# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
## (AUTONOMOUS)
**Accredited by NAAC with "A" Grade & NBA for ME, ASE, CE, CSE, ECE, EEE & IT** (Under Tier - I)
**An ISO 21001:2018, 14001:2015 and 50001:2018 Certified Institution**
**Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada**
**L.B. Reddy Nagar, Mylavaram, NTR Dist., Andhra Pradesh-521 230.**
www.lbrce.ac.in/fed/index.php, www. lbrce.ac.in, **Phone**: 08659-222933, **Fax**: 08659-222931

### FRESHMAN ENGINEERING DEPARTMENT

## COURSE HANDOUT
## PART-A

| | | | |
|---|---|---|---|
| **Course Instructor** | : Dr. T. Satyanarayana | | |
| **Course Name & Code** | : Engineering Physics & 23FE04 | **Credits** | : 3 |
| **L-T-P Structure** | : 3-1-0 | **A.Y.** | : 2025-26 |
| **Program/Sem./Branch** | : B.Tech./II/IT/A | **Regulations**: R23 | |

**Pre-requisite** : Basic Knowledge of Physics

**Course Objectives:**

To bridge the gap between the physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

**Course Outcomes (COs):** At the end of this course, the student will be able to

| CO1 | Analyze the intensity variation of light due to interference, diffraction and Polarization **(Apply)** |
|---|---|
| CO2 | Understand the basics of crystals and their structures **(Understand)** |
| CO3 | Summarize various types of polarization of dielectrics and classify the magnetic materials **(Understand)** |
| CO4 | Explain fundamentals of quantum mechanics and free electron theory of metal **(Understand)** |
| CO5 | Identify the type of semiconductor using Hall Effect **(Apply)** |

### Course Articulation Matrix (Correlation between COs, Pos & PSOs):

| Course Designed by | | | Division of Physics, Freshman Engineering Department | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | - | - | - | 1 |
| **CO2** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | - | - | - | 1 |
| **CO3** | 3 | 3 | 2 | 1 | 1 | 1 | | - | - | - | - | 1 |
| **CO4** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | - | - | - | 1 |
| **CO5** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | - | - | - | 1 |
| **1** = Slight (Low) | | | **2** = Moderate (Medium) | | | **3** = Substantial (High) | | | | | |

### Textbooks

1. Engineering Physics, M.N.Avadhanulu, P.G.Kshirsagar, T.V.S. Arun Murthy, *S.Chand &Co., 11th Ed.*, 2019.
2. Engineering Physics, D.K. Bhattacharya & Poonam Tandon*, Oxford Press,* 2015.

### References

1. Engineering Physics, B.K. Pandey & S. Chaturvedi, *Cengage Learning,* 2021.
2. Engineering Physics, Shatendra Sharma, Jyotsna Sharma, *Pearson Education*, 2018.
3. Engineering Physics, Sanjay D. Jain, D. Sahasrabudhe and Girish, *University Press*, 2010.
4. Engineering Physics, M.R. Srinivasan, *New Age International Publishers,* 2009.

### Web Resources

1. http://www.loc.gov/rr/scitech/selected-internet/physics.html
2. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html
3. http://physicsdatabase.com/free-physics-books/
4. http://www.e-booksdirectory.com
5. http://www.thphys.physics.ox.ac.uk

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**PART-B**
**Course Delivery Plan (Lesson Plan)**

</div>

**Unit-I:** Interference, Diffraction & Polarization    **Course Outcome:** CO1; **Textbook:** T1, R2

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction to Course & its Outcomes | 1 | 02-02-2026 | | TLM-2 | |
| 2. | **Interference**: Introduction, Principle of Superposition, Interference of light | 1 | 04-02-2026 | | TLM-1 | |
| 3. | Interference in thin films by Reflection & Applications | 1 | 06-02-2026 | | TLM-1 | |
| 4. | Colors in thin films, Newton's rings | 1 | 07-02-2026 | | TLM-1 | |
| 5. | Determination of wavelength and refractive index | 1 | 09-02-2026 | | TLM-1 | |
| 6. | **Diffraction**: Introduction, Fresnel and Fraunhoffer diffractions | 1 | 11-02-2026 | | TLM-1 | |
| 7. | Problems & Assignment/Tutorial | 1 | 13-02-2026 | | TLM-3 | |
| 8. | Fraunhoffer diffraction due to single slit | 1 | 14-02-2026 | | TLM-2 | |
| 9. | Double slit & N slits (Qualitative) | 1 | 16-02-2026 | | TLM-2 | |
| 10. | Diffraction Grating, Dispersive power & Resolving power of Grating- Qualitative | 1 | 18-02-2026 | | TLM-1 | |
| 11. | Tutorial | 1 | 20-02-2026 | | TLM-3 | |
| 12. | **Polarization**: Introduction – Types of polarization | 1 | 21-02-2026 | | TLM-2 | |
| 13. | Polarization by reflection, refraction & double refraction | 1 | 23-02-2026 | | TLM-2 | |
| 14. | Nicol's Prism | 1 | 25-02-2026 | | TLM-1 | |
| 15. | Half wave and Quarter wave plates | 1 | 27-02-2026 | | TLM-2 | |
| **No. of classes required to complete UNIT-I: 15** | | | | **No. of classes taken:** | | |

**Unit-II:** Crystallography & X– Ray Diffraction    **Course Outcome**: CO2; **Textbook**: T1, R2

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Crystallography:** Space lattice; Basis, Unit cell & Lattice parameters | 1 | 28-02-2026 | | TLM-2 | |
| 2 | Crystal Systems (3D) Bravais Lattices | 1 | 02-03-2026 | | TLM-2 | |
| 3. | Coordination number and Packing fraction of SC, BCC | 1 | 06-03-2026 | | TLM-1 | |
| 4. | Coordination number and Packing fraction of FCC | 1 | 07-03-2026 | | TLM-1 | |
| 5. | Miller indices-Properties | 1 | 09-03-2026 | | TLM-1 | |
| 6. | Tutorial | 1 | 11-03-2026 | | TLM-3 | |
| 7. | Miller indices-Sketching planes | 1 | 13-03-2026 | | | |
| 8. | Separation between successive (hkl) planes | 1 | 14-03-2026 | | TLM-2 | |
| 9. | **X-ray diffraction:** Bragg's law | 1 | 16-03-2026 | | TLM-2 | |
| 10 | X–ray Diffractometer | 1 | 18-03-2026 | | TLM-2 | |
| 11 | Crystal Structure determination by Laue's method Powder method | 1 | 21-03-2026 | | TLM-1 | |
| **No. of classes required to complete UNIT-II: 11** | | | | **No. of classes taken:** | | |

**Unit-III:** Dielectric & Magnetic Materials          **Course Outcome:** CO3; **Textbook:** T1, R2

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Dielectric Materials:** Introduction, Dielectric polarization, Dielectric polarizability, Susceptibility | 1 | 30-03-2026 | | TLM-2 | |
| 2. | Dielectric constant and displacement vector | 1 | 01-04-2026 | | TLM-2 | |
| 3. | Relation between the electric vectors | 1 | 04-04-2026 | | TLM-1 | |
| 4. | Types of polarizations- Electronic polarization (Quantitative) | 1 | 06-04-2026 | | TLM-1 | |
| 5. | Tutorial | 1 | 08-04-2026 | | TLM-3 | |
| 6. | Ionic Polarization (Quantitative) & Orientation polarization (Qualitative) | 1 | 10-04-2026 | | TLM-2 | |
| 7. | Lorentz internal field | 1 | 11-04-2026 | | TLM-2 | |
| 8. | Claussius-Mossotti equation, complex dielectric constant | 1 | 13-04-2026 | | TLM-1 | |
| 9. | Frequency dependence of polarization | 1 | 15-04-2026 | | TLM-1 | |
| 10. | Dielectric loss | 1 | 17-04-2026 | | TLM-1 | |
| 11. | **Magnetic Materials:** Introduction Magnetic dipole moment, Magnetization, Magnetic susceptibility and permeability | 1 | 18-04-2026 | | TLM-2 | |
| 12. | Tutorial | 1 | 20-04-2026 | | TLM-3 | |
| 13. | Atomic origin of magnetism | 1 | 22-04-2026 | | TLM-1 | |
| 14. | Classification of magnetic materials- Dia, Para, Ferro, Anti-Ferro & Ferri magnetic materials | 1 | 24-04-2026 | | TLM-1 | |
| 15. | Domain concept for Ferromagnetism & Domain walls | 1 | 25-04-2026 | | TLM-1 | |
| 16. | Hysteresis, Soft and hard magnetic materials | 1 | 27-04-2026 | | TLM-1 | |
| **No. of classes required to complete UNIT-III: 16** | | | | **No. of classes taken:** | | |

**Unit-IV:** Quantum Mechanics & Free Electron Theory          **Course Outcome:** CO4; **Textbook:** T1, R2

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Quantum Mechanics:** Dual nature of matter, De-Broglie's Hypothesis | 1 | 29-04-2026 | | TLM-2 | |
| 2. | Heisenberg's Uncertainty Principle Significance & properties of wave function | 1 | 01-05-2026 | | TLM-2 | |
| 3. | Schrodinger's time independent and dependent wave equations | 1 | 02-04-2026 | | TLM-1 | |
| 4. | Tutorial | 1 | 04-05-2026 | | TLM-3 | |
| 5. | Particle in a one –dimensional infinite potential well | 1 | 06-05-2026 | | TLM-1 | |
| 6. | **Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) | 1 | 08-05-2026 | | TLM-1 | |
| 7. | Quantum free electron theory, Electrical conductivity based on quantum free electron theory | 1 | 09-05-2026 | | TLM-2 | |

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 8. | Fermi -Dirac distribution and temperature dependence Density of states, Fermi energy | 1 | 11-05-2026 | | TLM-1 | |
| 9. | Tutorial | 1 | 13-05-2026 | | TLM-3 | |
| **No. of classes required to complete UNIT-III:** 09 | | | | **No. of classes taken:** | | |

**Unit-V:** Semiconductor Physics                    **Course Outcome:** CO5; **Textbook:** T2, R1

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Semiconductors**: Formation of energy bands, Classification of crystalline solids | 1 | 15-05-2026 | | TLM-1 | |
| 2. | Intrinsic semiconductors, Density of charge carriers | 1 | 16-05-2026 | | TLM-1 | |
| 3. | Tutorial | | 01-06-2026 | | | |
| 4. | Electrical conductivity, Fermi level | 1 | 03-06-2026 | | TLM-2 | |
| 5. | Extrinsic semiconductors (p-type) Density of charge carriers | 1 | 05-06-2026 | | TLM-2 | |
| 6. | Extrinsic semiconductors (n-type) Density of charge carriers | 1 | 06-06-2026 | | TLM-2 | |
| 7. | Dependence of Fermi energy on carrier concentration &temperature | 1 | 08-06-2026 | | TLM-1 | |
| 8. | Tutorial | 1 | 10-06-2026 | | | |
| 9. | Drift and Diffusion Currents, Einstein's equation | 1 | 12-06-2026 | | TLM-1 | |
| 10. | Hall Effect & its applications | 1 | 13-06-2026 | | TLM-1 | |
| **No. of classes required to complete UNIT-III:** 10 | | | | **No. of classes taken:** | | |

| **Teaching-Learning Methods** | | | |
|---|---|---|---|
| **TLM-1** | Chalk and talk | **TLM-4** | Demonstration (Lab/Field Visit) |
| **TLM-2** | PPT/A illustrations | **TLM-5** | ICT (NPTEL/Swayam Prabha /MOOCS) |
| **TLM-3** | Tutorial/Quiz/Assignment | **TLM-6** | Group Discussion/Project |

## PART-C
### EVALUATION PROCESS (R23 Regulation)

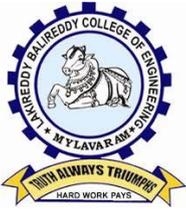| Evaluation Task | Marks |
|---|---|
| Assignment-I (Units-I, II) | A1=5 |
| I-Descriptive Examination (Units-I, II) | M1=15 |
| I-Quiz Examination (Units-I, II) | Q1=10 |
| Assignment-II (Unit-III, IV & V) | A2=5 |
| II- Descriptive Examination (UNIT-III, IV & V) | M2=15 |
| II-Quiz Examination (UNIT-III, IV & V) | Q2=10 |
| Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2)) | M=30 |
| Cumulative Internal Examination (CIE): M | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

# PART-D

**PROGRAMME OUTCOMES (POs):**

| | |
|---|---|
| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| PO 2 | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| PO 7 | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

**Date**: 02-02-2026

| Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|
| Dr. T. Satyanarayana | Dr. S. Yusub | Dr. S. Yusub | Dr. T. Satyanarayana |
| | | | |

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**Phone**: 08659-222933, **Fax**: 08659-222931

**FRESHMAN ENGINEERING DEPARTMENT**

## COURSE HANDOUT
### Part-A

| | |
|---|---|
| **PROGRAM** | : I B. Tech., II-Sem., IT-A |
| **ACADEMIC YEAR** | : 2025-26 |
| **COURSE NAME & CODE** | : Differential Equations & Vector Calculus |
| **L-T-P STRUCTURE** | : 3-0-0 |
| **COURSE CREDITS** | : 3 |
| **COURSE INSTRUCTOR** | : Mrs .G. Vijaya Lakshmi |
| **COURSE COORDINATOR** | : Dr. K.Jhansi Rani |
| **PRE-REQUISITES** | : Basics of Vectors, Differentiation, Integration |

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**

- To enlighten the learners in the concept of differential equations and multivariable calculus
- To furnish the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real-world applications.

**COURSE OUTCOMES (COs)**

After completion of the course, the student will be able to

CO1: Solve the differential equations related to various engineering fields – **L3**

CO2: Apply knowledge of partial differentiation in modeling and solving of Partial differential equations – **L3**

CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence – **L3**

CO4: Evaluate the work done against a field, circulation and flux using Vector Calculus – **L3**

**COURSE ARTICULATION MATRIX (Correlation between Cos &POs, PSOs):**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| **CO1** | 3 | 3 | - | - | - | - | - | - | - | - | - | 1 |
| **CO2** | 3 | 1 | - | - | - | - | - | - | - | - | - | 1 |
| **CO3** | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| **CO4** | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |

**Note:** Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'.**

**1-** Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

**BOS APPROVED TEXT BOOKS:**

**T1** Dr. B.S. Grewal, "Higher Engineering Mathematics", 44[nd]Edition, Khanna Publishers, New Delhi, 2017.

**T2** Erwin Kreyszig, *"Advanced Engineering Mathematics"*, 10th Edition, John Wiley & sons, New Delhi, 2018.

**BOS APPROVED REFERENCE BOOKS:**

**R1** George B. Thomas, Maurice D. Weir and Joel Hass, "*Thomas Calculus*", 14th Edition, Pearson Publishers, 2018.

**R2** Dennis G. Zill and Warren S. Jones and Bartlett, "*Advanced Engineering Mathematics*",2018.

**R3** Glyn James, "*Advanced Modern Engineering Mathematics*", 5th Edition, Pearson Publishers, 2018.

**R4** R.K. Jain and S.R.K. Iyengar, "*Advanced Engineering Mathematics*", 5th Edition (9th reprint), Alpha Science International Ltd., 2021.

**R5** B. V. Ramana, "*Higher Engineering Mathematics*", 3rd Edition McGraw Hill Education, 2017.

**Part-B**

**COURSE DELIVERY PLAN (LESSON PLAN):**

| S. No | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 1. | Introduction to the course | 1 | 02/02/2026 | | TLM2 | | | |
| 2. | Course Outcomes, Program Outcomes | 1 | 03/02/2026 | | TLM2 | | | |

**UNIT-I: Differential Equations of first order and first degree**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 3. | Introduction to UNIT I | 1 | 05/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 4. | Linear Differential equation | 1 | 06/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 5. | Bernoulli's DE | 1 | 07/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 6. | Exact DE | 1 | 09/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 7. | Non-exact DE Type I | 1 | 10/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 8. | Non-exact DE Type II | 1 | 12/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 9. | TUTORIAL - 1 | 1 | 13/02/2026 | | TLM3 | CO1 | T1,T2 | |
| 10. | Non-exact DE Type III | 1 | 14/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 11. | Non-exact DE Type IV | 1 | 16/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 12. | Newton's Law of cooling | 1 | 17/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 13. | Law of natural growth and decay | 1 | 19/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 14. | TUTORIAL - 2 | 1 | 20/02/2026 | | TLM3 | CO1 | T1,T2 | |
| 15. | Electrical circuits | 1 | 21/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 16. | Law of natural growth and decay | 1 | 23/02/2026 | | TLM1 | CO1 | T1,T2 | |
| No. of classes required to complete UNIT-I | | 14 | | | | No. of classes taken: | | |

**UNIT-II: Linear Differential equations of higher order (Constant Coefficients)**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 17. | Introduction to UNIT II | 1 | 24/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 18. | Solving a homogeneous DE | 1 | 26/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 19. | Finding Particular Integral, P.I for $e^{ax+b}$ | 1 | 27/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 20. | P.I for Cos bx, or sin bx | 1 | 28/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 21. | P.I for polynomial function | 1 | 02/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 22. | P.I for $e^{ax+b}v(x)$ | 1 | 05/03/2026 | | TLM | CO1 | T1,T2 | |
| 23. | TUTORIAL - 3 | 1 | 06/03/2026 | | TLM3 | CO1 | T1,T2 | |
| 24. | P.I for $x^k v(x)$ | 1 | 07/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 25. | Method of Variation of parameters | 1 | 09/03/2026 | | TLM1 | CO1 | T1,T2 | |

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 26. | Method of Variation of parameters | 1 | 10/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 27. | Simultaneous linear equations | 1 | 12/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 28. | TUTORIAL - 4 | 1 | 13/03/2026 | | TLM3 | CO1 | T1,T2 | |
| 29. | L-C-R circuits | 1 | 14/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 30. | Simple Harmonic motion | 1 | 16/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 31. | Revision | 1 | 17/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 32. | TUTORIAL - 5 | 1 | 20/03/2026 | | TLM3 | CO1 | T1,T2 | |
| No. of classes required to complete UNIT-II | | 16 | | | No. of classes taken: | | | |

**I MID EXAMINATIONS (23-03-2026 TO 28-03-2026)**

## UNIT-III: Partial Differential Equations

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 33. | Introduction to Unit III | 1 | 30/03/2026 | | TLM1 | CO2 | T1,T2 | |
| 34. | Formation of PDE by elimination of arbitrary constants | 1 | 31/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 35. | Formation of PDE by elimination of arbitrary functions | 1 | 02/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 36. | Formation of PDE by elimination of arbitrary functions | 1 | 04/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 37. | Solving of PDE | 1 | 06/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 38. | Lagrange's Method | 1 | 07/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 39. | Homogeneous Linear PDE with constant coefficients | 1 | 09/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 40. | TUTORIAL - 6 | 1 | 10/04/2026 | | TLM3 | CO2 | T1,T2 | |
| 41. | Homogeneous Linear PDE with constant coefficients | 1 | 13/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 42. | Homogeneous Linear PDE with constant coefficients | 1 | 16/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 43. | TUTORIAL - 7 | 1 | 10/04/2026 | | TLM3 | CO2 | T1,T2 | |
| No. of classes required to complete UNIT-III | | 11 | | | No. of classes taken: | | | |

