# SIPNA COLLEGE OF ENGINEERING & TECHNOLOGY, AMRAVATI

**An Autonomous Institute Affiliated to**

**Sant Gadge Baba Amravati University, Amravati, Maharashtra (India)**

**(Approved by AICTE, New Delhi and Recognized by DTE, Maharashtra)**

**(Accredited with 'A+' Grade by NAAC)**

# Bachelor of Technology

## Syllabus: Semester-III and IV

**Department of Electronics and Telecommunications Engineering**

**B. Tech. Electronics and Telecommunications Engineering**

**(Semester Pattern)**

**Effective from Academic Year 2026-27**

**(Applicable to Previous Batches)**

**Prepared by: Board of Studies - Electronics and Telecommunications Engineering**

**Approved by: Academic Council Sipna COET, Amravati**

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| | | | 22/09/2026 | 1.1 |
| Chairman Board of Studies | Dean Academics | Chairman Academic Council | Date of Release | Version |

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | Semester: | III |
|---|---|---|---|
| Course: | Engineering Mathematics -III | Code: | BTETBS07SH3T |

| Teaching Scheme | | | | Evaluation Scheme | | | | |
|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 3 | - | 3 | 3 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Assignments & Class Attendance

**Course Objectives:** To develop essential Mathematical & statistical skills.

**Course Outcomes:**
After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level (L1 to L6) |
|---|---|---|
| CO-1 | Solve the differential equation by various methods. | L3 |
| CO-2 | Apply properties to find the Laplace Transform of various functions. | L3 |
| CO-3 | Make use of concepts of Gradient, Divergence & Curl to understand vector Calculus. | L3 |
| CO-4 | Analyze the data to fit Curves Using Statistical Techniques. | L4 |
| CO-5 | Explain how to find Fourier Transform by using Formulae. | L2 |
| CO-6 | Find the solution of Partial Differential Equations by identifying its various types. | L1 |

**Unit I: Ordinary Differential Equations:** **(6 Hrs.)**

Complete solution, Rules for finding complementary function, and the particular integral, Method of variations of parameters, Cauchy's linear differential equations.

**Unit II: Laplace transforms:** **(6 Hrs.)**

Definition, standard forms, properties of Laplace transform, inverse Laplace transform, convolution theorem

**Unit III: Vector Calculus:** **(6 Hrs.)**

Scalar and Vector point functions, Differentiation of vectors, Gradient of a scalar point function, Directional derivatives, Divergence and curl of a vector point function, irrotational and solenoidal vector fields.

**Unit IV: Z-Transform:** **(6 Hrs.)**

Definition, standard forms, Z-transform of impulse function, Unit step functions, Properties of Z transform, inverse Z-transforms by partial fraction.

**b. Curve fitting:** Method of Least Square: Fitting of Straight Line & Second-Degree parabola, Coefficient of Correlation, Line of Regression.

**Unit V: Fourier transforms:** **(6 Hrs.)**

Definition, standard forms, inverse Fourier transform, properties of Fourier transforms, Fourier sine and Fourier cosine transforms and integrals.

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**Unit VI: Partial differential equation:** **(6 Hrs.)**

Partial differential equation of first order of following types (i) f(p,q)=0; (ii) f (p, q,z) =0; (iii) f(x, p) =g (y, q); (iv)Pp + Qq=R (Lagranges Form); (v) Z=px+qy+f(p, q)

**Total 36 Hours**

| **Textbooks:** | |
|---|---|
| 1. | A Textbook of Applied Mathematics, Vol II by P N. Wartikar, J. N. Wartikar |
| 2. | Higher Engineering Mathematics by Dr. B.S. Grewal. |

| **Reference Books:** | |
|---|---|
| 1. | Mathematical Statistics by J.N. Kapur & H.C. Saxena |
| 2. | Fundamentals of Mathematical statistics, S. C. Gupta, V. K. Kapoor |

Approved in..... 24
Academic Council Meeting
Dated:-.....05/7/25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | Semester: | III |
|---|---|---|---|
| Course: | Electronics Devices & Circuits | Code: | BTETPC02ET3T |

| Teaching Scheme | | | | Evaluation Scheme | | | | |
|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 3 | - | 3 | 3 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Class Tests, Assignments, Quiz & Class Attendance

**Course Objectives:** Develop practical skills in designing and analyzing semiconductor-based analog Circuits.

**Course Outcomes:**
After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level (L1 to L6) |
|---|---|---|
| CO-1 | Explain PN junction diodes, rectifiers, filters, and applications. | L2, L4 |
| CO-2 | Analyze wave-shaping circuits using RC filters and diodes. | L4 |
| CO-3 | Explain BJTs, configurations, biasing, and characteristics. | L2 |
| CO-4 | Analyze feedback amplifiers and oscillators. | L4 |
| CO-5 | Understand and evaluate multistage amplifiers. | L2, L5 |
| CO-6 | Explain FETs, MOSFETs, and UJTs with applications. | L2 |

**Unit I: PN Junction Diode** **(6 Hrs.)**

PN Junction Diode: Formation, biasing, V-I characteristics, Rectifiers: Analysis of Half Wave (HWR) & Full Wave Rectifier (FWR), Filters: C, L, LC, CLC filters, Applications: Diode as a switch, Zener diode as a voltage regulator (Numerical)

**Unit II: Wave shaping Circuits** **(6 Hrs.)**

RC Circuits: Low pass & high pass filters, Waveforms: Sinusoidal, Square signal. Clipping & Clamping circuits using diodes (positive & negative unbiased)

**Unit III: Bipolar Junction Transistors (BJT)** **(6 Hrs.)**

Transistor Basics: Transistor types & configurations (NPN transistor CB, CE configurations characteristics) DC Load line analysis, Transistor Biasing Methods (fixed & voltage divider) Derivation of Stability factor, Numerical on Current Amplification factor, Introduction to voltage divider biased CE amplifier using h-parameter model.

**Unit IV: Feedback Amplifiers & Oscillators** **(6 Hrs.)**

Feedback Amplifiers: Concept, negative feedback, basic topologies & its comparison (Current Series, Current Shunt, Voltage series, Voltage Shunt). Oscillators: Barkhausen's criteria, Hartley, RC Phase shift (Numerical)

**Unit V: Multistage Amplifiers** **(6 Hrs.)**

Need for Multistage Amplifiers, Multistage Amplifiers : RC Coupled, Direct Coupled, Emitter Follower, Darlington Emitter Follower, Bootstrapping Principle (Numerical on overall gain).

