



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## COURSE HANDOUT

### PART-A

Name of Course Instructor : Mr. L V Krishna rao  
Course Name & Code : Design and Analysis of Algorithms- 17CI08  
L-T-P Structure : 3-0-0 Credits : 3  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- A A.Y : 2019-20

**PRE-REQUISITE:** : Basic of Programming language and Data structure

### **COURSE EDUCATIONAL OBJECTIVES (CEOs):**

Students undergoing this course are expected to:

Explain the fundamental concepts of various algorithm design techniques. Make the students familiar to conduct performance evaluation of algorithms. Expertise the students with the various existing algorithm design techniques .Motivate the students to design a new algorithms for various problems and introduce the concepts of P&NP-class problems.

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

|      |  |
|------|--|
| CO 1 | Identify the basic properties and analysis methods of algorithms and design divide and conquer paradigm for solving a few example problems and analyze them. |
| CO 2 | Design Greedy algorithms for knapsack problem, minimum cost spanning tree, single source shortest path problem and analyze them.                             |
| CO 3 | Apply dynamic programming paradigm to solve travelling sales person problem, 0/1 knapsack problem, Optimal binary search tree.                               |
| CO 4 | Apply Backtracking search methods on state space trees for few example problems  |
| CO 5 | Analyze branch and bound search methods through problems such as 0/1 knapsack problem, Travelling salesperson problem.                                       |

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

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

T1: Ellis Horowitz, Sartaj Sahni, 'Fundamentals of Computer Algorithms', Galgotia Publications.

T2: Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, Pearson, 2007.

**REFERENCE BOOKS:**

R1: Aho, Hopcroft & Ullman, 'The Design and Analysis of Computer Algorithms', Addison Wesley publications

R2: Thomas H. Cormen et al, 'Introduction to Algorithms', PHI.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN):****UNIT -I: INTRODUCTION**

| S.No   | Topics to be covered                          | No. of Classes Required | Tentative Date of Completion (DD-MM-YY) | Actual Date of Completion (DD-MM-YY) | Teaching Learning Methods | HOD Sign Weekly |
|--|---|-------------------------|---|--------------------------------------|---------------------------|-----------------|
| 1.   | Introduction to course                        | 1                       | 26-11-19                                |                                      | TLM1                      |                 |
| 2.   | Algorithm definition and Specifications       | 1                       | 28-11-19                                |                                      | TLM1                      |                 |
| 3.   | Performance Analysis                          | 1                       | 29-11-19                                |                                      | TLM1                      |                 |
| 4.   | Time Complexity and space complexity          | 1                       | 03-12-19                                |                                      | TLM1                      |                 |
| 5.   | Asymptotic Notations- Big-Oh, Omega and Theta | 1                       | 05-12-19                                |                                      | TLM1 /TLM2                |                 |
| 6.   | Divide & Conquer Technique: General Method    | 1                       | 06-12-19                                |                                      | TLM1 /TLM2                |                 |
| 7.   | Binary Search and its analysis                | 1                       | 10-12-19                                |                                      | TLM1 /TLM2                |                 |
| 8.   | Finding Maximum and Minimum and its Analysis  | 1                       | 12-12-19                                |                                      | TLM1 /TLM2                |                 |
| 9.   | Merge sort and its Analysis                   | 1                       | 13-12-19                                |                                      | TLM1 /TLM2                |                 |
| 10.  | Quick Sort algorithm and its analysis         | 1                       | 17-12-19                                |                                      | TLM1 /TLM2                |                 |
| 11.  | Assignment-1/Tutorial-1                       | 1                       | 19-12-19                                |                                      | TLM 3                     |                 |
| No. of classes required to complete UNIT-I : <b>11</b> |   |                         |   | No. of classes taken:                |                           |                 |

**UNIT –II: Greedy Method**

| S.No   | Topics to be covered                           | No. of Classes Required | Tentative Date of Completion (DD-MM-YY) | Actual Date of Completion (DD-MM-YY) | Teaching Learning Methods | HOD Sign Weekly |
|--|--|-------------------------|---|--------------------------------------|---------------------------|-----------------|
| 12.  | Greedy Method – Introduction, General method   | 1                       | 20-12-19                                |                                      | TLM1/<br>TLM2             |                 |
| 13.  | Knapsack problem , Example problem             | 1                       | 24-12-19                                |                                      | TLM1<br>/TLM2             |                 |
| 14.  | Job sequencing with deadlines, Example problem | 1                       | 26-12-19                                |                                      | TLM1<br>/TLM2             |                 |
| 15.  | Minimum cost spanning trees, example problem   | 1                       | 27-12-19                                |                                      | TLM1<br>/TLM2             |                 |
| 16.  | Optimal storage on tapes, Example problem      | 1                       | 31-12-19                                |                                      | TLM1<br>/TLM2             |                 |
| 17.  | Optimal Merge patterns, Example problem        | 1                       | 02-01-20                                |                                      | TLM1<br>/TLM4             |                 |
| 18.  | Single source Shortest path problem            | 1                       | 03-01-20                                |                                      | TLM1<br>/TLM2             |                 |
| 19.  | Assignment-2/Tutorial-2                        | 1                       | 07-01-20                                |                                      | TLM 3                     |                 |
| No. of classes required to complete <b>UNIT-2 : 08</b> |  |                         |   | No. of classes taken:                |                           |                 |

**UNIT –III: DYNAMIC PROGRAMMING**

| S.No.  | Topics to be covered                                 | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|--|--|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 20.  | Dynamic Programming- General method                  | 1                       | 09-01-20                     |                           | TLM1                      |                 |
| 21.  | Multistage Graph, Example problem                    | 1                       | 10-01-20                     |                           | TLM1<br>/TLM2             |                 |
| 22.  | All pairs Shortest path, Example problem             | 1                       | 28-01-20                     |                           | TLM1<br>/TLM2             |                 |
| 23.  | Optimal Binary Search Tree , Example problem         | 1                       | 30-01-20                     |                           | TLM1<br>/TLM2             |                 |
| 24.  | 0/1 Knapsack Problem                                 | 1                       | 31-01-20                     |                           | TLM1<br>/TLM2             |                 |
| 25.  | Travelling Sales Person Problem                      | 1                       | 04-02-20                     |                           | TLM1                      |                 |
| 26.  | Single source shortest path problem, Example Problem | 1                       | 05-02-20                     |                           | TLM1                      |                 |
| 27.  | Reliability design, Example Problem                  | 1                       | 07-02-20                     |                           | TLM1                      |                 |
| 28.  | Tutorial-3/ Assignment-3                             | 1                       | 11-02-20                     |                           | TLM 3                     |                 |
| No. of classes required to complete <b>UNIT-3 : 09</b> |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT –IV: BACK TRACKING**

| S.No.   | Topics to be covered    | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|-------------------------|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 29.   | General Method          | 1                       | 13-02-20                     |                           | TLM1                      |                 |
| 30.   | The 8-Queens problem    | 2                       | 14-02-20,<br>18-02-20        |                           | TLM1<br>/TLM2             |                 |
| 31.   | Sum of subsets problem  | 2                       | 20-02-20,<br>25-02-20        |                           | TLM1<br>/TLM2             |                 |
| 32.   | Graph coloring problem  | 1                       | 27-02-20                     |                           | TLM1<br>/TLM2             |                 |
| 33.   | Hamiltonian cycles      | 1                       | 28-02-20                     |                           | TLM1<br>/TLM2             |                 |
| 34.   | Tutorial-4/Assignment-4 | 1                       | 03-03-20                     |                           | TLM 3                     |                 |
| No. of classes required to complete UNIT-4 : 08 |                         |                         |                              |                           |                           |                 |

**UNIT-V: NP- HARD AND NP-COMPLETE PROBLEMS**

| S.No.   | Topics to be covered   | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|---|--|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 35.   | Branch and Bound-<br>General method                                      | 1                       | 05-03-20                     |                           | TLM1                      |                 |
| 36.   | LC Branch and bound<br>solution for Travelling<br>Sales Person Problem   | 1                       | 06-03-20                     |                           | TLM1<br>/TLM2             |                 |
| 37.   | LC Branch and bound<br>solution 0/1 Knapsack<br>problem                  | 2                       | 12-03-20 &<br>13-03-20       |                           | TLM1<br>/TLM2             |                 |
| 38.   | FIFO Branch and bound<br>solution for Travelling<br>Sales Person Problem | 2                       | 17-03-20 &<br>19-03-20       |                           | TLM1<br>/TLM2             |                 |
| 39.   | FIFO Branch and bound<br>solution 0/1 Knapsack<br>problem                | 1                       | 20-03-20                     |                           | TLM1<br>/TLM2             |                 |
| 40.   | Assignment-5 /Tutorial-5   | 1                       | 24-03-20                     |                           | TLM 3                     |                 |
| No. of classes required to complete UNIT-5 : 08 |  |                         |                              |                           |                           |                 |

**Contents 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 |
|-------|--|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 41.   | Huffman Coding   | 1                       | 26-03-20                     |                           | TLM1<br>/TLM4             |                 |
| 42.   | Matrix chain multiplication<br>& Longest common<br>subsequence | 1                       | 27-03-20                     |                           | TLM1<br>/TLM4             |                 |

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                           | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                            | A1=5         |
| Assignment-II (Unit-II)                          | A2=5         |
| I-Mid Examination (Units-I & II)                 | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)          | Q2=10        |
| Attendance                                       | B=5          |
| Assignment Marks = Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)   | M=20         |
| Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)  | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q  | 40           |
| Semester End Examination (SEE)                   | 60           |
| Total Marks = CIE + SEE                          | 100          |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b> To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.     |
| <b>PSO 2</b> | <b>Data Engineering:</b> To inculcate an ability to Analyze, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | <b>Software Engineering:</b> Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |

Course Instructor  
Mr. L V Krishna rao

Course Coordinator  
Mr. D Srinivasa Rao

Module Coordinator  
Dr. D. Veeraiah

HOD  
Dr. D. Veeraiah



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## COURSE HANDOUT

### PART-A

Name of Course Instructor : Mr. D.SRINIVASA RAO  
Course Name & Code : Design and Analysis of Algorithms- 17CI08  
L-T-P Structure : 3-0-0 Credits : 3  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- B A.Y : 2019-20

**PRE-REQUISITE:** : Basic of Programming language and Data structure

### **COURSE EDUCATIONAL OBJECTIVES (CEOs):**

Students undergoing this course are expected to:

Explain the fundamental concepts of various algorithm design techniques. Make the students familiar to conduct performance evaluation of algorithms. Expertise the students with the various existing algorithm design techniques .Motivate the students to design a new algorithms for various problems.

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

|      |  |
|------|--|
| CO 1 | Identify the basic properties and analysis methods of algorithms and design divide and conquer paradigm for solving a few example problems and analyze them. |
| CO 2 | Design Greedy algorithms for knapsack problem, minimum cost spanning tree, single source shortest path problem and analyze them.                             |
| CO 3 | Apply dynamic programming paradigm to solve travelling sales person problem, 0/1 knapsack problem, Optimal binary search tree.                               |
| CO 4 | Apply Backtracking search methods on state space trees for few example problems  |
| CO 5 | Analyze branch and bound search methods through problems such as 0/1 knapsack problem, Travelling salesperson problem.                                       |

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

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

T1: Ellis Horowitz, Sartaj Sahni, 'Fundamentals of Computer Algorithms', Galgotia Publications.

T2: Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, Pearson, 2007.

**REFERENCE BOOKS:**

R1: Aho, Hopcroft & Ullman, 'The Design and Analysis of Computer Algorithms', Addison Wesley publications

R2: Thomas H. Cormen et al, 'Introduction to Algorithms', PHI.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN): B-SEC****UNIT -I: INTRODUCTION**

| S.No   | Topics to be covered                          | No. of Classes Required | Tentative Date of Completion (DD-MM-YY) | Actual Date of Completion (DD-MM-YY) | Teaching Learning Methods | HOD Sign Weekly |
|--|---|-------------------------|---|--------------------------------------|---------------------------|-----------------|
| 1.   | Introduction to course                        | 1                       | 26-11-19                                |                                      | TLM1                      |                 |
| 2.   | Algorithm definition and Specifications       | 1                       | 27-11-19                                |                                      | TLM1                      |                 |
| 3.   | Performance Analysis                          | 1                       | 29-11-19                                |                                      | TLM1                      |                 |
| 4.   | Time Complexity and space complexity          | 1                       | 29-12-19                                |                                      | TLM1                      |                 |
| 5.   | Asymptotic Notations- Big-Oh, Omega and Theta | 1                       | 03-12-19                                |                                      | TLM1 /TLM2                |                 |
| 6.   | Divide & Conquer Technique: General Method    | 1                       | 04-12-19                                |                                      | TLM1 /TLM2                |                 |
| 7.   | Binary Search and its analysis                | 1                       | 06-12-19                                |                                      | TLM1 /TLM2                |                 |
| 8.   | Finding Maximum and Minimum and its Analysis  | 1                       | 10-12-19 & 11-12-19                     |                                      | TLM1 /TLM2                |                 |
| 9.   | Merge sort and its Analysis                   | 1                       | 13-12-19 & 17-12-19                     |                                      | TLM1 /TLM2                |                 |
| 10.  | Quick Sort algorithm and its analysis         | 1                       | 20-12-19                                |                                      | TLM1 /TLM2                |                 |
| 11.  | Assignment-1/Tutorial-1                       | 1                       | 24-12-19                                |                                      | TLM 3                     |                 |
| No. of classes required to complete UNIT-I : <b>11</b> |   |                         |   | No. of classes taken:                |                           |                 |



**UNIT –II: Greedy Method**

| S.No   | Topics to be covered                           | No. of Classes Required | Tentative Date of Completion (DD-MM-YY) | Actual Date of Completion (DD-MM-YY) | Teaching Learning Methods | HOD Sign Weekly |
|--|--|-------------------------|---|--------------------------------------|---------------------------|-----------------|
| 12.  | Greedy Method – Introduction, General method   | 1                       | 31-12-19                                |                                      | TLM1/<br>TLM2             |                 |
| 13.  | Knapsack problem , Example problem             | 1                       | 31-12-19                                |                                      | TLM1<br>/TLM2             |                 |
| 14.  | Job sequencing with deadlines, Example problem | 1                       | 03-01-20                                |                                      | TLM1<br>/TLM2             |                 |
| 15.  | Minimum cost spanning trees, example problem   | 1                       | 07-01-20                                |                                      | TLM1<br>/TLM2             |                 |
| 16.  | Optimal storage on tapes, Example problem      | 1                       | 08-01-20                                |                                      | TLM1<br>/TLM2             |                 |
| 17.  | Optimal Merge patterns, Example problem        | 1                       | 08-01-20                                |                                      | TLM1<br>/TLM4             |                 |
| 18.  | Single source Shortest path problem            | 1                       | 10-01-20                                |                                      | TLM1<br>/TLM2             |                 |
| 19.  | Assignment-2/Tutorial-2                        | 1                       | 10-01-20                                |                                      | TLM 3                     |                 |
| No. of classes required to complete <b>UNIT-2 : 08</b> |  |                         |   | No. of classes taken:                |                           |                 |

**UNIT –III: DYNAMIC PROGRAMMING**

| S.No.  | Topics to be covered                                 | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|--|--|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 20.  | Dynamic Programming- General method                  | 1                       | 28-01-20                     |                           | TLM1                      |                 |
| 21.  | Multistage Graph, Example problem                    | 1                       | 29-01-20                     |                           | TLM1<br>/TLM2             |                 |
| 22.  | All pairs Shortest path, Example problem             | 1                       | 31-01-20                     |                           | TLM1<br>/TLM2             |                 |
| 23.  | Optimal Binary Search Tree , Example problem         | 1                       | 04-02-20                     |                           | TLM1<br>/TLM2             |                 |
| 24.  | 0/1 Knapsack Problem                                 | 1                       | 05-02-20                     |                           | TLM1<br>/TLM2             |                 |
| 25.  | Travelling Sales Person Problem                      | 1                       | 07-02-20                     |                           | TLM1                      |                 |
| 26.  | Single source shortest path problem, Example Problem | 1                       | 11-02-20                     |                           | TLM1                      |                 |
| 27.  | Reliability design, Example Problem                  | 1                       | 12-02-20                     |                           | TLM1                      |                 |
| 28.  | Tutorial-3/ Assignment-3                             | 1                       | 14-02-20                     |                           | TLM 3                     |                 |
| No. of classes required to complete <b>UNIT-3 : 09</b> |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT –IV: BACK TRACKING**

| S.No.  | Topics to be covered    | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|--|-------------------------|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 29.  | General Method          | 1                       | 18-02-20                     |                           | TLM1                      |                 |
| 30.  | The 8-Queens problem    | 2                       | 19-02-20<br>&<br>21-02-20    |                           | TLM1<br>/TLM2             |                 |
| 31.  | Sum of subsets problem  | 2                       | 25-02-20                     |                           | TLM1<br>/TLM2             |                 |
| 32.  | Graph coloring problem  | 1                       | 26-02-20                     |                           | TLM1<br>/TLM2             |                 |
| 33.  | Hamiltonian cycles      | 1                       | 28-02-20                     |                           | TLM1<br>/TLM2             |                 |
| 34.  | Tutorial-4/Assignment-4 | 1                       | 03-03-20                     |                           | TLM 3                     |                 |
| No. of classes required to complete <b>UNIT-4 : 08</b> |                         |                         |                              |                           |                           |                 |

**UNIT-V: BRANCH AND BOUND**

| S.No.  | Topics to be covered   | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|--|--|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 35.  | Branch and Bound-<br>General method                                      | 1                       | 04-03-20 &<br>06-03-20       |                           | TLM1                      |                 |
| 36.  | LC Branch and bound<br>solution for Travelling<br>Sales Person Problem   | 1                       | 11-03-20                     |                           | TLM1<br>/TLM2             |                 |
| 37.  | LC Branch and bound<br>solution 0/1 Knapsack<br>problem                  | 2                       | 13-03-20                     |                           | TLM1<br>/TLM2             |                 |
| 38.  | FIFO Branch and bound<br>solution for Travelling<br>Sales Person Problem | 2                       | 17-03-20                     |                           | TLM1<br>/TLM2             |                 |
| 39.  | FIFO Branch and bound<br>solution 0/1 Knapsack<br>problem                | 1                       | 18-03-20                     |                           | TLM1<br>/TLM2             |                 |
| 40.  | Assignment-5 /Tutorial-5   | 1                       | 20-03-20                     |                           | TLM 3                     |                 |
| No. of classes required to complete <b>UNIT-5 : 08</b> |  |                         |                              |                           |                           |                 |

**Contents 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 |
|-------|----------------------------------|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 41.   | Master theorem,Huffman<br>Coding | 1                       | 24-03-20                     |                           | TLM1<br>/TLM4             |                 |

|     |  |   |          |  |                   |  |
|-----|--|---|----------|--|-------------------|--|
| 42. | Matrix chain multiplication & Longest common subsequence | 1 | 25-03-20 |  | <b>TLM1 /TLM4</b> |  |
|-----|--|---|----------|--|-------------------|--|

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                           | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                            | A1=5         |
| Assignment-II (Unit-II)                          | A2=5         |
| I-Mid Examination (Units-I & II)                 | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)          | Q2=10        |
| Attendance                                       | B=5          |
| Assignment Marks = Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)   | M=20         |
| Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)  | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q  | 40           |
| Semester End Examination (SEE)                   | 60           |
| Total Marks = CIE + SEE                          | 100          |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b> To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.     |
| <b>PSO 2</b> | <b>Data Engineering:</b> To inculcate an ability to Analyze, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | <b>Software Engineering:</b> Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |

Course Instructor  
Mr. D Srinivasa Rao

Course Coordinator  
Mr. D Srinivasa Rao

Module Coordinator  
Dr. D. Veeraiah

HOD  
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# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## COURSE HANDOUT

### PART-A

Name of Course Instructor : G.V.Rajya Lakshmi  
Course Name & Code : DataBase Management Systems (17CI09)  
L-T-P Structure : 3-1-0 Credits : 3  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., A A.Y : 2019-20

**PRE-REQUISITE:** Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries) & File Concepts.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** This course enables the students to know about

- ✓ DBMS basic concepts, Database Languages.
- ✓ Data base Design.
- ✓ Normalization process and Transaction processing.
- ✓ Indexing.