## UNIT-IV: Vector Differentiation

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 44. | Introduction to UNIT IV | 1 | 17/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 45. | Vector Differentiation | 1 | 18/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 46. | Gradient | 1 | 20/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 47. | Directional Derivative | 1 | 21/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 48. | Divergence | 1 | 23/04/2026 | | TLM1 | CO3 | T1,T2 | |

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 49. | TUTORIAL – 8 | 1 | 24/04/2026 | | TLM3 | CO3 | T1,T2 | |
| 50. | Curl | 1 | 25/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 51. | Solenoidal fields, Irrotational fields, potential surfaces | 1 | 27/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 52. | Solenoidal fields, Irrotational fields, potential surfaces | 1 | 28/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 53. | Laplacian, second order operators | 1 | 30/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 54. | TUTORIAL - 9 | 1 | 01/05/2026 | | TLM3 | CO3 | T1,T2 | |
| 55. | Vector Identities | 1 | 02/05/2026 | | TLM1 | CO3 | T1,T2 | |
| 56. | Vector Identities | 1 | 04/05/2026 | | TLM1 | CO3 | T1,T2 | |
| 57. | Vector Identities | 1 | 05/05/2026 | | TLM1 | CO3 | T1,T2 | |
| No. of classes required to complete UNIT-IV | 14 | | | | No. of classes taken: | | | |

## UNIT-V:  Vector Integration

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 58. | Introduction to Unit-V | 1 | 07/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 59. | TUTORIAL - 10 | 1 | 08/05/2026 | | TLM3 | CO4 | T1,T2 | |
| 60. | Line Integral | 1 | 09/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 61. | Circulation | 1 | 11/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 62. | Work done | 1 | 12/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 63. | Surface Integral, Flux | 1 | 14/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 64. | TUTORIAL - 11 | 1 | 15/05/2026 | | TLM3 | CO4 | T1,T2 | |
| 65. | Volume Integral | 1 | 16/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 66. | Green's Theorem | 1 | 01/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 67. | Green's Theorem | 1 | 02/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 68. | Stoke's Theorem | 1 | 04/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 69. | TUTORIAL - 12 | 1 | 05/06/2026 | | TLM3 | CO4 | T1,T2 | |
| 70. | Divergence Theorem | 1 | 06/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 71. | Divergence Theorem | 1 | 08/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 72. | Revision | 1 | 09/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 73. | TUTORIAL - 13 | 1 | 12/06/2026 | | TLM3 | CO4 | T1,T2 | |
| No. of classes required to complete UNIT-V | 14 | | | | No. of classes taken: | | | |

## Content beyond the Syllabus

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 74. | Non-homogeneous Linear PDE with constant coefficients | 2 | 11/06/2026 & 13/06/2026 | | TLM2 | CO2 | T1,T2 | |
| No. of classes | 2 | | | | No. of classes taken: | | | |

### II MID EXAMINATIONS (15-06-2026 TO 20-06-2026)

**Teaching Learning Methods**

| TLM1 | Chalk and Talk | TLM4 | Demonstration (Lab/Field Visit) |
|------|----------------|------|---------------------------------|
| TLM2 | PPT | TLM5 | ICT (NPTEL/SwayamPrabha/MOOCS) |
| TLM3 | Tutorial | TLM6 | Group Discussion/Project |

## PART-C EVALUATION PROCESS (R23 Regulation):

| Evaluation Task | Marks |
|-----------------|-------|
| Assignment-I (Units-I, II) | A1=5 |
| I-Descriptive Examination (Units-I, II) | M1=15 |
| I-Quiz Examination (Units-I, II) | Q1=10 |
| Assignment-II (Unit-III, IV & V) | A2=5 |
| II- Descriptive Examination (UNIT-III, IV & V) | M2=15 |
| II-Quiz Examination (UNIT-III, IV & V) | Q2=10 |
| Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2)) | M=30 |
| Cumulative Internal Examination (CIE): | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

## PART-D PROGRAMME OUTCOMES (POs):

| | |
|---|---|
| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems. |
| PO 2 | **Problem analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| PO 7 | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development. |
| PO 8 | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings. |
| PO 10 | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions. |
| PO 11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

| Mrs.G. Vijaya Lakshmi | Dr. K.Jhansi Rani | Dr. A. RAMI REDDY | Dr.T.Satyanarayana |
|------------------------|-------------------|-------------------|--------------------|
| Course Instructor | Course Coordinator | Module Coordinator | HOD |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
**(AUTONOMOUS)**
**Accredited by NAAC with "A" Grade & NBA (Under Tier - I)**
**An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution**
**Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada**
**L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.**
**Phone**: 08659-222933, **Fax**: 08659-222931

## DEPARTMENT OF ECE

# COURSE HANDOUT

## PART-A

**Name of Course Instructor:** Dr A.Narendra Babu          **Date**: 02-02-2026
**Course Name & Code**     : Basic Electrical & Electronics Engineering – 23EE01
**L-T-P Structure**        **: 3-0-0**                      **Credits:** 3
**Program/Sem./Sec.**      : B.Tech/II/IT-A                 **A.Y.:** 2025-26
                                                            **Regulations**: R23

**PREREQUISITE:** Physics

**Course Objectives (COs)**

**Basic Electrical Engineering:**
To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.
**Basic Electronics Engineering**
To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

**Course Outcomes (COs):** At the end of the course, student will be able to

| PART-A: BASIC ELECTRICAL ENGINEERING | |
|---|---|
| **CO1** | Extract electrical variables of AC & DC circuits using fundamental laws. **(Understand)** |
| **CO2** | Understand the operation of electrical machines and measuring instruments. **(Understand)** |
| **CO3** | Classify various energy resources, safety measures and interpret electricity bill generation in electrical systems. **(Understand)** |
| PART-B: BASIC ELECTRONICS ENGINEERING | |
| **CO4** | Interpret the characteristics of various semiconductor devices **(Knowledge)** |
| **CO5** | Infer the operation of rectifiers, amplifiers. **(Understand)** |
| **CO6** | Contrast various logic gates, sequential and combinational logic circuits. **(Understand)** |

**COURSE ARTICULATION MATRIX** (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | | | | | | | | | 1 | 3 | 2 | | 2 |
| **CO2** | 2 | 2 | | | | | | | | | | | | 2 | | 3 |
| **CO3** | 2 | 2 | | | | 3 | | | | 2 | 2 | 2 | | | | |
| **CO4** | 3 | 2 | | | | | | | | | | 1 | 2 | | 3 | 2 |
| **CO5** | 3 | 2 | | | | | | | | | | 1 | 2 | | 3 | 2 |
| **CO6** | 2 | 2 | 2 | | | | | | | | | | 2 | | 2 | 1 |
| | **1 - Low** | | | | **2 –Medium** | | | | **3 - High** | | | | | | | |

**TEXTBOOKS:**
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

4. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
5. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

**REFERENCE BOOKS:**
1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehta, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.
5. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
6. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
7. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

# PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

## PART B: BASIC ELECTRONICS ENGINEERING

### UNIT-I: Semiconductor Devices

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction to Course and Course Outcomes | 1 | 02-02-2026 | | TLM1 | |
| 2. | Evolution of electronics, Vacuum tubes to nano electronics | 1 | 03-02-2026 | | TLM1 | |
| 3. | Characteristics of PN Junction Diode, **Role-Play Pedagogy**: "Inside the PN Junction"-ITM | 1 | 04-02-2026 | | TLM1 | |
| 4. | Zener Effect — Zener Diode and its Characteristics | 1 | 05-02-2026 | | TLM1 | |
| 5. | Bipolar Junction Transistor | 1 | 09-02-2026 | | TLM1 | |
| 6. | Bipolar Junction Transistor | 1 | 10-02-2026 | | TLM1 | |
| 7. | CB Configurations and Characteristics | 1 | 11-02-2026 | | TLM2 | |
| 8. | CE Configurations and Characteristics. CC Configurations and Characteristics. | 1 | 12-02-2026 | | TLM2 | |
| 9. | Elementary Treatment of Small Signal CE Amplifier. | 1 | 16-02-2026 | | TLM2 | |
| **No. of classes required to complete UNIT-I: 09** | | | | **No. of classes taken:** | | |

### UNIT-II: Basic Electronic Circuits and Instrumentation

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 10. | Rectifiers and power supplies: Block diagram description of a DC power supply | 1 | 17-02-2026 | | TLM1 | |
| 11. | Working of full wave bridge rectifier, capacitor filter (no analysis) | 1 | 18-02-2026 | | TLM1 | |
| 12. | Working of full wave bridge rectifier, capacitor filter (no analysis) | 1 | 19-02-2026 | | TLM1 | |
| 13. | Amplifiers: Block diagram of Public Address system | 1 | 23-02-2026 | | TLM1 | |
| 14. | Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency | 1 | 24-02-2026 | | TLM2 | |

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| | response. | | | | | |
| 15. | Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. **QUIZ** -ITM | 1 | 25-02-2026 | | TLM1 | |
| 16. | Electronic Instrumentation**:** Block diagram of an electronic instrumentation system. | 1 | 26-02-2026 | | TLM2 | |
| 17. | Electronic Instrumentation: Block diagram of an electronic instrumentation system. | 1 | 02-03-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-II: 08** | | | | **No. of classes taken:** | | |

## UNIT-III: Digital Electronics

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 18. | Overview of Number Systems | 1 | 04-03-2026 | | TLM1 | |
| 19. | Logic gates including Universal Gates -NOT, OR, AND, NOR, NAND, XOR and XNOR | 1 | 05-03-2026 | | TLM2 | |
| 20. | BCD codes, Excess-3 code, gray code**, Logic Gates as Decision Machines**-ITM | 1 | 09-03-2026 | | TLM1 | |
| 21. | Hamming code, | 1 | 10-03-2026 | | TLM2 | |
| 22. | Basic Theorems and properties of Boolean Algebra, Boolean Algebra | 1 | 11-03-2026 | | TLM1 | |
| 23. | Half and Full Adders, | 1 | 12-03-2026 | | TLM1 | |
| 24. | Simple combinational circuits | 1 | 16-03-2026 | | TLM1 | |
| 25. | Introduction to sequential circuits, Flip flops, Registers , Counters | 1 | 17-03-2026 | | TLM1 | |
| 26. | Review | 1 | 18-03-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-III: 09** | | | | **No. of classes taken:** | | |

### I Mid Examinations: 23-03-2026 to 28-03-2026

### PART A: BASIC ELECTRICAL ENGINEERING

### UNIT-I:  DC & AC Circuits

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 27. | Introduction to Course and Course Outcomes | 1 | 30-03-2026 | | TLM1 | |
| 28. | DC Circuits: Electrical circuit elements (R, L and C) | 1 | 31-03-2026 | | TLM1 | |
| 29. | Ohm's Law and its limitations, KCL & KVL, **HUMAN KCL & KVL ROLE-PLAY-ITM** | 1 | 01-04-2026 | | TLM1 | |
| 30. | Series, Parallel, series-parallel circuits | 1 | 02-04-2026 | | TLM1 | |
| 31. | Problems on series-parallel circuits | | 06-04-2026 | | | |
| 32. | Superposition theorem | 1 | 07-04-2026 | | TLM1 | |
| 33. | **AC Circuits:** A.C. Fundamentals: | 1 | 08-04-2026 | | TLM1 | |
| 34. | Equation of AC Voltage and current, waveform | 1 | 09-04-2026 | | TLM1 | |

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 35. | Time period, frequency, amplitude, phase, | 1 | 13-04-2026 | | TLM1 | |
| 36. | Phase difference, average value, RMS value | | 15-04-2026 | | | |
| 37. | Form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits | 1 | 16-04-2026 | | TLM1 | |
| 38. | Concept of Impedance, Active power, reactive power and apparent power | 1 | 20-04-2026 | | TLM2 | |
| 39. | Concept of power factor (Simple Numerical problems). | 1 | 21-04-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-I: 13** | | | | **No. of classes taken:** | | |

## UNIT-II: Machines and Measuring Instruments

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 40. | **Machines:** Construction, principle and operation of DC Motor | 2 | 22-04-2026 23-04-2026 | | TLM1 | |
| 41. | Construction, principle and operation of DC Generator | 2 | 27-04-2026 28-04-2026 | | TLM2 | |
| 42. | Construction, principle and operation of Single-Phase Transformer | 1 | 29-04-2026 | | TLM2 | |
| 43. | Construction, principle and operation of Three Phase Induction Motor | 1 | 30-04-2026 | | TLM2 | |
| 44. | Construction, principle and operation of Alternator, Applications of electrical machines | 1 | 04-05-2026 05-05-2026 | | TLM1 | |
| 45. | Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC) | 1 | 06-05-2026 | | TLM2 | |
| 46. | Moving Iron (MI) Instruments, Wheatstone Bridge | 1 | 07-05-2026 | | TLM2 | |
| **No. of classes required to complete UNIT-II: 09** | | | | **No. of classes taken:** | | |

## UNIT-III: Energy Resources, Electricity Bill & Safety Measures

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 47. | Energy Resources: Conventional and non-conventional energy resources | 1 | 11-05-2026 | | TLM1 | |
| 48. | Layout and operation of various Power Generation systems: Hydel power generation | 2 | 12-05-2026 13-05-2026 | | TLM1 | |
| 49. | Layout and operation of nuclear power generation | 1 | 14-05-2026 | | TLM1 | |
| 50. | Layout and operation of Solar power generation | 1 | 01-06-2026 02-06-2026 | | TLM1 | |
| 51. | Electricity bill: Power rating of household appliances including air conditioners PCs, Laptops, | 1 | 03-06-2026 04-06-2026 | | TLM1 | |

| Sl. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| | Printers, etc. **Electricity Bill as a Story Problem-ITM** | | | | | |
| 52. | Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, Calculation of electricity bill for domestic consumers | 2 | 08-06-2026 09-06-2026 | | TLM1 | |
| 53. | Equipment Safety Measures: Working principle of Fuse and Miniature Circuit Breaker (MCB), merits and demerits. | 1 | 10-06-2026 | | TLM1 | |
| 54. | Personal Safety Measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock. | 1 | 11-06-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-III: 10** | | | | **No. of classes taken:** | | |

**II Mid Examinations: 15-06-2026 to 20-06-2026**

| Teaching Learning Methods | | | |
|---|---|---|---|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/Swayam Prabha/MOOCS) |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project |

## PART-C

**EVALUATION PROCESS (R23 Regulation):**

| Evaluation Task | Marks |
|---|---|
| Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus)) | A1=5 |
| I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus)) | M1=15 |
| I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus)) | Q1=10 |
| Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V) | A2=5 |
| II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V) | M2=15 |
| II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V) | Q2=10 |
| Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2)) | M=30 |
| Cumulative Internal Examination (CIE): | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

## ACADEMIC CALENDAR:

| Description | From | To | Weeks |
|---|---|---|---|
| I Phase of Instructions | 02-02-2026 | 21-03-2026 | 8W |
| I Mid Examinations | 23-03-2026 | 28-03-2026 | 1W |
| II Phase of Instructions | 30-03-2026 | 16-05-2026 | 8W |
| Summer Vacation | 18-05-2026 | 30-05-2026 | 2W |
| II Phase of Instructions | 01-06-2026 | 13-06-2026 | 2W |
| II Mid Examinations | 15-06-2026 | 20-06-2026 | 1W |
| Preparation and Practicals | 22-06-2026 | 27-06-2026 | 1W |
| Semester End Examinations | 29-06-2026 | 11-07-2026 | 2W |

## PART-D

## PROGRAMME OUTCOMES (POs):

| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|------|------|
| PO 2 | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| PO 7 | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

## PROGRAMME SPECIFIC OUTCOMES (PSOs):

| PSO a | Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power |
|-------|------|
| PSO b | Design and analyze electrical machines, modern drive and lighting systems |
| PSO c | Specify, design, implement and test analog and embedded signal processing electronic systems |
| PSO d | Design controllers for electrical and electronic systems to improve their performance. |

**Date**: 02-02-2026

| **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|------|------|------|------|
| Dr.A.Narendra Babu | Dr. AVGA Marthanda | Dr. G. Nageswara Rao | Dr. G.Srinivasulu |

## DEPARTMENT OF MECHANICAL ENGINEERING

### COURSE HANDOUT

### PART-A

**Name of Course Instructor:** **Dr. K.Dilip Kumar, Professor,**
Mr.K.Venkateswara Reddy , Sr. Asst. Professor,
Mr. Uma Maheswara reddy, Asst. Professor

| Course Name & Code | : Engineering Drawing – 23ME01 | |
|---|---|---|
| L-T-P Structure | : 3-0-4 | **Credits:** 4 |
| Program/Sem/Sec | : B.Tech/I Sem/A-Sec | **A.Y.:** 2025-26 |

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** To recognize the Bureau of Indian Standards of Engineering Drawing and develop an ability to get familiarized with orthographic projections and isometric views of solid objects.

