# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade**
**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, NTR DIST., A.P.-521 230.**
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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT

### PART-A

**Name of Course Instructor** : Mr M.PRUTHVI RAJ
**Course Name & Code** : Natural Language Processing & 23AM05
**L-T-P Structure** : 3-0-0 **Credits:** 03
**Program/Sem/Sec** : B.Tech./CSE(AI&ML)/VI/A **A.Y.:** 2025-26

**Pre-requisite:** Knowledge on Python programming, Formal Language Theory.

**Course Educational Objective:**

The main objective of the course is

- To introduce the core concepts and techniques of Natural Language Processing (NLP), covering both traditional and statistical approaches. Students will learn key algorithms, computational properties of language, and major aspects of syntactic, semantic, and pragmatic processing, enabling them to understand and describe NLP applications.

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

- COI: Understand the basic components of NLP. **(Understand L2)**
- CO2: Apply N-grams models to predict a sequence of text. **(Apply L3)**
- C03: Apply a grammar rule to write the syntax of a language. **(Apply L3)**
- C04: Apply a grammar rule to write the semantic and pragmatics of a language. **(Apply L3)**
- C05: Apply the Discourse Analysis and Lexical Resources of NLP. **(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 | 2 | 2 | - | - | 3 | - | - | - | - | - | - | 2 | 2 | - | 1 |
| CO2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | 2 |
| CO4 | 2 | - | 3 | - | 3 | - | - | - | - | - | - | - | 2 | - | 2 |
| CO5 | - | 2 | 3 | - | 3 | - | - | - | - | - | - | - | 2 | 1 | 2 |
| 1-Low | | | | | 2 –Medium | | | | | | | 3-High | | | |

**Text Books:**

1. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2nd Edition, Daniel Jurafsky, James H. Martin-Pearson Publication,2014.
2. Natural Language Processing with Python, First Edition, Steven Bird, Ewan Klein and Edward Loper, OReilly Media,2009.

**Reference books:**

1. Handbook ofNatural Language Processing, Second, Nitin Indurkhya and Fred J. Damerau, Chapman and Hall/CRC Press, 2010.Edition
2. Natural Language Processing and Information Retrieval, 3rd Edition, Tanveer Siddiqui, U.S. Tiwary, Oxford University Press,2008.

## PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

**UNIT-I: Introduction**

| 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**: Origins and challenges of NLP | 1 | 01-Dec-2025 | | TLM2 | |
| 2. | Language Modeling: Grammar-based LM | 1 | 03-Dec-2025 | | TLM2 | |
| 3. | Statistical LM | 1 | 04-Dec-2025 | | TLM1 | |
| 4. | Finite-State Automata | 1 | 05-Dec-2025 | | TLM2 | |
| 5. | English Morphology | 2 | 08-Dec-2025<br>10-Dec-2025 | | TLM2 | |
| 6. | Transducers for lexicon and rules Tokenization | 1 | 11-Dec-2025 | | TLM2 | |
| 7. | Detecting and Correcting Spelling Errors, Minimum Edit Distance | 2 | 12-Dec-2025<br>15-Dec-2025 | | TLM2 | |
| 8. | Tutorial | 1 | 17-Dec-2025 | | TLM2 | |
| **No. of classes required to complete UNIT-I: 10** | | | | **No. of classes taken:** | | |

**UNIT-II: Word Level Analysis**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 9. | **Word Level Analysis:** Unsmoothed N-grams | 1 | 18-Dec-2025 | | TLM2 | |
| 10. | Evaluating N-grams | 1 | 19-Dec-2025 | | TLM2 | |
| 11. | Smoothing | 1 | 24-Dec-2025 | | TLM2 | |
| 12. | Interpolation and Backoff | 1 | 26-Dec-2025 | | TLM2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13. | Word Classes, Part- of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging | 2 | 29-Dec-2025<br>31-Dec-2025 | | TLM2 | |
| 14. | Issues in PoS tagging | 1 | 01-Jan-2025 | | TLM2 | |
| 15. | Hidden Markov Model | 2 | 02-Jan-2026<br>05-Jan-2026 | | TLM2 | |
| 16. | Maximum Entropy models | 2 | 07-Jan-2026<br>08-Jan-2026 | | TLM2 | |
| 17. | Tutorial | 1 | 09-Jan-2026 | | TLM3 | |
| **I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)** | | | | | | |
| **No. of classes required to complete UNIT-II: 12** | | | | **No. of classes taken:** | | |

**UNIT-III: Syntactic Analysis**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 18. | **Syntactic Analysis:** Context-Free Grammars, Grammar rules for English | 1 | 19-Jan-2026 | | TLM2 | |
| 19. | Treebanks, Normal Forms for grammar | 1 | 21-Jan-2026 | | TLM2 | |
| 20. | Dependency Grammar - Syntactic Parsing | 1 | 22-Jan-2026 | | TLM2 | |
| 21. | Ambiguity, Dynamic Programming parsing | 1 | 02-Feb-2026 | | TLM2 | |
| 22. | Shallow parsing Probabilistic CFG | 1 | 04-Feb-2026 | | TLM2 | |
| 23. | Probabilistic CYK | 1 | 05-Feb-2026 | | TLM2 | |
| 24. | Probabilistic Lexicalized CFGs | 1 | 06-Feb-2026 | | TLM2 | |
| 25. | Feature structures | 1 | 09-Feb-2026 | | TLM2 | |
| 26. | Unification of feature structures | 1 | 11-Feb-2026 | | TLM2 | |
| **No. of classes required to complete UNIT-III: 10** | | | | **No. of classes taken:** | | |

**UNIT-IV: Semantics And Pragmatics**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 27. | **Semantics And Pragmatics:** Requirements for representation, | 1 | 12-Feb-2026 | | TLM2 | |
| 28. | First-Order Logic | 1 | 13-Feb-2026 | | TLM2 | |
| 29. | Description Logics | 1 | 16-Feb-2026 | | TLM2 | |
| 30. | Syntax-Driven Semantic analysis | 1 | 18-Feb-2026 | | TLM2 | |
| 31. | Semantic attachments | 1 | 19-Feb-2026 | | TLM2 | |
| 32. | Word Senses, Relations between Senses | 1 | 20-Feb-2026 | | TLM2 | |
| 33. | Thematic Roles, selectional restrictions | 1 | 23-Feb-2026 | | TLM2 | |
| 34. | Word Sense Disambiguation | 1 | 25-Feb-2026 | | TLM2 | |
| 35. | WSD using Supervised, Dictionary & Thesaurus | 1 | 26-Feb-2026 | | TLM2 | |
| 36. | Bootstrapping method | 2 | 27-Feb-2026<br>02-Mar-2026 | | TLM2 | |
| 37. | Word Similarity using Thesaurus | 2 | 05-Mar-2026<br>06-Mar-2026 | | TLM2 | |
| 38. | Distributional methods | 2 | 09-Mar-2026<br>11-Mar-2026 | | TLM2 | |
| 39. | **Semantics And Pragmatics Over View** | 2 | 12-Mar-2026<br>13-Mar-2026 | | TLM2 | |
| 40. | Tutorial | 1 | 16-Mar-2026 | | TLM3 | |
| **No. of classes required to complete UNIT-IV: 16** | | | | **No. of classes taken:** | | |

**UNIT-V: Discourse Analysis And Lexical Resources**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 41. | **Discourse Analysis And Lexical Resources:** Discourse segmentation | 2 | 18-Mar-2026<br>20-Mar-2026 | | TLM2 | |
| 42. | Coherence - Reference Phenomena, Coreference Resolution | 2 | 23-Mar-2026<br>25-Mar-2026 | | TLM2 | |
| 43. | Resources: Porter Stemmer, Lemmatizer, Penn | 2 | 27-Mar-2026<br>30-Mar-2026<br>(Mon–Tutorial) | | TLM2 | |

| 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. | Brill's Tagger, WordNet, PropBank | 2 | 01-Apr-2026<br>02-Mar-2026 | | TLM2 | |
| 45. | FrameNet, Brown Corpus | 2 | 03-Apr-2026<br>04-Apr-2026 | | TLM2 | |
| 46. | British National Corpus (BNC) | 1 | 05-Apr-2026 | | TLM2 | |
| 47. | Tutorial | 1 | 05-Apr-2026 | | TLM3 | |
| **No. of classes required to complete UNIT-V: 12** | | | | **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 | Textbook followed | HOD Sign |
|---|---|---|---|---|---|---|---|---|
| 1. | Real Time Applications of NLP | 1 | 05-Apr-2026 | | TLM2 | CO5 | T1 | |
| No. of classes | | 01 | | | No. of classes taken: | | | |
| **II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)** | | | | | | | | |

| 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) | 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- | 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 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):

| | |
|---|---|
| **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 |
|---|---|---|---|---|
| **Name of the Faculty** | **Mr M PRUTHVI RAJ** | **Mr K Venkatesh** | **Dr Shaik Salma Asiya Begum** | **Dr. S Jayaprada** |
| **Signature** | | | | |

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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT

### PART-A

**Name of Course Instructor** : Dr Shaik Salma Asiya Begum
**Course Name & Code** : Deep Learning & 23AM06
**L-T-P Structure** : 3-0-0 **Credits:** 03
**Program/Sem/Sec** : B.Tech./CSE(AI&ML)/VI/A **A.Y.:** 2025-26

**Pre-requisites**: Linear algebra, calculus, probability, Python, Machine Learning, Neural Networks.

**Course Objectives**

The main objectives of the course is to make students

- The objective of this course is to cover the fundamentals of neural networks as well as some advanced topics such as recurrent neural networks, long short-term memory cells and convolution neural networks.

**Course Outcomes:** At the end of the course, students will be able to

CO1: Understand the fundamental concepts of artificial neurons, perceptrons, and learning rules used in basic neural network models. **(Understand – L2)**

CO2: Apply feed-forward neural network architectures and backpropagation algorithms for supervised learning tasks. **(Apply – L3)**

CO3: Apply various optimization and regularization techniques to improve deep neural network training performance. **(Apply – L3)**

CO4: Implement the working of RNNs, LSTMs, CNNs, and generative models (RBMs, DBMs) for sequential and visual data. **(Apply – L3)**

CO5: Apply GPT-based models for NLP, vision, and speech applications **(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 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | 2 | 2 | 1 | - |
| CO2 | 3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | 2 | 3 | 2 | 1 |
| CO3 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 3 | 2 | 1 |
| CO4 | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 2 | 3 | 3 | 1 |
| CO5 | 2 | 2 | 2 | 1 | 2 | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| 1-Low | | | | | | 2 –Medium | | | | | 3-High | | | | |

**Textbooks**

1. Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press, 2016.

**Reference Books**

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
2. Pattern Recognition and Machine Learning, Christopher M. Bishop, 2007

## PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

**UNIT-I: Basics**

| 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. | Biological Neuron | 2 | 01-12-2025<br>02-12-2025 | | TLM 1&2 | |
| 2. | Idea of computational units | 1 | 05-12-2025 | | TLM 1&2 | |
| 3. | McCulloch–Pitts unit and Thresholding logic | 2 | 05-12-2025<br>06-12-2025 | | TLM 1&2 | |
| 4. | Linear Perceptron | 1 | 08-12-2025 | | TLM 1&2 | |
| 5. | Perceptron Learning Algorithm | 2 | 09-12-2025<br>12-12-2025 | | TLM 1&2 | |
| 6. | Linear separability | 1 | 13-12-2025 | | TLM 1&2 | |
| 7. | Convergence theorem for Perceptron Learning Algorithm | 2 | 15-12-2025<br>16-12-2025 | | TLM 1&2 | |
| 8. | Assignment | 1 | 19-12-2025 | | TLM 1&2 | |
| **No. of classes required to complete UNIT-I: 12** | | | | **No. of classes taken:** | | |

**UNIT-II:** Feed Forward Networks

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 9. | Feed Forward Networks | 2 | 20-12-2025<br>22-12-2025 | | TLM 1&2 | TLM 1&2 |
| 10. | Multilayer Perceptron | 2 | 23-12-2025<br>26-12-2025 | | TLM 1&2 | |
| 11. | Gradient Descent | 1 | 27-12-2025 | | TLM 1&2 | |
| 12. | Backpropagation | 1 | 29-12-2025 | | TLM 1&2 | |
| 13. | Empirical Risk Minimization | 2 | 30-12-2025<br>02-01-2025 | | TLM 1&2 | |
| 14. | Regularization | 1 | 03-01-2025 | | TLM 1&2 | |
| 15. | Autoencoders | 1 | 05-01-2025 | | TLM 1&2 | |
| 16. | Deep Neural Networks | 2 | 06-01-2025<br>09-1-2025 | | TLM 1&2 | |
| 17. | Difficulty of training deep neural networks | 1 | 10-1-2025 | | TLM 1&2 | |
| 18. | Difficulty of training deep neural networks | 1 | 12-1-2025 | | TLM 1&2 | |
| 19. | Greedy layer-wise training | 1 | 13-1-2025 | | TLM 1&2 | |
| 20. | Assignment | 1 | 16-1-2025 | | TLM 1&2 | |
| **I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)** | | | | | | |
| **No. of classes required to complete UNIT-II: 16** | | | | **No. of classes taken:** | | |

**UNIT-III: Better Training of Neural Networks**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 21. | Better Training of Neural Networks | 1 | 17-1-2025 | | TLM 1&2 | TLM 1&2 |
| 22. | Newer optimization methods for neural networks (Adagrad, Adadelta, RMSProp, Adam, NAG) | 1 | 19-1-2025 | | TLM 1&2 | |
| 23. | Newer optimization methods for neural networks (Adagrad, Adadelta, RMSProp, Adam, NAG) | 1 | 20-1-2025 | | TLM 1&2 | |
| 24. | Newer optimization methods for neural networks (Adagrad, Adadelta, RMSProp, Adam, NAG) | 1 | 23-1-2025 | | TLM 1&2 | |
| 25. | Newer optimization methods for neural networks (Adagrad, Adadelta, RMSProp, Adam, NAG) | 1 | 24-1-2025 | | TLM 1&2 | |
| 26. | Second-order methods for training | 1 | 02-02-2026 | | TLM 1&2 | |
| 27. | Saddle point problem in neural networks | 1 | 03-02-2026 | | TLM 1&2 | |
| 28. | Regularization methods (dropout, drop connect, batch normalization) | 1 | 06-02-2026 | | TLM 1&2 | |
| 29. | Regularization methods (dropout, drop connect, batch normalization) | 1 | 07-02-2026 | | TLM 1&2 | |
| 30. | Regularization methods (dropout, drop connect, batch normalization) | 1 | 09-02-2026 | | TLM 1&2 | |
| **No. of classes required to complete UNIT-III: 10** | | | | **No. of classes taken:** | | |

**UNIT-IV: Recurrent Neural Networks**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 31. | Recurrent Neural Networks | 1 | 10-02-2026 | | TLM 1&2 | |
| 32. | Backpropagation through time | 1 | 13-02-2026 | | TLM 1&2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 33. | Long Short-Term Memory (LSTM) | 1 | 14-02-2026 | | TLM 1&2 | |
| 34. | Gated Recurrent Units (GRU) | 1 | 16-02-2026 | | TLM 1&2 | |
| 35. | Bidirectional LSTMs | 1 | 17-02-2026 | | TLM 1&2 | |
| 36. | Bidirectional RNNs | 1 | 20-02-2026 | | TLM 1&2 | |
| 37. | Convolutional Neural Networks | 1 | 21-02-2026 | | TLM 1&2 | |
| 38. | LeNet | 1 | 23-02-2026 | | TLM 1&2 | |
| 39. | AlexNet | 1 | 24-02-2026 | | TLM 1&2 | |
| 40. | Generative Models | 1 | 27-02-2026 | | TLM 1&2 | |
| 41. | Restricted Boltzmann Machines (RBMs) | 2 | 28-02-2026<br>03-03-2026 | | TLM 1&2 | |
| 42. | Introduction to MCMC and Gibbs Sampling | 2 | 06-03-2026<br>07-03-2026 | | TLM 1&2 | |
| 43. | Gradient computations in RBMs | 2 | 09-03-2026<br>10-03-2026 | | TLM 1&2 | |
| **No. of classes required to complete UNIT-IV: 16** | | | | **No. of classes taken:** | | |

**UNIT-V: Recent Trends**

| 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. | Recent Trends | 1 | 13-03-2026 | | TLM 1&2 | |
| 45. | Variational Autoencoders | 1 | 14-03-2026 | | TLM 1&2 | |
| 46. | Transformers | 1 | 16-03-2026 | | TLM 1&2 | |
| 47. | GPT Applications: Vision, NLP, Speech | 1 | 17-03-2026 | | TLM 1&2 | |
| 48. | GPT Applications: Vision, NLP, Speech | 1 | 20-03-2026 | | TLM 1&2 | |
| 49. | GPT Applications: Vision, NLP, Speech | 1 | 23-03-2026 | | TLM 1&2 | |
| **No. of classes required to complete UNIT-V: 06** | | | | **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 | Textbook followed | HOD Sign |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. | Osprey optimization technique | 1 | 02-03-2026 | | TLM2 | CO5 | T1 | |
| No. of classes | | 01 | | | No. of classes taken: | | | |
| **II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)** | | | | | | | | |

| **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) | 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- | 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 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):

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| **Title** | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | | | | |
| **Signature** | | | | |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade**
**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, NTR DIST., A.P.-521 230.**
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT

## PART-A

**Name of Course Instructor: Mrs. K. Rajasree**
**Course Name & Code : DATA VISUALIZATION (23AD05)**
**L-T-P Structure : 3-0-0** **Credits:** 3
**Program/Sem/Sec :III B.Tech /VI /A** **A.Y.:** 2025-26

**PREREQUISITE:** Computer Graphics, Image Processing.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**
To familiarize students with the basic and advanced techniques of information visualization and scientific visualization, learn key techniques of the visualization process, a detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques.