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

|      |  |
|------|--|
| CO 1 | Outline the components of DBMS & design database using ER model  |
| CO 2 | Construct database using SQL and extract data from database using Relational algebra & SQL queries.          |
| CO 3 | Apply the normalization process for effective database design  |
| CO 4 | Analyze components of transaction processing, Concurrency control mechanisms and recovery strategies of DBMS |
| CO 5 | Evaluate different File organization & Indexing Techniques   |

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

**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** Henry F. Korth, Abraham Silberschatz, S.Sudarshan, “Database System Concepts”, McGraw Hill, 6 thedition, 2009.
- T2** Ramez Elmasri, Shamkanth B.Navathe, “Fundamentals of Database Systems”, Addison Wesley, 6 thedition, 2010.

**REFERENCE BOOKS:**

- R1** Raghu Ramakrishnan, Johannese Gehrke, “Database Management System”, McGraw Hill, 3 rd edition, 2000.
- R2** Date C J, “An Introduction to Database System”, Pearson Education, 8th edition, 2003
- R3** Sharad Maheshwari, Ruchin Jain, “DBMS: Complete Practical Approach”, Firewall Media, New Delhi, 2005

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN) :****UNIT –I: Introduction & Data modeling using the Entity Relationship Model**

| 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, An overview of database management system    | 1                       | 25/11/19                     |                           |                           |                 |
| 2.   | Database system Vs file system                             | 1                       | 26/11/19                     |                           |                           |                 |
| 3.   | Database system concepts and architecture                  | 1                       | 29/11/19                     |                           |                           |                 |
| 4.   | Data models schema and instances                           | 1                       | 30/11/19                     |                           |                           |                 |
| 5.   | Data independence and data base language and interfaces    | 1                       | 02/12/19                     |                           |                           |                 |
| 6.   | Data definitions language, DML, Overall Database Structure | 1                       | 03/12/19                     |                           |                           |                 |
| 7.   | Tutorial – I   | 1                       | 06/12/19                     |                           |                           |                 |
| 8.   | ER model concepts- notation for ER diagram                 | 1                       | 07/12/19                     |                           |                           |                 |
| 9.   | Mapping constraints, keys                                  | 1                       | 09/12/19                     |                           |                           |                 |
| 10.  | Concepts of Super Key, candidate key, primary key          | 1                       | 10/12/19                     |                           |                           |                 |
| 11.  | Generalization, aggregation                                | 1                       | 13/12/19                     |                           |                           |                 |
| 12.  | Reduction of an ER diagrams to tables, Extended ER model   | 1                       | 14/12/19                     |                           |                           |                 |
| 13.  | Relationships of higher degree                             | 1                       | 16/12/19                     |                           |                           |                 |
| 14.  | Tutorial – II  | 1                       | 17/12/19                     |                           |                           |                 |
| No. of classes required to complete UNIT-I: 14 |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT –II: Relational data Model and Language & Introduction to SQL**

| 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.  | Relational data model concepts                                 | 1                       | 20/12/19                     |                           | TLM1                      |                 |
| 2.  | Integrity constraints: entity integrity, referential integrity | 1                       | 21/12/19                     |                           | TLM1                      |                 |
| 3.  | Keys constraints, Domain constraints                           | 1                       | 23/12/19                     |                           | TLM1                      |                 |
| 4.  | Relational algebra   | 1                       | 24/12/19                     |                           | TLM1                      |                 |
| 5.  | Tutorial – III   | 1                       | 27/12/19                     |                           | TLM3                      |                 |
| 6.  | Characteristics of SQL, Advantage of SQL                       | 1                       | 28/12/19                     |                           | TLM1                      |                 |
| 7.  | SQL data types and literals, Types of SQL commands             | 1                       | 30/12/19                     |                           | TLM1                      |                 |
| 8.  | SQL operators and their procedure                              | 1                       | 31/12/19                     |                           | TLM1                      |                 |
| 9.  | Tables, views and indexes,                                     | 1                       | 03/01/20                     |                           | TLM1                      |                 |
| 10.   | Queries and sub queries, Aggregate functions                   | 1                       | 04/01/20                     |                           | TLM1/<br>TLM2             |                 |
| 11.   | Insert, update and delete operations                           | 1                       | 06/01/20                     |                           | TLM1                      |                 |
| 12.   | Unions, Intersection, Minus, Cursors in SQL                    | 1                       | 07/01/20                     |                           | TLM1                      |                 |
| 13.   | Tutorial – IV  | 1                       | 10/11/20                     |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-II: 13 |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT –III: Normalization**

| 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.   | Functional Dependencies                   | 1                       | 27/01/20                     |                           | TLM1                      |                 |
| 2.   | Normal Forms: First, Second               | 1                       | 28/01/20                     |                           | TLM1                      |                 |
| 3.   | Third Normal Forms                        | 1                       | 31/01/20                     |                           | TLM1/<br>TLM2             |                 |
| 4.   | BCNF, Inclusion Dependences               | 1                       | 01/02/20                     |                           | TLM1                      |                 |
| 5.   | Loss Less Join Decompositions             | 1                       | 03/02/20                     |                           | TLM1                      |                 |
| 6.   | Tutorial – V                              | 1                       | 04/02/20                     |                           | TLM3                      |                 |
| 7.   | Normalization Using FD,MVD                | 1                       | 07/02/20                     |                           | TLM1                      |                 |
| 8.   | Normalization Using JD                    | 1                       | 08/02/20                     |                           | TLM1                      |                 |
| 9.   | Alternative Approaches To Database Design | 1                       | 10/02/20                     |                           | TLM1                      |                 |
| 10.  | Tutorial – VI                             | 1                       | 11/02/20                     |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-III: 10 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT –IV: Transaction Processing Concepts & Concurrency Control 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 |
|---|--|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 1.  | Transaction System                               | 1                       | 14/02/20                     |                           | TLM1                      |                 |
| 2.  | Testing Of Serializability                       | 1                       | 15/02/20                     |                           | TLM1                      |                 |
| 3.  | Serializability Of Schedules                     | 1                       | 17/02/20                     |                           | TLM1                      |                 |
| 4.  | Conflict & View Serializable Schedule            | 1                       | 18/02/20                     |                           | TLM1                      |                 |
| 5.  | Recoverability, Log Based Recovery, Checkpoints, | 1                       | 22/02/20                     |                           | TLM1                      |                 |
| 6.  | ARIES Algorithm, Deadlock Handling               | 1                       | 24/02/20                     |                           | TLM1/<br>TLM2             |                 |
| 7.  | Tutorial –VII                                    | 1                       | 25/02/20                     |                           | TLM3                      |                 |
| 8.  | Concurrency Control                              | 1                       | 28/02/20                     |                           | TLM1                      |                 |
| 9.  | Techniques For Concurrency Control               | 1                       | 29/02/20                     |                           | TLM1                      |                 |
| 10.   | Time Stamping Protocols For Concurrency Control  | 1                       | 02/03/20                     |                           | TLM1                      |                 |
| 11.   | Locking, Validation Based Protocol               | 1                       | 03/03/20                     |                           | TLM1                      |                 |
| 12.   | Multiple Granularity                             | 1                       | 06/03/20                     |                           | TLM1                      |                 |
| 13.   | Recovery With Concurrent Transactions            | 1                       | 07/03/20                     |                           | TLM1/<br>TLM2             |                 |
| 14.   | Tutorial-VIII                                    |                         | 10/03/20                     |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-IV: 14 |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-V: Storage and Indexing**

| 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.    | RAID Levels                                | 1                       | 13/03/20                     |                           | TLM1                      |                 |
| 2.    | Page Formats                               | 1                       | 14/03/20                     |                           | TLM1                      |                 |
| 3.    | Record Formats                             | 1                       | 16/03/20                     |                           | TLM1                      |                 |
| 4.    | File Types And Organization, Tutorial – IX | 1                       | 17/03/20                     |                           | TLM1/<br>TLM3             |                 |



|   |                   |   |          |                       |                       |  |
|---|-------------------|---|----------|-----------------------|-----------------------|--|
| 5.  | ISAM              | 1 | 20/03/20 |                       | <b>TLM1/<br/>TLM2</b> |  |
| 6.  | B-Tree            | 1 | 21/03/20 |                       | <b>TLM1</b>           |  |
| 7.  | B+-Tree           | 1 | 23/03/20 |                       | <b>TLM1/<br/>TLM2</b> |  |
| 8.  | Examples on trees | 1 | 24/03/20 |                       | <b>TLM1</b>           |  |
| 9.  | Tutorial – X      | 1 | 27/03/20 |                       | <b>TLM3</b>           |  |
| No. of classes required to complete UNIT-V: 9 |                   |   |          | No. of classes taken: |                       |  |

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)            | M=20         |
| Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)           | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b> To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.     |
| <b>PSO 2</b> | <b>Data Engineering:</b> To inculcate an ability to Analyse, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | <b>Software Engineering:</b> Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |

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Lakshmi

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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : G.V.Rajya Lakshmi  
Course Name & Code : DataBase Management Systems Lab(17CI64)  
L-T-P Structure : 0-0-2 Credits : 1  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., A A.Y : 2019-20

**PRE-REQUISITE** : C Language

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The major objective of this lab is to provide a strong formal foundation in database concepts, technology and practice to the participants to groom them into well-informed database application developers.

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

|      |   |
|------|---|
| CO 1 | Design & implement a database schema for a given problem-domain.                                  |
| CO 2 | Create database using SQL and implement various integrity constraints.                            |
| CO 3 | Apply PL/SQL Programming for problem solving.   |
| CO 4 | 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 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 2   | 2   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | 2    | 1    | 3    | -    |
| CO2 | 2   | 2   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | 2    | 1    | 3    | -    |
| CO3 | 2   | 2   | 2   | -   | 3   | -   | -   | -   | -   | -    | -    | 2    | 3    | 3    | -    |
| 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

##### CYCLE-1

1) Create a table STUDENT with appropriate data types and perform the following queries.

Roll number, student name, date of birth, branch and year of study.

1. Insert 5 to 10 rows in a table?
2. List all the students of all branches
3. List student names whose name starts with 's'

4. List student names whose name contains 's' as third literal
5. List student names whose contains two 's' anywhere in the name
6. List students whose branch is NULL
7. List students of CSE & ECE who born after 1980
8. List all students in reverse order of their names
9. Delete students of any branch whose name starts with 's'
10. Update the branch of CSE students to ECE
11. Display student name padded with '\*' after the name of all the students

**2) Create the following tables based on the above Schema Diagram with appropriate data types and constraints and perform the following queries.**

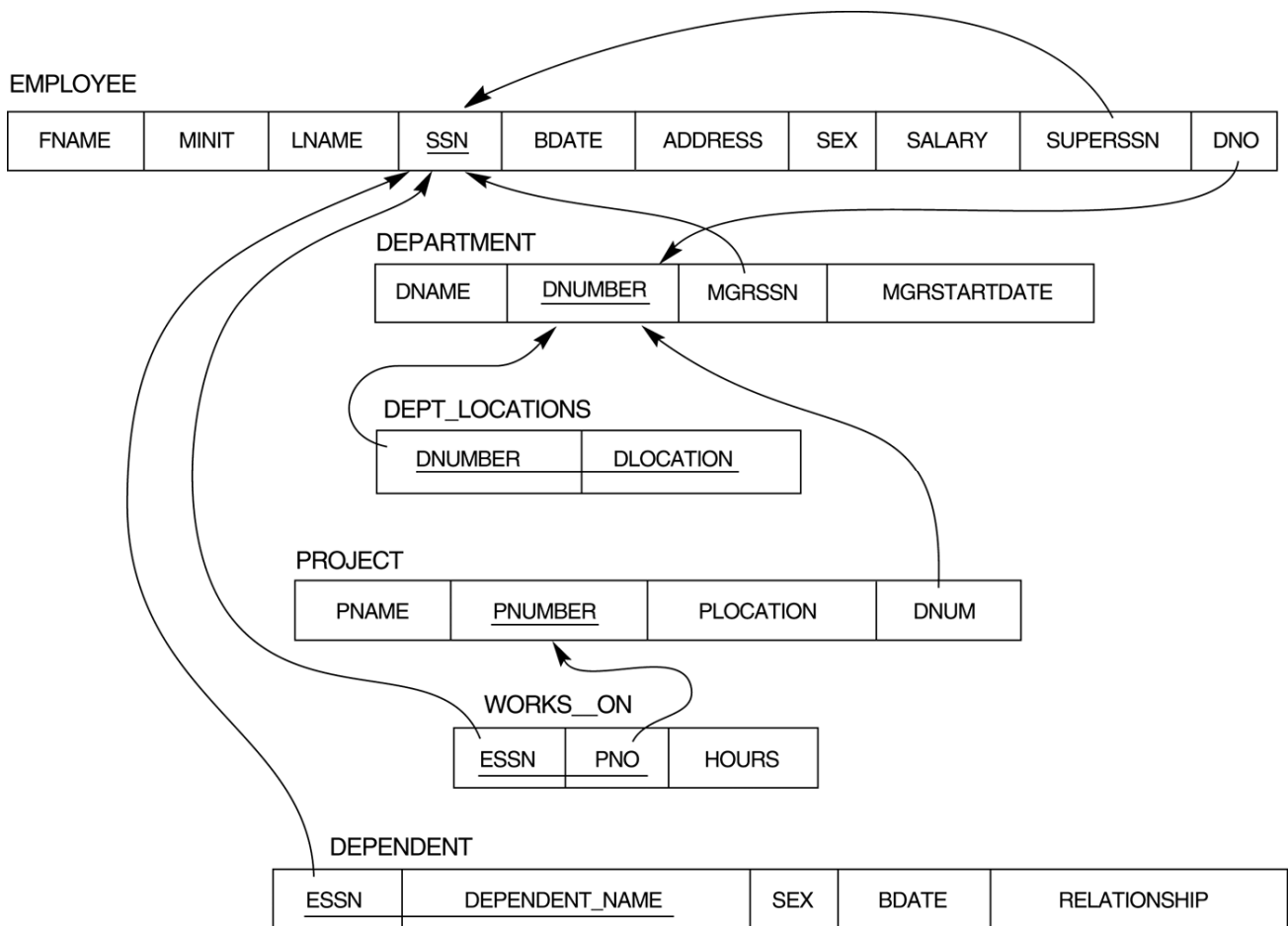
**SAILORS** (Sailid, Salname, Rating, Age)

**RESERVES** (Sailid, boatid, Day)

**BOATS** (Boatid, Boat-name, Color)

1. Insert 5 to 10 rows in all tables?
2. Find the name of sailors who reserved boat number 3.
3. Find the name of sailors who reserved green boat.
4. Find the colors of boats reserved by "Ramesh".
5. Find the names of sailors who have reserved atleast one boat.
6. Find the all sailid of sailors who have a rating of 10 or have reserved boated 104.
7. Find the Sailid's of sailors with age over 20 who have not registered a red boat.
8. Find the names of sailors who have reserved a red or green boat.
9. Find sailors whose rating is better than some sailor called 'Salvador'.
10. Find the names of sailors who are older than the oldest sailor with a rating of 10.

**3) Schema Diagram for the rest of the SQL and PLSQL Programs.**



Create the following tables based on the above Schema Diagram with appropriate data types and constraints.

**EMPLOYEE** (Fname, Mname, Lname, SSN, Bdate, Address, Gender, Salary, SuperSSN, Dno)

**DEPARTMENT**(Dnumber, Dname, MgrSSN, Mgrstartdate)

**DEPENDENT** (ESSN, Dependent\_Name, Gender, Bdate, Relationship)

- 1) Insert 5 to 10 rows into all the tables.
- 2) Display all employee's names along with their department names.
- 3) Display all employee's names along with their dependent details.
- 4) Display name and address of all employees who work for 'ECE' department.
- 5) List the names of all employees with two or more dependents.
- 6) List the names of employee who have no dependents.
- 7) List the names of employees who have at least one dependent.
- 8) List the names of the employees along with names of their supervisors using aliases.
- 9) Display name of the department and name of manager for all the departments.
- 10) Display the name of each employee who has a dependent with the same first name and gender as the employee.
- 11) List the names of managers who have at least one dependent.

- 12) Display the sum of all employees' salaries as well as maximum, minimum and average salary in the entire departments department wise if the department has more than two employees.
- 13) List the departments of each female employee along with her name.
- 14) List all employee names and also the name of the department they manage if they happen to manage a dept.
- 15) Display the name of the employee and his / her supervisor's name.

**4) Create the following tables based on the above Schema Diagram with appropriate data types and constraints in addition to the tables in Experiment 2.**

DEPT\_LOCATIONS (Dnumber, Dlocation)

PROJECT (Pname, Pnumber, Plocation, Dnum)

WORKS\_ON(ESSN, Pno, Hours).

- 1) Insert 5 to 10 rows into all the tables.
- 2) Find the names of the employees who work on all the projects controlled by the department 'ECM'.
- 3) List the project number, name and no. Of employees who work on that project for all the projects.
- 4) List the names of all the projects controlled by the departments department wise.
- 5) Retrieve the names of employees who work on all projects that 'John' works on.
- 6) List the project numbers for projects that involve an employee either as worker or as a manager of the department that controls the project.
- 7) List the names of all employees in one department who work more than 10 hours on one specific project.
- 8) For each project, list the project name and total hours (by all employees) spent on that project.
- 9) Retrieve the names of all employees who work on every project.
- 10) Retrieve the names of all employees who do not work on any project.
- 11) Display the name and total no. of hours worked by an employee who is working on maximum no. of projects among all the employees.
- 12) Display the names of all employees and also no. of hours, project names that they work on if they happen to work on any project(use outer join).
- 13) List the employee name, project name on which they work and the department they belong to for all the employees using alias names for the resulting columns.
- 14) Retrieve the names of all employees who work on more than one project department wise.
- 15) List all the departments that contain at least one occurrence of 'C' in their names.

**5) Create a view that has project name, controlling department name, number of employees and total hours worked on the project for each project with more than one employee working on it.**

- 1) List the projects that are controlled by one department from this view.

- 2) List the managers of the controlling departments for all the projects.
- 3) Demonstrate one update operation on this view.
- 4) List the Location of the controlling departments for all the projects.
- 5) Retrieve the data from the view.

### PL/SQL LAB CYCLE

#### CYCLE-II

6. Write a PL/SQL Block to find whether the number is Armstrong or not.
7. Write a PL/SQL program for generating Fibonacci series
8. Write an anonymous PL/SQL block that fetches and displays the data from employee table to the console.
9. Write a program that updates salaries of all employees with 10 % hike (use cursors).
10. Write a program to fetch salary and employee name from employee table for a given user input. When no data found raise an exception that prints the message “no data found”.
11. Write a program to find the number of records of any given table using % ROWCOUNT.
12. Write a cursor to display the list of employees and total salary department wise.
13. Write a database trigger on employee table so that the trigger fires when all the DML statements are executed (print appropriate message).
14. Write a trigger in such a way that it should not allow insert or update or delete on Wednesday and Thursday and display the proper message.
15. Write a procedure to display the name and salary of employee when user inputs SSN using IN/OUT parameters.
16. Write a function to check the validity of the given employee number from the employee table (print the appropriate message using PL/SQL block).
17. Visit TPC and submit report.