**COURSE OUTCOMES (COs):** At the end of the course, student will be able to

| CO1 | Understand the principles of engineering drawing, including engineering curves, scales, Orthographic and isometric projections. (**Understanding Level –L2**) |
|---|---|
| CO2 | Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. (**Applying Level –L3**) |
| CO3 | Understand and draw projection of solids in various positions in first quadrant. (**Applying Level –L3**) |
| CO4 | Draw the development of surfaces of simple objects. (**Applying Level –L3**) |
| CO5 | Prepare isometric and orthographic sections of simple solids. (**Applying Level –L3**) |

**COURSE ARTICULATION MATRIX** (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | 2 | 1 | 2 |
| CO2 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 3 | 1 | 1 | 2 |
| CO3 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | - | 1 | 2 |
| CO4 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | 2 | 1 | 2 |
| CO5 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| | | | **1 -** Low | | | **2 –**Medium | | | | **3 -** High | | | | | |

**TEXTBOOKS:**

**T1** N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar publishers,2012

**REFERENCE BOOKS:**

**R1** Narayana K L, Kannaiah P, Textbook on Engineering Drawing, 2nd Edition, SciTech publishers.

**R2** R.K.Dhawan, Engineering Drawing, S.Chand Company LTD.

**R3** Venugopal, Engineering Drawing and Graphics, New Age publishers

**R4** Dhananjay A. Jolhe, Engineering Drawing, Tata McGraw Hill Publishers

**R5** N.S.Parthasarathy, Vela Murali, Engineering Drawing, Oxford Higher Education

<div style="text-align:center">

**PART-B**

</div>

**COURSE DELIVERY PLAN (LESSON PLAN):**

**UNIT-I: INTRODUCTION TO ENGINEERING GRAPHICS, LETTERING, LINES AND DIMENSIONING, CONICS, CYCLOIDS, INVOLUTES**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date | Actual Date | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1 | **UNIT I: INTRODUCTION:** Introduction to Engineering Drawing, CEOs, COs, PEOs, and POs and PSOs | | | | | |
| 2 | Principles of Engineering Graphics and their significance, Drawing Instruments and their use- Conventions in Drawing – Practical orientation | 2 | 04-02-2026 | | TLM1/ TLM2 | |
| 3 | Lettering and Dimensioning – BIS Conventions- Geometrical Constructions – Theory Class | | | | | |
| 4 | Practice | 3 | 06-02-2026 | | TLM4 | |
| 5 | Engineering Curves: Conic Sections- Construction of ellipse, parabola and Hyperbola –Theory class | 2 | 11-02-2026 | | TLM1 | |
| 6 | Construction of Parabola, ellipse, hyperbola – General method -Practice | 3 | 13-02-2026 | | TLM4 | |
| 7 | Cycloids –Theory class | 2 | 18-02-2026 | | TLM1 | |
| 8 | Practice Session | 3 | 20-02-2026 | | TLM4 | |
| 9 | Involutes – Theory class | 2 | 25-02-2026 | | TLM1 | |
| 10 | Practice Session | 3 | 27-02-2026 | | TLM4 | |
| **No. of classes required to complete UNIT-I: 20 (Lecture:8 Practice:12)** | | | | **No. of classes taken: (including Practice)** | | |

**UNIT-II: PROJECTIONS OF POINTS, LINES AND PLANES**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date | Actual Date | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 9 | Orthographic Projections, First and third angle projection methods, Projections of Points, Lines inclined to one plane | 2 | 04-03-2026 | | TLM1 | |
| 10 | Practice Session | 3 | 06-03-2026 | | TLM4 | |
| 11 | Projection of lines - Projections of Straight Line Inclined to both the reference planes | 2 | 11-03-2026 | | TLM1 | |
| 12 | Practice Session | 3 | 13-03-2026 | | TLM4 | |
| 13 | Projections of planes- Regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes. | 2 | 18-03-2026 | | TLM1 | |
| 14 | Practice Session | 3 | 20-03-2026 | | TLM4 | |
| **No. of classes required to complete UNIT-II: 15 (Lecture:6 Practice:9)** | | | | **No. of classes taken: (including Practice)** | | |

## UNIT-III: PROJECTIONS OF SOLIDS

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date | Actual Date | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 15 | Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane – Theory and practice | 2 | 01-04-2026 | | TLM1 TLM4 | |
| 16 | Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane. | 3 | 08-04-2026 | | TLM1 | |
| 17 | Practice Session | 3 | 10-04-2026 | | TLM 4 | |
| 18 | Practice Session | 2 | 15-04-2026 | | TLM 4 | |
| 19 | Practice Session | 3 | 17-04-2026 | | TLM 4 | |
| **No. of classes required to complete UNIT-III: 13 (Lecture:4 Practice:9)** | | | | **No. of classes taken: (including Practice)** | | |

## UNIT-IV: SECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES

| S. No. | Topics to be covered | No. of Class Required | Tentative Date | Actual Date | Teaching Learning Method | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 20 | Sections of Solids Solids in simple positions, Perpendicular and inclined section planes | 2 | 22-04-2026 | | TLM1 | |
| 21 | Practice Session | 3 | 24-04-2026 | | TLM4 | |
| 22 | Sections of solids: Sectional views and True shape of section | 2 | 29-04-2026 | | TLM1 | |
| 23 | Practice Session | 3 | 01-05-2026 | | TLM4 | |
| 24 | Development of solids Methods of Development: Parallel line development and radial line development | 2 | 06-05-2026 | | TLM1 | |
| 25 | Practice Session | 3 | 08-05-2026 | | TLM4 | |
| 26 | Development of solids Development of a cube, prism, cylinder, pyramid and cone. | 2 | 13-05-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-IV: 17 (Lecture:8 Practice:9)** | | | | **No. of classes taken: (including Practice)** | | |

## UNIT-V: CONVERSION OF VIEWS

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date | Actual Date | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 27 | Introduction to Isometric Views – Theory Isometric views, isometric axes, scale, lines & planes | 3 | 15-05-2026 | | TLM1 | |
| 28 | Orthographic projections to Isometric Projections | 2 | 03-06-2026 | | TLM1 | |
| 29 | Practice Session | 3 | 05-06-2026 | | TLM4 | |
| 30 | Orthographic Projections to Isometric Projections | 2 | 10-06-2026 | | TLM1 | |
| 31 | Practice Session | 3 | 12-06-2026 | | TLM4 | |
| **No. of classes required to complete UNIT-V: 13 (Lecture:4 Practice:9)** | | | | **No. of classes taken:** | | |

| Teaching Learning Methods | | | | |
|---|---|---|---|---|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) | |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/SwayamPrabha/MOOCS) | |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project | |

## PART-C

**EVALUATION PROCESS (R23 Regulation):**

| Evaluation Task | Marks |
|---|---|
| I-Descriptive Examination (Units-I, II ) | M1=15 |
| II- Descriptive Examination (UNIT-III , IV & V) | M2=15 |
| Day to Day Evaluation (Assignment) | 15 |
| Mid Marks =80% of Max (M1,M2)+ 20% of Min ((M1, M2) + Day to Day Evaluation | M=30 |
| Cumulative Internal Examination (CIE): M | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

## PART-D

### PROGRAMME OUTCOMES (POs):

### Engineering Graduates will be able to:

| PO 1 | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|---|---|
| PO 2 | **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| PO 6 | **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| PO 7 | **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

### PROGRAMME SPECIFIC OUTCOMES (PSOs):

| PSO1 | To apply the principles of thermal sciences to design and develop various thermal systems. |
|------|---------------------------------------------------------------------------------------------|
| PSO2 | To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products. |
| PSO3 | To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment. |

| Title | Course Instructor | Course Coordinator | Head of the Department |
|-------|-------------------|--------------------|-----------------------|
| Name of the Faculty | Dr.K.Dilip Kumar | Mr.J.Subba Reddy | Dr. M B S S Reddy |
| Signature | | | |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)**
**An ISO 21001:2018,14001:2015,50001:2018 Certified Institution**
**Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada**
**L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.**
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

# COURSE HANDOUT

## PART-A

**Name of Course Instructor** : Mrs.J.Geetharenuka
**Course Name & Code** : DATA STRUCTURES & 23CS02
**L-T-P Structure** : 3-0-0 **Credits:** 3
**Program/Sem/Sec** : B.Tech/IT/II /A **A.Y.:** 2025-26

**PREREQUISITE : Introduction to programming-20CS01**

**COURSE EDUCATIONAL OBJECTIVES(CEO):**

The objective of the course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

**COURSE OUTCOMES (COs):** At the end of the course, student will be able to

| | |
|---|---|
| CO1 | Understand the role of linear and nonlinear data structures in organizing and accessing data **(Understand-L2)** |
| CO2 | Implement abstract data type (ADT) and data structures for given application. **(Apply-L3)** |
| CO3 | Design algorithms based on techniques like linked list, stack, queue, trees etc. **(Apply-L3)** |
| CO4 | Apply the appropriate linear and nonlinear data structure techniques for solving a problem. **(Apply-L3)** |
| CO5 | Design hash-based solutions for specific problems. **(Apply-L3)** |

**COURSE ARTICULATION MATRIX** (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | 2 | | | | | | | | | | | 2 | | |
| CO2 | 3 | 2 | 2 | 1 | | | | | | | | | | 2 | |
| CO3 | 3 | 2 | 2 | 1 | | | | | | | | | | 3 | |
| CO4 | 3 | 2 | 2 | 1 | | | | | | | | | | 2 | |
| CO5 | 3 | 2 | 2 | 1 | | | | | | | | | | 2 | |
| **1 -** Low | | | | **2 –**Medium | | | | | **3 -** High | | | | | | |

**TEXTBOOKS:**

**T1** Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.

**T2** Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan AndersonFreed, Silicon Press, 2008

**REFERENCE BOOKS:**

**R1** Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders

**R2** C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft

**R3** Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum

**R4** Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein

**R5** Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

# PART-B

**COURSE DELIVERY PLAN (LESSON PLAN):**

**UNIT-I: Introduction to Linear Data Structures**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction and Discussion of CO's | 1 | 03-02-2026 | | **TLM 1** | |
| 2. | Definition and Importance of LinearData Structures | 1 | 04-02-2026 | | **TLM1** | |
| 3. | Abstract Data Typesand Implementation | 1 | 06-02-2026 | | **TLM1** | |
| 4. | Overview of time and space complexity | 1 | 07-02-2026 | | **TLM 1** | |
| 5. | Analysis of Liner Datastructures | 1 | 10-02-2026 | | **TLM1** | |
| 6. | Revise Arrays | 1 | 11-02-2026 | | **TLM 1** | |
| 7. | Searching Techniques: LinearSearch | 1 | 13-02-2026 | | **TLM 1 & 4** | |
| 8. | Binary Search & Analysis, | 1 | 14-02-2026 | | **TLM 1 & 4** | |
| 9. | Bubble Sort &Analysis | 1 | 17-02-2026 | | **TLM 1 & 4** | |
| 10. | Insertion Sort & Analysis | 1 | 18-02-2026 | | **TLM 1 & 4** | |
| 11. | Selection Sort &Analysis | 1 | 20-02-2026 | | **TLM 1 & 4** | |
| 12. | Tutorial | 1 | 21-02-2026 | | **TLM3** | |
| 13. | Revision & Assignment | 1 | 24-02-2026 | | **TLM2** | |
| **No. of classes required to complete UNIT-I: 13** | | | | **No. of classes taken:** | | |

**UNIT-II: Linked Lists**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 14. | List Implementation using Arrays and Array Disadvantages | 1 | 25-02-2026 | | **TLM 1 & 4** | |
| 15. | Linked List Representation | 1 | 27-02-2026 | | **TLM 1** | |
| 16. | Sing Linked List: Operations | 3 | 28-02-2026 04-03-2026 06-03-2026 | | **TLM 1 & 4** | |

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 17. | Double Linked List : Operations | 2 | 07-03-2026 10-03-2026 | | **TLM 1 & 4** | |
| 18. | Circular Single Linked List | 1 | 11-03-2026 | | **TLM1** | |
| 19. | Circular Double Linked List | 2 | 13-03-2026 14-03-2026 | | **TLM 1& 4** | |
| 20. | Comparing Arrays and Linked List | 1 | 17-03-2026 | | **TLM1** | |
| 21. | Applications of Linked Lists: Polynomial Representation | 1 | 18-03-2026 | | **TLM1** | |
| 22. | Polynomial Addition | 1 | 20-03-2026 | | **TLM 1&4** | |
| 23. | Tutorial | 1 | | | **TLM3** | |

**No. of classes required to complete UNIT-II: 13**   **No. of classes taken:**

### UNIT-III: Stacks:

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 24. | Introduction to Stacks : Properties | 1 | 31-03-2026 | | **TLM 1** | |
| 25. | Operations of Stacks | 1 | 01-04-2026 | | **TLM 1** | |
| 26. | Implementation of stacks using arrays | 1 | 04-04-2026 | | **TLM 1 & 4** | |
| 27. | Stacks using Linked List | 1 | 07-04-2026 | | **TLM 1 & 4** | |
| 28. | Expressions: Expression evaluation | 2 | 08-04-2026 10-04-2026 | | **TLM1** | |
| 29. | Infix to Postfix Conversion | 2 | 11-04-2026 15-04-2026 | | **TLM1** | |
| 30. | Checking Balanced Parenthesis | 2 | 17-04-2026 18-04-2026 | | **TLM1** | |
| 31. | Reversing a List | 1 | 21-04-2026 | | **TLM1** | |
| 32. | Backtracking | 1 | 22-04-2026 | | **TLM1** | |
| 33. | Tutorial | 1 | 24-04-2026 | | **TLM3** | |
| 34. | Revision & Assignment | 1 | 25-04-2026 | | **TLM 2,6** | |

**No. of classes required to complete UNIT-III: 14**   **No. of classes taken:**

**UNIT-IV: Queues**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 35. | Introduction to queues: properties and operations, | 1 | 28-04-2026 | | TLM1 | |
| 36. | Implementing queues using arrays | 1 | 29-04-2026 | | TLM 1 & 4 | |
| 37. | Implementing queues using Linked List | 1 | 01-05-2026 | | TLM 1 & 4 | |
| 38. | Applications of Queue: Scheduling | 1 | 02-05-2026 | | TLM 1 | |
| 39. | Breadth First Search | 1 | 05-05-2026 | | TLM 1 & 4 | |
| 40. | Circular Queue | 1 | 06-05-2026 | | TLM 1& 4 | |
| 41. | Double ended queue | 1 | 08-05-2026 | | TLM 1 | |
| 42. | Applications of Deque | 1 | 09-05-2026 | | TLM 1 | |
| 43. | Revision & Assignment | 1 | 12-05-2026 | | TLM 2 ,6 | |
| **No. of classes required to complete UNIT-IV: 09** | | | | **No. of classes taken:** | | |

## UNIT-V: TREES & HASHING TECHNQIUES

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 44. | Introduction to Trees, | 1 | 13-05-2026 | | TLM 1 | |
| 45. | Representation of Trees | 1 | 15-05-2026 | | TLM 1 | |
| 46. | Tree Traversals | 1 | 16-05-2026 | | TLM 1 & 4 | |
| 47. | Binary Search Trees-Operations | 1 | 02-06-2026 | | TLM 1& 4 | |
| 48. | Hashing Introduction, Hash Functions | 1 | 03-06-2026 | | TLM 1 | |
| 49. | Collison Resolution Techniques: Separate Chaining | 1 | 05-06-2026 | | TLM 1 | |

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | HOD Sign Weekly |
|------|------|------|------|------|------|------|------|
| 50. | Open Addressing: Linear Probing | 1 | 06-06-2026 | | **TLM 1** | | |
| 51. | Quadratic Probing, Double Hashing | 1 | 09-06-2026 | | **TLM 1** | | |
| 52. | Rehashing | 1 | 10-06-2026 | | **TLM 1** | | |
| 53. | Applications of Hashing | 1 | 12-06-2026 | | **TLM 1** | | |
| **No. of classes required to complete UNIT-V: 10** | | | **No. of classes taken:** | | | | |

## Content Beyond Syllabus

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | HOD Sign Weekly |
|------|------|------|------|------|------|------|------|
| 1. | Evaluation of Prefix Expression | 1 | 13-06-2026 | | **TLM 1 & 4** | CO4 | |
| 2. | Extendable Hashing | 1 | 13-06-2026 | | **TLM 1** | CO5 | |

| Teaching Learning Methods | | | |
|------|------|------|------|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/Swayam Prabha/MOOCS) |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project |

# **PART-C**

## **EVALUATION PROCESS (R23 Regulation):**

| Evaluation Task | Marks |
|------|------|
| Assignment-I (Units-I, II ) | A1=5 |
| I-Descriptive Examination (Units-I, II ) | M1=15 |
| I-Quiz Examination (Units-I, II ) | Q1=10 |
| Assignment-II (Unit-III ,IV & V) | A2=5 |
| II- Descriptive Examination (Unit-III ,IV & V) | M2=15 |
| II-Quiz Examination (Unit-III ,IV & V) | Q2=10 |
| Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2)) | M=30 |
| Cumulative Internal Examination (CIE): M | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

# PART-D

## PROGRAMME OUTCOMES (POs):

| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|---|---|
| PO 2 | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| PO 7 | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change |

## PROGRAMME SPECIFIC OUTCOMES (PSOs):

| PSO 1 | The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization. |
|---|---|
| PSO 2 | The ability to design and develop computer programs in networking, web applications and IoT as per the society needs. |
| PSO 3 | To inculcate an ability to analyze, design and implement database applications. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| Signature | | | | |
| Name of the Faculty | J.Geetharenuka | | Dr.G.Rajendra | Dr. D. Ratna Kishore |

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**L.B. Reddy Nagar, Mylavaram, NTR Dist., Andhra Pradesh-521 230.**
www.lbrce.ac.in/fed/index.php, www. lbrce.ac.in, **Phone**: 08659-222933, **Fax**: 08659-222931
**FRESHMAN ENGINEERING DEPARTMENT**

# COURSE HANDOUT
# PART-A

| | |
|---|---|
| **Course Instructor** | : Dr. T. Satyanarayana /Dr. K. Kumar Raja |
| **Course Name & Code** | : Engineering Physics Lab & 23FE53 **Credits** : 1 |
| **L-T-P Structure** | : 0-0-**3** **A.Y.** : 2025-26 |
| **Program/Sem./Branch** | : B.Tech./II/IT A **Regulations**: R23 |

**Course Objective:** To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

**Course Outcomes:**
**CO1:** Analyze the wave properties of light using optical instruments **(Apply-L3).**
**CO2:** Estimate the elastic moduli of various materials and acceleration due to gravity **(Apply-L3)**.
**CO3:** Demonstrate the vibrations in stretched strings **(Understand-L2)**.
**CO4:** Evaluate dielectric constant and magnetic field of circular coil carrying current **(Apply-L3)**.
**CO5:** Examine the characteristics of semiconductor devices **(Apply-L3)**.

**Course Articulation Matrix** (Correlation between COs, Pos & PSOs):

| Course Designed by | | | Division of Physics, Freshman Engineering Department | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 2 | 1 | - | - | - | 1 | 1 | - | - | 1 |
| **CO2** | 3 | 3 | 2 | 1 | - | - | - | 1 | 1 | - | - | 1 |
| **CO3** | 3 | 3 | 2 | 1 | - | - | - | 1 | 1 | - | - | 1 |
| **CO4** | 3 | 3 | 2 | 1 | - | - | - | 1 | 1 | - | - | 1 |
| **CO5** | 3 | 3 | 2 | 1 | - | - | - | 1 | 1 | - | - | 1 |
| **1** = Slight (Low) | | | **2** = Moderate (Medium) | | | **3** = Substantial (High) | | | | | | |

# List of Experiments
1. Determination of radius of curvature of a given Plano - Convex lens by Newton's rings.
2. Determination of dielectric constant using charging and discharging method.
**3.** Determination of wavelength of a laser light using diffraction grating.
4. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
5. Determination of temperature coefficients of a thermistor.
6. Determination of acceleration due to gravity and radius of Gyration by using a compound
7. pendulum.
8. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
9. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
10. Sonometer- Verification of laws of a stretched string.
11. Determination of energy band gap of a semiconductor using p-n junction diode.
12. Verification of Brewster's Law.
13. Determination of Hall coefficient and Hall voltage.

**References:**
**T1:** A Textbook of Practical Physics – S. Balasubramanian, M.N. Srinivasan, *S. Chand publishers,* 2017.
**T2:** BOS Approved Textbook**:** Lab Manual Prepared by LBRCE.