**COURSE OUTCOMES (CO's):** After successful completion of the course the students are able to

| | |
|---|---|
| **CO1** | Explain the basic principles of Data Visualization. **(Understand-L2)** |
| **CO2** | Apply visualization techniques to a problem and its associated dataset. **(Apply-L3)** |
| **CO3** | Apply structured approach to create effective visualization. **(Apply-L3)** |
| **CO4** | Explain about the valuable insights from the massive dataset using visualization. **(Understand-L2)** |
| **CO5** | Build visualization dashboard to support decision making. **(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 | 2 | - | - | - | 1 | - | - | - | - | - | - | - | - | 2 | - |
| CO2 | 2 | 2 | 3 | - | 2 | - | - | - | - | - | - | - | 2 | 2 | - |
| CO3 | 2 | 2 | 3 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | - |
| CO4 | 2 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | 2 | - |
| CO5 | 2 | 2 | 3 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | - |
| **1 -** Low | | | **2 –**Medium | | | | | | **3 –** High | | | | | | |

**TEXTBOOKS:**

**T1** WARD, GRINSTEIN, KEIM.Interactive Data Visualization: Foundations, Techniques, and Applications. Natick : A K Peters, Ltd, 2nd Edition.

**T2** E. Tufte, The Visual Display of Quantitative Information, Graphics Press.

**REFERENCE BOOKS:**

**R1** Visualization Analytics & Design, Tamara Munzner, AK Peters Visualization Series, 1st Edition.
**R2** Interactive Data Visualization for the Web, Scott Murray, 2nd Edition.

**E-Resources:**

1. https://kdd.cs.ksu.edu/Courses/CIS536/Lectures/Slides/Lecture-34-Main_6up.pdf
2. https://elearn.nptel.ac.in/shop/iit-workshops/completed/data-visualization-with r/?v=c86ee0d9d7ed
3. https://www.geeksforgeeks.org/data-visualzation-and-its-importance.

# PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

### UNIT-I: Introduction to Visualization

| 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.** | What Is Visualization? History of Visualization | 1 | 01-12-2025 | | TLM 1,2 | |
| **2.** | Relationship between Visualization and Other Fields | 1 | 02-12-2025 | | TLM 1,2 | |
| 3. | The Visualization Process- Steps in visualization process | 1 | 04-12-2025 | | TLM 1,2 | |
| 4. | The Visualization Process- Steps in visualization process | 1 | 05-12-2025 | | TLM 1,2 | |
| 5. | Introduction of visual perception | 1 | 08-12-2025 | | TLM 1,2 | |
| 6. | Data representations in visual perception | 1 | 09-12-2025 | | TLM 1,2 | |
| 7. | visual representation of data | 1 | 11-12-2025 | | TLM 1,2 | |
| 8. | Gestalt principles | 1 | 12-12-2025 | | TLM 1,2 | |
| 9. | information overloads. | 1 | 15-12-2025 | | TLM 1,2 | |
| 10. | Case Study: Understanding the Impact of COVID-19 Using Data Visualization Principles in R | 1 | 16-12-2025 | | TLM 4 | |
| 11. | Case Study: Understanding the Impact of COVID-19 Using Data Visualization Principles in R | 1 | 18-12-2025 | | TLM4 | |
| 12. | Case Study: Understanding the Impact of COVID-19 Using Data Visualization Principles in R | 1 | 19-12-2025 | | TLM4 | |
| **No. of classes required to complete UNIT-I: 12** | | | | **No. of classes taken:** | | |

### UNIT-II: Visual Representations

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| **13.** | Creating Visual Representations | 1 | 22-12-2025 | | TLM 1,2 | |
| **14.** | Types of Visual Representations- Graphs, Plots, Charts, Maps | 1 | 23-12-2025 | | TLM 1,2 | |
| 15. | visualization reference model | 1 | 26-12-2025 | | TLM 1,2 | |
| 16. | Visual Mapping – Positional Mapping, Color Mapping | 1 | 29-12-2025 | | TLM 1,2 | |
| 17. | Visual Mapping – Size Mapping, Opacity Mapping | 1 | 30-12-2025 | | TLM 1,2 | |
| 18. | visual analytics- Static Visualization (ggplot2), Interactive Charts (plotly) | 1 | 05-01-2026 | | TLM 1,2 | |
| 19. | visual analytics- Interactive Tables (DT) | 1 | 06-01-2026 | | TLM 1,2 | |
| 20. | visual analytics- Geographic Visual Analytics (leaflet) | 1 | 08-01-2026 | | TLM 1,2 | |
| 21. | Design of visualization applications | 1 | 09-01-2026 | | TLM 1,2 | |
| **22.** | Design of visualization applications | 1 | 19-01-2026 | | TLM 1,2 | |
| 23. | Case Study: Visual Analytics of | 1 | 20-01-2026 | | TLM 4 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Global $CO_2$ Emissions | | | | | |
| 24. | Case Study: Visual Analytics of Global $CO_2$ Emissions | 2 | 22-01-2026 - 23-01-2026 | | TLM 4 | |
| **I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)** | | | | | | |
| **No. of classes required to complete UNIT-II: 13** | | | | **No. of classes taken:** | | |

## UNIT-III: Visualization Systems and Techniques

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 25. | Classification of visualization systems-By Data Type, By Task | 1 | 02-02-2026 | | TLM 1,2 | |
| 26. | Classification of visualization systems-By Interactivity, By User Control | 1 | 03-02-2026 | | TLM 1,2 | |
| **27.** | Classification of visualization systems-By Visual Encoding, By Medium | 1 | 05-06-2026 | | TLM 1,2 | |
| 28. | Interaction and visualization techniques misleading | 1 | 06-02-2026 | | TLM 1,2 | |
| 29. | Visualization of one-dimensional data | 1 | 09-02-2026 | | TLM 1,2 | |
| 30. | Visualization of one-dimensional text and text documents | 1 | 10-02-2026 | | TLM 1,2 | |
| **31.** | Visualization of two-dimensional data | 1 | 12-02-2026 | | TLM 1,2 | |
| 32. | Visualization of two-dimensional text and text documents | 1 | 13-02-2026 | | TLM 1,2 | |
| 33. | Visualization of two-dimensional data | 1 | 16-02-2026 | | TLM 1,2 | |
| 34. | Visualization of two-dimensional text and text documents | 1 | 17-02-2026 | | TLM 1,2 | |
| 35. | Case Study: Understanding Visualization Systems and Misleading Visuals Through Multi-dimensional and Text Data in R | 1 | 19-02-2026 | | TLM 4 | |
| 36. | Case Study: Understanding Visualization Systems and Misleading Visuals Through Multi-dimensional and Text Data in R | 1 | 20-02-2026 | | TLM 4 | |
| **No. of classes required to complete UNIT-III: 12** | | | | **No. of classes taken:** | | |

## UNIT-IV: Visualization of Entities

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| **37.** | Visualization of groups | 1 | 23-02-2026 | | TLM 1,2 | |
| **38.** | Visualization of trees | 1 | 24-02-2026 | | TLM 1,2 | |
| 39. | Visualization of graphs | 1 | 26-03-2026 | | TLM 1,2 | |
| 40. | Visualization of clusters | 1 | 27-03-2026 | | TLM 1,2 | |
| 41. | Visualization of networks | 1 | 02-03-2026 | | TLM 1,2 | |
| 42. | Visualization of software | 1 | 03-03-2026 | | TLM 1,2 | |
| 43. | Metaphorical visualization-graph/igraph, waffle | 1 | 05-03-2026 | | TLM 1,2 | |
| 44. | Metaphorical visualization-tree map | 1 | 06-03-2026 | | TLM 1,2 | |
| 45. | Metaphorical Visualization-grid/ggimage | 1 | 09-03-2026 | | TLM 1,2 | |
| 46. | Case Study: Metaphorical Visualization of Population Data as a Tree and Icons | 1 | 10-03-2026 | | TLM 4 | |
| 47. | Case Study: Metaphorical Visualization of Population Data as a Tree and Icons | 1 | 12-03-2026 | | TLM 4 | |
| **No. of classes required to complete UNIT-IV: 11** | | | | **No. of classes taken:** | | |

## UNIT-V: Visualization Trends-GIS Systems, Data Structures Used for Visualization

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| **48.** | Visualization of volumetric data, vector fields | 1 | 13-03-2026 | | TLM 1,2 | |
| 49. | processes and simulations | 1 | 16-03-2026 | | TLM 1,2 | |
| 50. | Visualization of maps | 1 | 17-03-2026 | | TLM 1,2 | |
| 51. | Visualization of geographic information | 1 | 23-03-2026 | | TLM 1,2 | |
| 52. | GIS systems | 1 | 24-03-2026 | | TLM 1,2 | |
| 53. | collaborative visualizations | 1 | 27-03-2026 | | TLM 1,2 | |
| **54.** | Evaluating visualizations | 1 | 30-03-2026 | | TLM 1,2 | |
| 55. | Recent trends in various perception techniques | 1 | 31-03-2026 | | TLM 1,2 | |
| 56. | Recent trends in various visualization techniques | 1 | 02-04-2026 | | TLM 1,2 | |
| 57. | Data structures used in data visualization. | 1 | 02-04-2026 | | TLM 1,2 | |
| **No. of classes required to complete UNIT-V: 10** | | | | **No. of classes taken:** | | |
| **II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)** | | | | | | |

| 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) | 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 |
| **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** | To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems. |
| **PSO 2** | To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues. |
| **PSO 3** | To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| **Name of the Faculty** | **Mrs.K.Rajasree** | **Dr.I.Murali Krishna** | **Dr. B.SrinivasaRao** | **Dr. S.Jayaprada** |
| **Signature** | | | | |

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hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

# COURSE HANDOUT

## PART-A

**Name of Course Instructor:** Mr.L.Narendra
**Course Name & Code** : DevOps & 23IT08
**L-T-P Structure** : **3-0-0** **Credits:** 3
**Program/ Sem /Sec** : B.Tech/VI/A **A.Y.:** 2025-26

**PREREQUISITES** : **Software Engineering, SDLC Models, Cloud Computing, Programming languages.**

**Course Objectives: The objectives of this course are to introduce**

- Describe the agile relationship between development and IT operations.
- Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

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

| | |
|---|---|
| **CO1** | Understand the concepts of SDLC Models, features of DevOps, Architecture of DevOps and Life Cycle of DevOps. **(Understand-L2)** |
| **CO2** | Apply the source code management tool to maintain the versions of the Source Code repositories. **(Apply-L3)** |
| **CO3** | Applying the pipeline tool to build an application and automate a continuous integration (CI) pipeline. **(Apply-L3)** |
| **CO4** | Implementing Docker containers to deliver and deploy the application continuously. **(Apply-L3)** |
| **CO5** | Deploying an application using Ansible, Kubernetes and OpenShift to automate Container orchestration tools. **(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** | | | | | 1 | | | 1 | 1 | 1 | 1 | | 1 | | 1 |
| **CO2** | | | | | 2 | | | | 1 | | | 1 | | | 2 |
| **CO3** | | | | | 2 | | | | | | | 1 | | | 2 |
| **CO4** | | | | | 2 | | | | | | | 1 | | | 2 |
| **CO5** | | | | | 2 | | | | 1 | | | 2 | | | 2 |
| **1-Low** | | | | | | | **2 –Medium** | | | | | | **3-High** | | |

**Text Books**

1. Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition Mihails Konoplows, 2015.
2. Alisson Machado de Menezes., Hands-on DevOps with Linux,1st Edition, BPB Publications, India, 2021.

**Reference Books**


1. LenBass, IngoWeber, LimingZhu.DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10

2. Gene Kim Je Humble, Patrick Debois, John Willis. The DevOps Handbook, 1st Edition, IT Revolution Press, 2016.

3. Verona, Joakim Practical DevOps, 1st Edition, Packt Publishing,2016.

4. Joakim Verona. Practical DevOps, 2nd Edition.Ingramshorttitle; 2nd edition (2018). ISBN10: 1788392574

5. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint.Wiley publications.ISBN:9788126579952


## PART-B

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

**UNIT-I: Introduction to DevOps**

| 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 to DevOps and COs** | 1 | 01-12-2025 | | TLM1,2 | |
| 2. | **Introduction to SDLC, Agile Model** | 1 | 02-12-2025 | | TLM1,2 | |
| 3. | **Introduction to DevOps.** | 1 | 05-12-2025 | | TLM1,2 | |
| 4. | **Features of DevOps, DevOps Architecture** | 1 | 08-12-2025 | | TLM1,2 | |
| 5. | **DevOps Lifecycle** | 1 | 09-12-2025 | | TLM1,2 | |
| 6. | **Understanding workflow and principles** | 1 | 12-12-2025 | | TLM1,2 | |
| 7. | **Introduction to DevOps Tools** | 1 | 15-12-2025 | | TLM1,2 | |
| 8. | **Build Automation, Delivery Automation** | 1 | 16-12-2025 | | TLM1,2 | |
| 9. | **Understanding Code Quality, Automation of CI/CD** | 1 | 19-12-2025 | | TLM1,2 | |
| 10. | **Release Management, Scrum** | 1 | 22-12-2025 | | TLM1,2 | |
| 11. | **Kanban, Delivery pipeline, bottlenecks Examples** | 1 | 23-12-2025 | | TLM1,2 | |
| **No. of classes required to complete UNIT-I: 11** | | | | **No. of classes taken:** | | |

**UNIT-II: Source Code Management**

| 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. | **Source Code Management, need for source code management, History of Source code management** | | 26-12-2025 | | TLM1,2 | |
| 2. | **source code management system and migrations. What is Version Control and GIT** | | 29-12-2025 | | TLM1,2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. | **GIT Installation, GIT features, GIT workflow** | | 30-12-2025 | | TLM1,2 | |
| 4. | **working with remote repository** | | 02-01-2026 | | TLM1,2 | |
| 5. | **GIT commands, GIT branching** | | 05-01-2026 | | TLM1,2 | |
| 6. | **GIT staging and collaboration** | | 06-01-2026 | | TLM1,2 | |
| 7. | **unit testing-code coverage: Junit** | | 09-01-2026 | | TLM1,2 | |
| 8. | **n Unit& Code Coverage with Sonar Qube** | | 19-01-2026 | | TLM1,2 | |
| 9. | **SonarQube- Code Quality Analysis.** | | 20-01-2026 | | TLM1,2 | |
| 10. | **SonarQube - Code Quality Analysis.** | | 23-01-2026 | | TLM1,2 | |
| **No. of classes required to complete UNIT-II: 10** | | | | **No. of classes taken:** | | |

**UNIT-III: Build Automation - Continuous Integration (CI)**

| 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. | **Build Automation - Continuous Integration (CI): Build Automation** | 1 | 02-02-2026 | | TLM1,2 | |
| 2. | **what is CI Why Cl is Required, CI tools** | 1 | 03-02-2026 | | TLM1,2 | |
| 3. | **Introduction to Jenkins (With Architecture)** | 1 | 06-02-2026 | | TLM1,2 | |
| 4. | **Jenkins workflow, Jenkins master slave architecture** | 1 | 09-02-2026 | | TLM1,2 | |
| 5. | **Jenkins Pipelines** | 1 | 10-02-2026 | | TLM1,2 | |
| 6. | **PIPELINE BASICS - Jenkins Master** | 1 | 13-02-2026 | | TLM1,2 | |
| 7. | **Node, Agent, and Executor Freestyle Projects& Pipelines** | 1 | 16-02-2026 | | TLM1,2 | |
| 8. | **Jenkins for Continuous Integration** | 1 | 27-02-2026 | | TLM1,2 | |
| 9. | **Create and Manage Builds** | 1 | 20-02-2026 | | TLM1,2 | |
| 10. | **User Management in Jenkins Schedule Builds** | 1 | 23-02-2026 | | TLM1,2 | |
| 11. | **Launch Builds on Slave Nodes** | 1 | 24-02-2026 | | TLM1,2 | |

| No. of classes required to complete UNIT-III: 11 | No. of classes taken: |
|---|---|