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

| S.No. | Topics to be covered          | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | HOD Sign Weekly |
|-------|-------------------------------|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|-----------------|
| 1     | Introduction to DBMS          | 2                       | 25/11/19                     |                           | TLM4                      | CO1                  |                 |
| 2     | <b>CYCLE-I : EXP-1</b>        | 2                       | 02/12/19                     |                           | TLM4                      | CO1,CO4              |                 |
| 3     | EXP-2                         | 2                       | 09/12/19                     |                           | TLM4                      | CO1,CO4              |                 |
| 4     | EXP-3                         | 2                       | 16/12/19                     |                           | TLM4                      | CO1,CO4              |                 |
| 5     | EXP-4                         | 2                       | 23/12/19                     |                           | TLM4                      | CO1,CO4              |                 |
| 6     | EXP-5                         | 2                       | 30/12/19                     |                           | TLM4                      | CO1,CO4              |                 |
| 7     | <b>CYCLE-II : EXP-6, EXP7</b> | 2                       | 06/01/20                     |                           | TLM4                      | CO1,CO4              |                 |

|    |                             |   |          |  |      |         |
|----|-----------------------------|---|----------|--|------|---------|
| 8  | EXP-8, EXP9                 | 2 | 27/01/20 |  | TLM4 | CO2,CO4 |
| 9  | EXP-10, EXP11               | 2 | 03/02/19 |  | TLM4 | CO2,CO4 |
| 10 | EXP-12                      | 2 | 10/02/19 |  | TLM4 | CO2,CO4 |
| 11 | EXP-13                      | 2 | 17/02/19 |  | TLM4 | CO2,CO4 |
| 12 | EXP-14                      | 2 | 24/02/19 |  | TLM4 | CO3,CO4 |
| 13 | EXP-15                      | 2 | 02/03/20 |  | TLM4 | CO3,CO4 |
| 14 | EXP-16, EXP17               | 2 | 09/03/20 |  | TLM4 | CO3,CO4 |
| 15 | Revision on all Experiments | 2 | 16/03/20 |  | TLM4 | CO3,CO4 |
| 16 | Internal Exam               |   | 23/03/20 |  |      |         |

| 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

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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. |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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.  |
| <b>PO 11</b> | <b>Project management and finance:</b> 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. |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):**

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b> To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.     |
| <b>PSO 2</b> | <b>Data Engineering:</b> To inculcate an ability to Analyse, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | <b>Software Engineering:</b> Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |

Course Instructor  
G.V.Rajya  
Lakshmi

Course Coordinator  
G.V.Rajya Lakshmi

Module Coordinator  
Dr.D.Veeraiah

HOD  
Dr.D.Veeraiah



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : S. Govindu  
Course Name & Code : Database Management Systems-17CI09  
L-T-P Structure : 2-2-0 Credits : 3  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- B A.Y : 2019-20

**PRE-REQUISITE:**Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries) & File Concepts.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**This course enables the students to know about Basic concepts of DBMS, Database Languages, Database Design, Normalization Process, Transaction Processing, and Indexing.

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

|     |  |
|-----|--|
| CO1 | Outline the components of DBMS & design database using ER model  |
| CO2 | Construct database using SQL and extract data from database using Relational algebra & SQL queries.          |
| CO3 | Apply the normalization process for effective database design  |
| CO4 | Analyze components of transaction processing, Concurrency control mechanisms and recovery strategies of DBMS |
| CO5 | Evaluate different File organization & Indexing Techniques   |

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

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| CO1 | 1    | 1    | 2    | -    | -    | -    | -    | -    | -    | -     | -     | -     | -     | 3     | -     |
| CO2 | 3    | 3    | -    | -    | 1    | -    | -    | -    | -    | -     | -     | -     | 2     | 3     | -     |
| CO3 | 3    | 2    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 2     | 3     | -     |
| CO4 | 2    | 1    | 2    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 1     | 3     | -     |
| CO5 | 2    | 1    | 2    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 1     | 3     | -     |

**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** Henry F. Korth, Abraham Silberschatz, S.Sudarshan, “Database System Concepts”, McGraw Hill, 6th edition, 2009.
- T2** Ramez Elmasri, Shamkanth B.Navathe, “Fundamentals of Database Systems”, Addison Wesley, 6th edition, 2010.

**REFERENCE BOOKS:**

- R1** Raghu Ramakrishnan, Johannes Gehrke, “Database Management System”, McGraw Hill, 3rd edition, 2000.
- R2** Date C J, “An Introduction to Database System”, Pearson Education, 8th edition, 2003
- R3** Sharad Maheshwari, Ruchin Jain, “DBMS: Complete Practical Approach”, Firewall Media, New Delhi, 2005

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN):****COURSE DELIVERY PLAN (LESSON PLAN): Section-A****UNIT –I: Introduction & Data modeling using the Entity Relationship Model**

| S.No | Topics to be covered                                       | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|------|--|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 1.   | Introduction, An overview of database management system    | 1                       | 25-11-2019                   |                           | <b>TLM1</b>               | CO1                  | T1,T2,R1           |                 |
| 2.   | Database system Vs file system                             | 1                       | 26-11-2019                   |                           | <b>TLM1</b>               | CO1                  | T1,T2,R1           |                 |
| 3.   | Database system concepts and architecture                  | 1                       | 28-11-2019                   |                           | <b>TLM1</b>               | CO1                  | T1,T2,R1           |                 |
| 4.   | Data models schema and instances                           | 1                       | 30-11-2019                   |                           | <b>TLM1</b>               | CO1                  | T1,T2,R1           |                 |
| 5.   | Data independence and data base language and interfaces    | 1                       | 02-12-2019                   |                           | <b>TLM1</b>               | CO1                  | T1,T2,R1           |                 |
| 6.   | Data definitions language, DML, Overall Database Structure | 1                       | 03-12-2019                   |                           | <b>TLM1</b>               | CO1                  | T1,T2,R1           |                 |
| 7.   | <b>Tutorial – I</b>  | 1                       | 05-12-2019                   |                           | <b>TLM3</b>               | CO1                  |                    |                 |
| 8.   | ER model   | 1                       | 07-12-2019                   |                           | <b>TLM1/</b>              | CO1                  | T1,T2,R1           |                 |

|  |  |    |            |  |                       |     |          |  |
|--|--|----|------------|--|-----------------------|-----|----------|--|
|  | concepts-notation for ER diagram   |    |            |  | <b>TLM2</b>           |     |          |  |
| 9.   | Mapping constraints, keys  | 1  | 09-12-2019 |  | <b>TLM1</b>           | CO1 | T1,T2,R1 |  |
| 10.  | Concepts of Super Key, candidate key, primary key, Generalization, aggregation           | 1  | 10-12-2019 |  | <b>TLM1</b>           | CO1 | T1,T2,R1 |  |
| 11.  | Reduction of an ER diagrams to tables, Extended ER model, Relationships of higher degree | 1  | 12-12-2019 |  | <b>TLM1/<br/>TLM2</b> | CO1 | T1,T2,R1 |  |
| 12.  | <b>Tutorial – II</b>   | 1  | 16-12-219  |  | <b>TLM3</b>           | CO1 |          |  |
| No. of classes required to complete UNIT-I |  | 12 |            |  | No. of classes taken: |     |          |  |

### **UNIT –II: Relational data Model and Language & Introduction to SQL**

| S.No. | Topics to be covered   | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|-------|--|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 13.   | Relational data model concepts                                 | 1                       | 17-12-2019                   |                           | <b>TLM1</b>               | CO2                  | T1,T2,R1           |                 |
| 14.   | Integrity constraints: entity integrity, referential integrity | 1                       | 19-12-2019                   |                           | <b>TLM1</b>               | CO2                  | T1,T2,R1           |                 |
| 15.   | Keys constraints, Domain constraints                           | 1                       | 23-12-2019                   |                           | <b>TLM1</b>               | CO2                  | T1,T2,R1           |                 |
| 16.   | Relational algebra   | 1                       | 24-12-2019                   |                           | <b>TLM1</b>               | CO2                  | T1,T2,R1           |                 |
| 17.   | Tutorial – III   | 1                       | 26-12-2019                   |                           | <b>TLM3</b>               | CO2                  |                    |                 |
| 18.   | Characteristics of SQL, Advantage of SQL                       | 1                       | 28-12-2019                   |                           | <b>TLM1</b>               | CO2                  | T1,T2,R1           |                 |
| 19.   | SQL data types and literals, Types of SQL commands             | 1                       | 30-12-2019                   |                           | <b>TLM1</b>               | CO2                  | T1,T2,R1           |                 |
| 20.   | SQL operators and their procedure                              | 1                       | 31-12-2019                   |                           | <b>TLM1</b>               | CO2                  | T1,T2,R1           |                 |
| 21.   | Tables, views and indexes,                                     | 1                       | 02-01-2020                   |                           | <b>TLM1</b>               | CO2                  | T1,T2,R1           |                 |
| 22.   | Queries and sub  | 1                       | 04-01-2020                   |                           | <b>TLM1/</b>              | CO2                  | T1,T2,R1           |                 |

|   |   |    |            |  |                       |     |          |  |
|---|---|----|------------|--|-----------------------|-----|----------|--|
|   | queries, Aggregate functions                |    |            |  | <b>TLM2</b>           |     |          |  |
| 23.   | Insert, update and delete operations        | 1  | 06-01-2020 |  | <b>TLM1</b>           | CO2 | T1,T2,R1 |  |
| 24.   | Unions, Intersection, Minus, Cursors in SQL | 1  | 07-01-2020 |  | <b>TLM1</b>           | CO2 | T1,T2,R1 |  |
| 25.   | Tutorial – IV                               | 1  | 09-01-2020 |  | <b>TLM3</b>           | CO2 |          |  |
| No. of classes required to complete <b>UNIT-2</b> |   | 13 |            |  | No. of classes taken: |     |          |  |

### **UNIT –III: Normalization**

| S.No.   | Topics to be covered                      | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 26.   | Functional Dependencies                   | 1                       | 27-01-2020                   |                           | <b>TLM1</b>               | CO3                  | T1,T2,R1           |                 |
| 27.   | Normal Forms: First, Second               | 1                       | 28-01-2020                   |                           | <b>TLM1</b>               | CO3                  | T1,T2,R1           |                 |
| 28.   | Third Normal Forms                        | 1                       | 30-01-2020                   |                           | <b>TLM1/<br/>TLM2</b>     | CO3                  | T1,T2,R1           |                 |
| 29.   | BCNF, Inclusion Dependences               | 1                       | 01-02-2020                   |                           | <b>TLM1</b>               | CO3                  | T1,T2,R1           |                 |
| 30.   | Loss Less Join Decompositions             | 1                       | 03-02-2020                   |                           | <b>TLM1</b>               | CO3                  | T1,T2,R1           |                 |
| 31.   | Tutorial – V                              | 1                       | 04-02-2020                   |                           | <b>TLM3</b>               |                      |                    |                 |
| 32.   | Normalization Using FD,MVD                | 1                       | 06-02-2020                   |                           | <b>TLM1</b>               | CO3                  | T1,T2,R1           |                 |
| 33.   | Normalization Using JD                    | 1                       | 10-02-2020                   |                           | <b>TLM1</b>               | CO3                  | T1,T2,R1           |                 |
| 34.   | Alternative Approaches To Database Design | 1                       | 11-02-2020                   |                           | <b>TLM1</b>               | CO3                  | T1,T2,R1           |                 |
| 35.   | Tutorial – VI                             | 1                       | 13-02-2020                   |                           | <b>TLM3</b>               | CO3                  |                    |                 |
| No. of classes required to complete <b>UNIT-3</b> |   | 10                      |                              |                           | No. of classes taken:     |                      |                    |                 |

**UNIT –IV: Transaction Processing Concepts &Concurrency Control techniques**

| S.No.   | Topics to be covered                             | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|--|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 36.   | Transaction System                               | 1                       | 15-02-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 37.   | Testing Of Serializability                       | 1                       | 17-02-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 38.   | Serializability Of Schedules                     | 1                       | 18-02-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 39.   | Conflict & View Serializable Schedule            | 1                       | 20-02-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 40.   | Recoverability, Log Based Recovery, Checkpoints, | 1                       | 22-02-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 41.   | ARIES Algorithm, Deadlock Handling               | 1                       | 24-02-2020                   |                           | <b>TLM1/<br/>TLM2</b>     | CO4                  | T1,T2,R1           |                 |
| 42.   | Tutorial –VII                                    | 1                       | 25-02-2020                   |                           | <b>TLM3</b>               |                      |                    |                 |
| 43.   | Concurrency Control                              | 1                       | 27-02-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 44.   | Techniques For Concurrency Control               | 1                       | 29-02-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 45.   | Time Stamping Protocols For Concurrency Control  | 1                       | 02-03-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 46.   | Locking, Validation Based Protocol               | 1                       | 03-03-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 47.   | Multiple Granularity                             | 1                       | 05-03-2020                   |                           | <b>TLM1</b>               | CO4                  | T1,T2,R1           |                 |
| 48.   | Recovery With Concurrent Transactions            | 1                       | 07-03-2020                   |                           | <b>TLM1/<br/>TLM2</b>     | CO4                  | T1,T2,R1           |                 |
| 49.   | Tutorial-VIII                                    |                         | 09-03-2020                   |                           | <b>TLM3</b>               | CO4                  |                    |                 |
| No. of classes required to complete <b>UNIT-4</b> |  | 14                      |                              |                           | No. of classes taken:     |                      |                    |                 |

### UNIT-V: Storage and Indexing

| S.No.                                      | Topics to be covered                       | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|--|--|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 50.  | RAID Levels                                | 1                       | 12-03-2020                   |                           | <b>TLM1</b>               | CO5                  | T1,T2,R1           |                 |
| 51.  | Page Formats                               | 1                       | 16-03-2020                   |                           | <b>TLM1</b>               | CO5                  | T1,T2,R1           |                 |
| 52.  | Record Formats                             | 1                       | 17-03-2020                   |                           | <b>TLM1</b>               | CO5                  | T1,T2,R1           |                 |
| 53.  | File Types And Organization, Tutorial – IX | 1                       | 19-03-2020                   |                           | <b>TLM1/<br/>TLM3</b>     | CO5                  | T1,T2,R1           |                 |
| 54.  | ISAM                                       | 1                       | 21-03-2020                   |                           | <b>TLM1/<br/>TLM2</b>     | CO5                  | T1,T2,R1           |                 |
| 55.  | B-Tree                                     | 1                       | 23-03-2020                   |                           | <b>TLM1</b>               | CO5                  | T1,T2,R1           |                 |
| 56.  | B+-Tree                                    | 1                       | 24-03-2020                   |                           | <b>TLM1/<br/>TLM2</b>     | CO5                  | T1,T2,R1           |                 |
| 57.  | Tutorial – X                               | 1                       | 26-03-2020                   |                           | <b>TLM3</b>               | CO5                  |                    |                 |
| No. of classes required to complete UNIT-5 |  | 08                      |                              |                           | No. of classes taken:     |                      |                    |                 |

### Contents beyond the Syllabus

| S.No. | Topics to be covered | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|-------|----------------------|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 58.   | CODD RULES           | 1                       | 28-03-2020                   |                           | <b>TLM1</b>               | CO1-CO5              | T1,T2,R1           |                 |

### Teaching Learning Methods

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

### ACADEMIC CALENDAR:

| Description                | From       | To         | Weeks |
|----------------------------|------------|------------|-------|
| I Phase of Instructions-1  | 25/11/2019 | 11/01/2020 | 7W    |
| Pongal Holidays            | 13-01-2020 | 18-01-2020 | 1W    |
| I Mid Examinations         | 20/01/2020 | 25/01/2020 | 1W    |
| II Phase of Instructions   | 27/01/2020 | 28/03/2020 | 9W    |
| II Mid Examinations        | 30/03/2020 | 04/04/2020 | 1W    |
| Preparation and Practicals | 06/04/2020 | 14/04/2020 | 2W    |
| Semester End Examinations  | 15/04/2020 | 30/04/2020 | 2W    |

## PART-C

### EVALUATION PROCESS (R17 Regulations):

| Evaluation Task  | Marks |
|--|-------|
| Assignment-I (Unit-I)                                      | A1=5  |
| Assignment-II (Unit-II)                                    | A2=5  |
| I-Mid Examination (Units-I & II)                           | M1=20 |
| 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=20 |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10 |
| Attendance   | B=5   |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5   |
| Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)             | M=20  |
| Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)            | B=10  |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40    |
| Semester End Examination (SEE)                             | 60    |
| Total Marks = CIE + SEE                                    | 100   |

## PART-D

### PROGRAMME OUTCOMES (POs):

|             |  |
|-------------|--|
| <b>PO 1</b> | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b> | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b> | <b>Design/development of solutions:</b> 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. |
| <b>PO 4</b> | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b> | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b> | <b>The engineer and society:</b> 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  |
| <b>PO 7</b> | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b> | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and   |



|              |  |
|--------------|--|
|              | norms of the engineering practice.   |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.   |

## PROGRAM SPECIFIC OUTCOMES

|              |  |
|--------------|--|
| <b>PSO 1</b> | Programming Paradigms: To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.     |
| <b>PSO 2</b> | Data Engineering: To inculcate an ability to Analyse, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |

|                   |                    |                    |     |
|-------------------|--------------------|--------------------|-----|
|                   |                    |                    |     |
| Course Instructor | Course Coordinator | Module Coordinator | HOD |



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

### COURSE HANDOUT

Name of Course Instructor : S. Govindu  
Course Name & Code : Database Management Systems Lab-17CI64  
L-T-P Structure : 0-0-2 Credits : 1  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- B A.Y : 2019-20

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**The major objective of this lab is to provide a strong formal foundations in database concepts, technology and practice to the participants to groom them into well-informed database application developers.

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

|     |   |
|-----|---|
| CO1 | Design & implement a database schema for a given problem-domain.                                  |
| CO2 | Create database using SQL and implement various integrity constraints.                            |
| CO3 | Apply PL/SQL Programming for problem solving.   |
| 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 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 2   | 2   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | 2    | 1    | 3    | -    |
| CO2 | 2   | 2   | -   | -   | 3   | -   | -   | -   | -   | -    | -    | 2    | 1    | 3    | -    |
| CO3 | 2   | 2   | 2   | -   | 3   | -   | -   | -   | -   | -    | -    | 2    | 3    | 3    | -    |
| 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

### CYCLE-1

1) Create a table **STUDENT** with appropriate data types and perform the following queries.

**Roll number, student name, date of birth, branch and year of study.**

1. Insert 5 to 10 rows in a table?
2. List all the students of all branches
3. List student names whose name starts with 's'
4. List student names whose name contains 's' as third literal
5. List student names whose contains two 's' anywhere in the name
6. List students whose branch is NULL
7. List students of CSE & ECE who born after 1980
8. List all students in reverse order of their names
9. Delete students of any branch whose name starts with 's'
10. Update the branch of CSE students to ECE
11. Display student name padded with '\*' after the name of all the students

2) Create the following tables based on the above Schema Diagram with appropriate data types and constraints and perform the following queries.

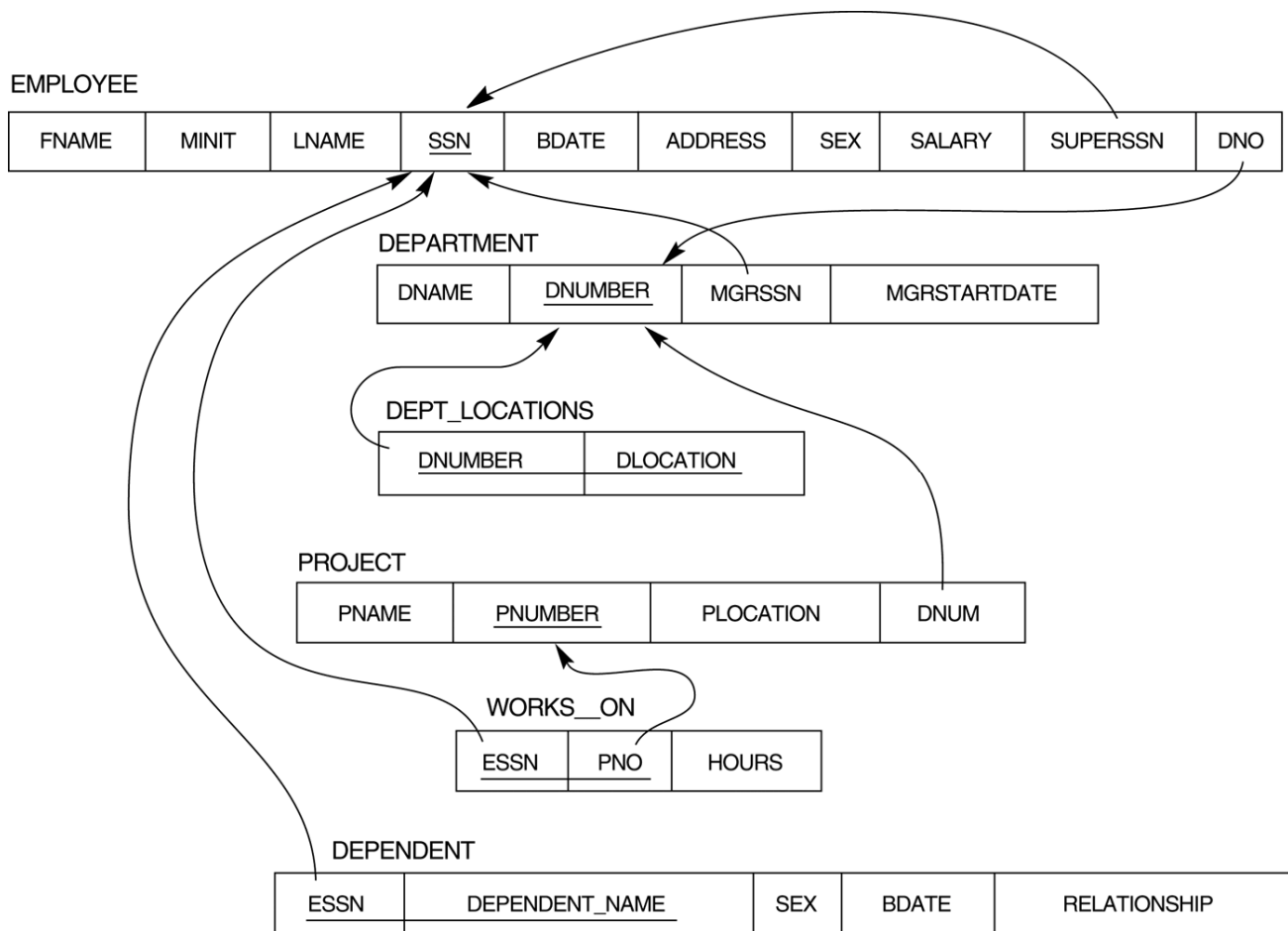
**SAILORS** (Sailid, Salname, Rating, Age)

**RESERVES** (Sailid, boatid, Day)

**BOATS** (Boatid, Boat-name, Color)

1. Insert 5 to 10 rows in all tables?
2. Find the name of sailors who reserved boat number 3.
3. Find the name of sailors who reserved green boat.
4. Find the colors of boats reserved by "Ramesh".
5. Find the names of sailors who have reserved atleast one boat.
6. Find the all sailid of sailors who have a rating of 10 or have reserved boated 104.
7. Find the Sailid's of sailors with age over 20 who have not registered a red boat.
8. Find the names of sailors who have reserved a red or green boat.
9. Find sailors whose rating is better than some sailor called 'Salvador'.
10. Find the names of sailors who are older than the oldest sailor with a rating of 10.