## EVALUATION PROCESS

| Evaluation Task | Marks |
|---|---|
| Day-to-Day Work | A1 = 10 |
| Record & Observation | B1 = 5 |
| Internal Exam | C1 = 15 |
| Cumulative Internal Examination (CIE): (A1+B1+C1) | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

## PART-B

### Course Delivery Plan (Lesson Plan): ASE

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | T-L Methods | Learning Outcome COs | Textbook followed | HOD Sign |
|---|---|---|---|---|---|---|---|---|
| 1. | Introduction | 3 | 03-02-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 2. | Demonstration | 3 | 11-02-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 3. | Experiment 1 | 3 | 17-02-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 4. | Experiment 2 | 3 | 24-02-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 5. | Demonstration | 3 | 03-03-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 6. | Experiment 3 | 3 | 10-03-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 7. | Experiment 4 | 3 | 17-03-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 8. | Experiment 5 | 3 | 31-03-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 10. | Experiment 6 | 3 | 07-04-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 11. | Experiment 7 | 3 | 21-04-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 12. | Experiment 8 | 3 | 28-04-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 13. | Repetition | 3 | 05-05-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 14. | Experiment 9 (Virtual Lab) | 3 | 12-05-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 15. | Experiment10 (Virtual Lab) | 3 | 02-06-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 16. | Revision | 3 | 09-06-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |
| 17. | Internal Exam | 3 | 13-06-2026 | | TLM-4 | CO1, CO2, CO3, CO4 & CO5 | T1 | |

| Teaching-Learning Methods | | | |
|---|---|---|---|
| **TLM-1** | Chalk and talk | **TLM-4** | Demonstration (Lab/Field Visit) |
| **TLM-2** | PPT/A illustrations | **TLM-5** | ICT (NPTEL/Swayam Prabha /MOOCS) |
| **TLM-3** | Tutorial/Quiz/Assignment | **TLM-6** | Group Discussion/Project |

## PROGRAM OUT COMES (POs):

| | |
|---|---|
| **PO 1** | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| **PO 2** | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| **PO 3** | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| **PO 4** | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **PO 5** | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations |
| **PO 6** | **The engineer and society**: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| **PO 7** | **Environment and sustainability**: Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| **PO 8** | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO 9** | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO 10** | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO 11** | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| **PO 12** | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

**Date**: 02-02-2026

| Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|
| Dr. T. Satyanarayana | Dr. N. Aruna | Dr. N. Aruna | Dr. T. Satyanarayana |
| | | | |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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**L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.**
**Phone**: 08659-222933, **Fax**: 08659-222931

| DEPARTMENT OF ECE |
|:---:|

# LAB HANDOUT
## PART-A

**Date:** 02-02-2026

**Name of Course Instructor** : Dr.A.Narendra Babu, Dr. P. Rakesh Kumar,
    Dr.P.Venkat Rao,    Mr.N.Dhramachari

**Course Name & Code** : Electrical & Electronics Engineering Workshop (E & EE WS)

**L-T-P Structure** : 0-0-3    **Credits** : 1.5

**Program/Sem** : B.Tech., IT-Sec-A., II Sem    **A.Y.** : 2025-26

**PREREQUISITE:** NIL

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

**COURSE OUTCOMES (COs):** At the end of the course, student will be able to

| CO1 | Compute voltage, current and power in an electrical circuit. (**Apply**) |
|---|---|
| CO2 | Compute medium resistance using Wheat stone bridge. (**Apply**) |
| CO3 | Discover critical field resistance and critical speed of DC shunt generators. (**Apply**) |
| CO4 | Estimate reactive power and power factor in electrical loads. (**Understand**) |
| CO5 | Plot the characteristics of semiconductor devices. (**Apply**) |
| CO6 | Demonstrate the working of various logic gates using ICs. (**Understand**) |

**COURSE ARTICULATION MATRIX** (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | | | | | | 2 | 3 | 2 | | 1 | | | | |
| CO2 | 2 | 2 | | 2 | | | | 2 | 2 | 2 | | | | | | |
| CO3 | 2 | 2 | 2 | 2 | | | | 2 | 2 | 2 | | | | 2 | | |
| CO4 | 2 | 2 | | 3 | | | | 2 | 3 | 2 | | 1 | 2 | | | |
| CO5 | 3 | 2 | | | 2 | | | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO6 | 3 | 3 | | 2 | 2 | | | 2 | 3 | 3 | | 1 | | | 3 | |
| **1 -** Low | | | | **2 –**Medium | | | | | **3 -** High | | | | | | | |

# PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

| S.No. | Topics to be covered. (Experiment Name) | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction to BEEE Lab (Function Generators, CRO, RPS, Breadboard etc), Course Objectives and Outcomes. | 3 | 02-02-2026 | | TLM4 | |
| 2. | Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias. | 3 | 09-02-2026 | | TLM4 | |
| 3. | Plot V – I characteristics of Zener Diode and its application as voltage Regulator. | 3 | 16-02-2026 | | TLM4 | |
| 4. | Implementation of half wave and full wave rectifiers | 3 | 23-02-2026 | | TLM4 | |
| 5. | Plot Input & Output characteristics of BJT in CB configuration-04 | 3 | 02-03-2026 | | TLM4 | |
| 6. | Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs | 3 | 09-03-2026 | | TLM4 | |
| 7. | Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs | 3 | 16-03-2026 | | TLM4 | |
| 8. | Internal Lab Examination (**Electronics**) | 3 | 30-03-2026 | | TLM4 | |
| 9. | Verification of KCL and KVL | 3 | 06-04-2026 | | TLM4 | |
| 10. | Verification of Superposition Theorem | 3 | 13-04-2026 | | TLM4 | |
| 11. | Measurement of Resistance using Wheat stone bridge | 3 | 20-04-2026 | | TLM4 | |
| 12. | Magnetization Characteristics of DC Shunt Generator | 3 | 27-04-2026 | | TLM4 | |
| 13. | Measurement of Power and Power factor using Single-phase wattmeter | 3 | 04-05-2026 | | TLM4 | |
| 14. | Calculation of Electrical Energy for Domestic Premises | 3 | 11-04-2026 | | TLM4 | |
| 15. | Reserve Day | 3 | 01-06-2026 | | TLM4 | |
| 16. | Internal Lab Examination (**Electricals**) | 3 | 08-06-2026 | | TLM4 | |
| No. of classes required:  45 | | | | No. of classes taken: | | |

| Teaching Learning Methods | | | |
|---|---|---|---|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/Swayam Prabha/MOOCS) |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project |

# PART-C

**EVALUATION PROCESS (R20 Regulation):**

| Evaluation Task | Expt. no's | Marks |
|---|---|---|
| Day to Day work | 1,2,3,4,5,6,7,8... | A1 =10 |
| Record and observation | 1,2,3,4,5,6,7,8... | B1 = 5 |
| **Internal Exam** | 1,2,3,4,5,6,7,8... | **C1=15** |
| **Cumulative Internal Examination (CIE):(A1+B1+C1)** | 1,2,3,4,5,6,7,8... | **30** |
| **Semester End Examination (SEE)** | 1,2,3,4,5,6,7,8... | **70** |
| **Total Marks=CIE+SEE** | | **100** |

# PART-D

**PROGRAMME OUTCOMES (POs):**

| | |
|---|---|
| **PO 1** | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| **PO 2** | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| **PO 3** | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| **PO 4** | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **PO 5** | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations |
| **PO 6** | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| **PO 7** | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| **PO 8** | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO 9** | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO 10** | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO 11** | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| **PO 12** | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

| | |
|---|---|
| **PSO a** | Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power |
| **PSO b** | Design and analyze electrical machines, modern drive and lighting systems |
| **PSO c** | Specify, design, implement and test analog and embedded signal processing electronic systems |
| **PSO d** | Design controllers for electrical and electronic systems to improve their performance. |

**Date:** 02-02-2026

| **Course Instructors** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|
| Dr. P. Rakesh Kumar | Dr. AVGA Marthanda | Dr. G.Nageswara Rao | Dr. G.Srinivasulu |
| Mrs.B.Rajewari | | | |
| Mr.T.Anil Raju | | | |
| Dr.B.Y.V.N.R Swamy | | | |

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Estd. 1998

ASE,CE,CSE,ECE, EEE, IT & ME Under Tier-I

CGPA: 3.20/4

## DEPARTMENT OF MECHANICA LENGINEERING

### COURSE HANDOUT

| | |
|---|---|
| **PROGRAM** | : B.Tech. II-Sem., IT-A Section |
| **ACADEMIC YEAR** | : 2025-26 |
| **COURSENAME & CODE** | : Engineering Workshop, 23ME51 |
| **PSTRUCTURE** | : 0-0-3 |
| COURSE CREDITS | :1.5 |
| **COURSE INSTRUCTOR** | : Mr.K.V.Viswanadh/Mr K Lakshmi Prasad |
| **COURSE COORDINATOR** | : Seelam Srinivasa Reddy |

**PRE-REQUISITE** : Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability

**COURSEOBJECTIVE:** To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicle.

**COURSEOUTCOMES(CO)**

| | |
|---|---|
| CO1 | Identify workshop tools and their operational capabilities. (Remember) |
| CO2 | Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, and welding. (Understand) |
| CO3 | Modal various basic prototypes in fitting trade. (Apply) |
| CO4 | Apply basic electrical engineering knowledge for House Wiring Practice (Apply) |

**COURSE ARTICULATION MATRIX (Correlation between Cos & POs, PSOs):**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 2 | 3 | 3 | 3 | | | 3 | | | 2 | | 3 | 2 |
| CO2 | 3 | | 2 | 3 | 3 | 3 | | | 3 | | | 2 | | 3 | 2 |
| CO3 | 3 | | 2 | 3 | 3 | 3 | | | 3 | | | 2 | | 3 | 2 |
| CO4 | 3 | | 2 | 3 | 3 | 3 | | | 3 | | | 2 | | 3 | 2 |

**Note:** Enter Correlation Levels **1** or **2** or **3**. If there is no correlation, **put'-'**
**1-**Slight (Low),**2-**Moderate (Medium),**3-**Substantial (High).

Textbooks:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai &Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22

## COURSEDELIVERYPLAN(LESSONPLAN): Section-B

| S.No. | Experiment to be conducted | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Reference | HOD Sign Weekly |
|-------|---------------------------|------------------------|------------------------------|---------------------------|---------------------------|-----------|-----------------|
| 1 | Demonstration | 3 | 14.02.2026 | | TLM8 | | |
| 2 | Experiment-1 | 3 | 21.02.2026 | | TLM8 | | |
| 3 | Experiment-2 | 3 | 28.02.2026 | | TLM8 | | |
| 4 | Experiment-3 | 3 | 07.03.2026 | | TLM8 | | |
| 5 | Experiment-4 | 3 | 14.03.2026 | | TLM8 | | |
| 6 | Experiment-5 | 3 | 21.03.2026 | | TLM8 | | |
| MID-1EXAM 23.03.2026 to 28.03.2026 | | | | | | | |
| 7. | Experiment-6 | 3 | 04.04.2026 | | TLM8 | | |
| 8. | Experiment-7 | 3 | 11.04.2026 | | TLM8 | | |
| 9. | Experiment-8 | 3 | 18.04.2026 | | TLM8 | | |
| 10. | Demonstration of Forging & Tin Smithy | 3 | 25.04.2026 | | TLM8 | | |
| 11. | Repetition | 3 | 02.05.2026 | | TLM8 | | |
| 12. | Lab Internal | 3 | 16.05.2026 | | TLM8 | | |

| TeachingLearningMethods | | | | | |
|------|----------------|------|----------------|------|------------|
| TLM1 | Chalk and talk | TLM4 | Problem Solving | TLM7 | Seminars or GD |
| TLM2 | PPT | TLM5 | Programming | TLM8 | Lab Demo |
| TLM3 | Tutorial | TLM6 | Assignment or Quiz | TLM9 | Case Study |

| Description | From | To | Weeks |
|-------------|------|-----|-------|
| I Phase of Instructions-1 | 02.02.2026 | 21.03.02026 | 7 |
| I mid Examinations | 23.03.2026 | 28.03.2026 | 1 |
| II Phase of Instructions | 30.03.2026 | 16.05.2026 | 7 |
| Summer Vacation | 18.05.2026 | 30.05.2026 | 2 |
| II Phase of Instructions | 01.06.2026 | 13.06.2026 | 2 |
| II Mid Examinations | 15.06.2026 | 20.06.2026 | 1 |
| Preparation and Practical | 22.06.2026 | 27.06.2026 | 1 |
| Semester End Examinations | 29.06.2026 | 11.07.2026 | 2 |

**EVALUATIONPROCESS:**

Part-C

| Parameter | | Marks |
|---|---|---|
| Day–to–Day Work | Observation & Record | A1=10Marks |
| | Viva | A2=05Marks |
| Internal Test | | B=15Marks |
| Cumulative Internal Examination | | A1+A2+B=30Marks |
| Semester End Examinations | | D=70Marks |
| Total Marks: A1+A2+B+C+D | | 100Marks |

Details of Batches: B-SEC

| Batch No. | Reg. No. of Students | Number of Students | Batch No. | Reg. No. of Students | Number of Students |
|---|---|---|---|---|---|
| B1 | 25761A0468-483 | 16 | B2 | 25761A0484-499 | 16 |
| B2 | 25761A04A0-4B5 | 16 | B4 | 25761A04B6-4D2 | 16 |

| Batch No: | Exp. 01 | Exp. 02 | Exp. 03 | Exp. 04 | Exp. 05 | Exp. 06 | Exp. 07 | Exp. 08 | Exp. 09 | Exp. 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| B1 | F1 | F2 | C1 | C2 | E1 | E2 | P1 | P2 | D1 | D2 |
| B2 | C1 | C2 | E1 | E2 | P1 | P2 | F1 | F2 | D1 | D2 |
| B3 | E1 | E2 | P1 | P2 | F1 | F2 | C1 | C2 | D1 | D2 |
| B4 | P1 | P2 | F1 | F2 | C1 | C2 | E1 | E2 | D1 | D2 |

*LISTOFEXPERIMENTS:*

| Exp. No. | Name of the Experiment | Related CO |
|---|---|---|
| 1. | Carpentry-1(C1)-Corner Bridle Joint | CO2 |
| 2. | Carpentry-2(C2)-Dovetail Joint | CO2 |
| 3. | Fitting-1(F1)-T-Joint | CO3 |
| 4. | Fitting-2(F2)-V-Joint | CO3 |
| 5. | Plumbing-1(P1)-Pipe Threading practice | CO2 |
| 6. | Plumbing-2(P2)-Pipe Layout | CO2 |
| 7. | HouseWiring-1(E1)–Series and Parallel connection | CO4 |
| 8. | HouseWiring-2(E2)–Fluorescent Lamp and Calling Bell Circuit | CO4 |
| 9. | Black Smithy(D1) | CO2 |
| 10. | Tin Smithy(D2) | CO2 |

## NOTIFICATION OF CYCLE

| Cycle | Exp. No | Name of the Experiment | Related CO |
|---|---|---|---|
| Cycle-1 | 1. | Carpentry-1(C1)-Corner Bridle Joint | CO 2 |
| | 2. | Carpentry-2(C2)-Dovetail Joint | CO 2 |
| | 3. | Fitting-1(F1)-T-Joint | CO 3 |
| | 4. | Fitting-2(F2)-V-Joint | CO 3 |
| | 5. | Plumbing-1(P1)-Pipe Threading practice | CO 2 |
| | 6. | Plumbing-2(P2)-Pipe Layout | CO 2 |
| | 7. | HouseWiring-1(E1)–Series and Parallel Connection | CO 4 |
| | 8. | HouseWiring-2(E2)–Fluorescent Lamp and Calling bell Circuit | CO 4 |
| Cycle-2 | 9. | Black Smithy(D1) | CO 2 |
| | 10. | Tin Smithy(D2) | CO 2 |

## PART-D
## Program Educational Objectives (PEOs):
**PEO1:** To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.
**PEO2:** To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.
**PEO3:** To develop inquisitiveness towards good communication and lifelong learning.

## Program Outcomes (POs):
**PO1 –** Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
**PO2 -** Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
**PO3 –** Design / Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
**PO4 -** Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
**PO5 –** Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
**PO6 –** The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional

engineering practice.

**PO7** – Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8** – Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9** – Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10** – Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11** – Project Management and Finance: Demonstrate knowledge and understanding of the ring and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12** - Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**Program Specific Outcomes (PSOs):**

**PSO1:** To apply the principles of thermal sciences to design and develop various thermal systems.

**PSO2:** To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.

**PSO3:** To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

| Signature | | | | |
|---|---|---|---|---|
| **Name of the Faculty** | Mr.K V Viswanadh, Mr. K Lakshmi Prasad | **Mr. S Srinivasa Reddy** | **Mr. J.Subba Reddy** | **Dr. M. B. S. Sreekara Reddy** |
| **Designation / Title** | **Sr Asst. Professor / Course Instructor** | **Associate Professor / Course Coordinator** | **Associate Professor/ Module Coordinator** | **Professor / Head of the Department** |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)**
**An ISO 21001:2018,14001:2015,50001:2018 Certified Institution**
**Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada**
**L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.**
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

# COURSE HANDOUT
## PART-A

**Name of Course Instructor** : Mrs.J.GeethaRenuka

**Course Name & Code** : DATA STRUCTURES LAB & 23CS52

**L-T-P Structure** : 0-0-3      **Credits:** 1.5

**Program/Sem/Sec** : B.Tech/IT/II/A      **A.Y.:** 2025-26

**PREREQUISITE: COMPUTER PROGRAMMING LAB**

**COURSE EDUCATIONAL OBJECTIVE:**

The objective of this course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

**COURSE OUTCOMES (CO):**

**CO1:** Apply Linear Data Structures for organizing the data efficiently **(Apply-L3)**

**CO2:** Apply Non- Linear Data Structures for organizing the data efficiently **(Apply-L3)**

**CO3:** Develop and implement hashing techniques for solving problems (**Apply - L3**)

**CO4:** Improve individual / teamwork skills, communication & report writing skills withethical values.

**COURSE ARTICULATION MATRIX (Correlation between Cos, Pos & PSOs):**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | 2 | 2 | 1 | 3 | | | | | | | | | 2 | |
| CO2 | 3 | 2 | 2 | 1 | 3 | | | | | | | | | 2 | 2 |
| CO3 | 3 | 2 | 2 | 1 | 3 | | | | | | | | | | 2 |
| CO4 | | | | | | | | 2 | 2 | 2 | | | | | |

**Note: 1-** Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High)

**PART-B:**

**COURSE DELIVERY PLAN (LESSON PLAN):**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | HOD Sign |
|---|---|---|---|---|---|
| 1. | Array Manipulations | 3 | 12-02-2026 | | |
| 2. | Searching and Sorting Techniques | 3 | 19-02-2026 | | |
| 3. | Single Linked List | 3 | 26-02-2026 | | |
| 4. | Double Linked List | 3 | 05-03-2026 | | |
| 5. | Circular Linked List | 3 | 12-03-2026 | | |
| 6. | Polynomial Representation & Polynomial Addition | 3 | 19-03-2026 | | |
| 7. | Linked List Applications | 3 | 02-04-2026 | | |
| 8. | Stack Implementation | 3 | 09-04-2026 | | |
| 9. | Stack Applications | 3 | 16-04-2026 | | |
| 10. | Queue Implementation | 3 | 23-04-2026 | | |
| 11. | Circular Queue | 3 | 30-04-2026 | | |
| 12. | Double Ended Queue | 3 | 07-05-2026 | | |
| 13. | Trees | 3 | 14-05-2026 | | |
| 14. | Hashing | 3 | 04-06-2026 | | |
| 15. | Internal Exam | 3 | 11-06-2026 | | |

# PART-C

**EVALUATION PROCESS (R23 Regulation):**

| Evaluation Task | Marks |
|---|---|
| Day to Day Work: | 15 |
| Internal Test | 15 |
| Continuous Internal Assessment | 30 |
| Procedure | 20 |
| Execution & Results | 30 |
| Viva-voce | 20 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

# PART-D

## PROGRAMME OUTCOMES (POs):

| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|---|---|
| PO 2 | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| PO 7 | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change |

## PROGRAMME SPECIFIC OUTCOMES (PSOs):

| PSO 1 | Organize, Analyze and Interpret the data to extract meaningful conclusions |
|---|---|
| PSO 2 | Design, Implement and Evaluate a computer-based system to meet desired needs. |
| PSO 3 | Develop IT application services with the help of different current engineering tools. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| **Signature** | | | | |
| **Name of the Faculty** | **J.Geetharenuka** | | **Dr.G.Rajendra** | **Dr. D. Ratna Kishore** |

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## FRESHMAN ENGINEERING DEPARTMENT

## PART-A

| | | | |
|---|---|---|---|
| **Course Instructor** | : Dr. T. Satyanarayana | | |
| **Course Name & Code** | : Engineering Physics & 23FE04 | **Credits** | : 3 |
| **L-T-P Structure** | : 3-1-0 | **A.Y.** | : 2025-26 |
| **Program/Sem./Branch** | : B.Tech/II/IT/B | **Regulations**: R23 | |

**Pre-requisite** : Basic Knowledge of Physics

**Course Objectives:**

To bridge the gap between the physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

**Course Outcomes (COs):** At the end of this course, the student will be able to

| CO1 | Analyze the intensity variation of light due to interference, diffraction and Polarization **(Apply)** |
|---|---|
| CO2 | Understand the basics of crystals and their structures **(Understand)** |
| CO3 | Summarize various types of polarization of dielectrics and classify the magnetic materials **(Understand)** |
| CO4 | Explain fundamentals of quantum mechanics and free electron theory of metal **(Understand)** |
| CO5 | Identify the type of semiconductor using Hall Effect **(Apply)** |

**Course Articulation Matrix** (Correlation between COs, Pos & PSOs):

| Course Designed by | | | Division of Physics, Freshman Engineering Department | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | - | - | - | 1 |
| **CO2** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | - | - | - | 1 |
| **CO3** | 3 | 3 | 2 | 1 | 1 | 1 | | - | - | - | - | 1 |
| **CO4** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | - | - | - | 1 |
| **CO5** | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | - | - | - | 1 |
| **1** = Slight (Low) | | | **2** = Moderate (Medium) | | | **3** = Substantial (High) | | | | | | |

**Textbooks**

1. Engineering Physics, M.N.Avadhanulu, P.G.Kshirsagar, T.V.S. Arun Murthy, *S.Chand &Co., 11th Ed.*, 2019.
2. Engineering Physics, D.K. Bhattacharya & Poonam Tandon, *Oxford Press,* 2015.