**UNIT-IV: Continuous Delivery**

| 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. | **Importance of Continuous Delivery, continuous deployment cd Flow** | 1 | 27-02-2026 | | TLM1,2 | |
| 2. | **Containerization with Docker: Introduction to Docker** | 1 | 02-03-2026 | | TLM1,2 | |
| 3. | **Docker installation, Docker commands** | 1 | 03-03-2026 | | TLM1,2 | |
| 4. | **Images & Containers** | 1 | 06-03-2026 | | TLM1,2 | |
| 5. | **Docker File** | 1 | 09-03-2026 | | TLM1,2 | |
| 6. | **running containers** | 1 | 10-03-2026 | | TLM1,2 | |
| 7. | **working with containers and publish to Docker Hub** | 1 | 13-03-2026 | | TLM1,2 | |
| 8. | **Testing Tools: Introduction to Selenium and its features** | 1 | 16-03-2026 | | TLM1,2 | |
| 9. | **Java Script testing.** | 1 | 17-03-2026 | | TLM1,2 | |
| **No. of classes required to complete UNIT-IV: 09** | | | | **No. of classes taken:** | | |

**UNIT-V: Configuration Management & Containerization**

| 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 to Ansible** | 1 | 20-03-2026 | | TLM1,2 | |
| 2. | **Ansible tasks Roles** | 1 | 20-03-2026 | | TLM1,2 | |
| 3. | **Jinja2 templating, Vaults** | 1 | 23-03-2026 | | TLM1,2 | |
| 4. | **Deployments using Ansible** | 1 | 23-03-2026 | | TLM1,2 | |
| 5. | **Introduction to Kubernetes** | 1 | 24-03-2026 | | TLM1,2 | |
| 6. | **Namespace& Resources** | 1 | 24-03-2026 | | TLM1,2 | |
| 7. | **CI/CD - On OCP** | 1 | 27-03-2026 | | TLM1,2 | |
| 8. | **BC, DC & ConfigMaps** | 1 | 30-03-2026 | | TLM1,2 | |
| 9. | **Deploying Apps on OpenShift Container Pods** | 1 | 31-03-2026 | | TLM1,2 | |
| 10. | **Introduction to Puppet master and Chef** | 1 | 03-04-2026 | | TLM1,2 | |
| **No. of classes required to complete UNIT-V: 10** | | | | **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 | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Argo CD** | 1 | 13-03-2026 | | TLM1,2 | |
| 2. | **Infrastructure as Code** | 1 | 20-03-2026 | | TLM1,2 | |
| 3. | **AIOps, MLOps** | 1 | 27-03-2026 | | TLM1,2 | |

| **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

**I MID EXAMINATIONS (27-06-2026 TO 02-02-2026)**
**II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)**

**PEVALUATION 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 | 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 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):

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| **Name of the Faculty** | **Mr.L.Narendra** | **Mr.L.Narendra** | **Dr.Sk.Jameer** | **Dr. S.Jayaprada** |
| **Signature** | | | | |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade**
**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, NTR DIST., A.P.-521 230.**
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT

### PART-A

**Name of Course Instructor: Dr. S. Jayaprada**
**Course Name & Code** : SOFTWARE PROJECT MANAGEMENT & 23IT07
**L-T-P Structure** : 3-0-0 **Credits:** 03
**Program/Sem/Sec** : B.Tech./CSE(AI&ML)/VI/A-SEC **A.Y.:** 2025-26

**PREREQUISITE:** Software Engineering, Object Oriented Analysis and Design.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**

The objective of the course is to Understand unique aspects of software project management at three levels: Organizational management, Infrastructure management and project management and measurement of the Project, and how these are applied to actual software project

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

| | |
|---|---|
| **CO1** | Understand the process of Conventional Software Management, Evolution and Improvement of Software Economics. **(Understand L2)** |
| **CO2** | Summarize Life cycle phases and Artifacts of the process in Software project management. **(Understand L2)** |
| **CO3** | Apply Workflows and checkpoints in Iterative Process planning. **(Apply L3)** |
| **CO4** | Use basic process automation components to improve efficiency in project environments **(Understand L2)** |
| **CO5** | Describe the Agile principles and examine how the DevOps pipeline improves modern software development **(Understand L2)** |

**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 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 2 | - | - |
| CO2 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | 1 | 2 | - | - |
| CO3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 3 | 1 | 3 | - | - |
| CO4 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 3 | - | - |
| CO5 | 2 | 2 | 1 | - | - | - | - | - | - | - | 3 | 1 | 3 | - | 2 |

**Text books:**


1. Software Project Management, Walker Royce, PEA,2005.Succeeding with Agile: Software Development Using Scrum, Mike Cohn, Addison Wesley.
2. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim, John Willis, Patrick Debois, Jez Humb,1st Edition, O'Reilly publications,2016.


**Reference books:**


1. Software Project Management, BobHughes,3/e,Mike Cotterell, TMH
2. Software Project Management, Joel Henry, PEA
3. Software Project Management in practice, PankajJalote, PEA, 2005,
4. Effective Software Project Management, Robert K.Wysocki,Wiley,2006.
5. Project Management in IT,Kathy Schwalbe, Cengage.

**E-resources:**

1. https://www.geeksforgeeks.org/software-engineering/software-engineering-software-projectmanagement-spm/
2. https://www.tutorialspoint.com/software_engineering/software_project_management.htm

## PART-B

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

**UNIT-I:** Conventional Software Management, Evolution of Software Economics, Improving Software Economics

| 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. | Course Objective & Outcomes | 1 | 01-12-2025 | | TLM1, TLM2 | |
| 2. | The waterfall model | 1 | 05-12-2025 | | TLM1, TLM2 | |
| 3. | conventional Software Management performance | 1 | 06-12-2025 | | TLM1, TLM2 | |
| 4. | Software Economics | 1 | 08-12-2025 | | TLM1, TLM2 | |
| 5. | Pragmatic software cost estimation | 1 | 12-12-2025 | | TLM1, TLM2 | |
| 6. | Reducing Software product size | 1 | 13-12-2025 | | TLM1, TLM2 | |
| 7. | Improving software processes improving team effectiveness, improving automation, Achieving required quality, peer inspections. | 2 | 15-12-2025 & 19-12-2025 | | TLM1, TLM2 | |
| 8. | The principles of conventional software Engineering | 1 | 20-12-2025 | | TLM1, TLM2 | |
| 9. | Principles of modern software management | 1 | 22-12-2025 | | TLM1, TLM2 | |
| 10. | Transitioning to an iterative process. | 1 | 26-12-2025 | | TLM1, TLM2 | |
| 11. | Assignment-1/Tutorial-1 | 1 | 27-12-2025 | | TLM3 | |
| No. of classes required to complete UNIT-I | | 12 | | No. of classes taken: | | |

**UNIT-II:** Life cycle phases, Artefacts of the process.

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 12. | Engineering and production stages | 1 | 29-12-2025 | | TLM1, TLM2 | |
| 13. | Inception, Elaboration | 1 | 02-01-2026 | | TLM1, TLM2 | |
| 14. | Construction, transition phases | 1 | 03-01-2026 | | TLM1, TLM2 | |
| 15. | artifact sets, Management artifacts | 1 | 05-01-2026 | | TLM1, TLM2 | |
| 16. | Engineering artifacts | 1 | 09-01-2026 | | TLM1, TLM2 | |
| 17. | Programmatic artifacts | 1 | 19-01-2026 | | TLM1, TLM2 | |
| 18. | Assignment-2/Tutorial-2 | 1 | 23-01-2026 | | TLM1, TLM2 | |
| No. of classes required to complete UNIT-II | | 07 | | No. of classes taken: | | |

**UNIT-III:** Model based software architectures, Work Flows of the process, Checkpoints of the process, Iterative Process Planning.

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 19. | A Management perspective and technical perspective | 1 | 24-01-2026 | | TLM2, TLM3 | |
| 20. | Software process workflows | 1 | 02-02-2026 | | TLM1, TLM2 | |
| 21. | Iteration workflows. | 1 | 06-02-2026 | | TLM1, TLM2 | |
| 22. | Major milestones, Minor Milestones | 1 | 07-02-2026 | | TLM1, TLM2 | |
| 23. | Periodic status assessments. | 1 | 09-02-2026 | | TLM1, TLM2 | |
| 24. | Work breakdown structures, planning guidelines | 1 | 13-02-2026 | | TLM1, TLM2 | |
| 25. | cost and schedule estimating, | 1 | 14-02-2026 | | TLM1, | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | TLM2 | |
| 26. | Iteration planning process, Pragmatic planning | 1 | 16-02-2026 | | TLM1, TLM2 | |
| 27. | Assignment-3/Tutorial-3 | 1 | 20-02-2026 | | TLM3 | |
| No. of classes required to complete UNIT-III | | 09 | | No. of classes taken: | | |

**UNIT-IV:** Project Organizations and Responsibilities, Process Automation, Project Control and Process instrumentation.

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 28. | Line-of-Business Organizations | 1 | 21-02-2026 | | TLM1, TLM2 | |
| 29. | Project Organizations | 1 | 23-02-2026 | | TLM1, TLM2 | |
| 30. | evolution of Organizations | 1 | 27-02-2026 | | TLM1, TLM2 | |
| 31. | Automation Building blocks, Project Environment | 1 | 28-02-2026 | | TLM1, TLM2 | |
| 32. | seven core Metrics | 1 | 02-03-2026 | | TLM1, TLM2 | |
| 33. | Management indicators | 1 | 06-03-2026 | | TLM1, TLM2 | |
| 34. | quality indicators, life cycle expectations | 1 | 07-03-2026 | | TLM1, TLM2 | |
| 35. | pragmatic Software Metrics. | 1 | 09-03-2026 | | TLM1, TLM2 | |
| 36. | Metric automation. | 1 | 13-03-2026 | | TLM3 | |
| No. of classes required to complete UNIT-IV | | 09 | | No. of classes taken: | | |

**UNIT-V: Fundamentals of DevOps, DevOps adoption in projects.**

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 37 | Agile Methodology | 1 | 16-03-2026 | | TLM1, TLM2 | |
| 38 | ADAPTing to Scrum, Patterns for Adopting Scrum | 1 | 20-03-2026 | | TLM1, TLM2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 39 | Architecture, Deployments, Orchestration | 1 | 21-03-2026 | | TLM1, TLM2 | |
| 40 | Need, Instance of applications | 1 | 23-03-2026 | | TLM1, TLM2 | |
| 41 | DevOps delivery pipeline, DevOp secosystem. | 2 | 27-03-2026<br>28-03-2026 | | TLM1, TLM2<br>**TLM3** | |
| 42 | Technology aspects, Agiling capabilities Tool stack implementation, Peopleaspect, processes | 2 | 30-03-2026<br>03-04-2026 | | TLM1, TLM2 | |
| 43 | Revision | 1 | 04-04-2026 | | **TLM3** | |
| No. of classes required to complete UNIT-V | | 09 | | No. of classes taken: | | |

**I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)**
**II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)**

| **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) | 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- | 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 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):

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| **Name of the Faculty** | **Dr. S Jayaprada** | **Dr. S Jayaprada** | **Dr.B.Srinivasa Rao** | **Dr. S Jayaprada** |
| **Signature** | | | | |

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L.B. REDDY NAGAR, MYLAVARAM, N.T.R. DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF CIVIL ENGINEERING

# COURSE HANDOUT
## PART-A

Name of Course Instructor : B. NARASIMHARAO
Course Name & Code : DISASTER MANAGEMENT& 23CE81
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CSM(AI&ML)/VI-Sem/A., A.Y : 2025-26

**PRE-REQUISITE:** NIL

**COURSE EDUCATIONAL OBJECTIVES (CEOs)**: This course deals with different types of disasters, impacts of disasters, importance of technology in handling disaster management situations, importance of planning and risk prevention in case of occurrence of disaster, importance of education and community approach for the responsive actions to be taken in case of occurrence of disaster.

**COURSE OUTCOMES (COs):** At the end of the course, students are able to

| | |
|---|---|
| **CO 1** | Identify the usefulness of integrating management principles in disaster mitigation work **(Understand-L2).** |
| **CO 2** | Illustrate the different approaches needed to manage pre- during and post- disaster periods **(Understand-L2).** |
| **CO 3** | Identify and explain the process of risk management **(Understand-L2).** |
| **CO 4** | Evaluate the risk transfer Relate to importance of education and community approach for the responsive actions to be taken in case of disaster occurrence **(Understand-L2).** |

**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** | 1 | 1 | - | 1 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 2 |
| **CO2** | 1 | 1 | 1 | 2 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 2 |
| **CO3** | 1 | - | - | 1 | 2 | 1 | 1 | 1 | - | - | - | 1 | 1 | 1 | 2 |
| **CO4** | 1 | - | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 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).

**TEXT BOOKS:**

**T1** An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Publishers& Distributors Pvt.Ltd.

**T2** Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh-Rawat Publications

**T3** 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

**T4** 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt.Ltd.

**REFERENCE BOOKS:**


**R1** 'Disaster Management' edited by H K Gupta (2003), Universities press.

**R2** 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universities press .R. Nishith, Singh AK

**R3** "Disaster Management in India: Perspectives, Issues and strategies" New Royal Book Company."


# PART-B

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

## UNIT –I: Natural Hazards and Disaster Management

| 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 of DM | 1 | **01-12-2025** | | **TLM2** | |
| 2. | Inter disciplinary nature of the subject | 1 | **04-12-2025** | | **TLM2** | |
| 3. | Disaster Management cycle | 1 | **06-12-2025** | | **TLM2** | |
| 4. | Five priorities for action | 1 | **08-12-2025** | | **TLM2** | |
| 5. | Case study methods of the following: Vegetal Cover floods | 1 | **11-12-2025** | | **TLM2** | |
| 6. | Droughts | 1 | **13-12-2025** | | **TLM2** | |
| 7. | Earthquakes | 1 | **15-12-2025** | | **TLM2** | |
| 8. | Landslides | 1 | **18-12-2025** | | **TLM2** | |
| 9. | Global warming | 1 | **20-12-2025** | | **TLM2** | |
| 10. | Cyclones & Tsunamis – Post Tsunami hazards along the Indian coast. | 1 | **22-12-2025** | | **TLM2** | |
| No. of classes required to complete UNIT-I:10 | | | | No. of classes taken: | | |

## UNIT-II: Man Made Disaster and Their Management Along with Case Study Methods of The Following

| 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. | Fire hazards | 1 | **27-12-2025** | | **TLM2** | |
| 2. | Transport hazard dynamics | 1 | **29-12-2025** | | **TLM2** | |
| 3. | Solid waste management | 1 | **03-01-2026** | | **TLM2** | |
| 4. | Bio terrorism -threat in mega cities | 1 | **05-01-2026** | | **TLM2** | |
| 5. | Rail and aircraft accidents | 1 | **08-01-2026** | | **TLM2** | |
| 6. | Ground water | 1 | **19-01-2026** | | **TLM2** | |
| 7. | Industries | 1 | **22-01-2026** | | **TLM2** | |
| 8. | Emerging infectious diseases and Aids and their management. | 1 | **24-01-2026** | | **TLM2** | |
| No. of classes required to complete UNIT-II:8 | | | | No. of classes taken: | | |

## UNIT-III: Risk and Vulnerability

| 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 | 1 | **02-02-2026** | | **TLM2** | |
| 2. | Building codes and land use planning | 1 | **05-02-2026** | | **TLM2** | |
| 3. | Social Vulnerability | 1 | **07-02-2026** | | **TLM2** | |
| 4. | Environmental vulnerability | 1 | **09-02-2026** | | **TLM2** | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5. | Macro-economic management and sustainable development | 1 | **12-02-2026** | | **TLM2** | |
| 6. | Climate change risk rendition | 1 | **16-02-2026** | | **TLM2** | |
| 7. | Financial management of disaster | 1 | **19-02-2026** | | **TLM2** | |
| 8. | Financial management of disaster - related losses. | 1 | **21-02-2026** | | **TLM2** | |
| No. of classes required to complete UNIT-III:8 | | | | No. of classes taken: | | |

## UNIT- IV: Role of Technology in Disaster Managements

| 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. | Disaster management for infra structures, taxonomy of infra structure | 1 | **23-02-2026** | | **TLM2** | |
| 2. | Treatment plants and process facilities | 1 | **26-02-2026** | | **TLM2** | |
| 3. | Electrical substations- roads and bridges | 1 | **28-02-2026** | | **TLM2** | |
| 4. | Mitigation programme for earth quakes- flowchart | 1 | **02-03-2026** | | **TLM2** | |
| 5. | Geospatial information in agriculture drought assessment | 1 | **05-03-2026** | | **TLM2** | |
| 6. | Multimedia Technology in disaster risk management and training | 1 | **07-03-2026** | | **TLM2** | |
| 7. | Transformable Indigenous Knowledge in disaster reduction | 1 | **09-03-2026** | | **TLM2** | |
| 8. | Role of RS & GIS. | 1 | **12-03-2026** | | **TLM2** | |
| No. of classes required to complete UNIT-IV:08 | | | | No. of classes taken: | | |

## UNIT-V: Multi-sectional Issues, Education and Community Preparedness

| 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. | Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards | 1 | **16-03-2026** | | **TLM2** | |
| 2. | Environmental risk-Forest management and disaster risk reduction | 1 | **21-03-2026** | | **TLM2** | |
| 3. | The Red cross and red crescent movement - Corporate sector and disaster risk reduction | 1 | **23-03-2026** | | **TLM2** | |
| 4. | Education in disaster risk reduction- Essentials of school disaster education | 1 | **28-03-2026** | | **TLM2** | |
| 5. | Community capacity and disaster resilience-Community based disaster recovery | 1 | **30-03-2026** | | **TLM2** | |
| 6. | Community based disaster management and social capital- | 1 | **02-04-2026** | | **TLM2** | |
| 7. | Designing resilience- building community capacity for action. | 1 | **04-04-2026** | | **TLM2** | |
| No. of classes required to complete UNIT-V:07 | | | | 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 (R23 Regulations):**

| **Evaluation Task** | **Marks** |
|---|---|
| Assignment-I (Unit-I) | A1=5 |
| Assignment-II (Unit-II) | A2=5 |
| I-Mid Examination (Units-I & II) | M1=15 |
| I-Quiz Examination (Units-I & II) | Q1=10 |
| Assignment-III (Unit-III) | A3=5 |
| Assignment-IV (Unit-IV) | A4=5 |
| Assignment-V (Unit-V) | A5=5 |
| II-Mid Examination (Units-III, IV & V) | M2=15 |
| II-Quiz Examination (Units-III, IV & V) | Q2=10 |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5 |
| CIE-I (Mid-I, Assignment-I. Quiz-I) | 30 |
| CIE-II (Mid-II, Assignment-II. Quiz-II) | 30 |
| Cumulative Internal Examination (CIE): 80% best and 20% least | 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** | Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering |
| **PSO 2** | Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands |
| **PSO 3** | Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain |

| Course Instructor | Course Coordinator | Module Coordinator | HOD |
|---|---|---|---|
| (B NARASIMHARAO) | | (B NARASIMHARAO) | (Dr.K.V.RAMANA) |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT
## PART-A

**Name of Course Instructor:** Dr Shaik Salma Asiya Begum
**Course Name & Code** : DEEP LEARNING LAB (23AM53)
**L-T-P Structure** : 0-0-3 **Credits:** 1.5
**Program/Sem/Sec** : B.Tech /CSE(AI&ML)/VI/A **A.Y:** 2025-2026

**PRE-REQUISITE:** Python/R.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The main objectives of the course are to:

- This course aims to develop students' foundational competence in deep learning by enabling them to design, implement, and analyze various neural network models for real-world problems. It equips learners with practical skills in modern deep learning frameworks, fosters the ability to select suitable architectures for different applications, and enhances their capability to interpret model performance and results effectively.