### 3) Schema Diagram for the rest of the SQL and PLSQL Programs.



Create the following tables based on the above Schema Diagram with appropriate data types and constraints.

**EMPLOYEE** (Fname, Mname, Lname, SSN, Bdate, Address, Gender, Salary, SuperSSN, Dno)

**DEPARTMENT**(Dnumber, Dname, MgrSSN, Mgrstartdate)

**DEPENDENT** (ESSN, Dependent\_Name, Gender, Bdate, Relationship)

- 1) Insert 5 to 10 rows into all the tables.
- 2) Display all employee's names along with their department names.
- 3) Display all employee's names along with their dependent details.
- 4) Display name and address of all employees who work for 'ECE' department.
- 5) List the names of all employees with two or more dependents.
- 6) List the names of employee who have no dependents.
- 7) List the names of employees who have at least one dependent.
- 8) List the names of the employees along with names of their supervisors using aliases.
- 9) Display name of the department and name of manager for all the departments.
- 10) Display the name of each employee who has a dependent with the same first name

and gender as the employee.

- 11) List the names of managers who have at least one dependent.
- 12) Display the sum of all employees' salaries as well as maximum, minimum and average salary in the entire departments department wise if the department has more than two employees.
- 13) List the departments of each female employee along with her name.
- 14) List all employee names and also the name of the department they manage if they happen to manage a dept.
- 15) Display the name of the employee and his / her supervisor's name.

**4) Create the following tables based on the above Schema Diagram with appropriate data types and constraints in addition to the tables in Experiment 2.**

DEPT\_LOCATIONS (Dnumber, Dlocation)

PROJECT (Pname, Pnumber, Plocation, Dnum)

WORKS\_ON(ESSN, Pno, Hours).

- 1) Insert 5 to 10 rows into all the tables.
- 2) Find the names of the employees who work on all the projects controlled by the department 'ECM'.
- 3) List the project number, name and no. Of employees who work on that project for all the projects.
- 4) List the names of all the projects controlled by the departments department wise.
- 5) Retrieve the names of employees who work on all projects that 'John' works on.
- 6) List the project numbers for projects that involve an employee either as worker or as a manager of the department that controls the project.
- 7) List the names of all employees in one department who work more than 10 hours on one specific project.
- 8) For each project, list the project name and total hours (by all employees) spent on that project.
- 9) Retrieve the names of all employees who work on every project.
- 10) Retrieve the names of all employees who do not work on any project.
- 11) Display the name and total no. of hours worked by an employee who is working on maximum no. of projects among all the employees.
- 12) Display the names of all employees and also no. of hours, project names that they work on if they happen to work on any project(use outer join).
- 13) List the employee name, project name on which they work and the department they belong to for all the employees using alias names for the resulting columns.
- 14) Retrieve the names of all employees who work on more than one project department wise.
- 15) List all the departments that contain at least one occurrence of 'C' in their names.

**5) Create a view that has project name, controlling department name, number of employees and total hours worked on the project for each project with more than one employee working on it.**

- 1) List the projects that are controlled by one department from this view.

- 2) List the managers of the controlling departments for all the projects.
- 3) Demonstrate one update operation on this view.
- 4) List the Location of the controlling departments for all the projects.
- 5) Retrieve the data from the view.

## **PL/SQL LAB CYCLE**

### **CYCLE-II**

6. Write a PL/SQL Block to find whether the number is Armstrong or not.
7. Write a PL/SQL program for generating Fibonacci series
8. Write an anonymous PL/SQL block that fetches and displays the data from employee table to the console.
9. Write a program that updates salaries of all employees with 10 % hike (use cursors).
10. Write a program to fetch salary and employee name from employee table for a given user input. When no data found raise an exception that prints the message “no data found”.
11. Write a program to find the number of records of any given table using % ROWCOUNT.
12. Write a cursor to display the list of employees and total salary department wise.
13. Write a database trigger on employee table so that the trigger fires when all the DML statements are executed (print appropriate message).
14. Write a trigger in such a way that it should not allow insert or update or delete on Wednesday and Thursday and display the proper message.
15. Write a procedure to display the name and salary of employee when user inputs SSN using IN/OUT parameters.
16. Write a function to check the validity of the given employee number from the employee table (print the appropriate message using PL/SQL block).
17. Visit TPC and submit report.

### **COURSE DELIVERY PLAN (LESSON PLAN): Section-A**

| S.No. | Topics to be covered          | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | HOD Sign Weekly |
|-------|-------------------------------|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|-----------------|
| 1     | Introduction to DBMS          | 2                       | 27-11-2019                   |                           | TLM8                      | CO1                  |                 |
| 2     | <b>CYCLE-I : EXP-1</b>        | 2                       | 04-12-2019                   |                           | TLM8                      | CO1,CO4              |                 |
| 3     | EXP-2                         | 2                       | 18-12-2019                   |                           | TLM8                      | CO1,CO4              |                 |
| 4     | EXP-3                         | 2                       | 01-01-2020                   |                           | TLM8                      | CO1,CO4              |                 |
| 5     | EXP-4                         | 2                       | 08-01-2020                   |                           | TLM8                      | CO1,CO4              |                 |
| 6     | EXP-5                         | 2                       | 22-01-2020                   |                           | TLM8                      | CO1,CO4              |                 |
| 7     | <b>CYCLE-II : EXP-6, EXP7</b> | 2                       | 29-01-2020                   |                           | TLM8                      | CO1,CO4              |                 |
| 8     | EXP-8, EXP9                   | 2                       | 05-02-2020                   |                           | TLM8                      | CO2,CO4              |                 |

|    |               |   |            |  |      |         |
|----|---------------|---|------------|--|------|---------|
| 9  | EXP-10, EXP11 | 2 | 12-02-2020 |  | TLM8 | CO2,CO4 |
| 10 | EXP-12        | 2 | 19-02-2020 |  | TLM8 | CO2,CO4 |
| 11 | EXP-13        | 2 | 26-02-2020 |  | TLM8 | CO2,CO4 |
| 12 | EXP-14        | 2 | 04-03-2020 |  | TLM8 | CO3,CO4 |
| 13 | EXP-15        | 2 | 11-03-2020 |  | TLM8 | CO3,CO4 |
| 14 | EXP-16, EXP17 | 2 | 18-03-2020 |  | TLM8 | CO3,CO4 |
| 15 | Internal Exam |   |            |  |      |         |

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

## PROGRAM OUTCOMES

### Engineering Graduates will be able to:

- Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 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.
- 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.
- 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.
- 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.
- 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.
- Environment and sustainability:** Understand the impact of the professional engineering solutions in

societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the **engineering and management principles and apply these to one's own work, as a member and leader** in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### PROGRAM SPECIFIC OUTCOMES

1. **Programming Paradigms:** To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.
2. **Data Engineering:** To inculcate an ability to Analyse, Design and implement data driven applications into the students.
3. **Software Engineering:** Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

|                   |                    |                    |     |
|-------------------|--------------------|--------------------|-----|
|                   |                    |                    |     |
| Course Instructor | Course Coordinator | Module Coordinator | HOD |







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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## COURSE HANDOUT

### PART-A

Name of Course Instructor : G BALU NARASIMHARAO  
Course Name & Code : Linux Programming & 17CS01  
L-T-P Structure : 3-0-0 Credits : 3  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- B A.Y : 2019-20

**PRE-REQUISITE:** Knowledge in Operating Systems

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** Introduce the student to Linux kernel programming techniques. Review basic concepts covered in the core Operating Systems course prerequisite as they are realized in the Linux platform. Discuss the Process, Inter-Process Communication Techniques and Network Implementation in Linux.

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

|      |  |
|------|--|
| CO 1 | Explore LINUX Ecosystem.   |
| CO 2 | Implement Shell scripting in LINUX Kernel.   |
| CO 3 | Design AWK scripts for text processing and Apply Regular Expressions for Pattern Matching. |
| CO 4 | Design Scripts for Process Creation & Network Management.                                  |
| CO5  | Analyze multi-processing in Linux kernel.  |

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

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

**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** Sumitabha Das., “Your Unix The Ultimate Guide”, TMH Publications, 2001.
- T2** M.G. Venkatesh Murthy, “Introduction to UNIX & SHELL programming”, Pearson Education, First Edition, New Delhi, 2009.

**REFERENCE BOOKS:**

- R1** B.A. Forouzan & R.F. Giberg, “Unix and shell Programming”, Thomson, First Edition, New Delhi, 2003.
- R2** E. Foster – Johnson & others, “Beginning shell scripting”, John Wiley & sons, First Edition, New Delhi, 2008.
- R3** Sumitabha Das, “Unix concepts and applications”, TMH Publications, 4<sup>th</sup> Edition,.
- R4** Gaham Glass & K. Ables, Unix for programmers and users, pearson education, 3<sup>rd</sup> edition,.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I: Introduction to Linux**

| 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.   | Operating systems Concepts         | 1                       | 25-11-2019                   |                           |                           |                 |
| 2.   | Introduction to LINUX              | 1                       | 26-11-2019                   |                           |                           |                 |
| 3.   | Features of Linux kernel and shell | 1                       | 28-11-2019                   |                           |                           |                 |
| 4.   | Linux KERNEL, Terminal, Shell      | 1                       | 02-12-2019                   |                           |                           |                 |
| 5.   | Linux Commands                     | 1                       | 03-12-2019                   |                           |                           |                 |
| 6.   | Linux Commands                     | 1                       | 05-12-2019                   |                           |                           |                 |
| 7.   | Linux Commands                     | 2                       | 09-12-2019<br>10-12-2019     |                           |                           |                 |
| No. of classes required to complete UNIT-I:8 |                                    |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-II: Introduction to Shell and Shell programming**

| 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 Shell                      | 1                       | 12-12-2019                             |                           | TLM1<br>TLM2              |                 |
| 2.  | Shell commands                             | 2                       | 16-12-2019<br>17-12-2019               |                           | TLM1<br>TLM2              |                 |
| 3.  | Shell programming (VI editor)              | 3                       | 19-12-2019<br>23-12-2019<br>24-12-2019 |                           | TLM1<br>TLM2              |                 |
| 4.  | Shell Meta characters, Variables, Commands | 3                       | 26-12-2019<br>30-12-2019<br>31-12-2019 |                           | TLM1<br>TLM2              |                 |
| 5.  | Control structures, shell script examples  | 3                       | 2-1-2020<br>6-1-2020<br>7-1-2020       |                           | TLM1<br>TLM2              |                 |
| No. of classes required to complete UNIT-II:12          |  |                         |  | No. of classes taken:     |                           |                 |
| <b>I MID EXAMINATIONS FROM 20-10-2020 TO 25-10-2020</b> |  |                         |  |                           |                           |                 |

**UNIT-III: Filters, regular expressions and Programming with AWK**

| 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 Filters and commands: pr, cmp, comm, ulink, diff, head, tail      | 1                       | 09-01-2020<br>27-01-2020     |                           | TLM1<br>TLM2              |                 |
| 2.  | Introduction to Filters and commands: find, cut, paste, sort, uniq, tr, w, finger | 1                       | 28-01-2020                   |                           | TLM1<br>TLM2              |                 |
| 3.  | Regular expression: grep, egrep, fgrep, sed                                       | 2                       | 30-01-2020<br>03-02-2020     |                           | TLM1<br>TLM2              |                 |
| 4.  | Line addressing, context addressing   | 2                       | 04-02-2020<br>06-02-2020     |                           | TLM1<br>TLM2              |                 |
| 5.  | Text substitution   | 1                       | 10-02-2020                   |                           | TLM1<br>TLM2              |                 |
| 6.  | Programming with AWK:<br>Awk statements, variables and expressions                | 2                       | 11-02-2020<br>13-02-2020     |                           | TLM1<br>TLM2              |                 |
| 7.  | Comparison and logical operators, Begin and end sections                          | 1                       | 17-02-2020                   |                           | TLM1<br>TLM2              |                 |
| 8.  | Decision and looping statements   | 1                       | 18-02-2020<br>20-02-2020     |                           | TLM1<br>TLM2              |                 |
| No. of classes required to complete UNIT-III:11 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-IV : Linux internals and networking**

| 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.  | Linux process concept                                | 1                       | 24-02-2020                   |                           | TLM1<br>TLM2              |                 |
| 2.  | Process creation mechanism, process attributes       | 1                       | 25-02-2020                   |                           | TLM1<br>TLM2              |                 |
| 3.  | Linux Internal: Kernal structure, system calls       | 1                       | 27-02-2020                   |                           | TLM1<br>TLM2              |                 |
| 4.  | Signals, Memory Management                           | 1                       | 02-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 5.  | Network Implementation: TCP-Sockets, connect, Listen | 1                       | 03-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 6.  | Read, write, accept, fork                            | 1                       | 05-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 7.  | UDP-sockets, sendto, recvfrom functions              | 2                       | 09-03-2020<br>10-03-2020     |                           | TLM1<br>TLM2              |                 |
| No. of classes required to complete UNIT-IV:8 |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-V:Multi-Processing**

| 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.  | Intel multi processor specification   | 1                       | 12-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 2.  | Problems with multi-processor systems | 2                       | 16-03-2020<br>17-03-2020     |                           | TLM1<br>TLM2              |                 |
| 3.  | Changes to the kernel                 | 2                       | 19-03-2020<br>23-03-2020     |                           | TLM1<br>TLM2              |                 |
| 4.  | compiling LINUX SMP                   | 2                       | 24-03-2020<br>26-03-2020     |                           | TLM1<br>TLM2              |                 |
| No. of classes required to complete UNIT-V:7      |                                       |                         |                              | No. of classes taken:     |                           |                 |
| <b>II MID EXAMINATIONS 30-3-2020 TO 4-04-2020</b> |                                       |                         |                              |                           |                           |                 |

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

**PART-C****EVALUATION PROCESS (R17 Regulations):**

| Evaluation Task  | Marks |
|--|-------|
| Assignment-I (Unit-I)                                      | A1=5  |
| Assignment-II (Unit-II)                                    | A2=5  |
| I-Mid Examination (Units-I & II)                           | M1=20 |
| 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=20 |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10 |
| Attendance   | B=5   |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5   |
| Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)             | M=20  |
| Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)            | B=10  |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40    |
| Semester End Examination (SEE)                             | 60    |
| Total Marks = CIE + SEE                                    | 100   |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |  |
|--------------|--|
| <b>PSO 1</b> | Programming Paradigms: To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms. 2. Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students. 3. Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |
| <b>PSO 2</b> | Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.   |

Course Instructor  
me)

Course Coordinator  
(Name)

Module Coordinator  
(Name)

HOD  
(Name)



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : K.SUNDEEP SARADHI  
Course Name & Code : OOPs through JAVA PROGRAMMING LAB ( 17CI65 )  
L-T-P Structure : 2-0-0 Credits : 2  
Program/Sem/Sec : B.Tech., CSE, IV-Sem., Section – B A.Y : 2019 - 2020

#### PRE-REQUISITE: C PROGRAMMING

#### COURSE OBJECTIVE:

Concentrates on the methodological and technical aspects of software design and programming based on OOP. Acquire the basic knowledge and skills necessary to implement object oriented programming techniques in software development through java. Know about the importance of GUI based applications and the development of applications through java.

#### COURSE OUTCOMES (COs)

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

|     |  |
|-----|--|
| CO1 | Implement and Test the concepts of OOP in program design with a few example exercises.                 |
| CO2 | Implement and Test the performance of Exception handling, Multithreading concepts with a few examples. |
| CO3 | Implement and Test the performance of GUI based applications using AWT, Swings.                        |
| 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 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 2   | 3   | 3   | 1   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | -    | -    |
| CO2 | 2   | 3   | 3   | 1   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | -    | -    |
| CO3 | 2   | 3   | 3   | 1   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | 3    | 1    |
| 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. | Programs to be covered                                     | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|-------|--|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 1.    | Introduction to Java programming                           | 2                       | 29.11.2019                   |                           | TLM8                      |                 |
| 2.    | Introduction to Java Compiler                              | 2                       | 06.12.2019                   |                           | TLM8                      |                 |
| 3.    | Programs on Basic control structures & Loops               | 2                       | 13.12.2019                   |                           | TLM4                      |                 |
| 4.    | Programs on Basic control structures & Loops               | 2                       | 20.12.2019                   |                           | TLM4                      |                 |
| 5.    | Programs on recursion                                      | 2                       | 27.12.2019                   |                           | TLM4                      |                 |
| 6.    | Programs on Arrays   | 2                       | 03.01.2020                   |                           | TLM4                      |                 |
| 7.    | Programs on Constructors & Method Overloading              | 2                       | 10.01.2020                   |                           | TLM4                      |                 |
| 8.    | Programs on String & String Buffer classes                 | 2                       | 31.01.2020                   |                           | TLM4                      |                 |
| 9.    | Programs on Inheritance , super and final keyword          | 2                       | 07.02.2020                   |                           | TLM4                      |                 |
| 10.   | Programs on Run-Time Polymorphism, Packages and Interfaces | 2                       | 14.02.2020                   |                           | TLM4                      |                 |
| 11.   | Programs on Exception Handling & Multithreading            | 2                       | 28.02.2020                   |                           | TLM4                      |                 |
| 12.   | Programs on Applets & Event Handling                       | 2                       | 06.03.2020                   |                           | TLM4                      |                 |
| 13.   | Programs on Applets & Event Handling                       | 2                       | 13.03.2020                   |                           | TLM4                      |                 |
| 14.   | Programs on AWT Components & Layout Managers               | 2                       | 20.03.2020                   |                           | TLM4                      |                 |
| 15.   | Programs on Swings   | 2                       | 27.03.2020                   |                           | 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        |



**PROGRAMME OUTCOMES (POs):**

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):**

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b><br>To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.    |
| <b>PSO 2</b> | <b>Data Engineering:</b><br>To inculcate an ability to Analyse, Design and implement data driven applications into the students.  |
| <b>PSO 3</b> | <b>Software Engineering:</b><br>Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products |

|                   |                    |                    |              |
|-------------------|--------------------|--------------------|--------------|
|                   |                    |                    |              |
| Course Instructor | Course Coordinator | Module Coordinator | HOD          |
| K.SUNDEEP SARADHI | A.S.R.C.MURTHY     | Dr.D.VEERAAIAH     | Dr.VEERAAIAH |



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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : K.SUNDEEP SARADHI

Course Name & Code : OOPs through JAVA ( 17CI07 )

L-T-P Structure : 3-0-0

Credits : 3

Program/Sem/Sec : B.Tech., CSE, IV-Sem., Section – B

A.Y : 2019 - 2020

**PRE-REQUISITE:** Knowledge of Procedural Programming Language

#### **COURSE EDUCATIONAL OBJECTIVES (CEOs):**

This course concentrates on the methodological and technical aspects of software design and programming based on OOP and Acquire the basic knowledge and skills necessary to implement object-oriented programming techniques in software development through JAVA and to know about the importance of GUI based applications and the development of those Applications through JAVA and getting sufficient knowledge to enter the job market related to web development.

