with Hybrid-π model. (L3)

UNIT-II **10 Lectures**

Multistage Amplifiers: BJT and FET RC Coupled Amplifiers – Frequency Response. Cascaded Amplifiers. high input resistance transistor amplifiers- Darlington and Bootstrap

circuits, Calculation of Band Width of Single and Multistage Amplifiers. Concept of Gain Bandwidth Product. [Textbook 1: Chapter -10]

Learning Outcomes:

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

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

UNIT-III **10 Lectures**

Feedback Amplifiers: Classification of Amplifiers, Concept of Feedback Amplifiers – Effect of Negative feedback on the amplifier Characteristics. Four Feedback Amplifier Topologies. Method of Analysis of Voltage Series, Current Series, Voltage Shunt and Current Shunt feedback Amplifiers. [Textbook 1: Chapter -13]

Learning Outcomes:

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

1. Outline the basic amplifiers and fundamental concepts of Feedback amplifiers. (L2)
2. Design and analyze feedback amplifiers using each of the four topologies. (L3)
3. Compare the advantages and disadvantages of each feedback topology in different applications. (L3)

UNIT-IV **9 Lectures**

Sinusoidal Oscillators: Condition for oscillations – RC Oscillators -- RC Phase Shift and Wein bridge Oscillators (BJT and JFET models), LC Oscillators – Hartley, Colpitts, Clapp and Tuned Collector Oscillators, Frequency and amplitude Stability of Oscillators– Crystal Oscillators. [Textbook 1: Chapter -14: Section 14-15 to 14-21]

Learning Outcomes:

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

1. Describe the significance of the loop gain and phase shift in sustaining oscillations. (L2)
2. Determine the frequency of oscillation and design criteria for RC, LC and crystal oscillators. (L3)
3. Compare the performance of crystal oscillators with other types of oscillators. (L3)

UNIT-V **9 Lectures**

Tuned Voltage Amplifiers and Power Amplifiers: Single Tuned and Stagger Tuned Amplifiers – Analysis, Double Tuned Amplifier, and Bandwidth Calculation. Classification of Power Amplifiers – Class A, Class B and Class AB power Amplifiers. Series Fed, Single Ended Transformer Coupled Class A Power Amplifiers. Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier. [Textbook 1: Chapter -18, RB1: Chapter -13]

Learning Outcomes:

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

1. List the varieties of Tuned and Power Amplifiers. (L1)
2. Illustrate the operation of Tuned and power amplifiers. (L2)
3. Design and analyze various Tuned and power amplifiers. (L4)

Text Books:

1. Jacob Millman and C.Halkias, Integrated Electronics, Analog Digital Circuits and systems McGraw Hill, 1972.
2. Adel S. Sedra, Kenneth C. Smith, Arun N. Chandorkar, Microelectronic Circuits, 6/e, Oxford University Press, 2013.
3. B.V.Rao, K. RajaRajeswari et.al, Electronic Circuit Analysis ,Pearson Publishers,2010.

Reference Books:

1. Salivahanan, N.Suresh Kumar,Electronic Devices and Circuits, TMH, 4th Edition,2017
2. G.K.Mithal, Electronic Devices and Circuits, Khanna Publishers, 23rd Edition, 2004.
3. Robert L. Boylestad and Louis Nashelsky Electronic Devices and Circuits Theory, Pearson/Prentice Hall, Tenth Edition,2009.

Web References:

1. https://onlinecourses.nptel.ac.in/noc23_ee106.
2. https://onlinecourses.nptel.ac.in/noc24_ee140.

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

DIGITAL LOGIC DESIGN LAB

I Year B. Tech. II semester

[ECE]

Course Code: 24EC11RC07

L	T	P	C
0	0	3	1.5

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

CO1: Verify the functional behavior of different logic gates and realize the Boolean expressions using these gates. (L3)

CO2: Build combinational circuits to implement different logic functions. (L3)

CO3: Verify the functional behavior of different Flipflops (L3)

CO4: Construct sequential circuits like counters and registers using flip-flops. (L3)

CO5: Make use of Digital ICs for verification and design of Digital circuits. (L3)

List of Hardware Experiments:

1. Verification of Logic Gates
2. Verification of Demorgan's Laws
3. Realization of Gates by using universal building blocks
4. Realization of SOP and POS
5. Half Adder & Full adder
6. Implementation of a function by using Decoders
7. Implementation of a function by using Multiplexers.
8. 3 bit Parity Generator
9. Verification of Flip - flops
10. Mod-8 Synchronous counter
11. Johnson Counter
12. 4 - bit Shift-register

Reference Books:

1. Digital Electronics- A Comprehensive Lab Manual by Cherry Bhargava, BS Publications, 2019.
2. Switching theory and Logic Design by Prof. K. Sivani and Prof. B. Ramadevi, BlueRose publishers, 2020.

Web References:

1. https://dec-iitkgp.vlabs.ac.in/
2. https://de-iitr.vlabs.ac.in/
3. https://de-iitg.vlabs.ac.in/

ELECTRONIC CIRCUIT ANALYSIS LAB

I Year B. Tech. II semester

[ECE]

Course Code: 24EC11RC08

L	T	P	C
0	0	3	1.5

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

CO1: Design and analyze feedback amplifiers (voltage series and current shunt feedback amplifiers). (L3)

CO2: Design and analyze various oscillators (RC phase shift oscillator and Colpitt's oscillator. (L3)

CO3: Design and analyze various amplifiers (Multistage amplifiers and Single tuned amplifier). (L3)

CO4: Design and analyze power amplifiers (Class A and Class B complimentary symmetry). (L3)

CO5: Become expert with computer skills (Multisim, OrCAD Pspice and Capture) for the analysis and design of circuits. (L3)

List of Experiments:

Cycle I (Hardware)

1. Voltage-Series Feedback Amplifier
2. Current-Shunt Feedback Amplifier
3. RC Phase Shift Oscillator
4. Colpitt's Oscillator
5. Two Stage RC Coupled Amplifier
6. Darlington Pair Amplifier

Cycle II (Software)

1. Class A Series-fed Power Amplifier
2. Transformer-coupled Class A Power Amplifier
3. Wien Bridge Oscillator
4. Hartley Oscillator
5. Complementary Symmetry Class B Push-Pull Power Amplifier
6. Single Tuned Voltage Amplifier

Equipment required:

Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Active & Passive Electronic Components

Software:

1. Multisim/ Equivalent Industrial Standard Licensed simulation software tool.
2. Computer Systems with required specifications

Reference Books:

1. Electronic Devices, Thomas L.Floyd, Tenth edition,2012
2. Electronic Devices and Circuits, David A. Bell, Fifth Edition,2008

Web References:

1. https://www.circuitlab.com