Approved in.....24
Academic Council Meeting
Dated:-.....05/7/25.....

**Unit VI: Field Effect Transistors (FET) & UJT** **(6 Hrs.)**

JFET: Introduction, characteristics, parameters (μ, gm, rd) MOSFET: Enhancement & depletion type MOSFET UJT: Construction, UJT as relaxation oscillator

**Total 36 Hours**

**Textbooks:**

1. **Electronic Devices and Circuit Theory** – Robert L. Boylestad, Louis Nashelsky (Pearson)
2. **Integrated Electronics: Analog and Digital Circuits and Systems** – Jacob Millman, Christos C. Halkias (McGraw Hill)
3. **Microelectronic Circuits** – Adel S. Sedra, Kenneth C. Smith (Oxford University Press)
4. **Electronic Principles** – Albert Malvino, David Bates (McGraw Hill)
5. **Electronic Devices and Circuits** – Salivahanan, Suresh Kumar, Vallavaraj (McGraw Hill)

**Reference Books:**

1. **Solid State Electronic Devices** – Ben G. Streetman, Sanjay Banerjee (Pearson)
2. **Electronic Circuit Analysis and Design** – Donald A. Neamen (McGraw Hill)
3. **Principles of Electronics** – V.K. Mehta, Rohit Mehta (S. Chand Publishing)
4. **Fundamentals of Microelectronics** – Behzad Razavi (Wiley)
5. **Electronic Devices & Circuits** – David A. Bell (Oxford University Press)

**MOOC Links:**

1) **NPTEL - Electronic Devices and Circuits** – *https://nptel.ac.in/courses/108105158*
2) **NPTEL - Analog Electronic Circuits** – *https://nptel.ac.in/courses/108/102/108102112/*
3) **NPTEL - Semiconductor Devices & Circuits –** *https://archive.nptel.ac.in/courses/117/103/117103063/*
4) **MIT OpenCourseWare - Circuits and Electronics** – *https://ocw.mit.edu/courses/electrical-engineering-a computer-science/6-002-circuits-and-electronics-spring-2007/*
5) **Coursera - Introduction to Electronics (Georgia Tech) –** *https://www.coursera.org/learn/electronics*

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| **Program:** | **B. Tech. (Electronics and Telecommunication Engineering)** | | | **Semester:** | **III** | |
|---|---|---|---|---|---|---|
| **Course:** | **Electronics Devices & Circuits Lab** | | | **Code:** | **BTETPC03ET3P** | |
| **Teaching Scheme** | | | | **Evaluation Scheme** | | |
| **Practical** | **Tutorial** | **Hours** | **Credit** | **INT** | **EXT** | **Total** |
| **2** | **0** | **2** | **1** | **30** | **20** | **50** |

**Course Objectives:** Develop hands-on expertise in designing, implementing, and analysing semiconductor and analog circuits through practical lab experiments.

**Course Outcomes:** After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Levels |
|---|---|---|
| CO1 | **Analyze** the V-I characteristics of PN Junction Diode in forward and reverse bias to understand its conduction behavior. | L4 |
| CO2 | **Implement** rectifier circuits (Half-Wave & Full-Wave) and **evaluate** their performance in terms of efficiency and ripple factor. | L5 |
| CO3 | **Design** and **verify** diode-based clipping circuits and RC filters for signal conditioning applications. | L4 |
| CO4 | **Interpret** the input and output characteristics of BJT and JFET to determine their operating regions and amplifier behavior. | L5 |
| CO5 | **Construct** and **test** amplifier circuits (Single-Stage & Multistage) to measure gain and frequency response. | L5 |
| CO6 | **Design** and **implement** oscillator circuits (Colpitts/Hartley) and analyze their frequency stability and waveform generation. | L6 |

**Experiment List**

1) Study and plot V-I characteristics of PN Junction Diode (Forward & Reverse Bias)
2) Perform rectification using Half Wave Rectifier & Full Wave Rectifier
3) Verify Clipping circuits using diodes.
4) Study and analyse RC Low Pass & High Pass Filters for different waveforms
5) Plot Input & Output Characteristics of BJT in CE Configuration
6) Implement RC coupled multistage amplifier & calculate its overall gain.
7) Verify the amplification using Single-Stage CE Amplifier.
8) Design and implement Colpitts / Hartley Oscillator
9) Study and analyse characteristics of JFET.
10) Study & verify characteristics of UJT and observe waveform in relaxation oscillator

Approved in..... 24
Academic Council Meeting
Dated:-.....05/7/25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | | III | |
|---|---|---|---|---|---|---|---|---|
| Course: | Digital System Design | | | Code: | | | BTETPC04ET3T | |
| Teaching Scheme | | | | Evaluation Scheme | | | | |
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 3 | - | 3 | 3 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Class Tests, Assignments, Quiz & Class Attendance

**Course Objectives:** To develop a comprehensive understanding of Boolean algebra, logic circuit design, and data conversion techniques for efficient digital system implementation.

**After completion of the course, the students will be able to:**

| CO | Course Outcomes | BT Levels |
|---|---|---|
| CO-1 | **Apply** Boolean algebra and simplification techniques, including Karnaugh Maps (K-Map), for efficient logic circuit design. | L3 |
| CO-2 | **Implement** combinational logic circuits using multiplexers, demultiplexers, decoders, encoders, and magnitude comparators for digital applications. | L3 |
| CO-3 | **Analyze** the behaviour of sequential circuits, including different types of flip-flops and their conversions. | L4 |
| CO-4 | **Design** and **differentiate** various types of shift registers and their applications in data storage and transfer. | L4, L6 |
| CO-5 | **Construct** and **evaluate** synchronous and asynchronous counters, including up/down, MOD-N, ring, and Johnson counters. | L5, L6 |
| CO-6 | **Understand** and **demonstrate** the working of data converters (ADC/DAC) and different types of memories (RAM, ROM, PROM) in digital electronics. | L2, L3 |

**Unit I: Boolean Algebra and Simplification Techniques** **(6 Hrs.)**

Sum-of-Products (SOP) and Product-of-Sums (POS) methods for logic simplification. Includes Karnaugh Maps (K-Map) for simplification (up to 5 variables), handling Don't-care conditions, and designing Code Converter (BCD, Binary, Gray Code).

**Unit II: Combinational Logic Circuits** **(6 Hrs.)**

Implementation of logic expression by Multiplexers and Demultiplexers, Decoders: BCD-to-Decimal, Seven-segment Decoders, Encoders and Priority Encoders, Magnitude Comparator.