**References**

1. Engineering Physics, B.K. Pandey & S. Chaturvedi, *Cengage Learning,* 2021.
2. Engineering Physics, Shatendra Sharma, Jyotsna Sharma, *Pearson Education*, 2018.
3. Engineering Physics, Sanjay D. Jain, D. Sahasrabudhe and Girish, *University Press*, 2010.
4. Engineering Physics, M.R. Srinivasan, *New Age International Publishers,* 2009.

**Web Resources**

1. http://www.loc.gov/rr/scitech/selected-internet/physics.html
2. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html
3. http://physicsdatabase.com/free-physics-books/
4. http://www.e-booksdirectory.com
5. http://www.thphys.physics.ox.ac.uk

<div align="center">

**PART-B**
**Course Delivery Plan (Lesson Plan)**
</div>

**Unit-I:** Interference, Diffraction & Polarization          **Course Outcome:** CO1; **Textbook:** T1, R2

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction to Course & its Outcomes | 1 | 03-02-2026 | | TLM-2 | |
| 2. | **Interference**: Introduction, Principle of Superposition, Interference of light | 1 | 04-02-2026 | | TLM-1 | |
| 3. | Interference in thin films by Reflection & Applications | 1 | 06-02-2026 | | TLM-1 | |
| 4. | Colors in thin films, Newton's rings | 1 | 07-02-2026 | | TLM-1 | |
| 5. | Determination of wavelength and refractive index | 1 | 10-02-2026 | | TLM-1 | |
| 6. | **Diffraction**: Introduction, Fresnel and Fraunhoffer diffractions | 1 | 11-02-2026 | | TLM-1 | |
| 7. | Problems & Assignment/Tutorial | 1 | 13-02-2026 | | TLM-3 | |
| 8. | Fraunhoffer diffraction due to single slit | 1 | 14-02-2026 | | TLM-2 | |
| 9. | Double slit & N slits (Qualitative) | 1 | 17-02-2026 | | TLM-2 | |
| 10. | Diffraction Grating, Dispersive power & Resolving power of Grating- Qualitative | 1 | 18-02-2026 | | TLM-1 | |
| 11. | Tutorial | 1 | 20-02-2026 | | TLM-3 | |
| 12. | **Polarization**: Introduction – Types of polarization | 1 | 21-02-2026 | | TLM-2 | |
| 13. | Polarization by reflection, refraction & double refraction | 1 | 24-02-2026 | | TLM-2 | |
| 14. | Nicol's Prism | 1 | 25-02-2026 | | TLM-1 | |
| 15. | Half wave and Quarter wave plates | 1 | 27-02-2026 | | TLM-2 | |
| **No. of classes required to complete UNIT-I:** 15 | | | | **No. of classes taken:** | | |

**Unit-II:** Crystallography & X– Ray Diffraction          **Course Outcome**: CO2; **Textbook**: T1, R2

| Sl. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Crystallography:** Space lattice; Basis, Unit cell & Lattice parameters | 1 | 28-02-2026 | | TLM-2 | |
| 2. | Crystal Systems (3D) Bravais Lattices | 1 | 03-03-2026 | | TLM-2 | |
| 3. | Coordination number and Packing fraction of SC, BCC | 1 | 06-03-2026 | | TLM-1 | |
| 4. | Coordination number and Packing fraction of FCC | 1 | 07-03-2026 | | TLM-1 | |
| 5. | Miller indices-Properties | 1 | 10-03-2026 | | TLM-1 | |
| 6. | Tutorial | 1 | 11-03-2026 | | TLM-3 | |
| 7. | Miller indices-Sketching planes | 1 | 13-03-2026 | | TLM-3 | |
| 8. | Separation between successive (hkl) planes | 1 | 14-03-2026 | | TLM-2 | |
| | **X-ray diffraction:** Bragg's law | 1 | 17-03-2026 | | TLM-2 | |
| 10 | X–ray Diffractometer | 1 | 18-03-2026 | | TLM-2 | |
| 11. | Crystal Structure determination by Laue's method Powder method | 1 | 21-03-2026 | | TLM 2 | |
| **No. of classes required to complete UNIT-II:** 11 | | | | **No. of classes taken:** | | |

**Unit-III:** Dielectric & Magnetic Materials          **Course Outcome:** CO3; **Textbook:** T1, R2

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Dielectric Materials:** Introduction, Dielectric polarization, Dielectric polarizability, Susceptibility | 1 | 01-04-2026 | | TLM-2 | |
| 2. | Dielectric constant and displacement vector | 1 | 04-04-2026 | | TLM-2 | |
| 3. | Relation between the electric vectors | 1 | 07-04-2026 | | TLM-1 | |
| 4. | Types of polarizations- Electronic polarization (Quantitative) | 1 | 08-04-2026 | | TLM-1 | |
| 5. | Tutorial | 1 | 10-04-2026 | | TLM-3 | |
| 6. | Ionic Polarization (Quantitative) & Orientation polarization (Qualitative) | 1 | 11-04-2026 | | TLM-2 | |
| 7. | Lorentz internal field | 1 | 15-04-2026 | | TLM-2 | |
| 8. | Claussius-Mossotti equation, complex dielectric constant | 1 | 17-04-2026 | | TLM-1 | |
| 9. | Frequency dependence of polarization | 1 | 18-04-2026 | | TLM-1 | |
| 10. | Dielectric loss | 1 | 21-04-2026 | | TLM-1 | |
| 11. | **Magnetic Materials:** Introduction Magnetic dipole moment, Magnetization, Magnetic susceptibility and permeability | 1 | 22-04-2026 | | TLM-2 | |
| 12. | Tutorial | 1 | 24-04-2026 | | TLM-3 | |
| 13. | Atomic origin of magnetism | 1 | 25-04-2026 | | TLM-1 | |
| 14. | Classification of magnetic materials- Dia, Para, Ferro, Anti-Ferro & Ferri magnetic materials | 1 | 28-04-2026 | | TLM-1 | |
| 15. | Domain concept for Ferromagnetism & Domain walls | 1 | 29-04-2026 | | TLM-1 | |
| 16. | Hysteresis, Soft and hard magnetic materials | 1 | 01-05-2026 | | TLM-1 | |
| **No. of classes required to complete UNIT-III: 16** | | | | **No. of classes taken:** | | |

**Unit-IV:** Quantum Mechanics & Free Electron Theory          **Course Outcome:** CO4; **Textbook:** T1, R2

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Quantum Mechanics:** Dual nature of matter, De-Broglie's Hypothesis | 1 | 02-05-2026 | | TLM-2 | |
| 2. | Heisenberg's Uncertainty Principle Significance & properties of wave function | 1 | 05-05-2026 | | TLM-2 | |
| 3. | Schrodinger's time independent and dependent wave equations | 1 | 06-04-2026 | | TLM-1 | |
| 4. | Tutorial | 1 | 08-05-2026 | | TLM-3 | |
| 5. | Particle in a one –dimensional infinite potential well | 1 | 09-05-2026 | | TLM-1 | |
| 6. | **Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) | 1 | 12-05-2026 | | TLM-1 | |
| 7. | Quantum free electron theory, Electrical conductivity based on quantum free electron theory | 1 | 13-05-2026 | | TLM-2 | |

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 8. | Fermi -Dirac distribution and temperature dependence Density of states, Fermi energy | 1 | 15-05-2026 | | TLM-1 | |

**No. of classes required to complete UNIT-III:** 08      **No. of classes taken:**

**Unit-V:** Semiconductor Physics      **Course Outcome:** CO5; **Textbook:** T2, R1

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Semiconductors**: Formation of energy bands, Classification of crystalline solids | 1 | 15-05-2026 | | TLM-1 | |
| 2. | Intrinsic semiconductors, Density of charge carriers | 1 | 02-06-2026 | | TLM-1 | |
| 3. | Electrical conductivity, Fermi level | 1 | 03-06-2026 | | TLM-2 | |
| 4. | Extrinsic semiconductors (p-type) Density of charge carriers | 1 | 05-06-2026 | | TLM-2 | |
| 5. | Extrinsic semiconductors (n-type) Density of charge carriers | 1 | 06-06-2026 | | TLM-2 | |
| 6. | Dependence of Fermi energy on carrier concentration &temperature | 1 | 09-06-2026 | | TLM-1 | |
| 7. | Tutorial | 1 | 10-06-2026 | | | |
| 8. | Drift and Diffusion Currents, Einstein's equation | 1 | 12-06-2026 | | TLM-1 | |
| 9. | Hall Effect & its applications | 1 | 13-06-2026 | | TLM-1 | |

**No. of classes required to complete UNIT-III:** 09      **No. of classes taken:**

| **Teaching-Learning Methods** | | | |
|---|---|---|---|
| **TLM-1** | Chalk and talk | **TLM-4** | Demonstration (Lab/Field Visit) |
| **TLM-2** | PPT/A illustrations | **TLM-5** | ICT (NPTEL/Swayam Prabha /MOOCS) |
| **TLM-3** | Tutorial/Quiz/Assignment | **TLM-6** | Group Discussion/Project |

## **PART-C**

### **EVALUATION PROCESS (R23 Regulation)**

| Evaluation Task | Marks |
|---|---|
| Assignment-I (Units-I, II) | A1=5 |
| I-Descriptive Examination (Units-I, II) | M1=15 |
| I-Quiz Examination (Units-I, II) | Q1=10 |
| Assignment-II (Unit-III, IV & V) | A2=5 |
| II- Descriptive Examination (UNIT-III, IV & V) | M2=15 |
| II-Quiz Examination (UNIT-III, IV & V) | Q2=10 |
| Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2)) | M=30 |
| Cumulative Internal Examination (CIE): M | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

# PART-D

**PROGRAMME OUTCOMES (POs):**

| | |
|---|---|
| **PO 1** | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| **PO 2** | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| **PO 3** | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| **PO 4** | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **PO 5** | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations |
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| **PO 8** | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO 9** | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO 10** | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO 11** | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| **PO 12** | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

**Date**: 02-02-2026

| Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|
| Dr. T. Satyanarayana | Dr. S. Yusub | Dr. S. Yusub | Dr. T. Satyanarayana |
| | | | |

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**Phone**: 08659-222933, **Fax**: 08659-222931

**FRESHMAN ENGINEERING DEPARTMENT**

## COURSE HANDOUT
### Part-A

| | |
|---|---|
| **PROGRAM** | : I B. Tech., II-Sem., IT-B |
| **ACADEMIC YEAR** | : 2025-26 |
| **COURSE NAME & CODE** | : Differential Equations & Vector Calculus |
| **L-T-P STRUCTURE** | : 3-0-0 |
| **COURSE CREDITS** | : 3 |
| **COURSE INSTRUCTOR** | : Mr.B.Tandava Krishna |
| **COURSE COORDINATOR** | : Dr. K.Jhansi Rani |
| **PRE-REQUISITES** | : Basics of Vectors, Differentiation, Integration |

## COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enlighten the learners in the concept of differential equations and multivariable calculus
- To furnish the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real-world applications.

## COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

CO1: Solve the differential equations related to various engineering fields – **L3**

CO2: Apply knowledge of partial differentiation in modeling and solving of Partial differential equations – **L3**

CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence – **L3**

CO4: Evaluate the work done against a field, circulation and flux using Vector Calculus – **L3**

## COURSE ARTICULATION MATRIX (Correlation between Cos &POs, PSOs):

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | 3 | - | - | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 1 | - | - | - | - | - | - | - | - | - | 1 |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| CO4 | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |

**Note:** Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'.**

**1-** Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

## BOS APPROVED TEXT BOOKS:

**T1** Dr. B.S. Grewal, "Higher Engineering Mathematics", 44ndEdition, Khanna Publishers, New Delhi, 2017.

**T2** Erwin Kreyszig, *"Advanced Engineering Mathematics"*, 10th Edition, John Wiley & sons, New Delhi, 2018.

## BOS APPROVED REFERENCE BOOKS:

**R1** George B. Thomas, Maurice D. Weir and Joel Hass, "*Thomas Calculus*", 14th Edition, Pearson Publishers, 2018.

**R2** Dennis G. Zill and Warren S. Jones and Bartlett, "*Advanced Engineering Mathematics*",2018.

**R3** Glyn James, "*Advanced Modern Engineering Mathematics*", 5th Edition, Pearson Publishers, 2018.

**R4** R.K. Jain and S.R.K. Iyengar, "*Advanced Engineering Mathematics*", 5th Edition (9th reprint), Alpha Science International Ltd., 2021.

**R5** B. V. Ramana, "*Higher Engineering Mathematics*", 3rd Edition McGraw Hill Education, 2017.

**COURSE DELIVERY PLAN (LESSON PLAN):**

| S. No | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 1. | Introduction to the course | 1 | 02/02/2026 | | TLM2 | | | |
| 2. | Course Outcomes, Program Outcomes | 1 | 03/02/2026 | | TLM2 | | | |

### UNIT-I: Differential Equations of first order and first degree

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 3. | Introduction to UNIT I | 1 | 05/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 4. | Linear Differential equation | 1 | 06/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 5. | Bernoulli's DE | 1 | 07/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 6. | TUTORIAL - 1 | 1 | 09/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 7. | Exact DE | 1 | 10/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 8. | Non-exact DE Type I | 1 | 12/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 9. | Non-exact DE Type II | 1 | 13/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 10. | Non-exact DE Type III | 1 | 14/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 11. | TUTORIAL - 2 | 1 | 16/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 12. | Non-exact DE Type IV | 1 | 17/02/2026 | | TLM3 | CO1 | T1,T2 | |
| 13. | Newton's Law of cooling | 1 | 19/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 14. | Law of natural growth and decay | 1 | 20/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 15. | Electrical circuits | 1 | 21/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 16. | TUTORIAL - 3 | 1 | 23/02/2026 | | TLM3 | CO1 | T1,T2 | |
| No. of classes required to complete UNIT-I | | 14 | | | No. of classes taken: | | | |

### UNIT-II: Linear Differential equations of higher order (Constant Coefficients)

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 17. | Introduction to UNIT II | 1 | 24/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 18. | Solving a homogeneous DE | 1 | 26/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 19. | Finding Particular Integral, P.I for $e^{ax+b}$ | 1 | 27/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 20. | P.I for Cos bx, or sin bx | 1 | 28/02/2026 | | TLM1 | CO1 | T1,T2 | |
| 21. | TUTORIAL - 4 | 1 | 02/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 22. | P.I for polynomial function | 1 | 05/03/2026 | | TLM3 | CO1 | T1,T2 | |
| 23. | P.I for $e^{ax+b}v(x)$ | 1 | 06/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 24. | P.I for $x^k v(x)$ | 1 | 07/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 25. | TUTORIAL - 5 | 1 | 09/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 26. | Method of Variation of parameters | 1 | 10/03/2026 | | TLM1 | CO1 | T1,T2 | |

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 27. | Method of Variation of parameters | 1 | 12/03/2026 | | TLM3 | CO1 | T1,T2 | |
| 28. | Simultaneous linear equations | 1 | 13/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 29. | L-C-R circuits | 1 | 14/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 30. | TUTORIAL - 6 | 1 | 16/03/2026 | | TLM1 | CO1 | T1,T2 | |
| 31. | Simple Harmonic motion | 1 | 17/03/2026 | | TLM3 | CO1 | T1,T2 | |
| 32. | Revision | 1 | 20/03/2026 | | | | | |
| No. of classes required to complete UNIT-II | | 16 | | | No. of classes taken: | | | |

**I MID EXAMINATIONS (23-03-2026 TO 28-03-2026)**

**UNIT-III: Partial Differential Equations**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 33. | Introduction to Unit III | 1 | 30/03/2026 | | TLM1 | CO2 | T1,T2 | |
| 34. | Formation of PDE by elimination of arbitrary constants | 1 | 31/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 35. | Formation of PDE by elimination of arbitrary functions | 1 | 02/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 36. | Formation of PDE by elimination of arbitrary functions | 1 | 04/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 37. | TUTORIAL - 7 | 1 | 06/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 38. | Solving of PDE | 1 | 07/04/2026 | | TLM3 | CO2 | T1,T2 | |
| 39. | Lagrange's Method | 1 | 09/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 40. | Homogeneous Linear PDE with constant coefficients | 1 | 10/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 41. | Homogeneous Linear PDE with constant coefficients | 1 | 11/04/2026 | | TLM1 | CO2 | T1,T2 | |
| 42. | TUTORIAL - 8 | 1 | 13/04/2026 | | TLM3 | CO2 | T1,T2 | |
| 43. | Homogeneous Linear PDE with constant coefficients | 1 | 16/04/2026 | | TLM1 | CO2 | T1,T2 | |
| No. of classes required to complete UNIT-III | | 11 | | | No. of classes taken: | | | |