#### **COURSE OUTCOMES (COs):**

At the end of the course, students are able to

|     |  |
|-----|--|
| CO1 | Identify Object Oriented concepts through constructs of JAVA.  |
| CO2 | Analyze the role of Inheritance, Polymorphism and implement Packages, Interfaces in program design using JAVA. |
| CO3 | Explore Exception handling and Multi-threading concepts in program design using JAVA.                          |
| CO4 | Develop GUI based applications using Applet class and explore the concept of Event Handling using JAVA.        |
| CO5 | Design some examples of GUI based applications using AWT controls and Swings.                                  |

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

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

**T1** Herbert Schildt, “Java: The complete Reference”, TMH Publications, 7<sup>th</sup> edition, 2006.

**REFERENCE BOOKS:**

**R1** Dr.R.Nageswara Rao, “Core JAVA: An Integrated Approach”, Dreamtech Press, 1<sup>st</sup> Edition, 2008.

**R2** E.Balaguruswamy, “Programming with JAVA”, TMH Publications, 2<sup>nd</sup> Edition, 2000.

**R3** Patrick Niemeyer & Jonathan Knudsen, “Learning Java”, O’REILLY Publications, 3<sup>rd</sup> Edition, 2005.

**R4** Benjamin J Evans & David Flanagan, “Java-in a Nutshell – A desktop quick reference”, O’REILLY Publications, 6<sup>th</sup> Edition, 2014.

**R5** David Flanagan, “Java Examples in a nutshell – A Tutorial companion to java in a nutshell”, O’REILLY Publications, 3<sup>rd</sup> Edition, 2004.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I: Introduction to Java Language and Classes**

| 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 Java Programming   | 1                       | 25.11.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 2.   | Java Basic Terminology (JDK, JRE, JVM)   | 1                       | 26.11.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 3.   | Drawbacks of POP, Object Oriented paradigm   | 1                       | 27.11.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 4.   | OOP Concept  | 1                       | 02.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 5.   | Java Buzzwords, Byte Code, Simple types  | 1                       | 03.12.2019                   |                           | <b>TLM1</b>               |                 |
| 6.   | Arrays, Type Conversion and Casting  | 1                       | 04.12.2019                   |                           | <b>TLM1</b>               |                 |
| 7.   | Simple Java Programs , Class Fundamentals  | 1                       | 09.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 8.   | Declaring Objects, Access Control and recursion, Constructors                        | 1                       | 10.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 9.   | Garbage Collection, Programs on String and String Buffer classes and Wrapper classes | 1                       | 11.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 10.  | Tutorial – 1 / Assignment - 1  | 1                       | 16.12.2019                   |                           | <b>TLM 3</b>              |                 |
| No. of classes required to complete UNIT-I: 10 |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-II: Inheritance & Polymorphism, Packages and Interfaces**

| 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.    | Inheritance Basics, Super Keyword, Multilevel Hierarchy,                 | 1                       | 17.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 2.    | Method Overloading & Method Overriding                                   | 1                       | 18.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 3.    | Dynamic method dispatch, Abstract class, Object class and final keyword. | 1                       | 23.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 4.    | Package definition, Accessing package, understanding CLASSPATH           | 1                       | 24.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |

|  |   |   |            |                       |               |  |
|--|---|---|------------|-----------------------|---------------|--|
| 5.   | Importing Packages, java.util package           | 1 | 30.12.2019 |                       | TLM1/<br>TLM2 |  |
| 6.   | Defining, Implementing and Applying Interfaces  | 1 | 31.12.2019 |                       | TLM1/<br>TLM2 |  |
| 7.   | Variables in interface and extending interfaces | 1 | 06.01.2020 |                       | TLM1/<br>TLM2 |  |
| 8.   | Differences between classes and interfaces      | 1 | 07.01.2020 |                       | TLM1/<br>TLM2 |  |
| 9.   | Tutorial – 2 / Assignment - 2                   | 1 | 08.01.2020 |                       | TLM3          |  |
| No. of classes required to complete UNIT-II: 9 |   |   |            | No. of classes taken: |               |  |

### UNIT-III: Exception Handling, Multithreading

| 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.  | Exception Handling Fundamentals, Exception types       | 1                       | 27.01.2020                   |                           | TLM1/<br>TLM2             |                 |
| 2.  | Usage of try & catch , throws and finally              | 1                       | 28.01.2020                   |                           | TLM1/<br>TLM2             |                 |
| 3.  | Java Built-in Exceptions                               | 1                       | 29.01.2020                   |                           | TLM1/<br>TLM2             |                 |
| 4.  | Differences between multi-threading and multi-tasking. | 1                       | 03.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 5.  | Java thread model Creating thread                      | 1                       | 04.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 6.  | Multiple threads                                       | 1                       | 05.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 7.  | Synchronizing threads                                  | 1                       | 10.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 8.  | Tutorial – 3 / Assignment - 3                          | 1                       | 11.02.2020                   |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-III: 8 |  |                         |                              | No. of classes taken:     |                           |                 |

### UNIT-IV : Applet class and Event Handling

| 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.   | Concepts of Applets, Differences between Applets and Applications | 1                       | 12.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 2.   | Applet Architecture, skeleton and creation.                       | 1                       | 17.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 3.   | Passing parameters to applets and working with graphics class.    | 1                       | 18.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 4.   | Event handling mechanisms, Events and Event sources.              | 1                       | 19.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 5.   | Event class, Listener interface, Delegation event model.          | 1                       | 20.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 6.   | Keyboard and Mouse Events, Adapter class, Inner class.            | 1                       | 24.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 7.   | Tutorial – 4 / Assignment - 4                                     | 1                       | 25.02.2020                   |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-IV: 7 |   |                         |                              | No. of classes taken:     |                           |                 |

### UNIT-V : AWT Controls and Introduction to Swings

| 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.    | Label, button, Scrollbars, Text Components                  | 1                       | 26.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 2.    | Check Box, Check Box groups, choices, controls, lists       | 1                       | 02.03.2020                   |                           | TLM1/<br>TLM2             |                 |
| 3.    | Scrollbar, Text field, Layout Managers – border, grid, flow | 1                       | 03.03.2020                   |                           | TLM1/<br>TLM2             |                 |

|  |   |   |            |                       |                       |  |
|--|---|---|------------|-----------------------|-----------------------|--|
| 4.   | Introduction to swing, Key features, Limitations of AWT   | 1 | 04.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |  |
| 5.   | Components and Containers, Swing packages.                | 1 | 09.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |  |
| 6.   | Creating Swing applet.                                    | 1 | 11.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |  |
| 7.   | JApplet class, JComponents – Labels, Text fields, buttons | 1 | 16.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |  |
| 8.   | Jbutton class, Tabbed Panes                               | 1 | 17.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |  |
| 9.   | Scroll Panes, Tables                                      | 1 | 18.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |  |
| 10.  | Tutorial – 5 / Assignment - 5                             | 1 | 23.03.2020 |                       | <b>TLM3</b>           |  |
| No. of classes required to complete UNIT-V: 10 |   |   |            | No. of classes taken: |                       |  |

|    |  |   |            |  |                        |  |
|----|--|---|------------|--|------------------------|--|
| 1. | Discussion of Previous Question Papers | 1 | 24.03.2020 |  | <b>TLM1/<br/>TLM 2</b> |  |
|----|--|---|------------|--|------------------------|--|

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)            | M=20         |
| Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)           | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b><br>To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.    |
| <b>PSO 2</b> | <b>Data Engineering:</b><br>To inculcate an ability to Analyse, Design and implement data driven applications into the students.  |
| <b>PSO 3</b> | <b>Software Engineering:</b><br>Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products |

|                   |                    |                    |              |
|-------------------|--------------------|--------------------|--------------|
|                   |                    |                    |              |
| Course Instructor | Course Coordinator | Module Coordinator | HOD          |
| K.SUNDEEP SARADHI | A.S.R.C.MURTHY     | Dr.D.VEERAAIAH     | Dr.VEERAAIAH |



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor** : A.Sree Rama Chandra Murthy  
**Course Name & Code** : OOPs through JAVA PROGRAMMING LAB ( 17CI65 )  
**L-T-P Structure** : 2-0-0 Credits : 2  
**Program/Sem/Sec** : B.Tech., CSE, IV-Sem., Section – A A.Y: 2019 - 2020

#### PRE-REQUISITE: C PROGRAMMING

#### COURSE OBJECTIVE:

Concentrates on the methodological and technical aspects of software design and programming based on OOP. Acquire the basic knowledge and skills necessary to implement object oriented programming techniques in software development through java. Know about the importance of GUI based applications and the development of applications through java.

#### COURSE OUTCOMES (COs)

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

|     |  |
|-----|--|
| CO1 | Implement and Test the concepts of OOP in program design with a few example exercises.                 |
| CO2 | Implement and Test the performance of Exception handling, Multithreading concepts with a few examples. |
| CO3 | Implement and Test the performance of GUI based applications using AWT, Swings.                        |
| 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 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 2   | 3   | 3   | 1   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | -    | -    |
| CO2 | 2   | 3   | 3   | 1   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | -    | -    |
| CO3 | 2   | 3   | 3   | 1   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | 3    | 1    |
| 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. | Programs to be covered                                     | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|-------|--|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 1.    | Introduction to Java programming                           | 2                       | 28.11.2019                   |                           | TLM8                      |                 |
| 2.    | Introduction to Java Compiler                              | 2                       | 05.12.2019                   |                           | TLM8                      |                 |
| 3.    | Programs on Basic control structures & Loops               | 2                       | 12.12.2019                   |                           | TLM4                      |                 |
| 4.    | Programs on Basic control structures & Loops               | 2                       | 19.12.2019                   |                           | TLM4                      |                 |
| 5.    | Programs on recursion                                      | 2                       | 26.12.2019                   |                           | TLM4                      |                 |
| 6.    | Programs on Arrays   | 2                       | 02.01.2020                   |                           | TLM4                      |                 |
| 7.    | Programs on Constructors & Method Overloading              | 2                       | 19.01.2020                   |                           | TLM4                      |                 |
| 8.    | Programs on String & String Buffer classes                 | 2                       | 30.01.2020                   |                           | TLM4                      |                 |
| 9.    | Programs on Inheritance , super and final keyword          | 2                       | 06.02.2020                   |                           | TLM4                      |                 |
| 10.   | Programs on Run-Time Polymorphism, Packages and Interfaces | 2                       | 13.02.2020                   |                           | TLM4                      |                 |
| 11.   | Programs on Exception Handling & Multithreading            | 2                       | 27.02.2020                   |                           | TLM4                      |                 |
| 12.   | Programs on Applets & Event Handling                       | 2                       | 05.03.2020                   |                           | TLM4                      |                 |
| 13.   | Programs on Applets & Event Handling                       | 2                       | 12.03.2020                   |                           | TLM4                      |                 |
| 14.   | Programs on AWT Components & Layout Managers               | 2                       | 19.03.2020                   |                           | TLM4                      |                 |
| 15.   | Programs on Swings   | 2                       | 26.03.2020                   |                           | 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        |



**PROGRAMME OUTCOMES (POs):**

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):**

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b><br>To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.    |
| <b>PSO 2</b> | <b>Data Engineering:</b><br>To inculcate an ability to Analyse, Design and implement data driven applications into the students.  |
| <b>PSO 3</b> | <b>Software Engineering:</b><br>Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products |

|                   |                    |                    |              |
|-------------------|--------------------|--------------------|--------------|
| Course Instructor | Course Coordinator | Module Coordinator | HOD          |
| A.S.R.C.MURTHY    | A.S.R.C.MURTHY     | Dr.D.VEERAI AH     | Dr.VEERAI AH |



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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor** : A.Sree Rama Chandra Murthy  
**Course Name & Code** : OOPs through JAVA (17CI07 )  
**L-T-P Structure** : 3-0-0 Credits : 3  
**Program/Sem/Sec** : B.Tech., CSE, IV-Sem., Section – A A.Y : 2019 - 2020

**PRE-REQUISITE:** Knowledge of Procedural Programming Language

#### **COURSE EDUCATIONAL OBJECTIVES (CEOs):**

This course concentrates on the methodological and technical aspects of software design and programming based on OOP and Acquire the basic knowledge and skills necessary to implement object-oriented programming techniques in software development through JAVA and to know about the importance of GUI based applications and the development of those Applications through JAVA and getting sufficient knowledge to enter the job market related to web development.

#### **COURSE OUTCOMES (COs):**

At the end of the course, students are able to

|            |   |
|------------|---|
| <b>CO1</b> | <b>Identify</b> Object Oriented concepts through constructs of JAVA.  |
| <b>CO2</b> | <b>Analyze</b> the role of Inheritance, Polymorphism and implement Packages, Interfaces in program design using JAVA. |
| <b>CO3</b> | <b>Explore</b> Exception handling and Multi-threading concepts in program design using JAVA.                          |
| <b>CO4</b> | <b>Develop</b> GUI based applications using Applet class and explore the concept of Event Handling using JAVA.        |
| <b>CO5</b> | <b>Design</b> some examples of GUI based applications using AWT controls and Swings.                                  |

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

| COs        | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| <b>CO1</b> | 3   | 1   | 2   | -   | -   | -   | -   | -   | -   | -    | -    | 1    | 3    | -    | 1    |
| <b>CO2</b> | 3   | 3   | 2   | -   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | -    | 1    |
| <b>CO3</b> | 3   | 2   | 3   | -   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | -    | 1    |
| <b>CO4</b> | 3   | 2   | 3   | -   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | -    | 1    |
| <b>CO5</b> | 3   | 2   | 2   | -   | 1   | -   | -   | -   | -   | -    | -    | 1    | 3    | 3    | 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:**

**T1** Herbert Schildt, "Java: The complete Reference", TMH Publications, 7<sup>th</sup> edition, 2006.

**REFERENCE BOOKS:**

**R1** Dr.R.Nageswara Rao, "Core JAVA: An Integrated Approach", Dreamtech Press, 1<sup>st</sup> Edition, 2008.

**R2** E.Balaguruswamy, "Programming with JAVA", TMH Publications, 2<sup>nd</sup> Edition, 2000.

**R3** Patrick Niemeyer & Jonathan Knudsen, "Learning Java", O'REILLY Publications, 3<sup>rd</sup> Edition, 2005.

**R4** Benjamin J Evans & David Flanagan, "Java-in a Nutshell – A desktop quick reference", O'REILLY Publications, 6<sup>th</sup> Edition, 2014.

**R5** David Flanagan, "Java Examples in a nutshell – A Tutorial companion to java in a nutshell", O'REILLY Publications, 3<sup>rd</sup> Edition, 2004.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I: Introduction to Java Language and Classes**

| 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 Java Programming   | 1                       | 26.11.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 2.   | Java Basic Terminology (JDK, JRE, JVM)   | 1                       | 28.11.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 3.   | Drawbacks of POP, Object Oriented paradigm   | 1                       | 29.11.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 4.   | OOP Concept  | 1                       | 03.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 5.   | Java Buzzwords, Byte Code, Simple types  | 1                       | 05.12.2019                   |                           | <b>TLM1</b>               |                 |
| 6.   | Arrays, Type Conversion and Casting  | 1                       | 06.12.2019                   |                           | <b>TLM1</b>               |                 |
| 7.   | Simple Java Programs , Class Fundamentals  | 1                       | 10.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 8.   | Declaring Objects, Access Control and recursion, Constructors                        | 1                       | 12.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 9.   | Garbage Collection, Programs on String and String Buffer classes and Wrapper classes | 1                       | 13.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 10.  | Tutorial – 1 / Assignment - 1  | 1                       | 17.12.2019                   |                           | <b>TLM 3</b>              |                 |
| No. of classes required to complete UNIT-I: 10 |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-II: Inheritance & Polymorphism, Packages and Interfaces**

| 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.    | Inheritance Basics, Super Keyword, Multilevel Hierarchy,                 | 1                       | 19.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 2.    | Method Overloading & Method Overriding                                   | 1                       | 20.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 3.    | Dynamic method dispatch, Abstract class, Object class and final keyword. | 1                       | 24.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |
| 4.    | Package definition, Accessing package, understanding CLASSPATH           | 1                       | 26.12.2019                   |                           | <b>TLM1/<br/>TLM2</b>     |                 |

|  |   |   |            |                       |               |  |
|--|---|---|------------|-----------------------|---------------|--|
| 5.   | Importing Packages, java.util package           | 1 | 27.12.2019 |                       | TLM1/<br>TLM2 |  |
| 6.   | Defining, Implementing and Applying Interfaces  | 1 | 31.12.2019 |                       | TLM1/<br>TLM2 |  |
| 7.   | Variables in interface and extending interfaces | 1 | 02.01.2020 |                       | TLM1/<br>TLM2 |  |
| 8.   | Differences between classes and interfaces      | 1 | 03.01.2020 |                       | TLM1/<br>TLM2 |  |
| 9.   | Tutorial – 2 / Assignment - 2                   | 1 | 08.01.2020 |                       | TLM3          |  |
| No. of classes required to complete UNIT-II: 9 |   |   |            | No. of classes taken: |               |  |

### UNIT-III: Exception Handling, Multithreading

| 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.  | Exception Handling Fundamentals, Exception types      | 1                       | 09.01.2020                   |                           | TLM1/<br>TLM2             |                 |
| 2.  | Usage of try & catch , throws and finally             | 1                       | 10.01.2020                   |                           | TLM1/<br>TLM2             |                 |
| 3.  | Java Built-in Exceptions                              | 1                       | 28.01.2020                   |                           | TLM1/<br>TLM2             |                 |
| 4.  | Differences between multi-threading and muti-tasking. | 1                       | 30.01.2020                   |                           | TLM1/<br>TLM2             |                 |
| 5.  | Java thread model Creating thread                     | 1                       | 31.01.2020                   |                           | TLM1/<br>TLM2             |                 |
| 6.  | Multiple threads                                      | 1                       | 04.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 7.  | Synchronizing threads                                 | 1                       | 06.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 8.  | Tutorial – 3 / Assignment - 3                         | 1                       | 07.02.2020                   |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-III: 8 |   |                         |                              | No. of classes taken:     |                           |                 |

### UNIT-IV : Applet class and Event Handling

| 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.   | Concepts of Applets, Differences between Applets and Applications | 1                       | 11.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 2.   | Applet Architecture, skeleton and creation.                       | 1                       | 13.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 3.   | Passing parameters to applets and working with graphics class.    | 1                       | 14.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 4.   | Event handling mechanisms, Events and Event sources.              | 1                       | 18.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 5.   | Event class, Listener interface, Delegation event model.          | 1                       | 20.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 6.   | Keyboard and Mouse Events, Adapter class, Inner class.            | 1                       | 21.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 7.   | Tutorial – 4 / Assignment - 4                                     | 1                       | 25.02.2020                   |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-IV: 7 |   |                         |                              | No. of classes taken:     |                           |                 |

### UNIT-V : AWT Controls and Introduction to Swings

| 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.    | Label, button, Scrollbars, Text Components                  | 1                       | 27.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 2.    | Check Box, Check Box groups, choices, controls, lists       | 1                       | 28.02.2020                   |                           | TLM1/<br>TLM2             |                 |
| 3.    | Scrollbar, Text field, Layout Managers – border, grid, flow | 1                       | 03.03.2020                   |                           | TLM1/<br>TLM2             |                 |

|  |   |   |            |                       |                       |
|--|---|---|------------|-----------------------|-----------------------|
| 4.   | Introduction to swing, Key features, Limitations of AWT   | 1 | 05.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |
| 5.   | Components and Containers, Swing packages.                | 1 | 06.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |
| 6.   | Creating Swing applet.                                    | 1 | 10.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |
| 7.   | JApplet class, JComponents – Labels, Text fields, buttons | 1 | 12.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |
| 8.   | Jbutton class, Tabbed Panes                               | 1 | 13.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |
| 9.   | Scroll Panes, Tables                                      | 1 | 17.03.2020 |                       | <b>TLM1/<br/>TLM2</b> |
| 10.  | Tutorial – 5 / Assignment - 5                             | 1 | 19.03.2020 |                       | <b>TLM3</b>           |
| No. of classes required to complete UNIT-V: 10 |   |   |            | No. of classes taken: |                       |

|    |  |   |            |  |                        |
|----|--|---|------------|--|------------------------|
| 1. | Discussion of Previous Question Papers | 1 | 23.03.2020 |  | <b>TLM1/<br/>TLM 2</b> |
| 2. | Revision / Doubts Clarification        | 1 | 26.03.2020 |  | <b>TLM3</b>            |

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)            | M=20         |
| Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)           | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b><br>To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.    |
| <b>PSO 2</b> | <b>Data Engineering:</b><br>To inculcate an ability to Analyse, Design and implement data driven applications into the students.  |
| <b>PSO 3</b> | <b>Software Engineering:</b><br>Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products |

|                   |                    |                    |              |
|-------------------|--------------------|--------------------|--------------|
|                   |                    |                    |              |
| Course Instructor | Course Coordinator | Module Coordinator | HOD          |
| A.S.R.C.MURTHY    | A.S.R.C.MURTHY     | Dr.D.VEERAAIAH     | Dr.VEERAAIAH |



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING COURSE HANDOUT

### PART-A

Name of Course Instructor : G. Vijaya Lakshmi.  
Course Name & Code : Linear Algebra & Numerical Applications, 17FE11  
L-T-P Structure : 3-2-0 Credits : 4  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- A A.Y : 2019-2020

**PRE-REQUISITE:** Basics of Matrix Algebra

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The objective of this course is to introduce the Matrix Algebra. The students will also gain the knowledge of numerical techniques for solving the equations and fitting of various curves.