**Unit-III: Sequential Circuits: Flip Flop** **(6 Hrs.)**

Introduction, Classification of sequential circuits, Latch, Flip-Flops: SR, JK, D, T Flip-Flops Master-Slave JK Flip-Flop, Flip Flop Excitation table, Conversions of Flip Flop.

**Unit-IV: Sequential Circuits: Shift Registers** **(6 Hrs.)**

Introduction to Buffer Register, Serial-In Serial-Out Shift Registers, Serial-In Parallel-Out Shift Registers, Parallel-In Serial-Out Shift Registers, Parallel-In Parallel-Out Shift Registers, Bidirectional Shift Register, Universal Shift Register.

**Unit-V: Sequential Circuits: Counters** **(6 Hrs.)**

Introduction, Counters: Asynchronous Counter, Synchronous Counter, Up/Down counter, MOD-N counter, Ring counter, Johnson counter.

Approved in..... 24
Academic Council Meeting
Dated:-.....05/7/25.....

**Unit-VI: Data Converter & Memories** **(6 Hrs.)**

Introduction, Digital-to-Analog (D-to-A) converter, parameter of DAC, DAC using BCD input code, Analog-to-Digital A-to-D converter, The flash type A/D Converter, Introduction of RAM, ROM, PROM.

**Total 36 Hours**

**Textbooks:**

1. **M. Morris Mano & Michael D. Ciletti** – Digital Design (Pearson)
2. **R. P. Jain** – Modern Digital Electronics (McGraw-Hill)
3. **Thomas L. Floyd** – Digital Fundamentals (Pearson)
4. **John F. Wakerly** – Digital Design: Principles and Practices (Pearson)
5. **Donald D. Givone** – Digital Principles and Design (McGraw-Hill)
6. **William I. Fletcher** – An Engineering Approach to Digital Design (Pearson)

**Reference Books:**

1. **Stephen Brown & Zvonko Vranesic** – Fundamentals of Digital Logic with Verilog Design (McGraw-Hill)
2. **Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss – Digital Systems:** Principles and Applications (Pearson)
3. **Charles H. Roth & Larry L. Kinney** – Fundamentals of Logic Design (Cengage Learning)
4. **John M. Yarbrough** – Digital Logic: Applications and Design (Cengage Learning)
5. **S. Salivahanan & S. Arivazhagan** – Digital Circuits and Design (Vikas Publishing)
6. **Anand Kumar –** Fundamentals of Digital Circuits (PHI Learning)

**MOOC Links:**

1) NPTEL – Digital Circuits (IIT Kharagpur) *https://nptel.ac.in/courses/108/105/108105132/*
2) Coursera – Digital Systems: From Logic Gates to Processors (University of London) *https://www.coursera.org/learn/digital-systems*
3) Udemy – Digital Electronics and Logic Design:*https://www.udemy.com/course/digital-electronics-and-logic-design/*
4) edX – Digital Circuit Design (UC Santa Cruz):*https://www.edx.org/course/digital-circuit-design*
5) MIT OpenCourseWare – Digital Systems :*https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-004*-computation-structures-spring-2017/
6) FutureLearn – Introduction to Digital Logic Design : *https://www.futurelearn.com/courses/digital-logic-design*

Approved in..... Academic Council Meeting
Dated:-.....05/7/25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | III |
|---|---|---|---|---|---|---|
| Course: | Digital System Design Lab | | | Code: | | BTETPC03ET3P |
| Teaching Scheme | | | | Evaluation Scheme | | |
| Practical | Tutorial | Hours | Credit | INT | EXT | Total |
| 2 | 0 | 2 | 1 | 30 | 20 | 50 |

**Course Objectives:** To design and verify digital logic circuits using gates, flip-flops, counters, and registers.

**Course Outcomes:** After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level |
|---|---|---|
| CO1 | Implement and verify Boolean expressions using SOP & POS methods. | L3 |
| CO2 | Design and construct BCD to Binary and Binary to Gray code converters. | L6 |
| CO3 | Demonstrate the working of multiplexers, demultiplexers, and logic functions | L4 |
| CO4 | Construct and test Flip-Flops, including SR and D Flip-Flops. | L5 |
| CO5 | Develop and implement synchronous counters and shift registers. | L6 |
| CO6 | Verify the functionality of an 8-bit parity checker/generator using IC 74180. | L4 |

**Experiment List**

1) Implementation of SOP Expressions: Verify the truth table for given Boolean expressions and implement them using logic gates.
2) Implementation of POS Expressions: Verify the truth table for given Boolean expressions and implement them using logic gates.
3) Design and implement BCD to Binary converters using logic gates.
4) Design and implement Binary to Gray code converters using logic gates.
5) Multiplexer & Demultiplexer Implementation: Implement logic functions using a multiplexer and demultiplexer.
6) Flip-Flop Implementation: Implement and test SR, JK and D Flip-Flops using logic gates.
7) Design and implementation of 3-bit synchronous up counter.
8) Design and implementation of 8-bit odd even parity checker generator using IC 74180.
9) Design and Implementation of 4-bit Johnson Counter
10) Implementation of Serial-In Serial-Out (SISO) Shift Register

Design and verify the working of a 4-bit Serial-In Serial-Out shift register using D Flip-Flops.

Approved in.....24
Academic Council Meeting
Dated:-.....05.12.25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | | III | |
|---|---|---|---|---|---|---|---|---|
| Course: | Electromagnetic Fields | | | Code: | | | BTETPC06ET3T | |
| Teaching Scheme | | | | Evaluation Scheme | | | | |
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 3 | - | 3 | 3 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Class Tests, Assignments, Quiz & Class Attendance

**Course Objectives:**

1.To understand the concept of vector analysis and co-ordinate system in electromagnetic theory.
2.To impart the knowledge of static electric field, static magnetic field and associated laws.
3.To understand the Maxwell's equation and EM wave propagation.

**After completion of the course, the students will be able to:**

| CO | Course Outcomes | BT Level |
|---|---|---|
| CO-1 | Apply vector calculus for solution to electric and magnetic field problems. | L4 |
| CO-2 | Elaborate and analyse the concepts of Electrostatic fields. | L5 |
| CO-3 | Elaborate and analyse the concepts of static magnetic fields. | L4 |
| CO-4 | Describe and analyse Boundary conditions in electromagnetic and Maxwell's equations. | L4 |
| CO-5 | Describe the electromagnetic wave and its propagation in different homogeneous media. | L3 |
| CO-6 | Illustrate and analyse the concept of electromagnetic radiation. | L3 |

**Unit I: Review of Vector Analysis** **(6 Hrs.)**

Cartesian, Cylindrical and Spherical Co-ordinate Systems, Vector products, Projection of Vectors, Gradient, Divergence and Curl, line, surface, volume integrals, Divergence Theorem and Stokes theorem.