**COURSE OUTCOMES (COs):** At the end of the course, students are able to

| | |
|---|---|
| **CO1** | Implement deep neural networks to solve real-world problems **(Apply-L3)** |
| **CO2** | Choose an appropriate pre-trained model to solve real real-time problem **(Analyze-L4)** |
| **CO3** | Interpret the results of two different deep learning models **(Analyze-L4)** |
| **CO4** | Improve individual/team work skills, communication & report writing skills with ethical values. |

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

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | 2 | - | 2 | 3 | 2 | 1 |
| CO2 | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | 2 | - | 2 | 3 | 3 | 1 |
| CO3 | 2 | 3 | 2 | 3 | 2 | - | - | - | 1 | 2 | - | 2 | 2 | 2 | 2 |
| CO4 | 1 | 1 | 1 | - | 1 | - | - | - | - | - | - | 1 | - | - | 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).

**Text Books:**


1. Reza Zadeh and Bharath Ram Sundar, *Tensorflow for Deep Learning*, O'Reilly publishers, 2018


**References:**


1. https://github.com/fchollet/deep-learning-with-python-notebooks

# PART-B

## COURSE DELIVERY PLAN (LESSON PLAN): Section-B

| 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 | Implement multi-layer perceptron algorithm for MNIST Handwritten Digit Classification. | 6 | 03-12-2025<br>10-12-2025 | | TLM4 | |
| 2 | Design a neural network for classifying movie reviews (Binary Classification) using IMDB dataset. | 6 | 17-12-2025<br>24-12-2025 | | TLM4 | |
| 3 | Design a neural network for classifying news wires (Multi class classification) using Reuters dataset. | 3 | 31-12-2025 | | TLM4 | |
| 4 | Design a neural network for predicting house prices using Boston Housing Price dataset. | 3 | 07-01-2026 | | TLM4 | |
| 5 | Build a Convolution Neural Network for MNIST Handwritten Digit Classification. | 3 | 21-01-2026 | | TLM4 | |
| 6 | Build a Convolution Neural Network for simple image (dogs and Cats) Classification. | 3 | 28-01-2026 | | TLM4 | |
| 7 | Use a pre-trained convolution neural network (VGG16) for image classification. | 3 | 04-02-2026 | | TLM4 | |
| 8 | Implement one hot encoding of words or characters. | 3 | 11-02-2026 | | TLM4 | |
| 9 | Implement word embeddings for IMDB dataset. | 6 | 18-02-2026<br>25-02-2026 | | TLM4 | |
| 10 | Implement a Recurrent Neural Network for IMDB movie review classification problem. | 3 | 11-03-2026 | | TLM4 | |
| 11 | Virtual Lab | 3 | 18-03-2026 | | TLM4 | |
| 12 | Internal Exam | 3 | 25-03-2026 | | TLM4 | |

| 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 Regulations):**

According to Academic Regulations of R23 Distribution and Weightage of Marks For Laboratory Courses is as follows

**(a) Continuous Internal Evaluation (CIE):** The Continuous Internal Evaluation (CIE) is based on the following parameters:

| Parameter | Marks |
|---|---|
| Day to Day work | 10 |
| Record | 05 |
| Internal Test | 15 |
| Total | 30 |

**(b) Semester End Examinations (SEE:** The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3 hours duration and evaluated for 70 marks.

# 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 engineeringproblems. |
| **PO 2** | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using firstprinciples of mathematics, natural sciences, and engineering sciences. |
| **PO 3** | **Design/development of solutions**: Design solutions for complex engineeringproblems 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 andresearch 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 complexengineering 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 consequentresponsibilities relevant to the professional engineering practice |
| **PO 7** | **Environment and sustainability**: Understand the impact of the professionalengineering 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 teamwork**: Function effectively as an individual, and as a member orleader 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 multidisciplinaryenvironments. |
| **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 technologicalchange. |

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| **Title** | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | | | | |
| **Signature** | | | | |

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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT
## PART-A

**Name of Course Instructors : Mrs.K.Rajasree**

| | | |
|---|---|---|
| **Course Name & Code** | **: DATA VISUALIZATION LAB (23AD54)** | |
| **L-T-P Structure** | **:** 0-0-3 | **Credits:** 1.5 |
| **Program/Sem/Sec** | **: III B.Tech /VI/A** | **A.Y.:** 2025-26 |

**PRE-REQUISITE:** R Tool, Engineering Graphics

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**

1. To visualize the different datasets using histograms, line charts.
2. To understand the use of bar charts and box plots.
3. To understand Scatter plots, mosaic plots
4. To understand different Map visualizations
5. To learn advanced graphs such as correlogram, heatmap and 3D graphs.

**COURSE OUTCOMES (COs):** After successful completion of the course the students are able to

| | |
|---|---|
| **CO 1** | Apply different visualization techniques like plots and graphs in R on different datasets **(Apply-L3)** |
| **CO 2** | Apply different Map visualizations in R **(Apply-L3)** |
| **CO 3** | Develop advanced graphs such as correlogram, heatmap and 3D graphs in R **(Apply-L3)** |
| **CO 4** | Improve individual / teamwork skills, communication & report writing skills with ethical 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** | - | 2 | 2 | - | 3 | - | - | - | - | - | - | - | - | 2 | - |
| **CO2** | - | 2 | 2 | - | 3 | - | - | - | - | - | - | - | 2 | 2 | - |
| **CO3** | - | 2 | 2 | - | 3 | - | - | - | - | - | - | - | 2 | 2 | - |
| **CO4** | - | - | - | - | - | - | - | 2 | 2 | - | - | - | - | - | 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).

# 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 | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | Introduction to Data Visualization , R Programming Basics | 3 | 04-12-2025 | | TLM4 | |
| 2. | 1. a) Load VADeaths(Death Rates in Virginia) dataset in R and visualize the data using different histograms.<br>b) Load air quality dataset in R and visualize La Guardia Airport's daily maximum temperature using histogram. | 3 | 11-12-2025 | | TLM4 | |
| 3. | 2.Load Air Passengers dataset in R and visualize the data using line chart that shows increase in air passengers over given time period. | 3 | 08-01-2026 | | TLM4 | |
| 4. | 3. a) Load iris dataset in R, visualize the data using different Bar Charts and also demonstrate the use of stacked plots.<br>b) Load air quality dataset in R and visualize ozone concentration in air. | 3 | 22-01-2026 | | TLM4 | |
| 5. | 4. a) Load iris dataset in R, visualize the data using different Box plots including group by option and also use color palette to represent species.<br>b) Load air quality dataset in R and visualize air quality parameters using box plots. | 3 | 22-01-2026 | | TLM4 | |
| 6. | 5. Visualize iris dataset using simple scatter, multivariate scatter plot and also visualize scatter plot matrix to visualize multiple variables across each other. | 3 | 05-02-2026 | | TLM4 | |
| 7. | 6. Load diamonds dataset in R and visualize the structure in datasets with large data points using hexagon binning and also add color palette | 3 | 12-02-2026 | | TLM4 | |
| 8. | 7. Load HairEyeColor dataset in R and plot categorical data using mosaic plot. | 3 | 12-02-2026 | | TLM4 | |
| 9. | 8. Load mtcars dataset in R and visualize data using heat map. | 3 | 26-02-2026 | | TLM4 | |
| 10. | 9. Install leaflet library in R and perform different map visualizations. | 3 | 05-03-2026 | | TLM4 | |
| 11. | 10 Visualize iris dataset using 3d graphs such as scatter3d, cloud, xyplot. | 3 | 05-03-2026 | | TLM4 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12. | 11.Make use of correlogram to visualize data in correlation matrices for iris dataset. | 3 | 12-03-2026 | | TLM4 | |
| 13. | 12.Install maps library in R and draw different map visualizations. | 3 | 12-03-2026 | | TLM4 | |
| 14. | Internal Exam | 3 | 02-04-2026 | | TLM4 | |

| **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** |
|---|---|
| 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. |
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| **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** | To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems. |
| **PSO 2** | To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues. |
| **PSO 3** | To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values. |

| **Title** | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | **Mrs.K.Rajasree** | **Dr.I.Murali Krishna** | **Dr. B.SrinivasaRao** | **Dr. S.Jayaprada** |
| **Signature** | | | | |

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## COURSE HANDOUT

## PART-A

**Name of Course Instructor: Dr. R.Padma Venkat**
**Course Name & Code** : Soft Skills & 23HSS1
**L-T-P Structure** : **0**-1-2 **Credits:** 02
**Program/Sem/Sec** : B. Tech- VI SEM / CSM-A
**Academic Year** : 2025-26
**PREREQUISITE** : Basic language proficiency and cognitive skills with an exposure to academic contexts.

**Course Objectives:**
**To equip the students with the skills to effectively communicate in English.**
**To train the students in interview skills, group discussions and presentation skills.**
**To motivate the students to develop confidence.**
**To enhance the students' interpersonal skills.**
**To improve the students' writing skills.**

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

| | |
|---|---|
| **CO1** | Demonstrate analytical thinking skills by effectively introducing themselves, evaluating their own strengths and weaknesses, and understanding the role of perception and attitude in personality development. **L2 -Understand** |
| **CO2** | Make use of self-management competencies, leadership qualities, and etiquette skills to function confidently and professionally in workplace environments. **L3 - Apply** |
| **CO3** | Utilize grammatical proficiency, writing skills, and documentation techniques to communicate clearly and professionally in academic and workplace settings. **L3 - Apply** |
| **CO4** | Take part in effectively in group discussions by demonstrating logical thinking, clarity of expression, and collaborative communication. **L4 - Analyze** |
| **CO5** | Identify the key factors that influence interpersonal relationships and analyze how they affect communication and collaboration. **L3 - Apply** |

**COURSE ARTICULATION MATRIX**

| **Course Outcomes** | **Programme Outcomes** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PO's | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **CO1.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **CO2.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **CO3.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **CO4.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **CO5.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |

**1 = Slight (Low) 2= Moderate (Medium) 3 = Substantial (High)**

**(Correlation between COs & POs)**

## Syllabus:

**UNIT – I**

***Analytical Thinking & Listening Skills:*** Self-Introduction, Shaping Young Minds - A Talk by Azim Premji (Listening Activity), Self – Analysis, Developing Positive Attitude, Perception.

***Communication Skills:*** Verbal Communication; Non Verbal Communication (Body Language)

**UNIT – II**

***Self-Management Skills:*** Anger Management, Stress Management, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

***Etiquette:*** Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

**UNIT – III**

***Standard Operation Methods:*** Basic Grammars, Tenses, Prepositions, Pronunciation, Letter Writing; Note Making, Note Taking, Minutes Preparation, Email & Letter Writing.

**UNIT-IV**

***Job-Oriented Skills:*** Group Discussion, Mock Group Discussions, Resume Preparation, Interview Skills, Mock Interviews

**UNIT-V**

***Interpersonal relationships:*** Introduction, Importance, Types, Uses, Factors affecting interpersonal relationships, Accommodating different styles, Consequences of interpersonal relationships

**Text books:**

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

**References:**

1. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand& Company Ltd., 2018.
2. Raman, Meenakshi& Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

**E-resources:**

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

**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 method | HOD Sign |
|---|---|---|---|---|---|---|
| 1. | ***Analytical Thinking & Listening Skills:*** Self-Introduction | 1+2 | 2-12-25 | | TLM1 TLM4 | |
| 2. | Self – Analysis, Developing Positive Attitude, Perception | 1+2 | 9-12-25 | | TLM1 TLM5 | |
| 3. | Verbal Communication; Non Verbal Communication (Body Language) | 1+2 | 16-12-25 | | TLM1 TLM4 TLM3 | |
| 4. | ***Self-Management Skills:*** Anger Management, Stress Management | 1+2 | 23-12-25 | | TLM2 TLM4 | |
| 5. | Time Management, Six Thinking Hats | 1+2 | 30-12-25 | | TLM2 TLM4 | |
| 6. | Team Building and Leadership Qualities | 1+2 | 6-1-26 | | TLM2 TLM4 | |
| 7. | ***Standard Operation Methods:*** Basic Grammars, Tenses, and Prepositions | 1+2 | 20-1-26 | | TLM1 TLM3 | |
| 8. | Pronunciation, Letter Writing | | 20-1-26 | | TLM1 TLM3 | |
| 9. | Note Making, Note Taking, Minutes Preparation, Email | 1+2 | 3-2-26 | | TLM2 TLM5 | |
| 10. | ***Job-Oriented Skills:*** Group Discussion, Mock Group Discussions | 1+2 | 10-2-26 | | TLM4, TLM6 | |
| 11. | Mock Group Discussions | 1+2 | 17-2-26 | | TLM4, TLM6 | |
| 12. | Resume Preparation | 1+2 | 24-2-26 | | TLM1, TLM5 | |
| 13. | Interview Skills, Mock Interviews | 1+2 | 3-3-26 | | TLM1, TLM6 | |
| 14. | Interview Skills, Mock Interviews | 1+2 | 10-3-26 | | TLM1, TLM6 | |
| 15. | ***Interpersonal relationships:*** Introduction, Importance, Types, Uses, Factors affecting interpersonal relationships | 1+2 | 17-3-26 | | TLM1 TLM3 TLM5 | |
| 16. | Accommodating different styles, Consequences of interpersonal relationships | 1+2 | 24-3-26 | | TLM1 TLM3 TLM5 | |
| **No. of classes required to complete Syllabus:** | | **45** | | | | |

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

| **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 |

**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. |

| **Title** | **Course Instructor** | **Lab. Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | **Dr. R. PadmaVenkat** | **Dr. B. Samrajya Lakshmi** | **Dr. R.PadmaVenkat** | **Dr. T. Satyanarayana** |
| **Signature** | | | | |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade**
**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, NTR DIST., A.P.-521 230.**
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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT

### PART-A

**Name of Course Instructor** : Dr.S.Jayaprada
**Course Name & Code** : Technical Paper Writing & IPR & 23MC04
**L-T-P Structure** : **2**-0-0 **Credits:** 02
**Program/Sem/Sec** : III B.Tech/VI/A Sec **A.Y.:** 2025-26

**Pre-requisites**: Students are expected to have a basic understanding of English grammar, sentence formation, and general writing skills. Familiarity with using word processing tools such as Microsoft Word will also help in effectively learning technical paper writing and report preparation.

**Course Objectives:**
The objectives of this course are to introduce:

- The basic concepts related to writing technical reports and understanding the concepts related to formatting and structuring the report. This will help students comprehend the concept of proofreading, proposals, and practice.