**UNIT-IV: Vector Differentiation**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 44. | Introduction to UNIT IV | 1 | 17/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 45. | Vector Differentiation | 1 | 18/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 46. | TUTORIAL - 9 | 1 | 20/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 47. | Gradient | 1 | 21/04/2026 | | TLM3 | CO3 | T1,T2 | |
| 48. | Directional Derivative | 1 | 23/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 49. | Divergence | 1 | 24/04/2026 | | TLM1 | CO3 | T1,T2 | |

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 50. | Curl | 1 | 25/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 51. | TUTORIAL – 10 | 1 | 27/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 52. | Solenoidal fields, Irrotational fields, potential surfaces | 1 | 28/04/2026 | | TLM3 | CO3 | T1,T2 | |
| 53. | Solenoidal fields, Irrotational fields, potential surfaces | 1 | 30/04/2026 | | TLM1 | CO3 | T1,T2 | |
| 54. | Laplacian, second order operators | 1 | 01/05/2026 | | TLM1 | CO3 | T1,T2 | |
| 55. | Vector Identities | 1 | 02/05/2026 | | TLM1 | CO3 | T1,T2 | |
| 56. | TUTORIAL - 11 | 1 | 04/05/2026 | | TLM1 | CO3 | T1,T2 | |
| 57. | Vector Identities | 1 | 05/05/2026 | | TLM3 | CO3 | T1,T2 | |
| No. of classes required to complete UNIT-IV | | 14 | | | | No. of classes taken: | | |

## UNIT-V: Vector Integration

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 58. | Introduction to Unit-V | 1 | 07/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 59. | Line Integral | 1 | 08/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 60. | Circulation | 1 | 09/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 61. | TUTORIAL - 12 | 1 | 11/05/2026 | | TLM3 | CO4 | T1,T2 | |
| 62. | Work done | 1 | 12/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 63. | Surface Integral, Flux | 1 | 14/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 64. | Volume Integral | 1 | 15/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 65. | Green's Theorem | 1 | 16/05/2026 | | TLM1 | CO4 | T1,T2 | |
| 66. | TUTORIAL - 13 | 1 | 01/06/2026 | | TLM3 | CO4 | T1,T2 | |
| 67. | Green's Theorem | 1 | 02/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 68. | Stoke's Theorem | 1 | 04/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 69. | Divergence Theorem | 1 | 05/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 70. | Divergence Theorem | 1 | 06/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 71. | TUTORIAL - 14 | 1 | 08/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 72. | Revision | 1 | 09/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 73. | Revision | 1 | 11/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 74. | Revision | 1 | 12/06/2026 | | TLM1 | CO4 | T1,T2 | |
| 75. | Revision | 1 | 13/06/2026 | | TLM1 | CO4 | T1,T2 | |
| No. of classes required to complete UNIT-V | | 14 | | | | No. of classes taken: | | |

### Content beyond the Syllabus

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|---|---|---|---|---|---|---|
| 76. | Non-homogeneous Linear PDE with constant coefficients | 2 | 11/06/2026 & 12/06/2026 | | TLM2 | CO2 | T1,T2 | |
| No. of classes | | 2 | | | | No. of classes taken: | | |

**II MID EXAMINATIONS (15-06-2026 TO 20-06-2026)**

## Teaching Learning Methods

| | | | |
|---|---|---|---|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/SwayamPrabha/MOOCS) |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project |

### PART-C EVALUATION PROCESS (R23 Regulation):

| Evaluation Task | Marks |
|---|---|
| Assignment-I (Units-I, II) | A1=5 |
| I-Descriptive Examination (Units-I, II) | M1=15 |
| I-Quiz Examination (Units-I, II) | Q1=10 |
| Assignment-II (Unit-III, IV & V) | A2=5 |
| II- Descriptive Examination (UNIT-III, IV & V) | M2=15 |
| II-Quiz Examination (UNIT-III, IV & V) | Q2=10 |
| Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2)) | M=30 |
| Cumulative Internal Examination (CIE): | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

### PART-D PROGRAMME OUTCOMES (POs):

| | |
|---|---|
| **PO 1** | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems. |
| **PO 2** | **Problem analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| **PO 3** | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations. |
| **PO 4** | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions. |
| **PO 5** | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations |
| **PO 6** | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| **PO 7** | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development. |
| **PO 8** | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO 9** | **Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings. |
| **PO 10** | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions. |
| **PO 11** | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| **PO 12** | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

| Mr.B.Tandava Krishna | Dr. K.Jhansi Rani | Dr. A. RAMI REDDY | Dr.T.Satyanarayana |
|---|---|---|---|
| Course Instructor | Course Coordinator | Module Coordinator | HOD |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with "A" Grade & NBA (Under Tier - I)**
An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
**L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.**
**Phone**: 08659-222933, **Fax**: 08659-222931

## DEPARTMENT OF ECE

## COURSE HANDOUT

### PART-A

**Name of Course Instructor:** Dr A.Narendra Babu          **Date**: 02-02-2026
**Course Name & Code**     : Basic Electrical & Electronics Engineering – 23EE01
**L-T-P Structure**          : 3-0-0                                **Credits:** 3
**Program/Sem./Sec.**      : B.Tech/II/IT-B                     **A.Y.:** 2025-26
                                                                  **Regulations**: R23

**PREREQUISITE:** Physics

**Course Objectives (COs)**

**Basic Electrical Engineering:**
To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.
**Basic Electronics Engineering**
To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

**Course Outcomes (COs):** At the end of the course, student will be able to

| | PART-A: BASIC ELECTRICAL ENGINEERING |
|---|---|
| **CO1** | Extract electrical variables of AC & DC circuits using fundamental laws. **(Understand)** |
| **CO2** | Understand the operation of electrical machines and measuring instruments. **(Understand)** |
| **CO3** | Classify various energy resources, safety measures and interpret electricity bill generation in electrical systems. **(Understand)** |
| | PART-B: BASIC ELECTRONICS ENGINEERING |
| **CO4** | Interpret the characteristics of various semiconductor devices **(Knowledge)** |
| **CO5** | Infer the operation of rectifiers, amplifiers. **(Understand)** |
| **CO6** | Contrast various logic gates, sequential and combinational logic circuits. **(Understand)** |

**COURSE ARTICULATION MATRIX** (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 3 | | | | | | | | | 1 | 3 | 2 | | 2 |
| **CO2** | 2 | 2 | | | | | | | | | | | | 2 | | 3 |
| **CO3** | 2 | 2 | | | | 3 | | | | | 2 | 2 | 2 | | | |
| **CO4** | 3 | 2 | | | | | | | | | | 1 | 2 | | 3 | 2 |
| **CO5** | 3 | 2 | | | | | | | | | | 1 | 2 | | 3 | 2 |
| **CO6** | 2 | 2 | 2 | | | | | | | | | | 2 | | 2 | 1 |
| | **1 - Low** | | | | | **2 –Medium** | | | | | **3 - High** | | | | | |

**TEXTBOOKS:**
1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

4. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
5. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

**REFERENCE BOOKS:**
1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.
5. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
6. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
7. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

# PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

### PART B: BASIC ELECTRONICS ENGINEERING

### UNIT-I: Semiconductor Devices

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction to Course and Course Outcomes | 1 | 04-02-2026 | | TLM1 | |
| 2. | Evolution of electronics, Vacuum tubes to nano electronics | 1 | 05-02-2026 | | TLM1 | |
| 3. | Characteristics of PN Junction Diode, **Role-Play Pedagogy**: "Inside the PN Junction"-ITM | 1 | 06-02-2026 | | TLM1 | |
| 4. | Zener Effect — Zener Diode and its Characteristics | 1 | 11-02-2026 | | TLM1 | |
| 5. | Bipolar Junction Transistor | 1 | 12-02-2026 | | TLM1 | |
| 6. | Bipolar Junction Transistor | 1 | 13-02-2026 | | TLM1 | |
| 7. | CB Configurations and Characteristics | 1 | 14-02-2026 | | TLM2 | |
| 8. | CE Configurations and Characteristics. CC Configurations and Characteristics. | 1 | 18-02-2026 | | TLM2 | |
| 9. | Elementary Treatment of Small Signal CE Amplifier. | 1 | 19-02-2026 | | TLM2 | |
| **No. of classes required to complete UNIT-I: 09** | | | | **No. of classes taken:** | | |

### UNIT-II: Basic Electronic Circuits and Instrumentation

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 10. | Rectifiers and power supplies: Block diagram description of a DC power supply | 1 | 20-02-2026 | | TLM1 | |
| 11. | Working of full wave bridge rectifier, capacitor filter (no analysis) | 1 | 21-02-2026 | | TLM1 | |
| 12. | Working of full wave bridge rectifier, capacitor filter (no analysis) | 1 | 25-02-2026 | | TLM1 | |
| 13. | Amplifiers: Block diagram of Public Address system | 1 | 26-02-2026 | | TLM1 | |
| 14. | Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency | 1 | 27-02-2026 | | TLM2 | |

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| | response. | | | | | |
| 15. | Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. **QUIZ** -ITM | 1 | 28-02-2026 | | TLM1 | |
| 16. | Electronic Instrumentation**:** Block diagram of an electronic instrumentation system. | 1 | 04-03-2026 | | TLM2 | |
| 17. | Electronic Instrumentation: Block diagram of an electronic instrumentation system. | 1 | 05-03-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-II: 08** | | | | **No. of classes taken:** | | |

## UNIT-III: Digital Electronics

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 18. | Overview of Number Systems | 1 | 06-03-2026 | | TLM1 | |
| 19. | Logic gates including Universal Gates -NOT, OR, AND, NOR, NAND, XOR and XNOR | 1 | 07-03-2026 | | TLM2 | |
| 20. | BCD codes, Excess-3 code, gray code**, Logic Gates as Decision Machines**-ITM | 1 | 11-03-2026 | | TLM1 | |
| 21. | Hamming code, | 1 | 12-03-2026 | | TLM2 | |
| 22. | Basic Theorems and properties of Boolean Algebra, Boolean Algebra | 1 | 13-03-2026 | | TLM1 | |
| 23. | Half and Full Adders, | 1 | 14-03-2026 | | TLM1 | |
| 24. | Simple combinational circuits | 1 | 18-03-2026 | | TLM1 | |
| 25. | Introduction to sequential circuits, Flip flops, Registers, Counters | 1 | 20-03-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-III: 08** | | | | **No. of classes taken:** | | |

### I Mid Examinations: 23-03-2026 to 28-03-2026

## PART A: BASIC ELECTRICAL ENGINEERING

## UNIT-I:  DC & AC Circuits

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 26. | Introduction to Course and Course Outcomes | 1 | 01-04-2026 | | TLM1 | |
| 27. | DC Circuits: Electrical circuit elements (R, L and C) | 1 | 02-04-2026 | | TLM1 | |
| 28. | Ohm's Law and its limitations, KCL & KVL, **HUMAN KCL & KVL ROLE-PLAY-ITM** | 1 | 04-04-2026 | | TLM1 | |
| 29. | Series, Parallel, series-parallel circuits | 1 | 08-04-2026 | | TLM1 | |
| 30. | Problems on series-parallel circuits | | 09-04-2026 | | | |
| 31. | Superposition theorem | 1 | 10-04-2026 | | TLM1 | |
| 32. | **AC Circuits:** A.C. Fundamentals: | 1 | 11-04-2026 | | TLM1 | |
| 33. | Equation of AC Voltage and current, waveform | 1 | 15-04-2026 | | TLM1 | |
| 34. | Time period, frequency, amplitude, phase, | 1 | 16-04-2026 | | TLM1 | |

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 35. | Phase difference, average value, RMS value | | 17-04-2026 | | | |
| 36. | Form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits | 1 | 18-04-2026 | | TLM1 | |
| 37. | Concept of Impedance, Active power, reactive power and apparent power | 1 | 22-04-2026 | | TLM2 | |
| 38. | Concept of power factor (Simple Numerical problems). | 1 | 23-04-2026 | | TLM1 | |
| No. of classes required to complete UNIT-I: 13 | | | | No. of classes taken: | | |

## UNIT-II: Machines and Measuring Instruments

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 39. | **Machines:** Construction, principle and operation of DC Motor | 2 | 24-04-2026 25-04-2026 | | TLM1 | |
| 40. | Construction, principle and operation of DC Generator | 2 | 29-04-2026 30-04-2026 | | TLM2 | |
| 41. | Construction, principle and operation of Single-Phase Transformer | 1 | 01-05-2026 | | TLM2 | |
| 42. | Construction, principle and operation of Three Phase Induction Motor | 1 | 02-05-2026 | | TLM2 | |
| 43. | Construction, principle and operation of Alternator, Applications of electrical machines | 1 | 06-05-2026 07-05-2026 | | TLM1 | |
| 44. | Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC) | 1 | 08-05-2026 | | TLM2 | |
| 45. | Moving Iron (MI) Instruments, Wheatstone Bridge | 1 | 09-05-2026 | | TLM2 | |
| No. of classes required to complete UNIT-II: 09 | | | | No. of classes taken: | | |

## UNIT-III: Energy Resources, Electricity Bill & Safety Measures

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 46. | Energy Resources: Conventional and non-conventional energy resources | 1 | 13-05-2026 | | TLM1 | |
| 47. | Layout and operation of various Power Generation systems: Hydel power generation | 2 | 14-05-2026 15-05-2026 | | TLM1 | |
| 48. | Layout and operation of nuclear power generation | 1 | 16-05-2026 | | TLM1 | |
| 49. | Layout and operation of Solar power generation | 1 | 03-06-2026 04-06-2026 | | TLM1 | |
| 50. | Electricity bill: Power rating of household appliances including air conditioners PCs, Laptops, Printers, etc. **Electricity Bill as a Story Problem-ITM** | 1 | 05-06-2026 06-06-2026 | | TLM1 | |

| SI. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 51. | Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, Calculation of electricity bill for domestic consumers | 2 | 10-06-2026 11-06-2026 | | TLM1 | |
| 52. | Equipment Safety Measures: Working principle of Fuse and Miniature Circuit Breaker (MCB), merits and demerits. | 1 | 12-06-2026 | | TLM1 | |
| 53. | Personal Safety Measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock. | 1 | 13-06-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-III: 10** | | | | **No. of classes taken:** | | |

**II Mid Examinations: 15-06-2026 to 20-06-2026**

| Teaching Learning Methods | | | |
|---|---|---|---|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/Swayam Prabha/MOOCS) |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project |

## PART-C

**EVALUATION PROCESS (R23 Regulation):**

| Evaluation Task | Marks |
|---|---|
| Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus)) | A1=5 |
| I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus)) | M1=15 |
| I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus)) | Q1=10 |
| Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V) | A2=5 |
| II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V) | M2=15 |
| II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V) | Q2=10 |
| Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2)) | M=30 |
| Cumulative Internal Examination (CIE): | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

**ACADEMIC CALENDAR:**

| Description | From | To | Weeks |
|---|---|---|---|
| I Phase of Instructions | 02-02-2026 | 21-03-2026 | 8W |
| I Mid Examinations | 23-03-2026 | 28-03-2026 | 1W |
| II Phase of Instructions | 30-03-2026 | 16-05-2026 | 8W |
| Summer Vacation | 18-05-2026 | 30-05-2026 | 2W |
| II Phase of Instructions | 01-06-2026 | 13-06-2026 | 2W |
| II Mid Examinations | 15-06-2026 | 20-06-2026 | 1W |
| Preparation and Practicals | 22-06-2026 | 27-06-2026 | 1W |
| Semester End Examinations | 29-06-2026 | 11-07-2026 | 2W |

## PART-D

**PROGRAMME OUTCOMES (POs):**

| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering |
|---|---|

| | fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|---|---|
| PO 2 | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| PO 7 | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

## PROGRAMME SPECIFIC OUTCOMES (PSOs):

| PSO a | Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power |
|---|---|
| PSO b | Design and analyze electrical machines, modern drive and lighting systems |
| PSO c | Specify, design, implement and test analog and embedded signal processing electronic systems |
| PSO d | Design controllers for electrical and electronic systems to improve their performance. |

**Date**: 02-02-2026

| **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|
| Dr.A.Narendra Babu | Dr. AVGA Marthanda | Dr. G. Nageswara Rao | Dr. G.Srinivasulu |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
## (An Autonomous Institution since 2010)
### Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
### L.B. Reddy Nagar, Mylavaram, NTR District, Andhra Pradesh - 521230

Estd: 1998

## DEPARTMENT OF MECHANICAL ENGINEERING
## COURSE HANDOUT
## PART-A

**Name of Course Instructor:** **Dr. K. Dilip Kumar, Professor,**
Dr. P. Ravindra Kumar, Professor,
Mr. D. Mallikarjuna Rao, Sr. Asst. Professor

| Course Name & Code | : Engineering Drawing – 23ME01 | |
|---|---|---|
| L-T-P Structure | : 3-0-4 | **Credits:** 4 |
| Program/Sem/Sec | : B.Tech/I Sem/B-Sec | **A.Y.:** 2025-26 |

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** To recognize the Bureau of Indian Standards of Engineering Drawing and develop an ability to get familiarized with orthographic projections and isometric views of solid objects.