**Unit II: Electrostatics** **(6 Hrs.)**

Coulomb's Law, Electric field intensity, Evaluation of Electric field intensity due to line charge, and Surface charge distribution, Electric flux and Electric flux density, Gauss Law, Electrostatic potential, Potential gradient, Electric dipole and Polarization.

**Unit III: Magnetostatics** **(6 Hrs.)**

Biot–Savart Law, Ampere's Circuital Law, Magnetic field intensity, Magnetic field intensity evaluation due to infinite, finite and circular current carrying conductors, Magnetic flux and Flux density, Magnetic dipole and Magnetization.

**Unit IV: Boundary Conditions & Maxwell's Equations** **(6 Hrs.)**

Boundary condition at Dielectric – Dielectric interface, Dielectric – Conductor interface, Boundary conditions for Magnetic materials interface, Current continuity equation, Maxwell's equations.

**Unit V: Electromagnetic wave propagation** **(6 Hrs.)**

Electromagnetic wave equation for free space, lossy dielectric material and perfect conductor, Propagation constant, Attenuation constant & Phase shift constant, Skin depth, Poynting Theorem, Reflection of a plain wave in a normal incidence at Dielectric – Dielectric interface

**Unit VI: Radiation** **(6 Hrs.)**

Scalar and Vector magnetic potential, Retarded potential, Power radiated and Radiation resistance due to oscillating dipole, Quarter wave monopole & Half wave dipole.

**Total 36 Hours**

Approved in Academic Council Meeting Dated:- 05/7/25

**Textbooks:**

1. Hayt W.H.: "Engineering Electromagnetic" Tata Mc Grawhill
2. Jordan E.C. and Balamin K.C.: "Electromagnetic Waves and Radiating System "Prentice Hall of India Privat Limited

**Reference Books:**

1. Mathew N.O., Sadiku "Principles of Electromagnetics" (Fourth Edition), Oxford University Press
2. Kranss J.D.: "Electromagnetic" Mc Grawhill Books co. (Third Edition)
3. Ramo S. and Whinnery R.: "Fields and Waves in Communication Electronics" John Wiley and sons, New Delhi.
4. Dr. TVS Arun Murthy, "Electromagnetic Fields (Theory & Problems)" S. Chand & Company Ltd.

**MOOC Links:**

1. https://onlinecourses.nptel.ac.in/noc21_ee83/preview

Approved in..... 24
Academic Council Meeting
Dated:-.....05.7.25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | III |
|---|---|---|---|---|---|---|
| Course: | Object Oriented Programming Lab | | | Code: | | BTETPC07ET3P |
| Teaching Scheme | | | | Evaluation Scheme | | |
| Practical | Tutorial | Hours | Credit | INT | EXT | Total |
| 2 | 0 | 2 | 1 | 30 | 20 | 50 |

**Course Objectives:** **To develop basic programming skills and logical problem-solving abilities using C++.**

**Course Outcomes:** After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level |
|---|---|---|
| CO1 | Understand the basic syntax and structure of a C++ program. | L2 |
| CO2 | Implement simple mathematical operations using C++. | L3 |
| CO3 | Apply conditional statements and loops in problem-solving. | L3 |
| CO4 | Utilize functions for modular programming. | L3 |
| CO5 | Handle user input and output effectively. | L3 |
| CO6 | Develop basic logic-building skills in programming. | L4 |

**Experiment List**

1) Hello World– Print "Hello, World!" on the screen.
2) Addition of Two Numbers – Take two numbers as input and print their sum.
3) Swap Two Numbers – Swap two numbers using a temporary variable.
4) Even or Odd Checker – Check if a number is even or odd.
5) Largest of Two Numbers – Find the largest number between two inputs.
6) Simple Calculator – Perform addition, subtraction, multiplication, and division.
7) Reverse a Number – Reverse the digits of a number.
8) Sum of Digits – Find the sum of all digits in a number.
9) Find ASCII Value – Display the ASCII value of a character.
10) Multiplication Table – Print the multiplication table of a given number.
11) Vowel or Consonant Checker – Check whether a character is a vowel or consonant.
12) Leap Year Checker – Determine if a year is a leap year.

Approved in.....
Academic Council Meeting
Dated:-.....05.7.25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | Semester: | III |
|---|---|---|---|
| Course: | Economics for Engineers | Code: | BTETEM01ET3T |

| Teaching Scheme | | | | Evaluation Scheme | | | | |
|---|---|---|---|---|---|---|---|---|
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 2 | - | 2 | 2 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Assignments & Class Attendance

## Course Objectives:

1. To familiarize the basic concepts and principles of Engineering Economics
2. To understand the concepts of theory of production in Economics
3. To learn different types of cash flow for evaluation
4. To learn depreciation analysis

**Course Outcomes:**

After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level (L1 to L6) |
|---|---|---|
| CO-1 | Learn basics concepts & principles of engineering economics | L2 |
| CO-2 | Understand and compute the production cost | L2 |
| CO-3 | Study different cash flow evaluation techniques | L1 |
| CO-4 | Understand depreciation analysis techniques | L2 |

**Unit I:** **(6 Hrs.)**

Definition and Scope of Engineering Economics, Subject Matter of Economics, Principles of Engineering Economics, Micro-economics Vs Macro-economics, Utility Analysis, Laws of diminishing utility analysis, derivation of demand curve and law of Demand, Elasticity of demand

**Unit II:** **(6 Hrs.)**

Theory of Production: Theory, Importance, Isoquants and its properties, Marginal rate of technical substitution, Law of variable proportions, Returns to Scale, Cost of Production and Cost of Curves, The law of supply, Price determination.

**Unit III:** **(6 Hrs.)**

Time value of Money, Techniques for adjusting time value of money, Uniform Gradient series factor, annuity, annuity due, calculation of deferred annuity, Types and components of cash flow, cash flow diagrams, principles of equivalence, Uses, significance and limitation of Cash flow statement

**Unit IV:** **(6 Hrs.)**

Depreciation Analysis causes of depreciation, Depreciable property, depreciation methods, Digit method, break even analysis, determination of breakeven point, Breakeven point in terms of quantity, sales and as percentage of capacity, Break even chart, Breakeven analysis assumptions, Managerial uses, Limitations.