**Course Outcomes:** At the end of the course, students will be able to
**CO1:** Understand the principles of technical writing and apply appropriate language, structure, and formatting to plan and draft professional technical reports. **Understand (L2)**
**CO2:** Draft technical documents using illustrations and revise them through structured editing, focusing on clarity, grammar, and professional language. **Apply (L3)**
**CO3:** Demonstrate effective proofreading and summarization techniques and present final technical documents both in written and verbal forms. **Analyze (L4)**
**CO4:** Use advanced word processing tools for formatting, editing, referencing, and securing technical documents efficiently. **Apply (L3)**
**CO5:** Understand the basics of Intellectual Property Rights and the process of innovation, patenting, and international cooperation in IP protection. **Understand (L2)**

**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 | 2 | 2 | 1 | 1 | 2 | - | - | 2 | 1 | 3 | - | 2 | 1 | 2 | 3 |
| CO2 | 2 | 2 | 2 | 1 | 2 | - | - | 2 | 1 | 3 | - | 2 | 1 | 2 | 3 |
| CO3 | 2 | 2 | 2 | 2 | 2 | - | - | 2 | 1 | 3 | - | 2 | 1 | 2 | 3 |
| CO4 | 1 | 1 | 1 | 1 | 3 | - | - | - | 1 | 3 | - | 2 | 1 | 2 | 3 |
| CO5 | 1 | 1 | - | - | - | 3 | 2 | 2 | - | 2 | - | 2 | 1 | 2 | 2 |
| **1-Low** | | | | | | **2 –Medium** | | | | | | **3-High** | | | |

**Text Books:**

1. Kompal Bansal & Parshit Bansal, *Fundamentals of IPR for Beginners*, 1st Ed., BS Publications, 2016.
2. William S. Pfeiffer and Kaye A. Adkins, *Technical Communication: A Practical Approach*, Pearson.
3. Ramappa T., *Intellectual Property Rights Under WTO*, 2nd Ed., S. Chand, 2015.

**Reference Books:**

1. Adrian Wallwork, *English for Writing Research Papers*, Springer New York Dordrecht Heidelberg London, 2011.
2. Day R., *How to Write and Publish a Scientific Paper*, Cambridge University Press, 2006.

**E-resources:**

https://www.udemy.com/course/reportwriting/
https://www.udemy.com/course/professional-business-english-and-technical-report-writing/
https://www.udemy.com/course/betterbusinesswriting/

## PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

**UNIT-I: Introduction**

| 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. | An introduction to writing technical reports | 1 | 03-12-2025 | | TLM1 TLM6 | |
| 2. | technical sentence formation, using transitions to join sentences, using tenses for technical writing. | 1 | 03-12-2025 | | TLM1 TLM2 | |
| 3. | Planning and Structuring | 1 | 10-12-2025 | | TLM1 TLM6 | |
| 4. | Planning the report | 1 | 10-12-2025 | | TLM1 TLM2 | |
| 5. | identifying readers | 1 | 17-12-2025 | | TLM1 TLM6 | |
| 6. | voice, formatting and structuring the report | 1 | 17-12-2025 | | TLM1 TLM2 | |
| 7. | sections of a technical report | 1 | 24-01-2026 | | TLM1 TLM6 | |
| 8. | minutes of meeting writing | 1 | 24-01-2026 | | TLM1 TLM6 | |
| **No. of classes required to complete UNIT-I: 8** | | | | **No. of classes taken:** | | |

**UNIT-II: Drafting report and design issues**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 9. | **Drafting report and design issues** | 1 | 31-12-2025 | | TLM1 TLM2 | |
| 10. | The use of drafts, illustrations and graphics. | 1 | 31-12-2025 | | TLM1 TLM6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11. | **Final edits:** Grammar, spelling, readability, and writing in plain English | 2 | 07-01-2026 | | TLM1 TLM6 | |
| 12. | jargon and final layout issues; spelling, punctuation and grammar | 1 | 21-01-2026 | | TLM1 TLM6 | |
| 13. | padding, paragraphs, ambiguity | 1 | 21-01-2026 | | TLM1 TLM2 | |
| **I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)** | | | | | | |
| **No. of classes required to complete UNIT-II: 6** | | | | **No. of classes taken:** | | |

**UNIT-III: Proofreading and summaries**

| 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. | Proofreading, summaries, activities on summaries. | 2 | 04-02-2026 | | TLM1 TLM6 | |
| 15. | **Presenting final reports:** Printed presentation, verbal presentation skills, introduction to proposals and practice | 2 | 04-02-2026 & 11-02-2026 | | TLM1 TLM2 | |
| **No. of classes required to complete UNIT-III: 4** | | | | **No. of classes taken:** | | |

**UNIT-IV: Using word processor**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 16. | Adding a Table of Contents, updating the Table of Contents, deleting the Table of Contents, adding an index, creating an outline, adding comments, tracking changes, viewing changes, additions, and comments, accepting and rejecting changes | 2 | 18-02-2026 | | TLM1 TLM6 | |
| 17. | working with footnotes and endnotes, inserting citations and bibliography, comparing documents, combining documents, marking documents final and making them read-only, password protecting Microsoft Word documents, using macros. | 2 | 25-02-2026 & 04-03-2026 | | TLM1 TLM6 | |
| **No. of classes required to complete UNIT-IV: 4** | | | | **No. of classes taken:** | | |

**UNIT-V: Nature of Intellectual Property**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 18. | Patents, designs, trade and copyright. Process of Patenting and Development: Technological research, innovation, patenting, development. | 2 | 11-03-2026 & 18-03-2026 | | TLM1 TLM6 | |
| 19. | **International Scenario: International cooperation on intellectual property.** | 2 | 25-03-2026 | | TLM1 TLM6 | |
| **No. of classes required to complete UNIT-V: 04** | | | | **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 | Textbook followed | HOD Sign |
|---|---|---|---|---|---|---|---|---|
| 1. | Digital Tools for Academic and Technical Writing | 2 | 01-04-2026 02-04-2026 | | TLM2 | CO5 | T1 | |
| No. of classes | | 02 | | | No. of classes taken: | | | |
| **II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)** | | | | | | | | |

| **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) | 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 | 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 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):

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| **Title** | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | **Dr. S Jayaprada** | **Dr S Pichi Reddy** | **Dr Shaik Jameer** | **Dr. S Jayaprada** |
| **Signature** | | | | |

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**Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada**
**L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.**
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT

### PART-A

**Name of Course Instructor** : Mr M.PRUTHVI RAJ
**Course Name & Code** : Natural Language Processing & 23AM05
**L-T-P Structure** : 3-0-0 **Credits:** 03
**Program/Sem/Sec** : B.Tech./CSE(AI&ML)/VI/B **A.Y.:** 2025-26

**Pre-requisite:** Knowledge on Python programming, Formal Language Theory.

**Course Educational Objective:** The main objective of the course is

- To introduce the core concepts and techniques of Natural Language Processing (NLP), covering both traditional and statistical approaches. Students will learn key algorithms, computational properties of language, and major aspects of syntactic, semantic, and pragmatic processing, enabling them to understand and describe NLP applications.

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

- COI: Understand the basic components of NLP. **(Understand L2)**
- CO2: Apply N-grams models to predict a sequence of text. **(Apply L3)**
- C03: Apply a grammar rule to write the syntax of a language. **(Apply L3)**
- C04: Apply a grammar rule to write the semantic and pragmatics of a language. **(Apply L3)**
- C05: Apply the Discourse Analysis and Lexical Resources of NLP. **(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 | 2 | 2 | - | - | 3 | - | - | - | - | - | - | 2 | 2 | - | 1 |
| CO2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | 2 |
| CO4 | 2 | - | 3 | - | 3 | - | - | - | - | - | - | - | 2 | - | 2 |
| CO5 | - | 2 | 3 | - | 3 | - | - | - | - | - | - | - | 2 | 1 | 2 |
| 1-Low | | | | | | | | 2 –Medium | | | | 3-High | | | |

**Text Books:**

1. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2nd Edition, Daniel Jurafsky, James H. Martin-Pearson Publication,2014.
2. Natural Language Processing with Python, First Edition, Steven Bird, Ewan Klein and Edward Loper, OReilly Media,2009.

**Reference books:**

1. Handbook ofNatural Language Processing, Second, Nitin Indurkhya and Fred J. Damerau, Chapman and Hall/CRC Press, 2010.Edition
2. Natural Language Processing and Information Retrieval, 3rd Edition, Tanveer Siddiqui, U.S. Tiwary, Oxford University Press,2008.

## PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

**UNIT-I: Introduction**

| 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**: Origins and challenges of NLP | 1 | 02-Dec-2025 | | TLM2 | |
| 2. | Language Modeling: Grammar-based LM | 1 | 04-Dec-2025 | | TLM2 | |
| 3. | Statistical LM | 1 | 05-Dec-2025 | | TLM2 | |
| 4. | Finite-State Automata | 1 | 06-Dec-2025 | | TLM2 | |
| 5. | English Morphology | 2 | 08-Dec-2025<br>11-Dec-2025 | | TLM2 | |
| 6. | Transducers for lexicon and rules Tokenization | 1 | 12-Dec-2025 | | TLM2 | |
| 7. | Detecting and Correcting Spelling Errors, Minimum Edit Distance | 2 | 13-Dec-2025<br>15-Dec-2025 | | TLM2 | |
| 8. | Tutorial | 1 | 18-Dec-2025 | | TLM2 | |
| **No. of classes required to complete UNIT-I: 10** | | | | **No. of classes taken:** | | |

**UNIT-II: Word Level Analysis**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 9. | **Word Level Analysis:** Unsmoothed N-grams | 1 | 19-Dec-2025 | | TLM2 | |
| 10. | Evaluating N-grams | 1 | 20-Dec-2025 | | TLM2 | |
| 11. | Smoothing | 1 | 22-Dec-2025 | | TLM2 | |
| 12. | Interpolation and Backoff | 1 | 26-Dec-2025 | | TLM2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13. | Word Classes, Part- of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging | 2 | 27-12-2025<br>29-12-2025 | | TLM2 | |
| 14. | Issues in PoS tagging | 1 | 01-Jan-2025 | | TLM2 | |
| 15. | Hidden Markov Model | 2 | 02-Jan-2026<br>03-Jan-2026 | | TLM2 | |
| 16. | Maximum Entropy models | 2 | 05-Jan-2026<br>08-Jan-2026 | | TLM2 | |
| 17. | Tutorial | 1 | 09-Jan-2026 | | TLM3 | |
| **I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)** | | | | | | |
| **No. of classes required to complete UNIT-II: 12** | | | | **No. of classes taken:** | | |

**UNIT-III: Syntactic Analysis**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 18. | **Syntactic Analysis:** Context-Free Grammars, Grammar rules for English | 1 | 10-Jan-2026 | | TLM2 | |
| 19. | Treebanks, Normal Forms for grammar | 1 | 19-Jan-2026 | | TLM2 | |
| 20. | Dependency Grammar - Syntactic Parsing | 1 | 22-Jan-2026 | | TLM2 | |
| 21. | Ambiguity, Dynamic Programming parsing | 1 | 23-Jan-2026 | | TLM2 | |
| 22. | Shallow parsing Probabilistic CFG | 1 | 24-Jan-2026 | | TLM2 | |
| 23. | Probabilistic CYK | 1 | 02-Feb-2026 | | TLM2 | |
| 24. | Probabilistic Lexicalized CFGs | 1 | 05-Feb-2026 | | TLM2 | |
| 25. | Feature structures | 1 | 06-Feb-2026 | | TLM2 | |
| 26. | Unification of feature structures | 1 | 07-Feb-2026 | | TLM2 | |
| **No. of classes required to complete UNIT-III: 10** | | | | **No. of classes taken:** | | |

**UNIT-IV: Semantics And Pragmatics**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 27. | **Semantics And Pragmatics:** Requirements for representation, | 1 | 09-Feb-2026 | | TLM2 | |
| 28. | First-Order Logic | 1 | 12-Feb-2026 | | TLM2 | |
| 29. | Description Logics | 1 | 13-Feb-2026 | | TLM2 | |
| 30. | Syntax-Driven Semantic analysis | 1 | 14-Feb-2026 | | TLM2 | |
| 31. | Semantic attachments | 1 | 16-Feb-2026 | | TLM2 | |
| 32. | Word Senses, Relations between Senses | 1 | 19-Feb-2026 | | TLM2 | |
| 33. | Thematic Roles, selectional restrictions | 1 | 20-Feb-2026 | | TLM2 | |
| 34. | Word Sense Disambiguation | 1 | 21-Feb-2026 | | TLM2 | |
| 35. | WSD using Supervised, Dictionary & Thesaurus | 1 | 23-Feb-2026 | | TLM2 | |
| 36. | Bootstrapping method | 2 | 26-02-2026<br>27-Mar-2026 | | TLM2 | |
| 37. | Word Similarity using Thesaurus | 2 | 28-Mar-2026<br>02-Mar-2026 | | TLM2 | |
| 38. | Distributional methods | 2 | 05-Mar-2026<br>06-Mar-2026 | | TLM2 | |
| 39. | **Semantics And Pragmatics Over View** | 2 | 07-Mar-2026<br>09-Mar-2026 | | TLM2 | |
| 40. | Tutorial | 1 | 12-Mar-2026 | | TLM3 | |
| **No. of classes required to complete UNIT-IV: 16** | | | | **No. of classes taken:** | | |

**UNIT-V: Discourse Analysis And Lexical Resources**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 41. | **Discourse Analysis And Lexical Resources:** Discourse segmentation | 2 | 13-Mar-2026<br>14-Mar-2026 | | TLM2 | |
| 42. | Coherence - Reference Phenomena, Coreference Resolution | 2 | 16-Mar-2026<br>20-Mar-2026 | | TLM2 | |
| 43. | Resources: Porter Stemmer, Lemmatizer, Penn | 2 | 23-Mar-2026<br>27-Mar-2026<br>(Fri–Tutorial) | | TLM2 | |

| 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. | Brill's Tagger, WordNet, PropBank | 2 | 28-Mar-2026<br>30-Mar-2026 | | TLM2 | |
| 45. | FrameNet, Brown Corpus | 2 | 02-Apr-2026<br>03-Apr-2026 | | TLM2 | |
| 46. | British National Corpus (BNC) | 1 | 04-Apr-2026 | | TLM2 | |
| 47. | Tutorial | 1 | 05-Apr-2026 | | TLM3 | |
| **No. of classes required to complete UNIT-V: 12** | | | | **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 | Textbook followed | HOD Sign |
|---|---|---|---|---|---|---|---|---|
| 1. | Real Time Applications of NLP | 1 | 05-Apr-2026 | | TLM2 | CO5 | T1 | |
| No. of classes | | 01 | | | No. of classes taken: | | | |
| **II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)** | | | | | | | | |

| 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) | 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 | 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 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):

| | |
|---|---|
| **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** |
|---|---|---|---|---|
| **Name of the Faculty** | **Mr M PRUTHVI RAJ** | | | **Dr. S Jayaprada** |
| **Signature** | | | | |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
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**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, NTR DIST., A.P.-521 230.**
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## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)


## COURSE HANDOUT

### PART-A

**Name of Course Instructor** : Dr Ch. Johnwesily
**Course Name & Code** : Deep Learning & 23AM06
**L-T-P Structure** : 3-0-0 **Credits:** 03
**Program/Sem/Sec** : B.Tech./CSE(AI&ML)/VI/B **A.Y.:** 2025-26

**PRE-REQUISITE:** Python/R.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The main objectives of the course are to:

- This course aims to develop students' foundational competence in deep learning by enabling them to design, implement, and analyze various neural network models for real-world problems. It equips learners with practical skills in modern deep learning frameworks, fosters the ability to select suitable architectures for different applications, and enhances their capability to interpret model performance and results effectively.

**COURSE OUTCOMES (COs):** At the end of the course, students are able to

| | |
|---|---|
| **CO1** | Implement deep neural networks to solve real-world problems **(Apply-L3)** |
| **CO2** | Choose an appropriate pre-trained model to solve real real-time problem **(Analyze-L4)** |
| **CO3** | Interpret the results of two different deep learning models **(Analyze-L4)** |
| **CO4** | Improve individual/team work skills, communication & report writing skills with ethical values. |

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

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | 2 | - | 2 | 3 | 2 | 1 |
| **CO2** | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | 2 | - | 2 | 3 | 3 | 1 |
| **CO3** | 2 | 3 | 2 | 3 | 2 | - | - | - | 1 | 2 | - | 2 | 2 | 2 | 2 |
| **CO4** | 1 | 1 | 1 | - | 1 | - | - | - | - | - | - | 1 | - | - | 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).