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

|     |   |
|-----|---|
| CO1 | Distinguish among the pros and cons between the Row operation methods and Iterative methods in solving system of linear equations.                          |
| CO2 | Compute the Eigen values and Eigen vectors and powers, Inverse of a square matrix through Cayley – Hamilton theorem   |
| CO3 | Reducing the given Matrix into Diagonal form using various transformations and Transforming the Quadratic form into canonical form and identify its nature. |
| CO4 | Application of numerical techniques fir Algebraic and Transcendental equations.   |
| CO5 | Use numerical methods for the solution of the liner system of equations and estimate the unknown dependent variables using curve fitting methods.           |

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

| CO NO. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1    | 3   | 2   | -   | 1   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO2    | 3   | 2   | -   | 1   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO3    | 3   | 2   | -   | 1   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO4    | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO5    | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |

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

### TEXT BOOKS:

- T1** Dr. B.S. Grewal, “Higher Engineering Mathematics”, 42<sup>nd</sup> Edition, Khanna Publishers, New Delhi, 2012.  
**T2** Dr. B. V. Ramana, “Higher Engineering Mathematics”, 1<sup>st</sup> Edition, TMH, New Delhi, 2010.

### BOS APPROVED REFERENCE BOOKS:

- R1** Michael D. Greenberg , “Advanced Engineering Mathematics”, 2<sup>nd</sup> Edition, TMH, New Delhi, 2011.
- R2** Erwin Kreyszig, “Advanced Engineering Mathematics”, 8<sup>th</sup> Edition, John Wiley & Sons, New Delhi, 2011.
- R3** W.E. Boyce, R.C.Diprima, ”Elementary Differential Equations”, 7<sup>th</sup> Edition, John Wiley and sons, New Delhi, 2001.

## **PART-B**

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

#### **UNIT-I: System of Linear Equations**

| 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 Course & Co's       | 1                       | 25/11/19                     |                           |                           |                 |
| 2.   | Introduction to Unit-I              | 1                       | 26/11/19                     |                           | TLM1                      |                 |
| 3.   | Matrices - Rank                     | 1                       | 27/11/19                     |                           | TLM1                      |                 |
| 4.   | Echelon form                        | 1                       | 29/11/19                     |                           | TLM1                      |                 |
| 5.   | Tutorial-1                          | 1                       | 30/11/19                     |                           | TLM3                      |                 |
| 6.   | Echelon form                        | 1                       | 2/12/19                      |                           | TLM1                      |                 |
| 7.   | Normal form                         | 1                       | 3/12/19                      |                           | TLM1                      |                 |
| 8.   | Normal form through PAQ             | 1                       | 4/12/19                      |                           | TLM1                      |                 |
| 9.   | Normal form through PAQ             | 1                       | 6/12/19                      |                           | TLM1                      |                 |
| 10.  | Tutorial-2                          | 1                       | 7/12/19                      |                           | TLM3                      |                 |
| 11.  | Solution of Linear Systems          | 1                       | 9/12/19                      |                           | TLM1                      |                 |
| 12.  | Non Homogeneous system of equations | 2                       | 10/12/19<br>11/12/19         |                           | TLM1                      |                 |
| 13.  | Homogeneous system of equations     | 2                       | 13/12/19<br>16/12/19         |                           | TLM1                      |                 |
| 14.  | Assignment/ Quiz Unit-I             | 1                       | 17/12/19                     |                           | TLM6                      |                 |
| No. of classes required to complete Unit-I : |                                     |                         | 16                           | No. of classes taken:     |                           |                 |

#### **UNIT-II: Eigen Values and Eigen Vectors**

| 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 Unit II      | 1                       | 18/12/19                     |                           | TLM1                      |                 |
| 2.     | Eigen values – Eigen Vectors | 1                       | 20/12/19                     |                           | TLM1                      |                 |
| 3.     | Properties                   | 2                       | 21/12/19<br>23/12/19         |                           | TLM1                      |                 |
| 4.     | Eigen values – Eigen Vectors | 2                       | 24/12/19<br>27/12/19         |                           | TLM1                      |                 |
| 5.     | Tutorial-3                   | 1                       | 28/12/19                     |                           | TLM3                      |                 |
| 6.     | Cayley Hamilton Theorem      | 2                       | 30/12/19<br>31/12/19         |                           | TLM1                      |                 |



|  |  |   |         |                       |      |
|--|--|---|---------|-----------------------|------|
| 7.   | Inverse and Powers of a matrix by using Cayley Hamilton Theorem. | 1 | 3/1/20  |                       | TLM1 |
| 8.   | Tutorial-4   | 1 | 4/1/20  |                       | TLM3 |
| 9.   | Inverse and Powers of a matrix by using Cayley Hamilton Theorem. | 1 | 6/1/20  |                       | TLM1 |
| 10.  | Assignment/ Quiz Unit- II  | 1 | 7/1/20  |                       | TLM6 |
| 11.  | Revision   | 1 | 8/1/20  |                       |      |
| 12.  | Revision   | 1 | 10/1/20 |                       |      |
| No. of classes required to complete Unit-II: |  |   | 15      | No. of classes taken: |      |

### UNIT-III: Linear Transformation and Diagonalization

| 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 Unit III  | 1                       | 28/1/20                      |                           | TLM1                      |                 |
| 2.  | Linear transformation of Matrices                                     | 1                       | 29/1/20                      |                           | TLM1                      |                 |
| 3.  | Orthogonal transformation of Matrices                                 | 1                       | 31/1/20                      |                           | TLM1                      |                 |
| 4.  | Tutorial-5  | 1                       | 1/2/20                       |                           | TLM3                      |                 |
| 5.  | Similarity of Matrices  | 1                       | 3/2/20                       |                           | TLM1                      |                 |
| 6.  | Diagonalization of a Matrix   | 1                       | 4/2/20                       |                           | TLM1                      |                 |
| 7.  | Orthogonal reduction of real symmetric matrices                       | 1                       | 5/2/20                       |                           | TLM1                      |                 |
| 8.  | Reduction of quadratic form to canonical form                         | 1                       | 7/2/20                       |                           | TLM1                      |                 |
| 9.  | Reduction of quadratic form to canonical form-Rank-Positive, Negative | 1                       | 10/2/20                      |                           | TLM1                      |                 |
| 10.   | Definite-Semi definite-Index, Signature                               | 1                       | 11/2/20                      |                           | TLM1                      |                 |
| 11.   | Definite-Semi definite-Index, Signature                               | 1                       | 12/2/20                      |                           | TLM1                      |                 |
| 12.   | Assignment/Quiz Unit-III  | 1                       | 14/2/20                      |                           | TLM6                      |                 |
| 13.   | Tutorial-6  | 1                       | 15/2/20                      |                           | TLM3                      |                 |
| No. of classes required to complete Unit-III: |   |                         | 13                           | No. of classes taken:     |                           |                 |

### UNIT-IV: Solution of Algebraic and Transcendental equations & Interpolation and finite Differences

| 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 Unit IV                | 1                       | 17/2/20                      |                           | TLM1                      |                 |
| 2.     | False Position method                  | 1                       | 18/2/20                      |                           | TLM1                      |                 |
| 3.     | Newton- Raphson Method in one variable | 1                       | 19/2/20                      |                           | TLM1                      |                 |

|  |  |   |                  |                       |      |  |
|--|--|---|------------------|-----------------------|------|--|
| 4.   | Tutorial-7   | 1 | 22/2/20          |                       | TLM3 |  |
| 5.   | Introduction – Finite differences                              | 1 | 24/2/20          |                       | TLM1 |  |
| 6.   | Forward Differences- Backward differences –Central differences | 1 | 25/2/20          |                       | TLM1 |  |
| 7.   | Forward Differences- Backward differences –Central differences | 1 | 26/2/20          |                       | TLM1 |  |
| 8.   | Symbolic relations and separation of symbols                   | 1 | 28/2/20          |                       | TLM1 |  |
| 9.   | Tutorial-8   | 1 | 29/2/20          |                       | TLM3 |  |
| 10.  | Newton’s formulae for interpolation                            | 2 | 2/3/20<br>3/3/20 |                       | TLM1 |  |
| 11.  | Lagrange’s Interpolation                                       | 2 | 4/3/20<br>6/3/20 |                       | TLM1 |  |
| 12.  | Assignment/Quiz Unit-IV  | 1 | 7/3/20           |                       | TLM6 |  |
| No. of classes required to complete Unit-IV: |  |   | 14               | No. of classes taken: |      |  |

#### UNIT-V : Numerical Solution of Linear System of Equations& Curve Fitting

| 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 UNIT V                      | 1                       | 9/3/20                       |                           |                           |                 |  |
| 2.  | Gauss –Seidal method                        | 2                       | 11/3/20<br>13/3/20           |                           |                           |                 |  |
| 3.  | Gauss Jacobi Method                         | 2                       | 16/3/20<br>17/3/20           |                           |                           |                 |  |
| 4.  | Determination of EIGEN values by iteration. |                         | 18/3/20                      |                           |                           |                 |  |
| 5.  | Fitting of a Straight line                  | 1                       | 20/3/20                      |                           |                           |                 |  |
| 6.  | Tutorial-9                                  | 1                       | 21/3/20                      |                           |                           |                 |  |
| 7.  | Fitting of a second degree polynomial       | 1                       | 23/3/20                      |                           |                           |                 |  |
| 8.  | Fitting of exponential curves               | 1                       | 24/3/20                      |                           |                           |                 |  |
| 9.  | Fitting of a power curve                    | 1                       | 25/3/20                      |                           |                           |                 |  |
| 10.   | Assignment/Quiz UNIT-V                      | 1                       | 27/3/20                      |                           |                           |                 |  |
| 11.   | Tutorial-10                                 | 1                       | 28/3/20                      |                           |                           |                 |  |
| No. of classes required to complete UNIT-V: |   |                         | 13                           | No. of classes taken:     |                           |                 |  |

#### Contents 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.  | Solving System of Equations using other methods | 1                       | 16/3/20                      |                           |                           |                 |  |
| No. of classes required to complete UNIT-V: |   |                         |                              | No. of classes taken:     |                           |                 |  |

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

## **PART-C**

### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)            | M=20         |
| Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)           | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
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Course Instructor  
(G.Vijaya Lakshmi)

Course Coordinator  
(Dr. K. R. Kavitha)

Module Coordinator  
(Dr. A. Rami Reddy)

HOD  
(Dr. A. Rami Reddy)



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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING COURSE HANDOUT

### PART-A

Name of Course Instructor : K. N. V. Lakshmi.  
Course Name & Code : Linear Algebra & Numerical Applications, 17FE11  
L-T-P Structure : 3-2-0 Credits : 4  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- B A.Y : 2019-2020

**PRE-REQUISITE:** Basics of Matrix Algebra

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The objective of this course is to introduce the Matrix Algebra. The students will also gain the knowledge of numerical techniques for solving the equations and fitting of various curves.

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

|            |   |
|------------|---|
| <b>CO1</b> | Distinguish among the pros and cons between the Row operation methods and Iterative methods in solving system of linear equations.                          |
| <b>CO2</b> | Compute the Eigen values and Eigen vectors and powers, Inverse of a square matrix through Cayley – Hamilton theorem   |
| <b>CO3</b> | Reducing the given Matrix into Diagonal form using various transformations and Transforming the Quadratic form into canonical form and identify its nature. |
| <b>CO4</b> | Application of numerical techniques fir Algebraic and Transcendental equations.   |
| <b>CO5</b> | Use numerical methods for the solution of the liner system of equations and estimate the unknown dependent variables using curve fitting methods.           |

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

| CO NO. | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1    | 3   | 2   | -   | 1   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO2    | 3   | 2   | -   | 1   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO3    | 3   | 2   | -   | 1   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO4    | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO5    | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |

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

### **TEXT BOOKS:**

- T1** Dr. B.S. Grewal, “Higher Engineering Mathematics”, 42<sup>nd</sup> Edition, Khanna Publishers, New Delhi, 2012.  
**T2** Dr. B. V. Ramana, “Higher Engineering Mathematics”, 1<sup>st</sup> Edition, TMH, New Delhi, 2010.

### **BOS APPROVED REFERENCE BOOKS:**

- R1** Michael D. Greenberg , “Advanced Engineering Mathematics”, 2<sup>nd</sup> Edition, TMH, New Delhi, 2011.
- R2** Erwin Kreyszig, “Advanced Engineering Mathematics”, 8<sup>th</sup> Edition, John Wiley & Sons, New Delhi, 2011.
- R3** W.E. Boyce, R.C. DiPrima, ”Elementary Differential Equations”, 7<sup>th</sup> Edition, John Wiley and sons, New Delhi, 2001.

## **PART-B**

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

#### **UNIT-I: System of Linear Equations**

| 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 Course & Co's       | 1                       | 25/11/19                     |                           |                           |                 |
| 2.   | Introduction to Unit-I              | 1                       | 26/11/19                     |                           | TLM1                      |                 |
| 3.   | Matrices - Rank                     | 1                       | 27/11/19                     |                           | TLM1                      |                 |
| 4.   | Echelon form                        | 1                       | 28/11/19                     |                           | TLM1                      |                 |
| 5.   | Tutorial-1                          | 1                       | 30/11/19                     |                           | TLM3                      |                 |
| 6.   | Echelon form                        | 1                       | 2/12/19                      |                           | TLM1                      |                 |
| 7.   | Normal form                         | 1                       | 3/12/19                      |                           | TLM1                      |                 |
| 8.   | Normal form through PAQ             | 1                       | 4/12/19                      |                           | TLM1                      |                 |
| 9.   | Normal form through PAQ             | 1                       | 5/12/19                      |                           | TLM1                      |                 |
| 10.  | Tutorial-2                          | 1                       | 7/12/19                      |                           | TLM3                      |                 |
| 11.  | Solution of Linear Systems          | 1                       | 9/12/19                      |                           | TLM1                      |                 |
| 12.  | Non Homogeneous system of equations | 2                       | 10/12/19<br>11/12/19         |                           | TLM1                      |                 |
| 13.  | Homogeneous system of equations     | 2                       | 12/12/19<br>16/12/19         |                           | TLM1                      |                 |
| 14.  | Assignment/ Quiz Unit-I             | 1                       | 17/12/19                     |                           | TLM6                      |                 |
| No. of classes required to complete Unit-I : |                                     |                         | 16                           | No. of classes taken:     |                           |                 |

#### **UNIT-II: Eigen Values and Eigen Vectors**

| 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 Unit II      | 1                       | 18/12/19                     |                           | TLM1                      |                 |
| 2.     | Eigen values – Eigen Vectors | 1                       | 19/12/19                     |                           | TLM1                      |                 |
| 3.     | Properties                   | 2                       | 21/12/19<br>23/12/19         |                           | TLM1                      |                 |
| 4.     | Eigen values – Eigen Vectors | 2                       | 24/12/19<br>26/12/19         |                           | TLM1                      |                 |
| 5.     | Tutorial-3                   | 1                       | 28/12/19                     |                           | TLM3                      |                 |

|  |  |   |                      |                       |      |  |
|--|--|---|----------------------|-----------------------|------|--|
| 6.   | Cayley Hamilton Theorem  | 2 | 30/12/19<br>31/12/19 |                       | TLM1 |  |
| 7.   | Inverse and Powers of a matrix by using Cayley Hamilton Theorem. | 1 | 2/1/20               |                       | TLM1 |  |
| 8.   | Tutorial-4   | 1 | 4/1/20               |                       | TLM3 |  |
| 9.   | Inverse and Powers of a matrix by using Cayley Hamilton Theorem. | 1 | 6/1/20               |                       | TLM1 |  |
| 10.  | Assignment/ Quiz Unit- II  | 1 | 7/1/20               |                       | TLM6 |  |
| 11.  | Revision   | 1 | 8/1/20               |                       |      |  |
| 12.  | Revision   | 1 | 9/1/20               |                       |      |  |
| No. of classes required to complete Unit-II: |  |   | 15                   | No. of classes taken: |      |  |

### UNIT-III: Linear Transformation and Diagonalization

| 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 Unit III  | 1                       | 28/1/20                      |                           | TLM1                      |                 |
| 2.  | Linear transformation of Matrices                                     | 1                       | 29/1/20                      |                           | TLM1                      |                 |
| 3.  | Orthogonal transformation of Matrices                                 | 1                       | 30/1/20                      |                           | TLM1                      |                 |
| 4.  | Tutorial-5  | 1                       | 1/2/20                       |                           | TLM3                      |                 |
| 5.  | Similarity of Matrices  | 1                       | 3/2/20                       |                           | TLM1                      |                 |
| 6.  | Diagonalization of a Matrix   | 1                       | 4/2/20                       |                           | TLM1                      |                 |
| 7.  | Orthogonal reduction of real symmetric matrices                       | 1                       | 5/2/20                       |                           | TLM1                      |                 |
| 8.  | Reduction of quadratic form to canonical form                         | 1                       | 6/2/20                       |                           | TLM1                      |                 |
| 9.  | Reduction of quadratic form to canonical form-Rank-Positive, Negative | 1                       | 10/2/20                      |                           | TLM1                      |                 |
| 10.   | Definite-Semi definite-Index, Signature                               | 1                       | 11/2/20                      |                           | TLM1                      |                 |
| 11.   | Definite-Semi definite-Index, Signature                               | 1                       | 12/2/20                      |                           | TLM1                      |                 |
| 12.   | Assignment/Quiz Unit-III  | 1                       | 13/2/20                      |                           | TLM6                      |                 |
| 13.   | Tutorial-6  | 1                       | 15/2/20                      |                           | TLM3                      |                 |
| No. of classes required to complete Unit-III: |   |                         | 13                           | No. of classes taken:     |                           |                 |

### UNIT-IV: Solution of Algebraic and Transcendental equations & Interpolation and finite Differences

| 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 Unit IV               | 1                       | 17/2/20                      |                           | TLM1                      |                 |
| 2.     | Algebraic and Transcendental Equation | 1                       | 18/2/20                      |                           | TLM1                      |                 |

|  |  |   |                  |                       |      |
|--|--|---|------------------|-----------------------|------|
| 3.   | False Position method  | 1 | 19/2/20          |                       | TLM1 |
| 4.   | Newton- Raphson Method in one variable                         | 1 | 20/2/20          |                       | TLM1 |
| 5.   | Tutorial-7   | 1 | 22/2/20          |                       | TLM3 |
| 6.   | Introduction – Finite differences                              | 1 | 24/2/20          |                       | TLM1 |
| 7.   | Forward Differences- Backward differences –Central differences | 1 | 25/2/20          |                       | TLM1 |
| 8.   | Forward Differences- Backward differences –Central differences | 1 | 26/2/20          |                       | TLM1 |
| 9.   | Symbolic relations and separation of symbols                   | 1 | 27/2/20          |                       | TLM1 |
| 10.  | Tutorial-8   | 1 | 29/2/20          |                       | TLM3 |
| 11.  | Newton’s formulae for interpolation                            | 2 | 2/3/20<br>3/3/20 |                       | TLM1 |
| 12.  | Lagrange’s Interpolation                                       | 2 | 4/3/20<br>5/3/20 |                       | TLM1 |
| 13.  | Assignment/Quiz Unit-IV  | 1 | 7/3/20           |                       | TLM6 |
| No. of classes required to complete Unit-IV: |  |   | 15               | No. of classes taken: |      |