**Total 24 Hours**

Approved in..... 24
Academic Council Meeting
Dated:-.....05/7/25.....

**Textbooks:**

1. Engineering Economics: Panneerselvam R

**Reference Books:**

1. Economics for Engineers (For MAKAUT), 3/e Dr H L Bhatia & Dr S N Maheshwari

Approved in..... 24
Academic Council Meeting
Dated:-.....05/7/25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | | IV | |
|---|---|---|---|---|---|---|---|---|
| Course: | Analog Circuits | | | Code: | | | BTETPC08ET4T | |
| Teaching Scheme | | | | Evaluation Scheme | | | | |
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 3 | - | 3 | 3 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Class Tests, Assignments, Quiz & Class Attendance

**Course Objectives:**
1. To understand the basics and internal structure of Op-Amp
2. To analyze and design linear applications of Op-Amp
3. To analyze and design non-linear applications of Op-Amp
4. To understand and design concepts of voltage regulators
5. To study and synthesize the Timer IC 555
6. To study and synthesize the PLL IC 565

**Course Outcomes: After completion of the course, the students will be able to:**

| CO | Course Outcomes | BT Level |
|---|---|---|
| CO-1 | Comprehend the basic concepts and performance parameters of Op-Amp | L2 |
| CO-2 | Use Op-Amp for implementation of linear applications | L3 |
| CO-3 | Use Op-Amp for implementation of non-linear applications | L3 |
| CO-4 | Design a Voltage regulator | L6 |
| CO-5 | Design an application of timer IC 555 | L6 |
| CO-6 | Comprehend the knowledge of PLL and its applications | L2 |

**Unit I: Operational amplifier** **(6 Hrs.)**

Block diagram of Op-Amp, differential amplifier configurations using BJT, constant current source (constant current bias circuit and current mirror circuit), level shifting, transfer characteristics, frequency response, study of ICuA741, Op-Amp parameters.

**Unit II: Linear applications of Op-Amp:** **(6 Hrs.)**

Introduction to Inverting and non-inverting amplifiers, scaling, summing, difference amplifier, integrator and differentiator, 3 op amp instrumentation amplifier (no numerical) and sinusoidal RC oscillators: RC-phase shift, Wein bridge oscillator using IC 741.

**Unit III: Non-Linear Applications of Op-Amp:** **(6 Hrs.)**

Introduction to Comparator, zero-crossing detector, window detectors, Schmitt trigger, astable multivibrator as square and triangular wave generator, bistable and monostable multivibrator, and design of Butterworth filters and notch filter.

**Unit IV: Voltage Regulator** **(6 Hrs.)**

Introduction and design of Voltage regulators using IC 723 and LM 317, dual tracking regulators using 78XX and 79XX.

**Unit V: Timer IC 555** **(6 Hrs.)**

Introduction to IC 555, IC 555 based design of Astable, Monostable, multivibrator and their applications

**Unit VI: Phase Lock Loop:** **(6 Hrs.)**

Operation of phase lock loop system, transfer characteristics, lock range and capture range, study of PLL IC LM 565 and its applications as AM detector, FM detector.

**Total 36 Hours**

Approved in 5th Academic Council Meeting
Dated:- 22/09/2020

**Text Books:**

1. R.A. Gayakwad, "OP-AMP and Linear Integrated Circuits", Prentice Hall/ Pearson Education Publications.
2. K R Botkar "Integrated Circuits" Khanna Publications.
3. Sergio Franco, "Design with Linear Integrated Circuits & Op-Amps", TMH

**Reference Books:**

1. Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley Intl. Publication.
2. Paul Horowitz, W. Hill, "The art of Electronics", Cambridge Publications.

Approved in 5th Academic Council Meeting
Dated:- 22/09/2026

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | IV | |
|---|---|---|---|---|---|---|
| Course: | Analog Circuits Lab | | | Code: | BTETPC09ET4P | |
| Teaching Scheme | | | | Evaluation Scheme | | |
| Practical | Tutorial | Hours | Credit | INT | EXT | Total |
| 2 | - | 2 | 1 | 30 | 20 | 50 |

**Course Objectives:**
1. To demonstrate linear and non-linear applications of Op-Amp.
2. To evaluate multivibrator circuits using Op-Amp.
3. To evaluate multivibrator circuits using timer IC 555
4. To understand functions and characteristics of PLL

**Course Outcomes:** After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level (L1 to L6) |
|---|---|---|
| CO1 | Demonstrate linear applications of Op-Amp. | L3 |
| CO2 | Demonstrate non-linear applications of Op-Amp. | L3 |
| CO3 | Analyze multivibrator circuits using IC 555 | L4 |
| CO4 | Implement PLL in certain applications. | L3 |

**General Guidelines: Example: - Minimum 8 practical's are to be conducted covering entire syllabus.**

## Experiment List

1) To verify Op-Amp IC 741 as an inverting and non- inverting amplifier with a specific gain value.
2) To demonstrate integrator and differentiator circuit using Op-Amp IC 741.
3) To verify RC- phase shift oscillator using Op-Amp IC 741.
4) To verify Op-Amp IC 741 as a Schmitt trigger and calculate the hysteresis voltage.
5) To verify operation of Astable multivibrator using Op-Amp IC 741.
6) Design of summing amplifier using IC 741.
7) Design a low voltage variable regulator to 7 V using IC 723.
8) Design of Schmitt trigger using IC 555
9) Design Astable multivibrator using IC 555
10) To plot frequency response of first order Butterworth LPF for a specific pass-band gain and cut-off frequency.
11) To verify characteristics of PLL.
12) Application of PLL as AM detector/FM detector/frequency translator (Any one application)
13) Design and setup a Wien-bridge oscillator.
14) Design the square and triangular wave generator using IC 741.
15) Design a Butterworth high pass filter with specifications

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Academic Council Meeting
Dated:-.....05/7/25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | | IV | |
|---|---|---|---|---|---|---|---|---|
| Course: | Analog & Digital Communications | | | Code: | | | BTETPC10ET4T | |
| Teaching Scheme | | | | Evaluation Scheme | | | | |
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 3 | - | 3 | 3 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Class Tests, Assignments, Quiz & Class Attendance