**COURSE OUTCOMES (COs):** At the end of the course, student will be able to

| CO1 | Understand the principles of engineering drawing, including engineering curves, scales, Orthographic and isometric projections. (**Understanding Level –L2**) |
|---|---|
| CO2 | Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. (**Applying Level –L3**) |
| CO3 | Understand and draw projection of solids in various positions in first quadrant. (**Applying Level –L3**) |
| CO4 | Draw the development of surfaces of simple objects. (**Applying Level –L3**) |
| CO5 | Prepare isometric and orthographic sections of simple solids. (**Applying Level –L3**) |

### COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | 2 | 1 | 2 |
| CO2 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 3 | 1 | 1 | 2 |
| CO3 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | - | 1 | 2 |
| CO4 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | 2 | 1 | 2 |
| CO5 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| | **1 -** Low | | | | **2 –**Medium | | | | **3 -** High | | | | | | |

**TEXTBOOKS:**
**T1** N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar publishers,2012
**REFERENCE BOOKS:**
**R1** Narayana K L, Kannaiah P, Textbook on Engineering Drawing, 2nd Edition, SciTech publishers.
**R2** R.K.Dhawan, Engineering Drawing, S.Chand Company LTD.
**R3** Venugopal, Engineering Drawing and Graphics, New Age publishers
**R4** Dhananjay A. Jolhe, Engineering Drawing, Tata McGraw Hill Publishers
**R5** N.S.Parthasarathy, Vela Murali, Engineering Drawing, Oxford Higher Education

**COURSE DELIVERY PLAN (LESSON PLAN):**

**UNIT-I: INTRODUCTION TO ENGINEERING GRAPHICS, LETTERING, LINES AND DIMENSIONING, CONICS, CYCLOIDS, INVOLUTES**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date | Actual Date | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1 | **UNIT I: INTRODUCTION:** Introduction to Engineering Drawing, CEOs, COs, PEOs, and POs and PSOs | 2 | 02-02-2026 | | TLM1/ TLM2 | |
| 2 | Principles of Engineering Graphics and their significance, Drawing Instruments and their use- Conventions in Drawing – Practical orientation | | | | | |
| 3 | Lettering and Dimensioning – BIS Conventions- Geometrical Constructions – Theory Class | | | | | |
| 4 | Practice | 3 | 05-02-2026 | | TLM4 | |
| 5 | Engineering Curves: Conic Sections- Construction of ellipse, parabola and Hyperbola –Theory class | 2 | 09-02-2026 | | TLM1 | |
| 6 | Construction of Parabola, ellipse, hyperbola – General method -Practice | 3 | 12-02-2026 | | TLM4 | |
| 7 | Cycloids –Theory class | 2 | 16-02-2026 | | TLM1 | |
| 8 | Practice Session | 3 | 19-02-2026 | | TLM4 | |
| 9 | Involutes – Theory class | 2 | 23-02-2026 | | TLM1 | |
| 10 | Practice Session | 3 | 26-02-2026 | | TLM4 | |
| **No. of classes required to complete UNIT-I: 20 (Lecture:8 Practice:12)** | | | | **No. of classes taken: (including Practice)** | | |

**UNIT-II: PROJECTIONS OF POINTS, LINES AND PLANES**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date | Actual Date | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 9 | Orthographic Projections, First and third angle projection methods, Projections of Points, Lines inclined to one plane | 2 | 02-03-2026 | | TLM1 | |
| 10 | Practice Session | 3 | 05-03-2026 | | TLM4 | |
| 11 | Projection of lines - Projections of Straight Line Inclined to both the reference planes | 2 | 09-03-2026 | | TLM1 | |
| 12 | Practice Session | 3 | 12-03-2026 | | TLM4 | |
| 13 | Projections of planes- Regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes. | 2 | 16-03-2026 | | TLM1 | |
| **No. of classes required to complete UNIT-II: 12 (Lecture:6 Practice:6)** | | | | **No. of classes taken: (including Practice)** | | |

**UNIT-III: PROJECTIONS OF SOLIDS**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date | Actual Date | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 16 | Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane – Theory and practice | 2 | 30-03-2026 | | TLM1 TLM4 | |

| 17 | Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane. | 3 | 02-04-2026 | | TLM1 | |
| 18 | Practice Session | 2 | 06-04-2026 | | TLM 4 | |

**No. of classes required to complete UNIT-III: 07**
**(Lecture:5 Practice:2)**

**No. of classes taken:**
**(including Practice)**

### UNIT-IV: SECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES

| S. No. | Topics to be covered | No. of Class Required | Tentative Date | ActualDate | Teaching Learning ng Method | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 19 | Sections of Solids<br>Solids in simple positions, Perpendicular and inclined section planes | 3 | 09-04-2026 | | TLM1 | |
| 20 | Practice Session | 2 | 13-04-2026 | | TLM4 | |
| 21 | Sections of solids: Sectional views and True shape of section | 3 | 16-04-2026 | | TLM1 | |
| 22 | Practice Session | 2 | 20-04-2026 | | TLM4 | |
| 23 | Development of solids<br>Methods of Development: Parallel line development and radial line development | 3 | 23-04-2026 | | TLM1 | |
| 24 | Practice Session | 2 | 27-04-2026 | | TLM4 | |
| 25 | Development of solids<br>Development of a cube, prism, cylinder, pyramid and cone. | 3 | 30-04-2026 | | TLM1 | |

**No. of classes required to complete UNIT-IV: 18**
**(Lecture:6 Practice:12)**

**No. of classes taken:**
**(including Practice)**

### UNIT-V: CONVERSION OF VIEWS

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date | Actual Date | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 26 | Introduction to Isometric Views – Theory<br>Isometric views, isometric axes, scale, lines & planes | 2 | 04-05-2026 | | TLM1 | |
| 27 | Practice Session | 3 | 07-05-2026 | | TLM4 | |
| 28 | Orthographic projections to Isometric Projections | 2 | 11-05-2026 | | TLM1 | |
| 29 | Practice Session | 3 | 14-05-2026 | | TLM4 | |
| 30 | Orthographic Projections to Isometric Projections | 2 | 01-06-2026 | | TLM1 | |
| 31 | Practice Session | 3 | 04-06-2026 | | TLM4 | |
| 32 | **Content beyond the syllabus:** Scales, Planes inclined to both the planes. | 2 | 08-06-2026 | | TLM1/ TLM2 | |
| 33 | Revision | 3 | 11-06-2026 | | TLM1 | |

**No. of classes required to complete UNIT-V: 20**
**(Lecture:08 Practice:12)**

**No. of classes taken:**

| Teaching Learning Methods | | | |
|---|---|---|---|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/SwayamPrabha/MOOCS) |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project |

## PART-C

**EVALUATION PROCESS (R23 Regulation):**

| Evaluation Task | Marks |
|---|---|
| I-Descriptive Examination (Units-I, II ) | M1=15 |
| II- Descriptive Examination (UNIT-III , IV & V) | M2=15 |
| Day to Day Evaluation (Assignment) | 15 |
| Mid Marks =80% of Max (M1,M2)+ 20% of Min ((M1, M2) + Day to Day Evaluation | M=30 |
| Cumulative Internal Examination (CIE): M | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

## PART-D

### PROGRAMME OUTCOMES (POs):

**Engineering Graduates will be able to:**

| PO 1 | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|---|---|
| PO 2 | **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| PO 6 | **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| PO 7 | **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

### PROGRAMME SPECIFIC OUTCOMES (PSOs):

| PSO1 | **To apply the principles of thermal sciences to design and develop various thermal systems.** |
|---|---|
| PSO2 | **To apply the principles of manufacturing technology, scientific management towards improvement of quality and optimization of engineering systems in the design, analysis and manufacturability of products.** |
| PSO3 | **To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.** |

| Title | Course Instructor | Course Coordinator | Head of the Department |
|---|---|---|---|
| Name of the Faculty | Dr.K.Dilip Kumar | Mr.J.Subba Reddy | Dr. M B S S Reddy |
| Signature | | | |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)**
**An ISO 21001:2018,14001:2015,50001:2018 Certified Institution**
**Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada**
**L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.**
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

# COURSE HANDOUT

## PART-A

**Name of Course Instructor** : Mrs.D.Vijaya Sri
**Course Name & Code**      : DATA STRUCTURES & 23CS02
**L-T-P Structure**       : 3-0-0                **Credits:** 3
**Program/Sem/Sec**      : B.Tech/IT/II /B           **A.Y.:** 2025-26

**PREREQUISITE  : Introduction to Programming-20CS01**

**COURSE EDUCATIONAL OBJECTIVES(CEO):**

The objective of the course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

**COURSE OUTCOMES (COs):** At the end of the course, student will be able to

| | |
|---|---|
| **CO1** | Understand the role of linear and nonlinear data structures in organizing and accessing data **(Understand-L2)** |
| **CO2** | Implement abstract data type (ADT) and data structures for given application. **(Apply-L3)** |
| **CO3** | Design algorithms based on techniques like linked list, stack, queue, trees etc. **(Apply-L3)** |
| **CO4** | Apply the appropriate linear and nonlinear data structure techniques for solving a problem. **(Apply-L3)** |
| **CO5** | Design hash-based solutions for specific problems. **(Apply-L3)** |

**COURSE ARTICULATION MATRIX** (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | | | | | | | | | | | 2 | | |
| CO2 | 3 | 2 | 2 | 1 | | | | | | | | | | 2 | |
| CO3 | 3 | 2 | 2 | 1 | | | | | | | | | | 3 | |
| CO4 | 3 | 2 | 2 | 1 | | | | | | | | | | 2 | |
| CO5 | 3 | 2 | 2 | 1 | | | | | | | | | | 2 | |
| **1 -** Low | | | | | **2 –**Medium | | | | | **3 -** High | | | | | |

**TEXTBOOKS:**

**T1**  Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
**T2**  Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan AndersonFreed, Silicon Press, 2008

**REFERENCE BOOKS:**

**R1**  Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
**R2**  C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
**R3**  Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
**R4**  Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
**R5**  Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

## PART-B

**COURSE DELIVERY PLAN (LESSON PLAN):**

**UNIT-I: Introduction to Linear Data Structures**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction and Discussion of CO's | 1 | 03-02-2026 | | TLM1 | |
| 2. | Definition and Importance of LinearData Structures | 1 | 04-02-2026 | | TLM1 | |
| 3. | Abstract Data Typesand Implementation | 1 | 05-02-2026 | | TLM1 | |
| 4. | Overview of time and space complexity | 1 | 07-02-2026 | | TLM1 | |
| 5. | Analysis of Liner Datastructures | 1 | 10-02-2026 | | TLM1 | |
| 6. | Revise Arrays | 1 | 11-02-2026 | | TLM 1 | |
| 7. | Searching Techniques: LinearSearch | 1 | 12-02-2026 | | TLM 1 & 4 | |
| 8. | Binary Search & Analysis | 1 | 14-02-2026 | | TLM 1 & 4 | |
| 9. | Bubble Sort &Analysis | 1 | 17-02-2026 | | TLM 1 & 4 | |
| 10. | Insertion Sort & Analysis | 1 | 18-02-2026 | | TLM 1 & 4 | |
| 11. | Selection Sort &Analysis | 1 | 19-02-2026 | | TLM 1 & 4 | |
| 12. | Tutorial | 1 | 21-02-2026 | | TLM3 | |
| 13. | Revision & Assignment | 1 | 24-02-2026 | | TLM2 | |
| **No. of classes required to complete UNIT-I: 13** | | | | **No. of classes taken:** | | |

**UNIT-II: Linked Lists**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 14. | List Implementation using Arrays and Array Disadvantages | 1 | 25-02-2026 | | TLM 1 & 4 | |
| 15. | Linked List Representation | 1 | 26-02-2026 | | TLM 1 | |
| 16. | Sing Linked List: Operations | 3 | 28-02-2026 04-03-2026 05-03-2026 | | TLM 1 & 4 | |

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 17. | Double Linked List : Operations | 2 | 07-03-2026 10-03-2026 | | **TLM 1 & 4** | |
| 18. | Circular Single Linked List | 1 | 11-03-2026 | | **TLM1** | |
| 19. | Circular Double Linked List | 2 | 12-03-2026 14-03-2026 | | **TLM 1& 4** | |
| 20. | Comparing Arrays and Linked List | 1 | 17-03-2026 | | **TLM1** | |
| 21. | Applications of Linked Lists: Polynomial Representation | 1 | 18-03-2026 | | **TLM1** | |
| 22. | Polynomial Addition | 1 | 18-03-2026 | | **TLM 1&4** | |
| 23. | Tutorial | 1 | | | **TLM 3** | |

**No. of classes required to complete UNIT-II: 13**    **No. of classes taken:**

### UNIT-III: Stacks:

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 24. | Introduction to Stacks : Properties | 1 | 31-03-2026 | | **TLM 1** | |
| 25. | Operations of Stacks | 1 | 01-04-2026 | | **TLM 1** | |
| 26. | Implementation of stacks using arrays | 1 | 04-04-2026 | | **TLM 1 & 4** | |
| 27. | Stacks using Linked List | 1 | 07-04-2026 | | **TLM 1 & 4** | |
| 28. | Expressions: Expression evaluation | 2 | 08-04-2026 09-04-2026 | | **TLM1** | |
| 29. | Infix to Postfix Conversion | 2 | 11-04-2026 15-04-2026 | | **TLM1** | |
| 30. | Checking Balanced Parenthesis | 2 | 16-04-2026 18-04-2026 | | **TLM1** | |
| 31. | Reversing a List | 1 | 21-04-2026 | | **TLM1** | |
| 32. | Backtracking | 1 | 22-04-2026 | | **TLM1** | |
| 33. | Tutorial | 1 | 23-04-2026 | | **TLM3** | |
| 34. | Revision & Assignment | 1 | 25-04-2026 | | **TLM2** | |

**No. of classes required to complete UNIT-III: 14**    **No. of classes taken:**

**UNIT-IV: Queues**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 35. | Introduction to queues: properties and operations, | 1 | 28-04-2026 | | TLM1 | |
| 36. | Implementing queues using arrays | 1 | 29-04-2026 | | TLM 1 & 4 | |
| 37. | Implementing queues using Linked List | 1 | 30-04-2026 | | TLM 1 & 4 | |
| 38. | Applications of Queue: Scheduling | 1 | 02-05-2026 | | TLM 1 | |
| 39. | Breadth First Search | 1 | 05-05-2026 | | TLM 1 & 4 | |
| 40. | Circular Queue | 1 | 06-05-2026 | | TLM 1& 4 | |
| 41. | Double ended queue | 1 | 07-05-2026 | | TLM 1 | |
| 42. | Applications of Deque | 1 | 09-05-2026 | | TLM 1 | |
| 43. | Revision & Assignment | 1 | 12-05-2026 | | TLM 2 | |
| **No. of classes required to complete UNIT-IV: 09** | | | | **No. of classes taken:** | | |

**UNIT-V: TREES & HASHING TECHNQIUES**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 44. | Introduction to Trees, | 1 | 13-05-2026 | | TLM 1 | |
| 45. | Representation of Trees | 1 | 14-05-2026 | | TLM 1 | |
| 46. | Tree Traversals | 1 | 16-05-2026 | | TLM 1 & 4 | |
| 47. | Binary Search Trees- Operations | 1 | 02-06-2026 | | TLM 1& 4 | |
| 48. | Hashing Introduction, Hash Functions | 1 | 03-06-2026 | | TLM 1 | |
| 49. | Collison Resolution Techniques: Separate Chaining | 1 | 04-06-2026 | | TLM 1 | |
| 50. | Open Addressing: Linear Probing | 1 | 06-06-2026 | | TLM 1 | |

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | HOD Sign Weekly |
|-------|---------------------|------|------------|----|-------|----|-----|
| 51. | Quadratic Probing, Double Hashing | 1 | 09-06-2026 | | TLM 1 | | |
| 52. | Rehashing | 1 | 10-06-2026 | | TLM 1 | | |
| 53. | Applications of Hashing | 1 | 11-06-2026 | | TLM 1 | | |

| No. of classes required to complete UNIT-V: 10 | No. of classes taken: |
|---|---|

Content Beyond Syllabus

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | HOD Sign Weekly |
|-------|---------------------|------|------------|----|-------|----|-----|
| 1. | Evaluation of Prefix Expression | 1 | 13-06-2026 | | TLM 1 & 4 | CO4 | |
| 2. | Extendable Hashing | 1 | 13-06-2026 | | TLM 1 | CO5 | |

| Teaching Learning Methods | | | |
|------|----------------|------|---------------------------|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/Swayam Prabha/MOOCS) |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project |

## PART-C

**EVALUATION PROCESS (R23 Regulation):**

| Evaluation Task | Marks |
|-----------------|-------|
| Assignment-I (Units-I, II ) | A1=5 |
| I-Descriptive Examination (Units-I, II ) | M1=15 |
| I-Quiz Examination (Units-I, II ) | Q1=10 |
| Assignment-II (Unit-III ,IV & V) | A2=5 |
| II- Descriptive Examination (Unit-III ,IV & V) | M2=15 |
| II-Quiz Examination (Unit-III ,IV & V) | Q2=10 |
| Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2)) | M=30 |
| Cumulative Internal Examination (CIE): M | 30 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

# PART-D

## PROGRAMME OUTCOMES (POs):

| | |
|---|---|
| **PO 1** | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| **PO 2** | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| **PO 3** | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| **PO 4** | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| **PO 5** | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| **PO 6** | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| **PO 7** | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| **PO 8** | **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO 9** | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO 10** | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO 11** | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| **PO 12** | **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change |

## PROGRAMME SPECIFIC OUTCOMES (PSOs):

| | |
|---|---|
| **PSO 1** | The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization. |
| **PSO 2** | The ability to design and develop computer programs in networking, web applications and IoT as per the society needs. |
| **PSO 3** | To inculcate an ability to analyze, design and implement database applications. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| **Signature** | | | | |
| **Name of the Faculty** | **D.VijayaSri** | | **Dr.G.Rajendra** | **Dr. D. Ratna Kishore** |

# FRESHMAN ENGINEERING DEPARTMENT
## COURSE HANDOUT

### Part-A

| | | |
|---|---|---|
| **PROGRAM** | : | **B. Tech., II-Sem., IT-B** |
| **ACADEMICYEAR** | : | **2025-26** |
| **COURSENAME &CODE** | : | **ENGINEERING PHYSICS LAB - 23FE53** |
| **L-T-PSTRUCTURE** | : | **0 – 0 – 3** |
| **COURSECREDITS** | : | **1** |
| **COURSEINSTRUCTOR** | : | **Dr. N. Aruna & Mrs. P.V.  Sirisha** |
| **COURSECOORDINATOR** | : | **Dr. S. Yusuf** |
| **Pre-requisites** | : | **Nil** |

**Course Objective:** To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

**Course Outcomes:**
CO1: Analyze the wave properties of light using optical instruments (Apply-L3).
CO2: Estimate the elastic moduli of various materials and acceleration due to gravity (Apply-L3).
CO3: Demonstrate the vibrations in stretched strings (Understand-L2).
CO4: Evaluate dielectric constant and magnetic field of circular coil carrying current (Apply-L3).
CO5: Examine the characteristics of semiconductor devices (Apply-L3).

**Course articulation matrix** (Correlation between CO's and PO's):

| Engineering Physics Lab | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COURSE DESIGNED BY | **FRESHMAN ENGINEERING DEPARTMENT** | | | | | | | | | | | |
| **Course Outcomes** PO's | **Programme Outcomes** | | | | | | | | | | | |
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **CO1.** | 3 | 3 | 2 | 1 | | | | 1 | 1 | | | 1 |
| **CO2.** | 3 | 3 | 2 | 1 | | | | 1 | 1 | | | 1 |
| **CO3.** | 3 | 3 | 2 | 1 | | | | 1 | 1 | | | 1 |
| **CO4.** | 3 | 3 | 2 | 1 | | | | 1 | 1 | | | 1 |
| **CO5.** | 3 | 3 | 2 | 1 | | | | 1 | 1 | | | 1 |
| **1 = slight (Low)**    **2 = Moderate ( Medium)**    **3 =  Substantial ( High)** | | | | | | | | | | | | |

# List of Experiments

1. Determination of radius of curvature of a given Plano - Convex lens by Newton's rings.
2. Determination of dielectric constant using charging and discharging method.
3. Determination of wavelength of a laser light using diffraction grating.
4. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
5. Determination of temperature coefficients of a thermistor.
6. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
7. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
8. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
9. Sonometer- Verification of laws of a stretched string.
10. Determination of energy band gap of a semiconductor using p-n junction diode.
11. Verification of Brewster's Law.
12. Determination of Hall coefficient and Hall voltage.