#### UNIT-V : Numerical Solution of Linear System of Equations& Curve Fitting

| 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 UNIT V                      | 1                       | 9/3/20                       |                           |                           |                 |
| 2.  | Gauss –Seidal method                        | 2                       | 11/3/20<br>12/3/20           |                           |                           |                 |
| 3.  | Gauss Jacobi Method                         | 2                       | 16/3/20<br>17/3/20           |                           |                           |                 |
| 4.  | Determination of EIGEN values by iteration. |                         | 18/3/20                      |                           |                           |                 |
| 5.  | Fitting of a Straight line                  | 1                       | 19/3/20                      |                           |                           |                 |
| 6.  | Tutorial-9                                  | 1                       | 21/3/20                      |                           |                           |                 |
| 7.  | Fitting of a second degree polynomial       | 1                       | 23/3/20                      |                           |                           |                 |
| 8.  | Fitting of exponential curves               | 1                       | 24/3/20                      |                           |                           |                 |
| 9.  | Fitting of a power curve                    | 1                       | 25/3/20                      |                           |                           |                 |
| 10.   | Assignment/Quiz UNIT-V                      | 1                       | 26/3/20                      |                           |                           |                 |
| 11.   | Tutorial-10                                 | 1                       | 28/3/20                      |                           |                           |                 |
| No. of classes required to complete UNIT-V: |   |                         | 13                           | No. of classes taken:     |                           |                 |

#### Contents 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.  | Solving System of Equations using other methods | 1                       | 16/3/20                      |                           |                           |                 |
| No. of classes required to complete UNIT-V: |   |                         |                              | No. of classes taken:     |                           |                 |



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

## PART-C

### EVALUATION PROCESS (R17 Regulations):

| Evaluation Task  | Marks |
|--|-------|
| Assignment-I (Unit-I)                                      | A1=5  |
| Assignment-II (Unit-II)                                    | A2=5  |
| I-Mid Examination (Units-I & II)                           | M1=20 |
| 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=20 |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10 |
| Attendance   | B=5   |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5   |
| Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)            | M=20  |
| Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)           | B=10  |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40    |
| Semester End Examination (SEE)                             | 60    |
| Total Marks = CIE + SEE                                    | 100   |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.   |

Course Instructor  
(K. N. V. Lakshmi)

Course Coordinator  
(Dr. K. R. Kavitha)

Module Coordinator  
(Dr. A. Rami Reddy)

HOD  
(Dr. A. Rami Reddy)



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## COURSE HANDOUT

### PART-A

Name of Course Instructor : G BALU NARASIMHARAO  
Course Name & Code : Linux Programming Lab&17CI61  
L-T-P Structure : 2-0-0 Credits : 2  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- B A.Y : 2019-20

**PRE-REQUISITE:** Knowledge in Operating Systems

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** Introduce the student to Linux kernel programming techniques. Review basic concepts covered in the core Operating Systems course prerequisite as they are realized in the Linux platform. Discuss the Process, Inter-Process Communication Techniques and Network Implementation in Linux.

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

|      |  |
|------|--|
| CO 1 | Explore LINUX Ecosystem.   |
| CO 2 | Implement Shell scripting in LINUX Kernel.   |
| CO 3 | Design AWK scripts for text processing and Apply Regular Expressions for Pattern Matching. |
| CO 4 | Design Scripts for Process Creation & Network Management.                                  |

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

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

### **TEXT BOOKS:**

**T1** Sumitabha Das., “Your Unix The Ultimate Guide”, TMH Publications, 2001.

**T2** M.G. Venkatesh Murthy, “Introduction to UNIX & SHELL programming”, Pearson Education, First Edition, New Delhi, 2009.

**REFERENCE BOOKS:**

- R1** B.A. Forouzan & R.F. Giberg, “Unix and shell Programming”, Thomson, First Edition, New Delhi, 2003.
- R2** E. Foster – Johnson & others, “Beginning shell scripting”, John Wiley & sons, First Edition, New Delhi, 2008.
- R3** Sumitabha Das, “Unix concepts and applications”, TMH Publications, 4<sup>th</sup> Edition,.
- R4** Gaham Glass & K. Ables, Unix for programmers and users, pearson education, 3<sup>rd</sup> edition,.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I: Introduction to Linux**

| S.No. | Experiments to be covered  | No. of sessions Required (1 session 2 hrs) | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | HOD Sign Weekly |
|-------|--|--|------------------------------|---------------------------|---------------------------|-----------------|
| 1.    | <b>Week1</b><br><b>Session-1</b><br>a)Log into the system<br>b) Use vi editor to create a file called myfile.txt which contains some text.<br>c) Correct typing errors during creation.<br>d)Save the file<br>e)logout of the system<br><b>Session-2</b><br>a)Log into the system<br>b)open the file created in session 1<br>c)Add some text<br>d)Change some text<br>e)Delete some text<br>f)Save the Changes<br>g)Logout of the system   | 1  | 28-11-2019                   |                           | <b>TLM4</b>               |                 |
| 2.    | <b>Week2</b><br>a. log in the system<br>b Use the appropriate commandsto determine your login shell<br>c. use the / etc/ passwd file to Verify the result of step b.<br>d. use the who command redirect the result to a file called myfile.txt. Use the more command to see the contents of myfile.txt.<br>e) Use the date and who commandsin sequence? (in one line) suchthat the output of date willdisplay on the screen and theoutput of who will be redirected toa file called myfile1.txt. Use the | 1  | 05-12-2019                   |                           | <b>TLM4</b>               |                 |
| 3.    | <b>Week3</b><br>Log into the system<br>Use the cat command to create a file containing the following data.Call it mytable.txt use tabs to separate the fields  | 1  | 12-12-2019                   |                           | <b>TLM4</b>               |                 |

|    |   |   |                               |  |             |
|----|---|---|-------------------------------|--|-------------|
|    | <p>1425 ravi 15.65<br/> 4320 ramu 26.27<br/> 6830 sita 36.15<br/> 1450 raju 21.86</p> <p>a. use the cat command to display the file, mytable.txt<br/> b. use the vi command to correct any errors in the file, mytable.txt<br/> c. use the sort command to sort the file mytable.txt according to the first field. Call the sorted file mytable.txt (same name)<br/> d. print the file mytable.txt<br/> e. use the cut &amp; paste commands to swap fields 2 and 3 my table. Call it mytable.txt (same name)<br/> f. print the new file, mytable.txt<br/> g. logout of the system</p>   |   |                               |  |             |
| 4. | <p><b>Week4</b></p> <p>a) Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.<br/> b) Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.<br/> c) Write a shell script that determines the period for which a specified user is working on the system.</p>  | 1 | 19-12-2019<br>&<br>26-12-2019 |  | <b>TLM4</b> |
| 5. | <p><b>Week5</b></p> <p>Write a shell script that computes the total and average marks of a student according to the following</p> <p>If average marks <math>\geq 69</math> then result is “Distinction”<br/> If average marks <math>\geq 59</math> and <math>\leq 70</math> then result is “First Class”<br/> If average marks <math>\geq 49</math> and <math>\leq 60</math> then result is “Second Class”<br/> If average marks <math>\leq 50</math> then result is “Pass”<br/> Note that any subject marks <math>\leq 40</math> then result is “Fail”<br/> Accept student name and six subject marks through the keyboard</p> | 1 | 2-01-2020                     |  | <b>TLM4</b> |
| 6. | <p><b>Week6</b></p> <p>a) Write an interactive file handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the filename, new name and so on.</p>  | 1 |                               |  |             |

|     |   |   |                              |  |             |
|-----|---|---|------------------------------|--|-------------|
|     | <p>b) Write shell script that takes a login name as command – line argument and reports when that person logs in</p> <p>c) Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.</p>                             |   | 09-01-2020                   |  |             |
| 7.  | <p><b>Week7</b></p> <p>a)Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers.</p> <p>b)Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.</p>                          | 1 | 30-1-2020<br>&<br>06-02-2020 |  | <b>TLM4</b> |
| 8.  | <p><b>Week8</b></p> <p>a) Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.</p> <p>b) Develop an interactive script that ask for a word and a file name and then tells how many times that word occurred in the file.</p>                          | 1 | 13-2-2020                    |  | <b>TLM4</b> |
| 9.  | <p><b>Week9</b></p> <p>a) Write a shell script to perform the following string operations:</p> <p>i)To extract a sub-string from a given string.</p> <p>ii)To find the length of a given string.</p> <p>b) Write a awk script to find the number of characters, words and lines in a file.</p>  | 2 | 20-2-2020<br>27-2-2020       |  | <b>TLM4</b> |
| 10. | <p><b>Week10</b></p> <p>Write a C program that takes one or more file or directory names as Command line input and reports the following information on the file:</p> <p>i) File type</p> <p>ii) Number of links</p> <p>iii) Read, write and execute permissions</p> <p>iv) Time of last access</p> <p>(Note : Use stat/fstat system calls)</p> | 1 | 05-3-2020                    |  | <b>TLM4</b> |
| 11. | <p><b>Week11</b></p> <p>Write C programs that simulate the following unix commands:</p> <p>a) mv</p> <p>b) cp</p> <p>c) ls</p> <p>(Use system calls)</p>  | 1 | 12-3-2020                    |  | <b>TLM4</b> |

|   |   |   |            |  |             |  |
|---|---|---|------------|--|-------------|--|
| 12.   | <b>Week12</b><br>Write a program for bubble sorting using fork system call in linux | 1 | 19-3-2020  |  | <b>TLM4</b> |  |
| 13.   | <b>INTERNAL LAB EXAM</b>  | - | 26-03-2020 |  |             |  |
| <b>II MID EXAMINATIONS 30-3-2020 TO 4-04-2020</b> |   |   |            |  |             |  |

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

## **PART-C**

### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)            | M=20         |
| Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)           | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |  |
|--------------|--|
| <b>PSO 1</b> | Programming Paradigms: To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms. 2. Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students. 3. Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |
| <b>PSO 2</b> | Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.   |

Course Instructor  
(Name)

Course Coordinator  
(Name)

Module Coordinator  
(Name)

HOD  
(Name)





# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## COURSE HANDOUT

### PART-A

Name of Course Instructor : M.SRI BALA  
Course Name & Code : Linux Programming & 17CS01  
L-T-P Structure : 3-0-0 Credits : 3  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- A A.Y : 2019-20

**PRE-REQUISITE:** Knowledge in Operating Systems

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** Introduce the student to Linux kernel programming techniques. Review basic concepts covered in the core Operating Systems course prerequisite as they are realized in the Linux platform. Discuss the Process, Inter-Process Communication Techniques and Network Implementation in Linux.

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

|      |  |
|------|--|
| CO 1 | Explore LINUX Ecosystem.   |
| CO 2 | Implement Shell scripting in LINUX Kernel.   |
| CO 3 | Design AWK scripts for text processing and Apply Regular Expressions for Pattern Matching. |
| CO 4 | Design Scripts for Process Creation & Network Management.                                  |
| CO5  | Analyze multi-processing in Linux kernel.  |

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

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

**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** Sumitabha Das., “Your Unix The Ultimate Guide”, TMH Publications, 2001.

**T2** M.G. Venkatesh Murthy, “Introduction to UNIX & SHELL programming”, Pearson

**REFERENCE BOOKS:**

- R1** B.A. Forouzan & R.F. Giberg, “Unix and shell Programming”, Thomson, First Edition, New Delhi, 2003.
- R2** E. Foster – Johnson & others, “Beginning shell scripting”, John Wiley & sons, First Edition, New Delhi, 2008.
- R3** Sumitabha Das, “Unix concepts and applications”, TMH Publications, 4<sup>th</sup> Edition,.
- R4** Gaham Glass & K. Ables, Unix for programmers and users, pearson education, 3<sup>rd</sup> edition,.

**PART-B**

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

**UNIT-I: Introduction to Linux**

| 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 Operating systems  | 1                       | 25-11-2019                   |                           |                           |                 |
| 2.  | Introduction to Operating systems  | 1                       | 29-11-2019                   |                           |                           |                 |
| 3.  | Features of Linux kernel and shell | 1                       | 30-11-2019                   |                           |                           |                 |
| 4.  | Linux file systems                 | 2                       | 07-12-2019<br>09-12-2019     |                           |                           |                 |
| 5.  | Linux file systems                 | 2                       | 13-12-2019<br>14-12-2019     |                           |                           |                 |
| 6.  | Linux Commands                     | 1                       | 16-12-2019                   |                           |                           |                 |
| 7.  | Linux Commands                     | 2                       | 20-12-2019<br>21-12-2019     |                           |                           |                 |
| No. of classes required to complete UNIT-I: |                                    |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-II: Introduction to Shell and Shell programming**

| 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 Shell         | 2                       | 23-12-2019<br>27-12-2019     |                           | TLM1<br>TLM2              |                 |
| 2.  | Shell commands                | 2                       | 28-12-2019<br>30-12-2019     |                           | TLM1<br>TLM2              |                 |
| 3.  | Shell programming (VI editor) | 2                       | 03-01-2020<br>04-01-2020     |                           | TLM1<br>TLM2              |                 |
| 4.  | Shell programming             | 1                       | 06-01-2020                   |                           | TLM1<br>TLM2              |                 |
| 5.  | Shell programming             | 2                       | 10-01-2020<br>11-01-2020     |                           | TLM1<br>TLM2              |                 |
| No. of classes required to complete UNIT-II:            |                               |                         |                              | No. of classes taken:     |                           |                 |
| <b>I MID EXAMINATIONS FROM 20-10-2020 TO 25-10-2020</b> |                               |                         |                              |                           |                           |                 |

**UNIT-III: Filters, regular expressions and Programming with AWK**

| 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 Filters and commands | 2                       | 27-01-2020<br>31-01-2020     |                           | TLM1<br>TLM2              |                 |
| 2.    | Introduction to Filters and          | 2                       | 1-02-2020                    |                           | TLM1                      |                 |

|   |                         |   |                          |                       |              |  |
|---|-------------------------|---|--------------------------|-----------------------|--------------|--|
|   | commands                |   | 3-02-2020                |                       | TLM2         |  |
| 3.  | Filters and their usage | 1 | 03-02-2020               |                       | TLM1<br>TLM2 |  |
| 4.  | Filters and their usage | 2 | 07-02-2020<br>08-02-2020 |                       | TLM1<br>TLM2 |  |
| 5.  | Regular expression      | 1 | 10-02-2020               |                       | TLM1<br>TLM2 |  |
| 6.  | Regular expression      | 1 | 14-02-2020               |                       | TLM1<br>TLM2 |  |
| 7.  | Introduction to AWK     | 1 | 15-02-2020               |                       | TLM1<br>TLM2 |  |
| 8.  | AWK scripting           | 1 | 17-02-2020               |                       | TLM1<br>TLM2 |  |
| 9.  | AWK scripting           | 1 | 22-02-2020               |                       | TLM1<br>TLM2 |  |
| 10.   | AWK scripting           | 1 | 24-02-2020               |                       | TLM1<br>TLM2 |  |
| No. of classes required to complete UNIT-III: |                         |   |                          | No. of classes taken: |              |  |

#### UNIT-IV : Linux internals and networking

| 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.   | Linux process and process attributes | 2                       | 28-02-2020<br>29-02-2020     |                           | TLM1<br>TLM2              |                 |
| 2.   | Linux kernel and system calls        | 1                       | 02-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 3.   | System callas and signals            | 1                       | 06-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 4.   | Linux Memory Management              | 1                       | 07-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 5.   | Linux networking                     | 1                       | 09-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 6.   | Network Transport protocols          | 2                       | 13-03-2020<br>14-03-2020     |                           | TLM1<br>TLM2              |                 |
| 7.   | Network internals                    | 1                       | 16-03-2020                   |                           | TLM1<br>TLM2              |                 |
| No. of classes required to complete UNIT-IV: |                                      |                         |                              | No. of classes taken:     |                           |                 |

#### UNIT-V:Multi-Processing

| 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 multi-processing      | 1                       | 20-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 2.  | Problems with multi-processor systems | 1                       | 21-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 3.  | Changes to the kernel                 | 1                       | 23-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 4.  | compiling LINUX SMP                   | 1                       | 27-03-2020                   |                           | TLM1<br>TLM2              |                 |
| 5.  | Revision                              | 1                       | 28-03-2020                   |                           | TLM1<br>TLM2              |                 |
| No. of classes required to complete UNIT-V:       |                                       |                         |                              | No. of classes taken:     |                           |                 |
| <b>II MID EXAMINATIONS 30-3-2020 TO 4-04-2020</b> |                                       |                         |                              |                           |                           |                 |

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)             | M=20         |
| Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)            | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |

## PART-D

### **PROGRAMME OUTCOMES (POs):**

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
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| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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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### **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

|              |  |
|--------------|--|
| <b>PSO 1</b> | Programming Paradigms: To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms. 2. Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students. 3. Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |
| <b>PSO 2</b> | Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.   |

Course Instructor  
(Name)

Course Coordinator  
(Name)

Module Coordinator  
(Name)

HOD  
(Name)



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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : M.SRI BALA  
 Course Name & Code : Linux Programming Lab&17CI61  
 L-T-P Structure : 3-0-0 Credits : 3  
 Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- A A.Y : 2019-20

**PRE-REQUISITE:** Knowledge in Operating Systems

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** Introduce the student to Linux kernel programming techniques. Review basic concepts covered in the core Operating Systems course prerequisite as they are realized in the Linux platform. Discuss the Process, Inter-Process Communication Techniques and Network Implementation in Linux.

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

|      |  |
|------|--|
| CO 1 | Explore LINUX Ecosystem.   |
| CO 2 | Implement Shell scripting in LINUX Kernel.   |
| CO 3 | Design AWK scripts for text processing and Apply Regular Expressions for Pattern Matching. |
| CO 4 | Design Scripts for Process Creation & Network Management.                                  |

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

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

#### **TEXT BOOKS:**

- T1** Sumitabha Das., “Your Unix The Ultimate Guide”, TMH Publications, 2001.  
**T2** M.G. Venkatesh Murthy, “Introduction to UNIX & SHELL programming”, Pearson Education, First Edition, New Delhi, 2009.

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- R2** E. Foster – Johnson & others, “Beginning shell scripting”, John Wiley & sons, First Edition, New Delhi, 2008.
- R3** Sumitabha Das, “Unix concepts and applications”, TMH Publications, 4<sup>th</sup> Edition,.
- R4** Gaham Glass & K. Ables, Unix for programmers and users, pearson education, 3<sup>rd</sup> edition,.