**Course Objectives:** To understand the basic concepts of Differential calculus and Complex numbers.

**After completion of the course, the students will be able to:**

| CO | Course Outcomes | BT Level |
|---|---|---|
| CO-1 | Understand and apply various Amplitude Modulation (AM) techniques, their mathematical principles, and practical applications in communication systems. | L2 |
| CO-2 | Gain knowledge of Frequency Modulation (FM) and design FM transmitters for communication systems. | L3 |
| CO-3 | Analyze the characteristics of radio receivers and evaluate detection techniques for AM and FM signals. | L4 |
| CO-4 | Assess the impact of noise and random processes on communication systems and their effect on signal integrity and performance. | L2 |
| CO-5 | Apply pulse modulation techniques (PAM, PWM, PPM) in digital communication systems. | L3 |
| CO-6 | Understand digital communication concepts and apply digital modulation techniques (PSK, FSK, QAM) in real-world systems. | L2 |

**Unit I: AM Transmitters:** **(6 Hrs.)**

Modulation, need of modulation, AM Modulation with mathematical expression and numerical, Principles of DSB-FC, DSBSC, SSB-SC modulation and their comparison, DSBFC Transmitter.

**Unit II: FM Transmitters:** **(6 Hrs.)**

FM Modulation, Circuits & Analysis for direct FM generation using FET and varactor diode. Circuit & analysis of Indirect FM generation, Narrow Band and Wide Band FM, their comparison, pre-emphasis and De-emphasis. Stereo FM Transmitter, Compare AM & FM systems.

**Unit III: Radio Receivers:** **(6 Hrs.)**

Characteristics of Radio Receivers: Sensitivity, Selectivity, and Fidelity, TRF receiver and its drawbacks, Superheterodyne Receiver: Working and Block Diagram, Detection Techniques for AM (diode detector) and FM (slope detectors, Foster Seeley discriminator) Signals.

**Unit IV: Random Process and Noise:** **(6 Hrs.)**

Classification of Noise, Concept of Random Variables, Ensemble, Mean, Moments, Probability Density Function Sources (PDF), Cumulative Distribution Function (CDF), Random process: Ensemble Average, Time Average, Stationarity, Ergodic process.

**Unit V: Pulse Modulation:** **(6 Hrs.)**

Concept of Sampling Theorem, Types of Sampling: Natural and Flat-top Sampling, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), Introduction to Pulse Code Modulation (PCM), Differential Pulse Code Modulation, Delta Modulation (DM), Adaptive Delta Modulation (ADM)

Approved in 24th Academic Council Meeting Dated:- 05/12/25

**Unit VI: Basics of Digital Communication System:** **(6 Hrs.)**

Functional Blocks of Digital Communication System, Line Coding: Need for Line coding, Properties of Line Coding, Types of Line Coding, Scrambler and Unscrambler, Digital Modulation Techniques: ASK, FSK, PSK, QPSK, DPSK, Comparison of Digital modulation systems.

**Total 36 Hours**

**Textbooks:**

1. Kennedy G. “Electronic Communication System” Tata Mc-Graw Hill Co., New Delhi (Third Ed).
2. Taub and Schilling D.L., “Principles of Communication Systems”, Mc-Graw Hill Co., New Delhi (Second Ed.).
3. Shanmugam K.S., “Digital & Analog Communication Systems”, John Wiley & Sons, NewYork, 1996.
4. Lathi B. P., “Modern Digital and Communication Systems”, Holt Rinchart and Winston Inc.,New York, 1993.
5. Simon Haykin, “Digital Communication”, John Wiley and Sons,Pvt. Ltd., Singapore..

**Reference Books:**

1. Proakis J. K., “Digital Communication”, Mc-Graw Hill Book Co., London (Second Edition).
2. Glover and Grant, “Digital Communication”, Prentice Hall Publication
3. Collins Dennis, Collins John, “Electronic Communications” PHI.
4. Wayne Tomasi, “Electronic Communication Systems” Pearson Education, (Fifth Edition).
5. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering'',John Wiley, 1965.
6. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication'', Kluwer Academic Publishers, 2004.

Approved in 24th Academic Council Meeting
Dated:- 05.7.25

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | IV | |
|---|---|---|---|---|---|---|
| Course: | Analog & Digital Communications Lab | | | Code: | BTETPC11ET4P | |
| Teaching Scheme | | | | Evaluation Scheme | | |
| Practical | Tutorial | Hours | Credit | INT | EXT | Total |
| 2 | 0 | 2 | 1 | 30 | 20 | 50 |

**Course Objectives: Single line or in bullet points.**

**Course Outcomes:** After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level (L1 to L6) |
|---|---|---|
| CO1 | Demonstrate the working of AM Modulation and Demodulation. | L2 |
| CO2 | Demonstrate the working of FM Modulation and Demodulation. | L2 |
| CO3 | Analyze the working of AM Transmitter & Receiver. | L3 |
| CO4 | Illustrate the characteristics of AM Receiver. | L2 |
| CO5 | Analyse the working of different Analog Modulation techniques. | L3 |
| CO6 | Analyse the working of different Digital Modulation techniques. | L3 |

**Experi**

**List**

1) To perform amplitude Modulation.
2) To Analyze Amplitude Demodulation.
3) To Analyze the frequency modulation.
4) To Analyze the Frequency Demodulation.
5) To Analyze AM transmitter and receiver.
6) To study the characteristics of Pre-emphasis & De-emphasis.
7) To verify the operation of Pulse Amplitude Modulation using Natural & Flat top sampling.
8) To Analyze BPSK Modulation.
9) To Analyze BPSK Demodulation.
10) To Analyze QPSK Modulation.
11) To study the characteristics of AM Receiver.

Approved in..... 24
Academic Council Meeting
Dated:-.....05/7/25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | | IV | |
|---|---|---|---|---|---|---|---|---|
| Course: | Signals & Systems | | | Code: | | | BTETPC12ET4T | |
| Teaching Scheme | | | | Evaluation Scheme | | | | |
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 2 | - | 2 | 2 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Class Tests, Assignments, Quiz & Class Attendance

**Course Objectives:**

- Knowledge of basic elementary signals and its representation and analysis concepts
- Knowledge of frequency-domain representation and analysis concepts using Fourier analysis tools.
- Concepts of the sampling process.
- Mathematical and computational skills needed to understand the principal of LTI Systems.
- Mathematical and computational skills needed to understand the principal of convolution & correlation.