**Text Books:**

1. Reza Zadeh and Bharath Ram Sundar, *Tensorflow for Deep Learning*, O'Reilly publishers, 2018

**References:**

1. https://github.com/fchollet/deep-learning-with-python-notebooks

## PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

**UNIT-I: Basics**

| 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 to Deep learning; Biological Neuron | 1 | 01-Dec-2025 | | TLM2 | |
| 2. | Idea of computational units | 1 | 04-Dec-2025 | | TLM2 | |
| 3. | McCulloch–Pitts unit and Thresholding logic | 1 | 05-Dec-2025 | | TLM2 | |
| 4. | Linear Perceptron | 1 | 06-Dec-2025 | | TLM2 | |
| 5. | Perceptron Learning Algorithm | 2 | 08-Dec-2025<br>11-Dec-2025 | | TLM2 | |
| 6. | Linear separability | 1 | 12-Dec-2025 | | TLM2 | |
| 7. | Convergence theorem for Perceptron Learning Algorithm | 2 | 13-Dec-2025<br>15-Dec-2025 | | TLM2 | |
| 8. | Tutorial | 1 | 18-Dec-2025 | | TLM3 | |
| **No. of classes required to complete UNIT-I: 10** | | | | **No. of classes taken:** | | |

**UNIT-II:** Feed Forward Networks

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 9. | Feed Forward Networks | 1 | 19-Dec-2025 | | TLM1 | |
| 10. | Multilayer Perceptron | 1 | 20-Dec-2025 | | TLM1 | |
| 11. | Gradient Descent | 1 | 22-Dec-2025 | | TLM1 | |
| 12. | Backpropagation | 1 | 26-Dec-2025 | | TLM1 | |
| 13. | Empirical Risk Minimization | 2 | 27-12-2025<br>02-01-2025 | | TLM1 | |
| 14. | Regularization, Autoencoders | 1 | 29-Dec-2025 | | TLM1 | |
| 15. | Deep Neural Networks, Difficulty of training deep neural networks | 2 | 01-Jan-2026 | | TLM1 | |
| 16. | Greedy layer-wise training | 2 | 02-Jan-2026 | | TLM1 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 17. | Tutorial | 1 | 03-Jan-2026 | | TLM3 | |
| **I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)** | | | | | | |
| **No. of classes required to complete UNIT-II: 12** | | | | **No. of classes taken:** | | |

**UNIT-III: Better Training of Neural Networks**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 18. | Better Training of Neural Networks | 1 | 05-Jan-2026 | | TLM2 | |
| 19. | Newer optimization methods for neural networks (Adagrad, Adadelta, RMSProp, Adam, NAG) | 1 | 08-Jan-2026 | | TLM2 | |
| 20. | Newer optimization methods for neural networks (Adagrad, Adadelta, RMSProp, Adam, NAG) | 1 | 07-Feb-2026 | | TLM2 | |
| 21. | Newer optimization methods for neural networks (Adagrad, Adadelta, RMSProp, Adam, NAG) | 1 | 09-Jan-2026 | | TLM2 | |
| 22. | Newer optimization methods for neural networks (Adagrad, Adadelta, RMSProp, Adam, NAG) | 1 | 10-Jan-2026 | | TLM2 | |
| 23. | Second-order methods for training | 1 | 19-Jan-2026 | | TLM2 | |
| 24. | Saddle point problem in neural networks | 1 | 22-Jan-2026 | | TLM2 | |
| 25. | Regularization methods (dropout, drop connect, batch normalization) | 1 | 23-Jan-2026 | | TLM2 | |
| 26. | Regularization methods (dropout, drop connect, batch normalization) | 1 | 24-Jan-2026 | | TLM2 | |
| **No. of classes required to complete UNIT-III: 10** | | | | **No. of classes taken:** | | |

**UNIT-IV: Recurrent Neural Networks**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 27. | Recurrent Neural Networks | 1 | 05-Feb-2026 | | TLM2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 28. | Backpropagation through time | 1 | 06-Feb-2026 | | TLM2 | |
| 29. | Long Short-Term Memory (LSTM) | 1 | 07-Feb-2026 | | TLM2 | |
| 30. | Gated Recurrent Units (GRU) | 1 | 09-Feb-2026 | | TLM2 | |
| 31. | Bidirectional LSTMs | 1 | 12-Feb-2026 | | TLM2 | |
| 32. | Bidirectional RNNs | 1 | 13-Feb-2026 | | TLM2 | |
| 33. | Convolutional Neural Networks | 1 | 14-Feb-2026 | | TLM2 | |
| 34. | LeNet | 1 | 16-Feb-2026 | | TLM2 | |
| 35. | AlexNet | 1 | 19-Feb-2026 | | TLM2 | |
| 36. | Generative Models | 2 | 28-02-2026<br>21-Feb-2026 | | TLM2 | |
| 37. | Restricted Boltzmann Machines (RBMs) | 2 | 23-Feb-2026<br>26-Feb-2026 | | TLM2 | |
| 38. | Introduction to MCMC and Gibbs Sampling | 2 | 27-Feb-2026<br>02-Mar-2026 | | TLM2 | |
| 39. | Gradient computations in RBMs | 2 | 21-Feb-2026<br>28-Feb-2026 | | TLM2 | |
| 40. | Tutorial | 1 | 02-Mar-2026 | | TLM3 | |
| **No. of classes required to complete UNIT-IV: 16** | | | | **No. of classes taken:** | | |

**UNIT-V: Recent Trends**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 41. | Recent Trends | 2 | 05-Mar-2026<br>06-Mar-2026 | | TLM2 | |
| 42. | Variational Autoencoders | 2 | 09-Mar-2026<br>12-Mar-2026 | | TLM2 | |
| 43. | Transformers | 2 | 13-Mar-2026<br>14-Mar-2026 (Sat – Tutorial) | | TLM2 | |
| 44. | GPT Applications: Vision, NLP, Speech | 2 | 16-Mar-2026<br>20-Mar-2026 | | TLM2 | |
| 45. | GPT Applications: Vision, NLP, Speech | 2 | 23-Mar-2026<br>27-Mar-2026 | | TLM2 | |
| 46. | GPT Applications: Vision, NLP, Speech | 1 | 30-Mar-2026 | | TLM2 | |
| 47. | Tutorial | 1 | 02-Apr-2026 | | TLM3 | |

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| **No. of classes required to complete UNIT-V: 12** | | | | **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 | Textbook followed | HOD Sign |
|---|---|---|---|---|---|---|---|---|
| 1. | Osprey optimization technique | 1 | 02-03-2026 | | TLM2 | CO5 | T1 | |
| No. of classes | | 01 | | | No. of classes taken: | | | |
| **II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)** | | | | | | | | |

| **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 Regulations):**

According to Academic Regulations of R23 Distribution and Weightage of Marks for Laboratory Courses is as follows

(a) **Continuous Internal Evaluation (CIE):** The Continuous Internal Evaluation(CIE) is based on the following parameters:

| Parameter | Marks |
|---|---|
| Day to Day work | 10 |
| Record | 05 |
| Internal Test | 15 |
| Total | 30 |

(b) **Semester End Examinations (SEE:** The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3 hours duration and evaluated for 70 marks.

## 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 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):

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| **Title** | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | **Dr Ch Johnwesily** | | | **Dr. S Jayaprada** |
| **Signature** | | | | |

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## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)


## COURSE HANDOUT

### PART-A

**Name of Course Instructor :** Mr. Y.KRANTHI KUMAR
**Course Name & Code** : SOFTWARE PROJECT MANAGEMENT & 23IT07
**L-T-P Structure** : 3-0-0 **Credits:** 03
**Program/Sem/Sec** : B.Tech./CSE(AI&ML)/VI/B-SEC **A.Y.:** 2025-26

**PREREQUISITE:** Software Engineering, Object Oriented Analysis and Design.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**

The objective of the course is to Understand unique aspects of software project management at three levels: Organizational management, Infrastructure management and project management and measurement of the Project, and how these are applied to actual software project

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

| | |
|---|---|
| **CO1** | Understand the process of Conventional Software Management, Evolution and Improvement of Software Economics. **(Understand L2)** |
| **CO2** | Summarize Life cycle phases and Artifacts of the process in Software project management. **(Understand L2)** |
| **CO3** | Apply Workflows and checkpoints in Iterative Process planning. **(Apply L3)** |
| **CO4** | Use basic process automation components to improve efficiency in project environments **(Understand L2)** |
| **CO5** | Describe the Agile principles and examine how the DevOps pipeline improves modern software development **(Understand L2)** |

**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 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 2 | - | - |
| CO2 | 2 | 2 | - | - | - | - | - | - | - | - | 3 | 1 | 2 | - | - |
| CO3 | 2 | 2 | 1 | - | - | - | - | - | - | - | 3 | 1 | 3 | - | - |
| CO4 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 3 | - | - |
| CO5 | 2 | 2 | 1 | - | - | - | - | - | - | - | 3 | 1 | 3 | - | 2 |

**Text books:**

1. Software Project Management, Walker Royce, PEA,2005.Succeeding with Agile: Software Development Using Scrum, Mike Cohn, Addison Wesley.
2. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim, John Willis, Patrick Debois, Jez Humb,1st Edition, O'Reilly publications,2016.

**Reference books:**

1. Software Project Management, BobHughes,3/e,Mike Cotterell, TMH
2. Software Project Management, Joel Henry, PEA
3. Software Project Management in practice, PankajJalote, PEA, 2005,
4. Effective Software Project Management, Robert K.Wysocki,Wiley,2006.
5. Project Management in IT,Kathy Schwalbe, Cengage.

**E-resources:**

1. https://www.geeksforgeeks.org/software-engineering/software-engineering-software-projectmanagement-spm/
2. https://www.tutorialspoint.com/software_engineering/software_project_management.htm

## PART-B

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

**UNIT-I:** Conventional Software Management, Evolution of Software Economics, Improving Software Economics

| 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. | Course Objective & Outcomes | 1 | 02-12-2025 | | TLM1, TLM2 | |
| 2. | The waterfall model | 1 | 03-12-2025 | | TLM1, TLM2 | |
| 3. | conventional Software Management performance | 1 | 06-12-2025 | | TLM1, TLM2 | |
| 4. | Software Economics | 1 | 09-12-2025 | | TLM1, TLM2 | |
| 5. | Pragmatic software cost estimation | 1 | 10-12-2025 | | TLM1, TLM2 | |
| 6. | Reducing Software product size | 1 | 13-12-2025 | | TLM1, TLM2 | |
| 7. | Improving software processes improving team effectiveness, improving automation, Achieving required quality, peer inspections. | 2 | 16-12-2025 & 17-12-2025 | | TLM1, TLM2 | |
| 8. | The principles of conventional software Engineering | 1 | 20-12-2025 | | TLM1, TLM2 | |
| 9. | Principles of modern software management | 1 | 23-12-2025 | | TLM1, TLM2 | |
| 10. | Transitioning to an iterative process. | 1 | 24-12-2025 | | TLM1, TLM2 | |
| 11. | Assignment-1/Tutorial-1 | 1 | 27-12-2025 | | TLM3 | |
| No. of classes required to complete UNIT-I | | 12 | | No. of classes taken: | | |

**UNIT-II:** Life cycle phases, Artefacts of the process.

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 12. | Engineering and production stages | 1 | 30-12-2025 | | TLM1, TLM2 | |
| 13. | Inception, Elaboration | 1 | 31-12-2025 | | TLM1, TLM2 | |
| 14. | Construction, transition phases | 1 | 03-01-2026 | | TLM1, TLM2 | |
| 15. | artifact sets, Management artifacts | 1 | 06-01-2026 | | TLM1, TLM2 | |
| 16. | Engineering artifacts | 1 | 07-01-2026 | | TLM1, TLM2 | |
| 17. | Programmatic artifacts | 1 | 20-01-2026 | | TLM1, TLM2 | |
| 18. | Assignment-2/Tutorial-2 | 1 | 21-01-2026 | | TLM1, TLM2 | |
| No. of classes required to complete UNIT-II | | 07 | | No. of classes taken: | | |

**UNIT-III:** Model based software architectures, Work Flows of the process, Checkpoints of the process, Iterative Process Planning.

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 19. | A Management perspective and technical perspective | 1 | 24-01-2026 | | | |
| 20. | Software process workflows | 1 | 03-02-2026 | | TLM1, TLM2 | |
| 21. | Iteration workflows. | 1 | 04-02-2026 | | TLM1, TLM2 | |
| 22. | Major milestones, Minor Milestones | 1 | 07-02-2026 | | TLM1, TLM2 | |
| 23. | Periodic status assessments. | 1 | 10-02-2026 | | TLM1, TLM2 | |
| 24. | Work breakdown structures, planning guidelines | 1 | 11-02-2026 | | TLM1, TLM2 | |
| 25. | cost and schedule estimating, | 1 | 14-02-2026 | | TLM1, TLM2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 26. | Iteration planning process, Pragmatic planning | 1 | 17-02-2026 | | TLM1, TLM2 | |
| 27. | Assignment-3/Tutorial-3 | 1 | 18-02-2026 | | TLM3 | |
| No. of classes required to complete UNIT-III | | 09 | | No. of classes taken: | | |

**UNIT-IV:** Project Organizations and Responsibilities, Process Automation, Project Control and Process instrumentation.

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 28. | Line-of-Business Organizations | 1 | 21-02-2026 | | TLM1, TLM2 | |
| 29. | Project Organizations | 1 | 24-02-2026 | | TLM1, TLM2 | |
| 30. | evolution of Organizations | 1 | 25-02-2026 | | TLM1, TLM2 | |
| 31. | Automation Building blocks, Project Environment | 1 | 28-02-2026 | | TLM1, TLM2 | |
| 32. | seven core Metrics | 1 | 03-03-2026 | | TLM1, TLM2 | |
| 33. | Management indicators | 1 | 07-03-2026 | | TLM1, TLM2 | |
| 34. | quality indicators, life cycle expectations | 1 | 10-03-2026 | | TLM1, TLM2 | |
| 35. | pragmatic Software Metrics. | 1 | 11-03-2026 | | TLM1, TLM2 | |
| 36. | Metric sautomation. | 1 | 14-03-2026 | | TLM3 | |
| No. of classes required to complete UNIT-IV | | 09 | | No. of classes taken: | | |

**UNIT-V: Fundamentals of DevOps, DevOps adoption in projects.**

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 37 | Agile Methodology | 1 | 17-03-2026 | | TLM1, TLM2 | |
| 38 | ADAPTing to Scrum, Patterns for Adopting Scrum | 1 | 18-03-2026 | | TLM1, TLM2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 39 | Architecture, Deployments, Orchestration | 1 | 21-03-2026 | | TLM1, TLM2 | |
| 40 | Need, Instance of applications | 1 | 24-03-2026 | | TLM1, TLM2 | |
| 41 | DevOps delivery pipeline, DevOp secosystem. | 2 | 25-03-2026<br>28-03-2026 | | TLM1, TLM2 | |
| 42 | Technology aspects, Agiling capabilities Tool stack implementation, Peopleaspect, processes | 2 | 01-04-2026<br>04-04-2026 | | TLM1, TLM2 | |
| No. of classes required to complete UNIT-V | | 08 | | No. of classes taken: | | |

**I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)**
**II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)**

| **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) | 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 | 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 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):

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| **Name of the Faculty** | **Mr. Y.Kranthi Kumar** | **Dr. S Jayaprada** | **Dr.B.Srinivasa Rao** | **Dr. S Jayaprada** |
| **Signature** | | | | |

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

# COURSE HANDOUT

## PART-A

**Name of Course Instructor:** Mr.L.Narendra
**Course Name & Code** **:** DevOps & 23IT08
**L-T-P Structure** **: 3-0-0** **Credits:** 3
**Program/ Sem /Sec** : B.Tech/VI/B **A.Y.:** 2025-26

**PREREQUISITES** **: Software Engineering, SDLC Models, Cloud Computing, Programming Languages**

**Course Objectives: The objectives of this course are to introduce**

- Describe the agile relationship between development and IT operations.
- Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

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

| | |
|---|---|
| **CO1** | Understand the concepts of SDLC Models, features of DevOps, Architecture of DevOps and Life Cycle of DevOps. **(Understand-L2)** |
| **CO2** | Apply the source code management tool to maintain the versions of the Source Code repositories. **(Apply-L3)** |
| **CO3** | Applying the pipeline tool to build an application and automate a continuous integration (CI) pipeline. **(Apply-L3)** |
| **CO4** | Implementing Docker containers to deliver and deploy the application continuously. **(Apply-L3)** |
| **CO5** | Deploying an application using Ansible, Kubernetes and OpenShift to automate Container orchestration tools. **(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** | | | | | 1 | | | 1 | 1 | 1 | 1 | | 1 | | 1 |
| **CO2** | | | | | 2 | | | | 1 | | | 1 | | | 2 |
| **CO3** | | | | | 2 | | | | | | | 1 | | | 2 |
| **CO4** | | | | | 2 | | | | | | | 1 | | | 2 |
| **CO5** | | | | | 2 | | | | 1 | | | 2 | | | 2 |
| **1-Low** | | | | | | | **2 –Medium** | | | | | | **3-High** | | |

**Text Books**

1. Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition Mihails Konoplows, 2015.
2. Alisson Machado de Menezes., Hands-on DevOps with Linux,1st Edition, BPB Publications, India, 2021.