**References:**
- A Textbook of Practical Physics – S. Balasubramanian, M.N. Srinivasan, S. Chand publishers-2017.

**BOSAPPROVEDTEXTBOOKS:**
1. Lab Manual Prepared by the LBRCE.

**EVALUATIONPROCESS:**

| Evaluation Task | Marks |
|---|---|
| Day-to-Day Work | A1 = **10** |
| Record & Observation | B1 = **5** |
| Internal Exam | C1 = **15** |
| Cumulative Internal Examination (CIE): (A1+B1+C1) | **30** |
| Semester End Examination (SEE) | **70** |
| Total Marks = CIE + SEE | **100** |

**Part B**

**Course Delivery Plan (Lesson Plan):**

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | TeachingLearningMethods | Learning OutcomeCOs | Text Book followed | HOD Sign |
|---|---|---|---|---|---|---|---|---|
| 1. | Introduction to CO's | 3 | 04-02-2026 | | TLM-4 | CO1,CO2,CO3,CO4 & CO5 | T1 | |
| 2. | Demonstration | 3 | 11-02-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 3. | Experiment 1 | 3 | 18-02-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 4. | Experiment 2 | 3 | 25-02-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 5. | Experiment 3 | 3 | 4-03-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 6. | Experiment 4 | 3 | 11-03-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 7. | Experiment 5 | 3 | 18-03-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 8. | Repetition lab | 3 | 01-04-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 10. | Experiment 6 | 3 | 08-04-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 11. | Experiment 7 | 3 | 15-04-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 12. | Experiment 8 | 3 | 22-04-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 13. | Experiment 9 | 3 | 29-04-2026 | | TLM-4 | CO1,CO2,CO3,CO4 & CO5 | T1 | |
| 15 | Experiment 10 | 3 | 06-05-2026 | | TLM-4 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 16 | Revision | 3 | 13-05-2026 | | TLM-3 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 17 | Internal Exam | 3 | 03-06-2026 | | TLM-3 | CO1,CO2,CO3,CO4& CO5 | T1 | |
| 18 | Internal Exam | 3 | 10-06-2026 | | TLM-3 | CO1,CO2,CO3,CO4& CO5 | T1 | |

**PROGRAM OUT COMES:** Engineering Graduates will be able to:

1  **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2.  **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering

problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern-engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams and in multi disciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

| Course Instructor | Course- Coordinator | Module Coordinator | HoD |
|---|---|---|---|
| **13.**<br><br>Dr. N. Aruna & Mrs.P.V.Sirisha | Dr.S.Yusub | Dr. S. Yusub | Dr.T. Satyanarayana |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
**(AUTONOMOUS)**
**Accredited by NAAC with "A" Grade & NBA (Under Tier - I)**
**An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution**
**Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada**
**L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.**
**Phone**: 08659-222933, **Fax**: 08659-222931

## DEPARTMENT OF ECE

# LAB HANDOUT
## PART-A

**Date:** 02-02-2026

**Name of Course Instructor** : Mrs. K. Balavani, Dr.P.Venkata Rao, Mrs.M.V.L. Bhavani, Ms. B. Lakshmi Thirupathamma

**Course Name & Code** : Electrical & Electronics Engineering Workshop (E & EE WS)

**L-T-P Structure** : 0-0-3     **Credits** : 1.5

**Program/Sem** : B.Tech., IT., II Sem, B.Sec.     **A.Y.** : 2025-26

**PREREQUISITE:** NIL

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

**COURSE OUTCOMES (COs):** At the end of the course, student will be able to

| | |
|------|--------------------------------------------------------------------------------|
| CO1 | Compute voltage, current and power in an electrical circuit. (**Apply**) |
| CO2 | Compute medium resistance using Wheat stone bridge. (**Apply**) |
| CO3 | Discover critical field resistance and critical speed of DC shunt generators. (**Apply**) |
| CO4 | Estimate reactive power and power factor in electrical loads. (**Understand**) |
| CO5 | Plot the characteristics of semiconductor devices. (**Apply**) |
| CO6 | Demonstrate the working of various logic gates using ICs. (**Understand**) |

**COURSE ARTICULATION MATRIX** (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
| CO1 | 3 | 2 | | | | | | 2 | 3 | 2 | | 1 | | | | |
| CO2 | 2 | 2 | | 2 | | | | 2 | 2 | 2 | | | | | | |
| CO3 | 2 | 2 | 2 | 2 | | | | 2 | 2 | 2 | | | | 2 | | |
| CO4 | 2 | 2 | | 3 | | | | 2 | 3 | 2 | | 1 | 2 | | | |
| CO5 | 3 | 2 | | | 2 | | | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO6 | 3 | 3 | | 2 | 2 | | | 2 | 3 | 3 | | 1 | | | 3 | |
| | **1 -** Low | | | | **2 –** Medium | | | | | **3 -** High | | | | | | |

# PART-B

**COURSE DELIVERY PLAN (LESSON PLAN):**

| S.No. | Topics to be covered. (Experiment Name) | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction to BEEE Lab (Function Generators, CRO, RPS, Breadboard etc), Course Objectives and Outcomes. | 3 | 03-02-2026 | | TLM4 | |
| 2. | Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias. | 3 | 10-02-2026 | | TLM4 | |
| 3. | Plot V – I characteristics of Zener Diode and its application as voltage Regulator. | 3 | 17-02-2026 | | TLM4 | |
| 4. | Implementation of half wave and full wave rectifiers | 3 | 24-02-2026 | | TLM4 | |
| 5. | Plot Input & Output characteristics of BJT in CB configuration-04 | 3 | 10-03-2026 | | TLM4 | |
| 6. | Frequency response of CE amplifier. | 3 | 17-03-2026 | | TLM4 | |
| 7. | Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs | 3 | 31-03-2026 | | TLM4 | |
| 8. | Internal Lab Examination (**Electronics**) | 3 | 07-04-2026 | | TLM4 | |
| 9. | Verification of KCL and KVL | 3 | 21-04-2026 | | TLM4 | |
| 10. | Verification of Superposition Theorem | 3 | 28-04-2026 | | TLM4 | |
| 11. | Measurement of Resistance using Wheat stone bridge | 3 | 05-05-2026 | | TLM4 | |
| 12. | Magnetization Characteristics of DC Shunt Generator | 3 | 05-05-2026 | | TLM4 | |
| 13. | Measurement of Power and Power factor using Single-phase wattmeter | 3 | 12-05-2026 | | TLM4 | |
| 14. | Calculation of Electrical Energy for Domestic Premises | 3 | 12-05-2026 | | TLM4 | |
| 15. | Revision- Virtual lab experiments | 3 | 02-06-2026 | | TLM4 | |
| 16. | Internal Lab Examination (**Electricals**) | 3 | 09-06-2026 | | TLM4 | |
| **No. of classes required: 48** | | | | **No. of classes taken:** | | |

| Teaching Learning Methods | | | |
|---|---|---|---|
| **TLM1** | Chalk and Talk | **TLM4** | Demonstration (Lab/Field Visit) |
| **TLM2** | PPT | **TLM5** | ICT (NPTEL/Swayam Prabha/MOOCS) |
| **TLM3** | Tutorial | **TLM6** | Group Discussion/Project |

# PART-C

**EVALUATION PROCESS (R20 Regulation):**

| Evaluation Task | Expt. no's | Marks |
|---|---|---|
| Day to Day work | 1,2,3,4,5,6,7,8… | A1 =10 |
| Record and observation | 1,2,3,4,5,6,7,8… | B1 = 5 |
| **Internal Exam** | 1,2,3,4,5,6,7,8… | **C1=15** |
| **Cumulative Internal Examination (CIE):(A1+B1+C1)** | 1,2,3,4,5,6,7,8… | **30** |
| **Semester End Examination (SEE)** | 1,2,3,4,5,6,7,8… | **70** |
| **Total Marks=CIE+SEE** | | **100** |

# PART-D

## PROGRAMME OUTCOMES (POs):

| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|---|---|
| PO 2 | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice |
| PO 7 | **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO 9 | **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to     comprehend  and  write  effective reports  and  design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

## PROGRAMME SPECIFIC OUTCOMES (PSOs):

| PSO a | Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power |
|---|---|
| PSO b | Design and analyze electrical machines, modern drive and lighting systems |
| PSO c | Specify, design, implement and test analog and embedded signal processing electronic systems |
| PSO d | Design controllers for electrical and electronic systems to improve their performance. |

**Date:** 02-02-2026

| **Course Instructors** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|
| Mrs. K. Balavani | Dr. AVGA Marthanda | Dr. G.Nageswara Rao | Dr. G.Srinivasulu |
| Dr. P. Venkat Rao | | | |
| Mrs. M.V.L.Bhavani | | | |
| Ms. B. Lakshmi Thirupathamn | | | |
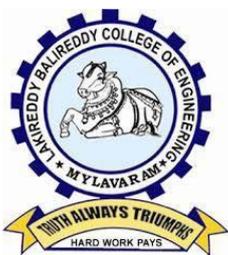
## LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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**Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution**
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**L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521230.**
Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

## COURSE HANDOUT

## PART-A

**Name of Course Instructor:** Mr. I. Dakshina Murthy/Mr. G. V. Surya Narayana

| | | | |
|---|---|---|---|
| **Course Name &** | : Engineering Workshop & 23ME51 | **Regulation** | : R23 |
| **L-T-P Structure** | : 0-0-3 | **Credits** | : 1.5 |
| **Program/Sem/Sec** | : B. Tech/II/IT-B | **A.Y.** | : 2025-26 |

**PREREQUISITE:** Nil

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicles.

**COURSE OUTCOMES (COs):** At the end of the course, student will be able to

| CO1 | Identify workshop tools and their operational capabilities. **(Remember)** |
|---|---|
| CO2 | Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding. **(Understand)** |
| CO3 | Modal various basic prototypes in fitting trade. **(Apply)** |
| CO4 | Apply basic electrical engineering knowledge for House Wiring Practice. **(Apply)** |

**COURSE ARTICULATION MATRIX** (Correlation between COs, POs & PSOs):

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 2 | 1 | 1 | 1 |
| CO2 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 2 | 1 | 1 | 1 |
| CO3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 2 | 1 | 1 | 1 |
| CO4 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 2 | 1 | 1 | 1 |
| **1 - Low** | | | | | **2 –Medium** | | | | | | **3 - High** | | | | |

**Textbooks:**

T1.  Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.

T2.  A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

**Reference Books:**

R1.  LBRCE Workshop Lab Manual.

R2.  Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition.

R3.  Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.

R4.  Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakash an, 2021-22.

## PART-B

**COURSE DELIVERY PLAN (LESSON PLAN):**

| Si. No. | Topics to be covered (Experiment Name) | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| | **CYCLE-I** | | | | | |
| 1. | **Introduction to Lab:** Safety practices and precautions to be observed in workshop. | 3 | 06-02-2026 | | TLM8 | |
| 2. | **WOODWORK:** Dove Tail Joint | 3 | 13-02-2026 | | TLM8 | |
| 3. | Corner Lap Joint | 3 | 20-02-2026 | | TLM8 | |
| 4. | **FITTING:** L-Fitting | 3 | 27-02-2026 | | TLM8 | |
| 5. | V-Fitting | 3 | 06-03-2026 | | TLM8 | |
| 6. | **ELECTRICAL WIRING:** Two Laps in Series and Parallel Connection with One Way Switch | 3 | 13-06-2026 | | TLM8 | |
| 7. | Florescent Lamp and Calling Bell Circuit | 3 | 20-03-2026 | | TLM8 | |
| | **CYCLE-II** | | | | | |
| 8. | **PLUMBING:** Preparation of Pipe Layout-Demonstration and practice of Plumbing tools | 3 | 10-04-2026 | | TLM8 | |
| 9. | **Pipe Threading-** Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters. | 3 | 17-04-2026 | | TLM8 | |
| 10. | **SHEET METAL WORKING:** Preparation of Tapered Tray | 3 | 24-10-2026 | | TLM8 | |
| 11. | **FOUNDRY TRADE:** | 3 | 01-05-2026 | | TLM8 | |

| 12. | **WELDING SHOP:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint. | 3 | 08-05-2026 | | TLM8 | |
| 13. | **BASIC REPAIRS OF TWO-WHEELER VEHICLE:** Demonstration of working of two-wheeler vehicle and its repairs. | 3 | 15-05-2026 | | TLM8 | |
| 14. | Repetition | 6 | 05-06-2026 | | TLM8 | |
| 15. | Internal Lab Exam | 3 | 12-06-2026 | | ----- | |

| No. of classes required to complete: | | No. of classes taken: | |
|---|---|---|---|

| **Teaching Learning Methods** | | | | | |
|---|---|---|---|---|---|
| **TLM1** | Chalk and talk | **TLM4** | Problem Solving | **TLM7** | Seminars or GD |
| **TLM2** | PPT | **TLM5** | Programming | **TLM8** | Lab Demo |
| **TLM3** | Tutorial | **TLM6** | Assignment or Quiz | **TLM9** | Case Study |

## **PART-C**

## ACADEMIC CALENDAR

| Description | From | To | Weeks |
|---|---|---|---|
| I Phase of Instructions-1 | 02-02-2026 | 21-03-2026 | 7 |
| I Mid Examinations | 23-03-2026 | 28-03-2026 | 1 |
| II Phase of Instructions | 30-03-2026 | 16-05-2026 | 7 |
| II Mid Examinations | 15-06-2026 | 20-06-2026 | 2 |
| Preparation and Practical's | 22-06-2026 | 27-06-2026 | 1 |
| Semester End Examinations | 29-06-2026 | 11-07-2026 | 1 |

## EVALUATION PROCESS (R23 Regulation):

| Evaluation Task | Expt. no's | Marks |
|---|---|---|
| Day to Day work = **A** | 1,2,3,4,5,6,7,8 | A=10 |
| Record/ Viva = **B** | 1,2,3,4,5,6,7,8 | B=05 |
| Internal Test = **C** | 1,2,3,4,5,6,7,8 | C = 15 |
| **Cumulative Internal Examination: A+B+C = 30** | 1,2,3,4,5,6,7,8 | **30** |
| **Semester End Examinations = D** | 1,2,3,4,5,6,7,8 | **70** |
| **Total Marks: A+ B + C + D = 100** | 1,2,3,4,5,6,7,8 | **100** |

# PART-D

## PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

| PEO1 | Pursue a successful career in the area of Information Technology or its allied fields. |
|---|---|
| PEO2 | Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems. |
| PEO3 | Demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects. |
| PEO4 | Understand the professional code of ethics and demonstrate ethical behavior, effective communication, team work and leadership skills in their job. |

## PROGRAMME OUTCOMES (POs):

| PO 1 | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|---|---|
| PO 2 | **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences |
| PO 3 | **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations |
| PO 6 | **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
| PO 7 | **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO 8 | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice |
| PO 9 | **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| PO 10 | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| PO 11 | **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |

| PO 12 | **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |
|---|---|

## PROGRAMME SPECIFIC OUTCOMES (PSOs):

| **PSO1:** | Organize, Analyze and Interpret the data to extract meaningful conclusions. |
|---|---|
| **PSO2:** | Design, Implement and Evaluate a computer-based system to meet desired needs. |
| **PSO3:** | Develop IT application services with the help of different current engineering tools. |

|  | **Course Instructor** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|
| **Signature** | | | |
| **Name of the Faculty** | Mr. I DAKSHNA MURTHY | Mr. I DAKSHNA MURTHY | Dr. P. LOVARAJU |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)**
**An ISO 21001:2018,14001:2015,50001:2018 Certified Institution**
**Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada**
**L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.**
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

# COURSE HANDOUT

## PART-A

**Name of Course Instructor** : Mrs.D.Vijaya sri

**Course Name & Code** : DATA STRUCTURES LAB & 23CS52

**L-T-P Structure** : 0-0-3      **Credits:** 1.5

**Program/Sem/Sec** : B.Tech/IT/II/B      **A.Y.:** 2025-26

**PREREQUISITE: COMPUTER PROGRAMMING LAB**

**COURSE EDUCATIONAL OBJECTIVE:**

The objective of this course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

**COURSE OUTCOMES (CO):**

**CO1:** Apply Linear Data Structures for organizing the data efficiently **(Apply-L3)**

**CO2:** Apply Non- Linear Data Structures for organizing the data efficiently **(Apply-L3)**

**CO3:** Develop and implement hashing techniques for solving problems (**Apply - L3**)

**CO4:** Improve individual / teamwork skills, communication & report writing skills withethical values.

**COURSE ARTICULATION MATRIX (Correlation between Cos, Pos & PSOs):**

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | 2 | 2 | 1 | 3 | | | | | | | | | 2 | |
| CO2 | 3 | 2 | 2 | 1 | 3 | | | | | | | | | 2 | 2 |
| CO3 | 3 | 2 | 2 | 1 | 3 | | | | | | | | | | 2 |
| CO4 | | | | | | | | 2 | 2 | 2 | | | | | |

**Note: 1-** Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High)

**PART-B:**

**COURSE DELIVERY PLAN (LESSON PLAN):**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | HOD Sign |
|---|---|---|---|---|---|
| 1. | Array Manipulations | 3 | 09-02-2026 | | |
| 2. | Searching and Sorting Techniques | 3 | 16-02-2026 | | |
| 3. | Single Linked List | 3 | 23-02-2026 | | |
| 4. | Double Linked List | 3 | 02-03-2026 | | |
| 5. | Circular Linked List | 3 | 09-03-2026 | | |
| 6. | Polynomial Representation & Polynomial Addition | 3 | 16-03-2026 | | |
| 7. | Linked List Applications | 3 | 30-03-2026 | | |
| 8. | Stack Implementation | 3 | 06-04-2026 | | |
| 9. | Stack Applications | 3 | 13-04-2026 | | |
| 10. | Queue Implementation | 3 | 20-04-2026 | | |
| 11. | Circular Queue | 3 | 27-04-2026 | | |
| 12. | Double Ended Queue | 3 | 04-05-2026 | | |
| 13. | Trees | 3 | 11-05-2026 | | |
| 14. | Hashing | 3 | 01-06-2026 | | |
| 15. | Internal Exam | 3 | 08-06-2026 | | |

# PART-C

**EVALUATION PROCESS (R23 Regulation):**

| Evaluation Task | Marks |
|---|---|
| Day to Day Work: | 15 |
| Internal Test | 15 |
| Continuous Internal Assessment | 30 |
| Procedure | 20 |
| Execution & Results | 30 |
| Viva-voce | 20 |
| Semester End Examination (SEE) | 70 |
| Total Marks = CIE + SEE | 100 |

# PART-D

## PROGRAMME OUTCOMES (POs):

| PO 1 | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
|---|---|
| PO 2 | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| PO 3 | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| PO 4 | **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| PO 5 | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| PO 6 | **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. |
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| PO 11 | **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| PO 12 | **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change |

## PROGRAMME SPECIFIC OUTCOMES (PSOs):

| PSO 1 | Organize, Analyze and Interpret the data to extract meaningful conclusions |
|---|---|
| PSO 2 | Design, Implement and Evaluate a computer-based system to meet desired needs. |
| PSO 3 | Develop IT application services with the help of different current engineering tools. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| **Signature** | | | | |
| **Name of the Faculty** | **D.VijayaSri** | | **Dr.G.Rajendra** | **Dr. D. Ratna Kishore** |