**Course Outcomes: After completion of the course, the students will be able to:**

| CO | Course Outcomes | BT Level |
|---|---|---|
| CO-1 | Understand the continuous time signals and systems mathematically and their classification along with the mathematical operations that can be performed on them. | L2 |
| CO-2 | Understand the spectral characteristics of continuous-time periodic signals using Fourier series. | L2 |
| CO-3 | Analyze the spectral characteristics of continuous-time aperiodic signals and systems using Fourier Transform. | L3 |
| CO-4 | Apply the Laplace transform for analysis of continuous-time systems | L3 |

**Unit I: Continuous time signals and systems:** **(6 Hrs.)**

Signal: Signal Classification, Energy and Power Signal, Even and Odd functions, Signal Operations, Signal models, System: System Classification. system models: input-output description

**Unit II: Continuous-Time Signal Analysis -The Fourier Series:** **(6 Hrs.)**

Fourier Series Representation of Periodic Signals, Existence and Convergence of Fourier Series, Trigonometric Fourier Series, Exponential Fourier Series.

**Unit III: Continuous-Time Signal Analysis-The Fourier Transform:** **(6 Hrs.)**

Define: Fourier Transform of Continuous-Time Signals, Aperiodic signal representation by Fourier Integral, Properties of Fourier Transform.

**Unit IV: Laplace Transform** **(6 Hrs.)**

Definition and Properties of Laplace Transform, Region of Convergence (ROC), Inverse Laplace Transform. **Sampling:** Sampling Theorem, Nyquist Rate and Aliasing, Reconstruction of Signals from Samples, Ideal and Practical Sampling Techniques.

**Total 24 Hours**

Approved in..... 24/
Academic Council Meeting
Dated:-.....05/7/25.....

**Text Books:**

1. A Signals & Systems, Book by A. Nagoor Kani
2. Signals and Systems – A. Anand Kumar, PHI Publications, 3rd edition

**Reference Books:**

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

**MOOC Links:**

https://onlinecourses.nptel.ac.in/noc21_ee28/preview

Approved in.....24
Academic Council Meeting
Dated:-.....05/7/25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | IV | |
|---|---|---|---|---|---|---|
| Course: | Signals and System Lab | | | Code: | BTETPC29ET4P | |
| Teaching Scheme | | | | Evaluation Scheme | | |
| Practical | Tutorial | Hours | Credit | INT | EXT | Total |
| 1 | - | 2 | 1 | 30 | 20 | 50 |

**Course Objectives:**

1. To use software to visualize analysis of Signals and System.
2. To manipulate the time signals and identify the type of given system.

**Course Outcomes:** After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level (L1 to L6) |
|---|---|---|
| CO1 | Illustrate different types of standard Continuous Time Signals. | L2 |
| CO2 | Demonstrate the concepts of sampling. | L3 |
| CO3 | Justify different types of System by using simulation tools. | L2 |
| CO4 | Solve basic mathematical operations on continuous time signal | L3 |

General Guidelines: Example: - Minimum 8 practical's are to be conducted covering entire syllabus.

**Experiment List**

| EXPT. NO | Name of the Experiment |
|---|---|
| 01 | To study the basic functions related to Signal Processing Toolbox in MATLAB. |
| 02 | To generate standard continuous Time Signals using MATLAB. |
| 03 | To perform basic operations over different continuous sequences using MATLAB |
| 04 | To verify Sampling Theorem. |
| 05 | To perform and find Even and Odd parts of a signal. |
| 06 | To perform Linear Convolution using function |
| 07 | To Verify the Linearity of a given Continuous System |
| 08 | Write a MATLAB program to perform Amplitude scaling, Time scaling, and Time shift on the signal. |

Approved in..... 24
Academic Council Meeting
Dated:-.....05/7/25.....

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | | IV | |
|---|---|---|---|---|---|---|---|---|
| Course: | Network Analysis | | | Code: | | | BTETPC13ET4T | |
| Teaching Scheme | | | | Evaluation Scheme | | | | |
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 3 | - | 3 | 3 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Class Tests, Assignments, Quiz & Class Attendance

## Course Objectives:

1. Understand fundamental concepts of Node and Mesh analysis for linear circuits.
2. Apply network theorems to simplify and analyze electrical circuits.
3. Analyze and apply graph theory and network topology in network analysis.
4. To apply the Laplace Transform Technique for the analysis of linear circuits.
5. Apply and analyze two-port network parameters to solve network problems.
6. Understand network functions and create time-domain behaviour analysis from pole-zero plots.

## After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level |
|---|---|---|
| CO-1 | Analyze electrical circuits using Mesh and Node analysis. | L4 |
| CO-2 | Apply a suitable Network Theorem to analyze electrical circuits. | L3 |
| CO-3 | Transform and analyze the network using graph theory. | L5 |
| CO-4 | Implement the concept of Laplace Transform for electrical circuit analysis. | L3 |
| CO-5 | Apply Two-Port network parameters for electrical network analysis | L3 |
| CO-6 | Evaluate the time domain behaviour of the network function. | L5 |

### Unit I: Node and Mesh analysis (6 Hrs.)

Circuit components, assumptions for circuit analysis, Sources of electrical energy, Source transformation, Kirchoff's laws, Node and Mesh analysis for AC and DC circuits.

### Unit II: Network Theorems (6 Hrs.)

Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem as applied to AC circuits.

### Unit III: Graph theory and network equations (6 Hrs.)

Graph of a network, Trees, cotrees and loops, Incidence matrix, Tie set and Cut set of a network, Analysis of a network using Tie set and Cut set matrix, Network equilibrium equations (without magnetic coupling), Duality.

### Unit IV: Network Analysis using Laplace Transform: (6 Hrs.)

Laplace transforms of specific functions such as impulse, step, ramp, parabolic, waveform synthesis, analysis of RC, RL and RLC networks with and without initial conditions. Initial and Final value theorems.

### Unit V: Two port networks (6 Hrs.)

Open circuit impedance parameters, short circuit admittance parameters, Transmission parameters, Hybrid parameters, Condition for reciprocity and symmetry of a two-port network, Introduction to interconnection of two port networks.

Approved in.....
Academic Council Meeting
Dated:-.....05/7/25.....

**Unit VI: Network functions** **(6 Hrs.)**

Network functions, poles and zeros, Necessary conditions for driving point function, Necessary conditions for transfer function, driving point functions and Transfer impedance function of LC networks, Time domain behaviour from pole-zero plot.