**Reference Books**


1. LenBass, IngoWeber, LimingZhu.DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10

2. Gene Kim Je Humble, Patrick Debois, John Willis. The DevOps Handbook, 1st Edition, IT Revolution Press, 2016.

3. Verona, Joakim Practical DevOps, 1st Edition, Packt Publishing,2016.

4. Joakim Verona. Practical DevOps, 2nd Edition.Ingramshorttitle; 2nd edition (2018). ISBN10: 1788392574

5. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint.Wiley publications.ISBN:9788126579952


## PART-B

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

**UNIT-I: Introduction to DevOps**

| 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 to DevOps and COs** | 1 | 03-12-2025 | | TLM1,2 | |
| 2. | **Introduction to SDLC, Agile Model** | 1 | 04-12-2025 | | TLM1,2 | |
| 3. | **Introduction to DevOps.** | 1 | 06-12-2025 | | TLM1,2 | |
| 4. | **Features of DevOps, DevOps Architecture** | 1 | 10-12-2025 | | TLM1,2 | |
| 5. | **DevOps Lifecycle** | 1 | 11-12-2025 | | TLM1,2 | |
| 6. | **Understanding workflow and principles** | 1 | 13-12-2025 | | TLM1,2 | |
| 7. | **Introduction to DevOps Tools** | 1 | 17-12-2025 | | TLM1,2 | |
| 8. | **Build Automation, Delivery Automation** | 1 | 18-12-2025 | | TLM1,2 | |
| 9. | **Understanding Code Quality, Automation of CI/CD** | 1 | 20-12-2025 | | TLM1,2 | |
| 10. | **Release Management, Scrum** | 1 | 24-12-2025 | | TLM1,2 | |
| 11. | **Kanban, Delivery pipeline, bottlenecks Examples** | 1 | 27-12-2025 | | TLM1,2 | |
| **No. of classes required to complete UNIT-I: 11** | | | | **No. of classes taken:** | | |

**UNIT-II: Source Code Management**

| 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. | **Source Code Management, need for source code management, History of Source code management** | | 31-12-2025 | | TLM1,2 | |
| 2. | **source code management system and migrations. What is Version Control and GIT** | | 03-01-2026 | | TLM1,2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. | **GIT Installation, GIT features, GIT workflow** | | 07-01-2026 | | TLM1,2 | |
| 4. | **working with remote repository** | | 08-01-2026 | | TLM1,2 | |
| 5. | **GIT commands, GIT branching** | | 10-01-2026 | | TLM1,2 | |
| 6. | **GIT staging and collaboration** | | 21-01-2026 | | TLM1,2 | |
| 7. | **unit testing-code coverage: Junit** | | 22-01-2026 | | TLM1,2 | |
| 8. | **n Unit& Code Coverage with Sonar Qube** | | 24-01-2026 | | TLM1,2 | |
| 9. | **SonarQube- Code Quality Analysis.** | | 28-01-2026 | | TLM1,2 | |
| 10. | **SonarQube - Code Quality Analysis.** | | 29-01-2026 | | TLM1,2 | |
| **No. of classes required to complete UNIT-II: 10** | | | | **No. of classes taken:** | | |

**UNIT-III: Build Automation - Continuous Integration (CI)**

| 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. | **Build Automation - Continuous Integration (CI): Build Automation** | 1 | 30-01-2026 | | TLM1,2 | |
| 2. | **what is CI Why Cl is Required, CI tools** | 1 | 04-02-2026 | | TLM1,2 | |
| 3. | **Introduction to Jenkins (With Architecture)** | 1 | 05-02-2026 | | TLM1,2 | |
| 4. | **Jenkins workflow, Jenkins master slave architecture** | 1 | 07-02-2026 | | TLM1,2 | |
| 5. | **Jenkins Pipelines** | 1 | 11-02-2026 | | TLM1,2 | |
| 6. | **PIPELINE BASICS - Jenkins Master** | 1 | 12-02-2026 | | TLM1,2 | |
| 7. | **Node, Agent, and Executor Freestyle Projects& Pipelines** | 1 | 14-02-2026 | | TLM1,2 | |
| 8. | **Jenkins for Continuous Integration** | 1 | 18-02-2026 | | TLM1,2 | |
| 9. | **Create and Manage Builds** | 1 | 19-02-2026 | | TLM1,2 | |
| 10. | **User Management in Jenkins Schedule Builds** | 1 | 21-02-2026 | | TLM1,2 | |
| 11. | **Launch Builds on Slave Nodes** | 1 | 25-02-2026 | | TLM1,2 | |

| No. of classes required to complete UNIT-III: 11 | No. of classes taken: |
|---|---|

**UNIT-IV: Continuous Delivery**

| 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. | **Importance of Continuous Delivery, continuous deployment cd Flow** | 1 | 26-02-2026 | | TLM1,2 | |
| 2. | **Containerization with Docker: Introduction to Docker** | 1 | 28-02-2026 | | TLM1,2 | |
| 3. | **Docker installation, Docker commands** | 1 | 04-03-2026 | | TLM1,2 | |
| 4. | **Images & Containers** | 1 | 05-03-2026 | | TLM1,2 | |
| 5. | **Docker File** | 1 | 07-03-2026 | | TLM1,2 | |
| 6. | **running containers** | 1 | 11-03-2026 | | TLM1,2 | |
| 7. | **working with containers and publish to Docker Hub** | 1 | 12-03-2026 | | TLM1,2 | |
| 8. | **Testing Tools: Introduction to Selenium and its features** | 1 | 14-03-2026 | | TLM1,2 | |
| 9. | **Java Script testing.** | 1 | 18-03-2026 | | TLM1,2 | |
| **No. of classes required to complete UNIT-IV: 09** | | | | **No. of classes taken:** | | |

**UNIT-V: Configuration Management & Containerization**

| 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 to Ansible** | 1 | 19-03-2026 | | TLM1,2 | |
| 2. | **Ansible tasks Roles** | 1 | 19-03-2026 | | TLM1,2 | |
| 3. | **Jinja2 templating, Vaults** | 1 | 21-03-2026 | | TLM1,2 | |
| 4. | **Deployments using Ansible** | 1 | 21-03-2026 | | TLM1,2 | |
| 5. | **Introduction to Kubernetes** | 1 | 25-03-2026 | | TLM1,2 | |
| 6. | **Namespace& Resources** | 1 | 26-03-2026 | | TLM1,2 | |
| 7. | **CI/CD - On OCP** | 1 | 28-03-2026 | | TLM1,2 | |
| 8. | **BC, DC & ConfigMaps** | 1 | 01-04-2026 | | TLM1,2 | |
| 9. | **Deploying Apps on OpenShift Container Pods** | 1 | 02-04-2026 | | TLM1,2 | |
| 10. | **Introduction to Puppet master and Chef** | 1 | 04-04-2026 | | TLM1,2 | |
| **No. of classes required to complete UNIT-V: 10** | | | | **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 | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 1. | **Argo CD** | 1 | 19-03-2026 | | TLM1,2 | |
| 2. | **Infrastructure as Code** | 1 | 26-03-2026 | | TLM1,2 | |
| 3. | **AIOps, MLOps** | 1 | 02-04-2026 | | TLM1,2 | |

| **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

**I MID EXAMINATIONS (27-06-2026 TO 02-02-2026)**
**II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)**

**PEVALUATION 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 | 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 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):

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| Title | Course Instructor | Course Coordinator | Module Coordinator | Head of the Department |
|---|---|---|---|---|
| **Name of the Faculty** | **Mr.L.Narendra** | **Mr.L.Narendra** | **Dr.Sk.Jameer** | **Dr. S.Jayaprada** |
| **Signature** | | | | |

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Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF CIVIL ENGINEERING

# COURSE HANDOUT
## PART-A

Name of Course Instructor : K. HARISH KUMAR
Course Name & Code : DISASTER MANAGEMENT&23CE81
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., CSM(AI&ML)/VI-Sem/B., A.Y : 2025-26

**PRE-REQUISITE:** NIL

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**This course deals with different types of disasters, impacts of disasters, importance of technology in handling disaster management situations, importance of planning and risk prevention in case of occurrence of disaster, importance of education and community approach for the responsive actions to be taken in case of occurrence of disaster.

**COURSE OUTCOMES (COs):** At the end of the course, students are able to

| | |
|---|---|
| **CO 1** | Identify the usefulness of integrating management principles in disaster mitigation work **(Understand-L2).** |
| **CO 2** | Illustrate the different approaches needed to manage pre- during and post- disaster periods **(Understand-L2).** |
| **CO 3** | Identify and explain the process of risk management **(Understand-L2).** |
| **CO 4** | Evaluate the risk transfer Relate to importance of education and community approach for the responsive actions to be taken in case of disaster occurrence **(Understand-L2).** |

**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** | 1 | 1 | - | 1 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 2 |
| **CO2** | 1 | 1 | 1 | 2 | 2 | 1 | - | - | - | - | - | 1 | 2 | 1 | 2 |
| **CO3** | 1 | - | - | 1 | 2 | 1 | 1 | 1 | - | - | - | 1 | 1 | 1 | 2 |
| **CO4** | 1 | - | - | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 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).

**TEXT BOOKS:**

**T1** An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Publishers& Distributors Pvt.Ltd.

**T2** Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh-Rawat Publications

**T3** 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., NewDelhi.

**T4** 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt.Ltd.

**REFERENCE BOOKS:**


**R1** 'Disaster Management' edited by H K Gupta (2003), Universitiespress.

**R2** 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universities press.R. Nishith, Singh AK

**R3** "Disaster Management in India: Perspectives, Issues and strategies" New Royal BookCompany."


# PART-B

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

## UNIT –I: Natural Hazards and Disaster Management

| 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 of DM | 1 | **01-12-2025** | | **TLM2** | |
| 2. | Inter disciplinary nature of the subject | 1 | **05-12-2025** | | **TLM2** | |
| 3. | Disaster Management cycle | 1 | **06-12-2025** | | **TLM2** | |
| 4. | Five priorities for action | 1 | **08-12-2025** | | **TLM2** | |
| 5. | Case study methods of the following: Vegetal Cover floods | 1 | **12-12-2025** | | **TLM2** | |
| 6. | Droughts | 1 | **13-12-2025** | | **TLM2** | |
| 7. | Earthquakes | 1 | **15-12-2025** | | **TLM2** | |
| 8. | Landslides | 1 | **19-12-2025** | | **TLM2** | |
| 9. | Globalwarming | 1 | **20-12-2025** | | **TLM2** | |
| 10. | Cyclones& Tsunamis – Post Tsunami hazards along the Indian coast. | 1 | **22-12-2025** | | **TLM2** | |
| No. of classes required to complete UNIT-I:10 | | | | No. of classes taken: | | |

## UNIT-II: Man Made Disaster and Their Management Along with Case Study Methods of The Following

| 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 | 1 | **26-12-2025** | | **TLM2** | |
| 2. | Fire hazards | 1 | **27-12-2025** | | **TLM2** | |
| 3. | Transport hazard dynamics | 1 | **29-12-2025** | | **TLM2** | |
| 4. | Solidwaste management | 1 | **02-01-2026** | | **TLM2** | |
| 5. | Bioterrorism-threat in mega cities | 1 | **03-01-2026** | | **TLM2** | |
| 6. | Railand aircraft accidents | 1 | **05-01-2026** | | **TLM2** | |
| 7. | Groundwater | 1 | **09-01-2026** | | **TLM2** | |
| 8. | Industries | 1 | **19-01-2026** | | **TLM2** | |
| 9. | Emerging infectious diseases and Aids and their management. | 1 | **23-01-2026** | | **TLM2** | |
| No. of classes required to complete UNIT-II:8 | | | | No. of classes taken: | | |

## UNIT-III: Risk and Vulnerability

| 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 | 1 | **24-01-2026** | | **TLM2** | |
| 2. | Building codes | 1 | **02-02-2026** | | **TLM2** | |
| 3. | land use planning | 1 | **06-02-2026** | | **TLM2** | |
| 4. | Social Vulnerability | 1 | **07-02-2026** | | **TLM2** | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5. | Environmental vulnerability | 1 | **09-02-2026** | | **TLM2** | |
| 6. | Macro-economic management and sustainable development | 1 | **13-02-2026** | | **TLM2** | |
| 7. | Climate change risk rendition | 1 | **16-02-2026** | | **TLM2** | |
| 8. | Financial management of disaster | 1 | **20-02-2026** | | **TLM2** | |
| 9. | Financial management of disaster - related losses. | 1 | **21-02-2026** | | **TLM2** | |
| No. of classes required to complete UNIT-III:9 | | | | No. of classes taken: | | |

**UNIT- IV: Role of Technology in Disaster Managements**

| 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. | Disaster management for infra structures, taxonomy of infra structure | 1 | **23-02-2026** | | **TLM2** | |
| 2. | Treatmentplants and process facilities | 1 | **27-02-2026** | | **TLM2** | |
| 3. | Electricalsubstations- roads and bridges | 1 | **28-02-2026** | | **TLM2** | |
| 4. | Mitigation programme for earth quakes-flowchart | 1 | **02-03-2026** | | **TLM2** | |
| 5. | Geospatialinformation inagriculture drought assessment | 1 | **06-03-2026** | | **TLM2** | |
| 6. | Multimedia Technology in disaster risk management and training | 1 | **07-03-2026** | | **TLM2** | |
| 7. | TransformableIndigenous Knowledge in disaster reduction | 1 | **09-03-2026** | | **TLM2** | |
| 8. | Role of RS & GIS. | 1 | **13-03-2026** | | **TLM2** | |
| No. of classes required to complete UNIT-IV:08 | | | | No. of classes taken: | | |

**UNIT-V:Multi-sectional Issues, Education and Community Preparedness**

| 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. | Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards | 1 | **16-03-2026** | | **TLM2** | |
| 2. | Environmentalrisk-Forest management and disaster risk reduction | 1 | **21-03-2026** | | **TLM2** | |
| 3. | The Red cross and red crescent movement - Corporate sector and disaster risk reduction | 1 | **23-03-2026** | | **TLM2** | |
| 4. | Education in disaster risk reduction-Essentials of school disaster education | 1 | **27-03-2026** | | **TLM2** | |
| 5. | Community capacity and disaster resilience-Community based disaster recovery | 1 | **28-03-2026** | | **TLM2** | |
| 6. | Community based disaster management and social capital- | 1 | **30-03-2026** | | **TLM2** | |
| 7. | Designing resilience- building community capacity for action. | 1 | **04-04-2026** | | **TLM2** | |
| No. of classes required to complete UNIT-V:07 | | | | 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 (R23 Regulations):**

| Evaluation Task | Marks |
|---|---|
| Assignment-I (Unit-I) | A1=5 |
| Assignment-II (Unit-II) | A2=5 |
| I-Mid Examination (Units-I & II) | M1=15 |
| I-Quiz Examination (Units-I & II) | Q1=10 |
| Assignment-III (Unit-III) | A3=5 |
| Assignment-IV (Unit-IV) | A4=5 |
| Assignment-V (Unit-V) | A5=5 |
| II-Mid Examination (Units-III, IV & V) | M2=15 |
| II-Quiz Examination (Units-III, IV & V) | Q2=10 |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5 |
| CIE-I (Mid-I, Assignment-I. Quiz-I) | 30 |
| CIE-II (Mid-II, Assignment-II. Quiz-II) | 30 |
| Cumulative Internal Examination (CIE):80% best and 20% least | 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, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems. |
| **PO 2** | **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering 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 anddesign 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 researchmethods 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 modernengineering 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 assesssocietal, 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 solutionsin 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 ofthe engineering practice. |
| **PO 9** | **Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings. |
| **PO 10** | **Communication**: Communicate effectively on complex engineering activities with the engineeringcommunity 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 theengineering 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 inindependent and life-long learning in the broadest context of technological change. |

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

| | |
|---|---|
| **PSO 1** | Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering |
| **PSO 2** | Possesses ability to plan, examine and analyze the various laboratory tests required for the professional demands |
| **PSO 3** | Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain |

| Course Instructor | Course Coordinator | Module Coordinator | HOD |
|---|---|---|---|
| (K. HARISH KUMAR) | | (B NARASIMHARAO) | (Dr.K.V.RAMANA) |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

**(AUTONOMOUS)**
**Accredited by NAAC with 'A' Grade**
**An ISO 21001:2018,14001:2015,50001:2018 Certified Institution**
**Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada**
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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT

### PART-A

**Name of Course Instructor** : Dr Shaik Salma Asiya Begum
**Course Name & Code** : TECHNICAL PAPER WRITING & 23MC04
**L-T-P Structure** : **2**-0-0 **Credits:** 02
**Program/Sem/Sec** : B.Tech./CSE(AI&ML)/VI/B **A.Y.:** 2025-26

**Pre-requisites**: Students are expected to have a basic understanding of English grammar, sentence formation, and general writing skills. Familiarity with using word processing tools such as Microsoft Word will also help in effectively learning technical paper writing and report preparation.

**Course Objectives:**
The objectives of this course are to introduce:

- The basic concepts related to writing technical reports and understanding the concepts related to formatting and structuring the report. This will help students comprehend the concept of proofreading, proposals, and practice.