**Total 36 Hours**

**Text Books:**

1. D. Roy Choudhary, "Networks and Systems", New Age International.
2. Ravish R. Singh, “Network Analysis and Synthesis”, McGraw Hill Publication

**Reference Books:**

1. M. E. Van Valkenburg, "Network Analysis", Prentice Hall,3rd Edition.
2. Sudhakar A., Shyammohan S. P. “Circuits and Network”; Tata McGraw-Hill New Delhi, 1994
3. W. H. Hayt, J. E. Kemmerly and S. M. Durbin, "Engineering Circuit Analysis", 7th Edition, Tata McGraw-Hill education private Limited, New Delhi.
4. Abhijit Chakrabarti, “Circuit theory, Analysis and Synthesis”, Dhanpat Rai and Co. Publications.

Approved in..... 21
Academic Council Meeting
Dated:-.....05/7/15.....

| Program | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | IV | |
|---|---|---|---|---|---|---|
| Course: | IOT Lab | | | Code: | BTETVS04ET4P | |
| Teaching Scheme | | | | Evaluation Scheme | | |
| Practical | Tutorial | Hours | Credit | INT | EXT | Total |
| 2 | 0 | 2 | 1 | 50 | | 50 |

**Course Objectives: To Get Exposure regarding the current trend in Industry**

**Course Outcomes:** After completion of the course, the students will be able to:

| CO | Course Outcomes | BT Level (L1 to L6) |
|---|---|---|
| CO1 | Design and implement basic electronic circuits using Arduino microcontrollers. | L6 |
| CO2 | Interface various sensors and actuators with Arduino for data acquisition and control. | L3 |
| CO3 | Develop programs in Arduino IDE to process sensor data and control actuators. | L3 |
| CO4 | Understand and apply communication protocols for data exchange in IoT systems. | L2 |
| CO5 | Build and test simple IoT systems for real-world applications. | L3 |
| CO6 | Design, develop, and evaluate an innovative IoT project that demonstrates creativity and addresses a specific need or challenge. | L6 |

General Guidelines: Example: - Minimum 8 practicals are to be conducted covering entire syllabus.

Experiment List

1) Interfacing the RGB LED with the Arduino.
2) Controlling the LED blink rate with the potentiometer interfacing with Arduino
3) Calculate the distance to an object with the help of an ultrasonic sensor and display it on an LCD
4) Displaying humidity and temperature values on LCD
5) Advanced burglar alarm security system with the help of PIR sensor, buzzer and keypad.
6) Interfacing of the Relay with Arduino.
7) Detection of the light using photo resistor
8) Interfacing Servo Motor with the Arduino
9) Upload humidity & temperature data to Thing Speak, periodically logging ambient light level to Thing Speak
10) Controlling LEDs, relay & buzzer using Blynk app

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Dated:- 05/7/25

| Program: | B. Tech. (Electronics and Telecommunication Engineering) | | | Semester: | | | IV | |
|---|---|---|---|---|---|---|---|---|
| Course: | Innovation, Creativity & Entrepreneurship | | | Code | | | BTETEM02ET4T | |
| Teaching Scheme | | | | Evaluation Scheme | | | | |
| Lecture | Tutorial | Hours | Credit | TA | MSE-I | MSE-II | ESE | Total |
| 2 | - | 2 | 2 | 10 | 15 | 15 | 60 | 100 |

**Methods of Teacher Assessment (TA):** Class Tests, Assignments, Quiz & Class Attendance

**Course Objectives:**

1. Develop a fundamental understanding of innovation and creativity in engineering.
2. Foster problem-solving and design-thinking skills.
3. Introduce students to entrepreneurship principles and startup ecosystems.
4. Enable students to identify and develop innovative business opportunities.

**Course Outcomes: After completion of the course, the students will be able to:**

| CO | Course Outcomes | BT Level |
|---|---|---|
| CO-1 | Understand the role of creativity and innovation in engineering. | L2 |
| CO-2 | Apply design thinking and idea-generation techniques to solve technical challenges. | L3 |
| CO-3 | Develop a business model and value proposition for a tech-based startup. | L3 |
| CO-4 | Analyze funding opportunities and entrepreneurial strategies for technology ventures | L3 |

**Unit I: Introduction to Innovation and Creativity** **(6 Hrs.)**

Definition & Importance: Creativity, Innovation, and their role in Engineering. Types of Innovation: Product, Process, Business Model, and System Innovation. Creativity Techniques: Brainstorming, Mind Mapping, Lateral Thinking. Barriers to Innovation.

**Unit II: Design Thinking and Problem Solving** **(6 Hrs.)**

Introduction to design thinking and Problem definition. Design Thinking Approach: Empathy, Need finding, Ideation, Prototyping, and Testing.

**Unit III: Introduction to Entrepreneurship** **(6 Hrs.)**

Fundamentals of Entrepreneurship: Entrepreneurial Mindset & Skills. Types of Entrepreneurships: Startup, Social, Intrapreneurship, Tech-Based Ventures. Market Research & Opportunity Identification: Understanding Customers & Market Trends.

**Unit IV: Startup Ecosystem & Funding Strategies** **(6 Hrs.)**

Startup Ecosystem: Incubators, Accelerators, Angel Investors, Venture Capital. Funding Strategies: Bootstrapping, Crowdfunding, Government Grants.

**Total 24 Hours**

Approved in.....24
Academic Council Meeting
Dated:-.....05/7/25.....

**Text Books:**

1. Design Thinking by Anuja Agarwal, Cengage Publication.
2. "Design Thinking for Entrepreneurs and Small Businesses" – Beverly Rudkin Ingle, Apress Publication

**MOOC Links:**

1. https://onlinecourses.swayam2.ac.in/aic25_ge11/preview
2. https://onlinecourses.swayam2.ac.in/imb25_mg26/preview

Approved in.....24
Academic Council Meeting
Dated:-.....05/7/25.....

**Course-Wise Details of Syllabus Revisions**
**(Version 1.0 to Version 1.1)**
**This Version 1.1 is also applicable to the students from previous batches appearing for these courses in session 2026-27 and onwards.**

| Sr. No. | Course Code | Course Name | Sem | Nature of Change | Remark |
|---|---|---|---|---|---|
| 1 | BTETPC08ET4T | Analog Circuit | IV | Reorganization of Content: The topic "Inverting and Non-Inverting Amplifiers" is to be shifted from Unit I to Unit II. Eliminating a word "Design" from Unit 3 & Unit 4. | |

Approved in 5th Academic Council Meeting
Dated:- 22/09/2026.