**Course Outcomes:** At the end of the course, students will be able to
**CO1:** Understand the principles of technical writing and apply appropriate language, structure, and formatting to plan and draft professional technical reports. **Understand (L2)**
**CO2:** Draft technical documents using illustrations and revise them through structured editing, focusing on clarity, grammar, and professional language. **Apply (L3)**
**CO3:** Demonstrate effective proofreading and summarization techniques and present final technical documents both in written and verbal forms. **Analyze (L4)**
**CO4:** Use advanced word processing tools for formatting, editing, referencing, and securing technical documents efficiently. **Apply (L3)**
**CO5:** Understand the basics of Intellectual Property Rights and the process of innovation, patenting, and international cooperation in IP protection. **Understand (L2)**

**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 | 2 | 2 | 1 | 1 | 2 | - | - | 2 | 1 | 3 | - | 2 | 1 | 2 | 3 |
| CO2 | 2 | 2 | 2 | 1 | 2 | - | - | 2 | 1 | 3 | - | 2 | 1 | 2 | 3 |
| CO3 | 2 | 2 | 2 | 2 | 2 | - | - | 2 | 1 | 3 | - | 2 | 1 | 2 | 3 |
| CO4 | 1 | 1 | 1 | 1 | 3 | - | - | - | 1 | 3 | - | 2 | 1 | 2 | 3 |
| CO5 | 1 | 1 | - | - | - | 3 | 2 | 2 | - | 2 | - | 2 | 1 | 2 | 2 |
| 1-Low | | | | | | 2 –Medium | | | | | | 3-High | | | |

**Text Books:**

1. Kompal Bansal & Parshit Bansal, *Fundamentals of IPR for Beginners*, 1st Ed., BS Publications, 2016.
2. William S. Pfeiffer and Kaye A. Adkins, *Technical Communication: A Practical Approach*, Pearson.
3. Ramappa T., *Intellectual Property Rights Under WTO*, 2nd Ed., S. Chand, 2015.

**Reference Books:**

1. Adrian Wallwork, *English for Writing Research Papers*, Springer New York Dordrecht Heidelberg London, 2011.
2. Day R., *How to Write and Publish a Scientific Paper*, Cambridge University Press, 2006.

**E-resources:**

https://www.udemy.com/course/reportwriting/
https://www.udemy.com/course/professional-business-english-and-technical-report-writing/
https://www.udemy.com/course/betterbusinesswriting/

## PART-B

## COURSE DELIVERY PLAN (LESSON PLAN):

**UNIT-I: Introduction**

| 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. | An introduction to writing technical reports | 1 | 04-12-2025 | | TLM1 TLM6 | |
| 2. | technical sentence formation, using transitions to join sentences, using tenses for technical writing. | 1 | 04-12-2025 | | TLM1 TLM2 | |
| 3. | Planning and Structuring | 1 | 11-12-2025 | | TLM1 TLM6 | |
| 4. | Planning the report | 1 | 11-12-2025 | | TLM1 TLM2 | |
| 5. | identifying readers | 1 | 18-12-2025 | | TLM1 TLM6 | |
| 6. | voice, formatting and structuring the report | 1 | 18-12-2025 | | TLM1 TLM2 | |
| 7. | sections of a technical report | 1 | 01-1-2026 | | TLM1 TLM6 | |
| 8. | minutes of meeting writing | 1 | 01-1-2026 | | TLM1 TLM6 | |
| **No. of classes required to complete UNIT-I: 8** | | | | **No. of classes taken:** | | |

**UNIT-II: Drafting report and design issues**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 9. | **Drafting report and design issues** | 1 | 08-1-2026 | | TLM1 TLM2 | |
| 10. | The use of drafts, illustrations and graphics. | 1 | 08-01-2026 | | TLM1 TLM6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11. | **Final edits:** Grammar, spelling, readability, and writing in plain English | 2 | 15-01-2026 | | TLM1<br>TLM6 | |
| 12. | jargon and final layout issues; spelling, punctuation and grammar | 1 | 22-01-2026 | | TLM1<br>TLM6 | |
| 13. | padding, paragraphs, ambiguity | 1 | 22-01-2026 | | TLM1<br>TLM2 | |
| **I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)** | | | | | | |
| **No. of classes required to complete UNIT-II: 6** | | | | **No. of classes taken:** | | |

**UNIT-III: Proofreading and summaries**

| 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. | Proofreading, summaries, activities on summaries. | 2 | 05-02-2026 | | TLM1<br>TLM6 | |
| 15. | **Presenting final reports:** Printed presentation, verbal presentation skills, introduction to proposals and practice | 2 | 12-02-2026 | | TLM1<br>TLM2 | |
| **No. of classes required to complete UNIT-III: 4** | | | | **No. of classes taken:** | | |

**UNIT-IV: Using word processor**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 16. | Adding a Table of Contents, updating the Table of Contents, deleting the Table of Contents, adding an index, creating an outline, adding comments, tracking changes, viewing changes, additions, and comments, accepting and rejecting changes | 2 | 19-02-2026 | | TLM1<br>TLM6 | |
| 17. | working with footnotes and endnotes, inserting citations and bibliography, comparing documents, combining documents, marking documents final and making them read-only, password protecting Microsoft Word documents, using macros. | 2 | 26-02-2026 | | TLM1<br>TLM6 | |
| **No. of classes required to complete UNIT-IV: 4** | | | | **No. of classes taken:** | | |

**UNIT-V: Nature of Intellectual Property**

| S. No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|---|---|---|---|---|---|
| 18. | Patents, designs, trade and copyright. Process of Patenting and Development: Technological research, innovation, patenting, development. | 2 | 12-03-2026 | | TLM1 TLM6 | |
| 19. | **International Scenario: International cooperation on intellectual property.** | 2 | 05-03-2026 | | TLM1 TLM6 | |
| **No. of classes required to complete UNIT-V: 04** | | | | **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 | Textbook followed | HOD Sign |
|---|---|---|---|---|---|---|---|---|
| 1. | Digital Tools for Academic and Technical Writing | 2 | 01-04-2026 02-04-2026 | | TLM2 | CO5 | T1 | |
| No. of classes | | 02 | | | No. of classes taken: | | | |
| **II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)** | | | | | | | | |

| **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) | 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 | 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 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):

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| **Title** | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | **Dr Sk Salma Asiya Begum** | **Dr S Pichi Reddy** | **Dr Shaik Jameer** | **Dr. S Jayaprada** |
| **Signature** | | | | |

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, (AUTONOMOUS)
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Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

# COURSE HANDOUT

## PART-A

**Name of Course Instructor** : **D.ASHOK KUMAR**
**Course Name & Code** : Soft Skills & 23HSS1
**L-T-P Structure** : **0**-1-2 **Credits:** 02
**Program/Sem/Sec** : B. Tech- VI SEM / AI&ML-B
**Academic Year** : 2025-26

**PREREQUISITE** : Basic language proficiency and cognitive skills with an exposure to academic contexts.

## Course Objectives:

- To equip the students with the skills to effectively communicate in English.
- To train the students in interview skills, group discussions and presentation skills.
- To motivate the students to develop confidence.
- To enhance the students' interpersonal skills.
- To improve the students' writing skills.

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

| | |
|---|---|
| **CO1** | Demonstrate analytical thinking skills by effectively introducing themselves, evaluating their own strengths and weaknesses, and understanding the role of perception and attitude in personality development. **L2 -Understand** |
| **CO2** | Make use of self-management competencies, leadership qualities, and etiquette skills to function confidently and professionally in workplace environments. **L3 - Apply** |
| **CO3** | Utilize grammatical proficiency, writing skills, and documentation techniques to communicate clearly and professionally in academic and workplace settings. **L3 - Apply** |
| **CO4** | Take part in effectively in group discussions by demonstrating logical thinking, clarity of expression, and collaborative communication. **L4 - Analyze** |
| **CO5** | Identify the key factors that influence interpersonal relationships and analyze how they affect communication and collaboration. **L3 - Apply** |

## COURSE ARTICULATION MATRIX
## (Correlation between COs & POs)

| Course Outcomes / PO's | Programme Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **CO1.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **CO2.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **CO3.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **CO4.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **CO5.** | | 1 | | | 2 | | | 3 | 3 | 3 | | 3 |
| **1 = Slight (Low)** | | | | **2= Moderate (Medium)** | | | | | | **3 = Substantial (High)** | | |

**UNIT – I**

***Analytical Thinking & Listening Skills:*** Self-Introduction, Shaping Young Minds - A Talk by Azim Premji (Listening Activity), Self – Analysis, Developing Positive Attitude, Perception.

***Communication Skills:*** Verbal Communication; Non Verbal Communication (Body Language)

**UNIT – II**

***Self-Management Skills:*** Anger Management, Stress Management, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

***Etiquette:*** Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

**UNIT – III**

***Standard Operation Methods:*** Basic Grammars, Tenses, Prepositions, Pronunciation, Letter Writing; Note Making, Note Taking, Minutes Preparation, Email & Letter Writing.

**UNIT-IV**

***Job-Oriented Skills:*** Group Discussion, Mock Group Discussions, Resume Preparation, Interview Skills, Mock Interviews

**UNIT-V**

***Interpersonal relationships:*** Introduction, Importance, Types, Uses, Factors affecting interpersonal relationships, Accommodating different styles, Consequences of interpersonal relationships

**Text books:**

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

**References:**

1. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand& Company Ltd., 2018.
2. Raman, Meenakshi& Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

**E-resources:**

1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01

**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 method | HOD Sign |
|---|---|---|---|---|---|---|
| 1. | ***Analytical Thinking & Listening Skills:*** Self-Introduction | 1+2 | 02/12/2025 | | TLM1 TLM4 | |
| 2. | Self – Analysis, Developing Positive Attitude, Perception | 1+2 | 08/12/2025 | | TLM1 TLM5 | |
| 3. | Verbal Communication; Non Verbal Communication (Body Language) | 1+2 | 15/12/2025 | | TLM1 TLM4 TLM3 | |
| 4. | ***Self-Management Skills:*** Anger Management, Stress Management | 1+2 | 22/12/2025 | | TLM2 TLM4 | |
| 5. | Time Management, Six Thinking Hats | 1+2 | 29/12/2025 | | TLM2 TLM4 | |
| 6. | Team Building and Leadership Qualities | 1+2 | 05/01/2026 | | TLM2 TLM4 | |
| 7. | ***Standard Operation Methods :*** Basic Grammars, Tenses, and Prepositions | 1+2 | 12/01/2026 | | TLM1 TLM3 | |
| 8. | Pronunciation, Letter Writing | 1+2 | 19/01/2026 | | TLM1 TLM3 | |
| 9. | Note Making, Note Taking, Minutes Preparation, Email | 1+2 | 02/02/2026 | | TLM2 TLM5 | |
| 10. | ***Job-Oriented Skills:*** Group Discussion, Mock Group Discussions | 1+2 | 09/02/2026 | | TLM4, TLM6 | |
| 11. | Mock Group Discussions | 1+2 | 16/02/2026 | | TLM4, TLM6 | |
| 12. | Resume Preparation | 1+2 | 02/03/2026 | | TLM1, TLM5 | |
| 13. | Interview Skills, Mock Interviews | 1+2 | 09/03/2026 | | TLM1, TLM6 | |
| 14. | Interview Skills, Mock Interviews | 1+2 | | | TLM1, TLM6 | |
| 15. | ***Interpersonal relationships:*** Introduction, Importance, Types, Uses, Factors affecting interpersonal relationships | 1+2 | 16/03/2026 | | TLM1 TLM3 TLM5 | |
| 16. | Accommodating different styles, Consequences of interpersonal relationships | 1+2 | 23/03/2026 | | TLM1 TLM3 TLM5 | |
| **No. of classes required to complete Syllabus:48** | | | | | | |

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

| **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 |

## 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. |

| **Title** | **Course Instructor** | **Lab. Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | | **Dr. B. Samrajya Lakshmi** | **Dr. Padma Venkat** | **Dr. T. Satyanarayana** |
| **Signature** | | | | |

# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

**Accredited by NAAC with 'A' Grade**
**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, NTR DIST., A.P.-521 230**
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)**


## COURSE HANDOUT PART-A

**Name of Course Instructor:** Dr Chappidi Johnwesily
**Course Name & Code** : DEEP LEARNING LAB (23AM53)
**L-T-P Structure** : 0-0-3 **Credits:** 1.5
**Program/Sem/Sec** : B.Tech /CSE(AI&ML)/VI/B **A.Y:** 2025-2026

**PRE-REQUISITE:** Python/R.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The main objectives of the course are to:

- This course aims to develop students' foundational competence in deep learning by enabling them to design, implement, and analyze various neural network models for real-world problems. It equips learners with practical skills in modern deep learning frameworks, fosters the ability to select suitable architectures for different applications, and enhances their capability to interpret model performance and results effectively.

**COURSE OUTCOMES (COs):** At the end of the course, students are able to

| | |
|---|---|
| **CO1** | Implement deep neural networks to solve real-world problems **(Apply-L3)** |
| **CO2** | Choose an appropriate pre-trained model to solve real real-time problem **(Analyze-L4)** |
| **CO3** | Interpret the results of two different deep learning models **(Analyze-L4)** |
| **CO4** | Improve individual/team work skills, communication & report writing skills with ethical values. |

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

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PS03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | 2 | - | 2 | 3 | 2 | 1 |
| **CO2** | 3 | 3 | 3 | 2 | 3 | - | - | - | 2 | 2 | - | 2 | 3 | 3 | 1 |
| **CO3** | 2 | 3 | 2 | 3 | 2 | - | - | - | 1 | 2 | - | 2 | 2 | 2 | 2 |
| **CO4** | 1 | 1 | 1 | - | 1 | - | - | - | - | - | - | 1 | - | - | 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).

**Text Books:**

1. Reza Zadeh and Bharath Ram Sundar, *Tensorflow for Deep Learning*, O'Reilly publishers, 2018

**References:**

1. https://github.com/fchollet/deep-learning-with-python-notebooks

# PART-B

## COURSE DELIVERY PLAN (LESSON PLAN): Section-B

| 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 | Implement multi-layer perceptron algorithm for MNIST Handwritten Digit Classification. | 6 | 02-Dec-2025<br>09-Dec-2025 | | TLM4 | |
| 2 | Design a neural network for classifying movie reviews (Binary Classification) using IMDB dataset. | 6 | 16-Dec-25<br>23-Dec-25 | | TLM4 | |
| 3 | Design a neural network for classifying news wires (Multi class classification) using Reuters dataset. | 3 | 30-Dec-25 | | TLM4 | |
| 4 | Design a neural network for predicting house prices using Boston Housing Price dataset. | 3 | 06-Jan-2026 | | TLM4 | |
| 5 | Build a Convolution Neural Network for MNIST Handwritten Digit Classification. | 3 | 20-Jan-2026 | | TLM4 | |
| 6 | Build a Convolution Neural Network for simple image (dogs and Cats) Classification. | 3 | 03-Feb-2026 | | TLM4 | |
| 7 | Use a pre-trained convolution neural network (VGG16) for image classification. | 3 | 10-Feb-2026 | | TLM4 | |
| 8 | Implement one hot encoding of words or characters. | 3 | 17-Feb-2026 | | TLM4 | |
| 9 | Implement word embeddings for IMDB dataset. | 6 | 24-Feb-2026<br>03-Mar-2026 | | TLM4 | |
| 10 | Implement a Recurrent Neural Network for IMDB movie review classification problem. | 3 | 17-Mar-26 | | TLM4 | |
| 11 | Virtual Lab | 3 | 24-Mar-26 | | | |
| 12 | Internal Exam | 3 | 31-Mar-26 | | TLM4 | |

| 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 Regulations):**

According to Academic Regulations of R23 Distribution and Weightage of Marks For Laboratory Courses is as follows

**(a) Continuous Internal Evaluation (CIE):** The Continuous Internal Evaluation(CIE) is based on the following parameters:

| **Parameter** | **Marks** |
|---|---|
| Day to Day work | 10 |
| Record | 05 |
| Internal Test | 15 |
| Total | 30 |

**(b) Semester End Examinations (SEE:** The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3hours duration and evaluated for 70 marks.

# 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 engineeringproblems. |
| **PO 2** | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using firstprinciples of mathematics, natural sciences, and engineering sciences. |
| **PO 3** | **Design/development of solutions**: Design solutions for complex engineeringproblems 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 andresearch 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 complexengineering activities with an understanding of the limitations |
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| **PO 8** | **Ethic**s: 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 orleader in diverse teams, and in multidisciplinary settings. |
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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 multidisciplinaryenvironments. |
| **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 technologicalchange. |

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

| | |
|---|---|
| **PSO 1** | Design and develop sophisticated software systems, leveraging expertise in data structures, algorithm analysis, web design, and proficiency in machine learning techniques. |
| **PSO 2** | Possess the strong data analysis and interpretation skills, enabling them to extract meaningful insights and patterns from large datasets using AI & ML methodologies. |
| **PSO 3** | To develop innovative AI and machine learning solutions that strategically leverage data-driven and technical expertise to effectively solve complex, real-world problems. |

| **Title** | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Head of the Department** |
|---|---|---|---|---|
| **Name of the Faculty** | **Dr Ch johnwesily** | | | **Dr S Jayaprada** |
| **Signature** | | | | |