## **PART-B**

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

#### **UNIT-I: Introduction to Linux**

| <b>S.No.</b> | <b>Experiments to be covered</b>  | <b>No. of sessions Required (1 session 2 hrs)</b> | <b>Tentative Date of Completion</b> | <b>Actual Date of Completion</b> | <b>Teaching Learning Methods</b> | <b>HOD Sign Weekly</b> |
|--------------|---|---|-------------------------------------|----------------------------------|----------------------------------|------------------------|
| 1.           | <p><b>Week1</b><br/> <b>Session-1</b><br/>           a)Log into the system<br/>           b) Use vi editor to create a file called myfile.txt which contains some text.<br/>           c) Correct typing errors during creation.<br/>           d)Save the file<br/>           e)logout of the system<br/> <b>Session-2</b><br/>           a)Log into the system<br/>           b)open the file created in session 1<br/>           c)Add some text<br/>           d)Change some text<br/>           e)Delete some text<br/>           f)Save the Changes<br/>           g)Logout of the system</p> | 1   | 27-11-2019                          |                                  | <b>TLM4</b>                      |                        |
| 2.           | <p><b>Week2</b><br/>           a. log in the system<br/>           b. Use the appropriate commands to determine your login shell<br/>           c. use the / etc/ passwd file to Verify the result of step b.<br/>           d. use the who command redirect the result to a file called myfile.txt. Use the more command to see the contents of myfile.txt.<br/>           e. Use the date and who commands in sequence? (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile1.txt. Use the</p>                  | 1   | 04-12-2019                          |                                  | <b>TLM4</b>                      |                        |
| 3.           | <p><b>Week3</b><br/>           Log into the system<br/>           Use the cat command to create a file containing the following data.<br/>           Call it mytable.txt use tabs to separate the fields</p>  | 1   | 11-12-2019                          |                                  | <b>TLM4</b>                      |                        |



|    |  |   |                         |  |  |             |
|----|--|---|-------------------------|--|--|-------------|
|    | <p>1425 ravi 15.65<br/> 4320 ramu 26.27<br/> 6830 sita 36.15<br/> 1450 raju 21.86</p> <p>a. use the cat command to display the file, mytable.txt<br/> b. use the vi command to correct any errors in the file, mytable.txt<br/> c. use the sort command to sort the file mytable.txt according to the first field. Call the sorted file mytable.txt (same name)<br/> d. print the file mytable.txt<br/> e. use the cut &amp; paste commands to swap fields 2 and 3 my table. Call it mytable.txt (same name)<br/> f. print the new file, mytable.txt<br/> g. logout of the system</p>  |   |                         |  |  |             |
| 4. | <p><b>Week4</b></p> <p>a) Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.<br/> b) Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.<br/> c) Write a shell script that determines the period for which a specified user is working on the system.</p>   | 1 | 18-12-2019              |  |  | <b>TLM4</b> |
| 5. | <p><b>Week5</b></p> <p>Write a shell script that computes the total and average marks of a student according to the following</p> <p>If average marks <math>\geq 69</math> then result is “Distinction”<br/> If average marks <math>\geq 59</math> and <math>\leq 70</math> then result is “First Class”<br/> If average marks <math>\geq 49</math> and <math>\leq 60</math> then result is “Second Class”<br/> If average marks <math>\leq 50</math> then result is “Pass”<br/> Note that any subject marks <math>\leq 40</math> then result is “Fail”<br/> Accept student name and six subject marks through the key board</p> | 1 | 8-01-2020               |  |  | <b>TLM4</b> |
| 6. | <p><b>Week6</b></p> <p>a) Write an interactive filehandling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program</p>  | 1 | 29-01-2020<br>5-02-2020 |  |  |             |

|     |   |   |                       |  |             |
|-----|---|---|-----------------------|--|-------------|
|     | <p>ask the user for the necessary information, such as the file name, new name and so on.</p> <p>b) Write shell script that takes a login name as command – line argument and reports when that person logs in</p> <p>c) Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.</p> |   |                       |  |             |
| 7.  | <p><b>Week7</b></p> <p>a)Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers.</p> <p>b)Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.</p>  | 1 | 12-2-2020             |  | <b>TLM4</b> |
| 8.  | <p><b>Week8</b></p> <p>a) Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.</p> <p>b) Develop an interactive script that ask for a word and a file name and then tells how many times that word occurred in the file.</p>  | 1 | 19-2-2020             |  | <b>TLM4</b> |
| 9.  | <p><b>Week9</b></p> <p>a) Write a shell script to perform the following string operations:</p> <p>i)To extract a sub-string from a given string.</p> <p>ii)To find the length of a given string.</p> <p>b) Write a awk script to find the number of characters, words and lines in a file.</p>  | 2 | 26-2-2020<br>5-3-2020 |  | <b>TLM4</b> |
| 10. | <p><b>Week10</b></p> <p>Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:</p> <p>i) File type</p> <p>ii) Number of links</p> <p>iii) Read, write and execute permissions</p> <p>iv) Time of last access</p> <p>(Note : Use stat/fstat system calls)</p>   | 1 | 4-3-2020              |  | <b>TLM4</b> |
| 11. | <b>Week11</b>   | 1 | 11-3-2020             |  | <b>TLM4</b> |

|   |  |   |           |  |             |
|---|--|---|-----------|--|-------------|
|   | Write C programs that simulate the following unix commands:<br>a) mv<br>b) cp<br>c) ls<br>(Use system calls) |   |           |  |             |
| 12.   | <b>Week12</b><br>Write a program for bubble sorting using fork system call in linux                          | 1 | 18-3-2020 |  | <b>TLM4</b> |
| <b>Internal lab examination on 26-04-2020</b>     |  |   |           |  |             |
| <b>II MID EXAMINATIONS 30-3-2020 TO 4-04-2020</b> |  |   |           |  |             |

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

## **PART-C**

### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)            | M=20         |
| Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)           | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |

## PART-D

### **PROGRAMME OUTCOMES (POs):**

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):**

|              |  |
|--------------|--|
| <b>PSO 1</b> | Programming Paradigms: To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms. 2. Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students. 3. Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |
| <b>PSO 2</b> | Data Engineering: To inculcate an ability to Analyze, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.   |

Course Instructor  
(Name)

Course Coordinator  
(Name)

Module Coordinator  
(Name)

HOD  
(Name)



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : T.Chandrasekhar Yadav  
Course Name & Code : Professional Ethics & Human Values  
L-T-P Structure : 3-0-0 Credits : 0  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- A A.Y : 2019-20

#### **PRE-REQUISITE: ETHICS & VALUES**

#### **COURSE EDUCATIONAL OBJECTIVES (CEOs):**

- ❖ To create an awareness on engineering ethics and human values.
- ❖ To adumbrate the inevitability of different intellectual property rights like patents, copyrights, trademarks, and trade secret.
- ❖ To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth.
- ❖ To explicate the professional and societal responsibilities of the engineers.
- ❖ To make the student realize the sensitiveness associated with experimentation process

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

|      |   |
|------|---|
| CO 1 | Acquires the basic concepts of human values & also gain the connotations of ethical theories  |
| CO 2 | To explicate the professional and societal responsibilities of the engineers.   |
| CO 3 | To make the student realize the sensitiveness associated with experimentation process   |
| CO 4 | To adumbrate the inevitability of different intellectual property rights like patents, copyrights, trademarks, and trade secret.    |
| CO 5 | To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth. |



## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Engineering Ethics

| 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 Course and COs                                 | 1                       | 27-11-19                     |                           | TLM1                      |                 |
| 2.   | Introduction to Unit-I   | 1                       | 28-11-19                     |                           | TLM1                      |                 |
| 3.   | UNIT-I<br>Introduction about engineering ethics                | 1                       | 30-11-19                     |                           | TLM1                      |                 |
| 4.   | Senses of engineering ethics, Variety of moral issues          | 1                       | 04-12-19                     |                           | TLM1                      |                 |
| 5.   | Moral dilemmas moral autonomy                                  | 1                       | 05-12-19                     |                           | TLM1                      |                 |
| 6.   | Kohlberg's theory  | 1                       | 07-12-19                     |                           | TLM1                      |                 |
| 7.   | Gilligan theory, Consensus and controversy                     | 2                       | 11-12-19&<br>12-12-19        |                           | TLM1                      |                 |
| 8.   | Models of professional roles about right action, self interest | 1                       | 18-12-19                     |                           | TLM1                      |                 |
| 9.   | Customs and religion, uses of ethical theories                 | 1                       | 19-12-19                     |                           | TLM1                      |                 |
| 10.  | Uses of ethical theories                                       | 1                       | 21-12-19                     |                           | TLM1                      |                 |
| 11.  | Assignment-1   |                         |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-I: 10 |  |                         |                              | No. of classes taken:     |                           |                 |

#### UNIT-II: Human Values

| 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 about values                               | 1                       | 26-12-19                     |                           | TLM1                      |                 |
| 2.   | Morals ethics and values, Integrity                     | 1                       | 28-12-19                     |                           | TLM1                      |                 |
| 3.   | Work ethic, Service learning, Civic virtue              | 1                       | 02-01-20                     |                           | TLM1                      |                 |
| 4.   | Respect for others, living peacefully, Caring, sharing, | 1                       | 04-01-20                     |                           | TLM1                      |                 |
| 5.   | Honesty, courage, Valuing time, cooperation             |                         |                              |                           | TLM1                      |                 |
| 6.   | Commitment, Empathy, self confidence                    | 1                       | 08-01-20                     |                           | TLM1                      |                 |
| 7.   | Character, spirituality                                 | 1                       | 09-01-20                     |                           | TLM1                      |                 |
| 8.   | Assignment-2  |                         |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-II: 6 |   |                         |                              | No. of classes taken:     |                           |                 |
| IST MID EXAMS : 20-01-20 to 25-01-20           |   |                         |                              |                           |                           |                 |



**UNIT-III: Engineering as Social Experimentation**

| 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.  | Engineering as experimentation introduction   | 1                       | 29-01-20                     |                           | TLM1                      |                 |
| 2.  | Engineering Projects VS. Standard Experiments | 1                       | 30-01-20                     |                           | TLM1                      |                 |
| 3.  | Engineers as responsible experimenters        | 1                       | 01-02-20                     |                           | TLM1                      |                 |
| 4.  | Codes of ethics, Industrial Standards         | 1                       | 05-02-20                     |                           | TLM1                      |                 |
| 5.  | A balanced outlook on law                     | 1                       | 06-02-20                     |                           | TLM1                      |                 |
| 6.  | The challenger case study                     | 1                       | 08-02-20                     |                           | TLM2                      |                 |
| 7.  | Assignment-3                                  |                         |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-III: 6 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-IV: Safety, Responsibilities and Rights**

| 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 about Safety, and rights   | 1                       | 12-02-20                     |                           | TLM1                      |                 |
| 2.   | Assessment of safety and risk   | 1                       | 13-02-20                     |                           | TLM1                      |                 |
| 3.   | Risk benefit analysis and reducing risk ,Three Mile Island and Chernobyl case study | 1                       | 15-02-20                     |                           | TLM2                      |                 |
| 4.   | Collegiality and loyalty, Respect for authority,                                    | 1                       | 19-02-20                     |                           | TLM1                      |                 |
| 5.   | Collective bargaining-Confidentiality   | 1                       | 20-02-20                     |                           | TLM1                      |                 |
| 6.   | Conflicts of interest, Occupational crime   | 1                       | 22-02-20                     |                           | TLM1                      |                 |
| 7.   | Professional Rights, Employee rights  | 1                       | 26-02-20                     |                           | TLM1                      |                 |
| 8.   | Intellectual Property Rights (IPR)  | 1                       | 27-02-20                     |                           | TLM1                      |                 |
| 9.   | Assignment-4  |                         |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-IV: 8 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-V: Global 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 |
|-------|---|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 1.    | MNC's, Morality in MNC's                    | 1                       | 29-02-20                     |                           | TLM1                      |                 |
| 2.    | Environmental Ethics                        | 1                       | 04-03-20                     |                           | TLM1                      |                 |
| 3.    | Computer ethics.                            | 1                       | 05-03-20                     |                           | TLM1                      |                 |
| 4.    | Weapons development                         | 1                       | 07-03-20                     |                           | TLM1                      |                 |
| 5.    | Engineers as managers, consulting engineers | 2                       | 11-02-20& 12-03-20           |                           | TLM1                      |                 |

|   |                                       |   |                       |                       |       |
|---|---------------------------------------|---|-----------------------|-----------------------|-------|
| 6.  | Engineers as expert witnesses         | 1 | 18-03-20              |                       | TLM1  |
| 7.  | Engineers as Advisors & Policy Makers | 2 | 19-03-20&<br>21-03-20 |                       | TLM1  |
| 8.  | Moral leadership                      | 1 | 26-03-20              |                       | TLM1  |
|   | Assignment-5                          |   |                       |                       | TLM-3 |
| 9.  | Sample code of Ethics                 | 1 | 28-03-20              |                       | TLM1  |
| No. of classes required to complete UNIT-V:11 |                                       |   |                       | No. of classes taken: |       |

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)             | M=20         |
| Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)            | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |

## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
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### PROGRAMME SPECIFIC OUTCOMES (PSOs):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming paradigms:</b> To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms. |
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| <b>PSO 3</b> | <b>Software Engineering:</b> Develop an ability to implement various processes/methodologies/practices employed in design, validation, testing and maintenance of software products |

Course Instructor  
(T.Chandrasekhar  
Yadav)

Course Coordinator  
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Module Coordinator  
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HOD  
(Dr.A.Adishesha  
Reddy)



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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : T.Chandrasekhar Yadav  
Course Name & Code : Professional Ethics & Human Values  
L-T-P Structure : 3-0-0 Credits : 0  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections- B A.Y : 2019-20

**PRE-REQUISITE: ETHICS & VALUES**

**COURSE EDUCATIONAL OBJECTIVES (CEOs):**

- ❖ To create an awareness on engineering ethics and human values.
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**COURSE OUTCOMES (COs):** At the end of the course, students are able to

|      |   |
|------|---|
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| CO 5 | To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth. |



## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Engineering Ethics

| 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 Course and COs                                    | 1                       | 28-11-19                     |                           | TLM1                      |                 |
| 2.   | Introduction to Unit-I  | 1                       | 29-11-19                     |                           | TLM1                      |                 |
| 3.   | UNIT-I<br>Introduction about engineering ethics                   | 1                       | 30-11-19                     |                           | TLM1                      |                 |
| 4.   | Senses of engineering ethics,<br>Variety of moral issues          | 1                       | 05-12-19                     |                           | TLM1                      |                 |
| 5.   | Moral dilemmas moral autonomy                                     | 1                       | 06-12-19                     |                           | TLM1                      |                 |
| 6.   | Kohlberg's theory   | 1                       | 07-12-19                     |                           | TLM1                      |                 |
| 7.   | Gilligan theory,<br>Consensus and controversy                     | 2                       | 12-12-19&<br>13-12-19        |                           | TLM1                      |                 |
| 8.   | Models of professional roles about<br>right action, self interest | 1                       | 19-12-19                     |                           | TLM1                      |                 |
| 9.   | Customs and religion, uses of<br>ethical theories                 | 1                       | 20-12-19                     |                           | TLM1                      |                 |
| 10.  | Uses of ethical theories  | 1                       | 21-12-19                     |                           | TLM1                      |                 |
| 11.  | Assignment-1  |                         |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-I: 11 |   |                         |                              | No. of classes taken:     |                           |                 |

#### UNIT-II: Human Values

| 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 about values                                  | 1                       | 26-12-19                     |                           | TLM1                      |                 |
| 2.   | Morals ethics and values,<br>Integrity                     | 1                       | 27-12-19                     |                           | TLM1                      |                 |
| 3.   | Work ethic, Service learning,<br>Civic virtue              | 1                       | 28-12-19                     |                           | TLM1                      |                 |
| 4.   | Respect for others, living<br>peacefully, Caring, sharing, | 1                       | 02-01-20                     |                           | TLM1                      |                 |
| 5.   | Honesty, courage, Valuing time,<br>cooperation             | 1                       | 04-01-20                     |                           | TLM1                      |                 |
| 6.   | Commitment, Empathy, self<br>confidence                    | 1                       | 10-01-20                     |                           | TLM1                      |                 |
| 7.   | Character, spirituality                                    | 1                       | 11-01-20                     |                           | TLM1                      |                 |
| 8.   | Assignment-2   |                         |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-II: 7 |  |                         |                              | No. of classes taken:     |                           |                 |
| IST MID EXAMS : 20-01-20 to 25-01-20           |  |                         |                              |                           |                           |                 |

**UNIT-III: Engineering as Social Experimentation**

| 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.  | Engineering as experimentation introduction   | 1                       | 30-01-20                     |                           | TLM1                      |                 |
| 2.  | Engineering Projects VS. Standard Experiments | 1                       | 31-01-20                     |                           | TLM1                      |                 |
| 3.  | Engineers as responsible experimenters        | 1                       | 01-02-20                     |                           | TLM1                      |                 |
| 4.  | Codes of ethics, Industrial Standards         | 1                       | 07-02-20                     |                           | TLM1                      |                 |
| 5.  | A balanced outlook on law                     | 1                       | 08-02-20                     |                           | TLM1                      |                 |
| 6.  | The challenger case study                     | 1                       | 13-02-20                     |                           | TLM2                      |                 |
| 7.  | Assignment-3                                  |                         |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-III: 6 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-IV: Safety, Responsibilities and Rights**

| 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 about Safety, and rights   | 1                       | 14-02-20                     |                           | TLM1                      |                 |
| 2.   | Assessment of safety and risk   | 1                       | 15-02-20                     |                           | TLM1                      |                 |
| 3.   | Risk benefit analysis and reducing risk ,Three Mile Island and Chernobyl case study | 1                       | 20-02-20                     |                           | TLM2                      |                 |
| 4.   | Collegiality and loyalty, Respect for authority,                                    | 1                       | 21-02-20                     |                           | TLM1                      |                 |
| 5.   | Collective bargaining-Confidentiality   | 1                       | 22-02-20                     |                           | TLM1                      |                 |
| 6.   | Conflicts of interest, Occupational crime   | 1                       | 27-02-20                     |                           | TLM1                      |                 |
| 7.   | Professional Rights, Employee rights  | 1                       | 28-02-20                     |                           | TLM1                      |                 |
| 8.   | Intellectual Property Rights (IPR)  | 1                       | 29-02-20                     |                           | TLM1                      |                 |
| 9.   | Assignment-4  |                         |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-IV: 8 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-V: Global 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 |
|-------|--------------------------|-------------------------|------------------------------|---------------------------|---------------------------|-----------------|
| 1.    | MNC's, Morality in MNC's | 1                       | 05-03-20                     |                           | TLM1                      |                 |
| 2.    | Environmental Ethics     | 1                       | 06-03-20                     |                           | TLM1                      |                 |
| 3.    | Computer ethics.         | 1                       | 07-03-20                     |                           | TLM1                      |                 |
| 4.    | Weapons development      | 1                       | 12-03-20                     |                           | TLM1                      |                 |

|   |   |   |                    |                       |       |
|---|---|---|--------------------|-----------------------|-------|
| 5.  | Engineers as managers, consulting engineers | 1 | 13-02-20           |                       | TLM1  |
| 6.  | Engineers as expert witnesses               | 1 | 19-03-20           |                       | TLM1  |
| 7.  | Engineers as Advisors & Policy Makers       | 2 | 20-03-20& 21-03-20 |                       | TLM1  |
| 8.  | Moral leadership                            | 1 | 26-03-20           |                       | TLM1  |
|   | Assignment-5                                |   |                    |                       | TLM-3 |
| 9.  | Sample code of Ethics                       | 2 | 27-03-20& 28-03-20 |                       | TLM1  |
| No. of classes required to complete UNIT-V:11 |   |   |                    | No. of classes taken: |       |

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulations):**

| <b>Evaluation Task</b>                                     | <b>Marks</b> |
|--|--------------|
| Assignment-I (Unit-I)                                      | A1=5         |
| Assignment-II (Unit-II)                                    | A2=5         |
| I-Mid Examination (Units-I & II)                           | M1=20        |
| 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=20        |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10        |
| Attendance   | B=5          |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5          |
| Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)             | M=20         |
| Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)            | B=10         |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40           |
| Semester End Examination (SEE)                             | 60           |
| Total Marks = CIE + SEE                                    | 100          |



## PART-D

### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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  |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming paradigms:</b> To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms. |
| <b>PSO 2</b> | <b>Data Engineering:</b> To inculcate an ability to analyze, design and implement data driven applications into the students.   |
| <b>PSO 3</b> | <b>Software Engineering:</b> Develop an ability to implement various processes/methodologies/practices employed in design, validation, testing and maintenance of software products |

Course Instructor  
(T.Chandrasekhar  
Yadav)

Course Coordinator  
(T.Chandrasekhar Yadav)

Module Coordinator  
(Dr.V.V.Narsi Reddy)

HOD  
(Dr.A.Adishesha  
Reddy)



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : Dr.Ch.V.Narayana  
Course Name & Code : Software Engineering - 17CI10  
L-T-P Structure : 3-0-0 Credits : 3  
Program/Sem/Sec : B.Tech., CSE., IV-Sem., Sections-A A.Y : 2019-20

PRE-REQUISITE: Programming, Database Management Systems.

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** This course provides the knowledge on importance of software engineering and software development process concepts and learn about different software development process models and how to choose an appropriate model for a project in specific domain.

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

|      |  |
|------|--|
| CO 1 | Outline the fundamentals of software engineering concepts and software process standards.          |
| CO 2 | Demonstrate appropriate process model and software engineering practices                           |
| CO 3 | Analyze requirements of software system and explore all requirements gathering approaches.         |
| CO 4 | Create an architectural design using design engineering process.                                   |
| CO5  | Apply software strategies and software testing tactics for testing real time projects effectively. |

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

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| CO1 | 1    | 1    | -    | -    | -    | -    | -    | -    | -    | -     | 2     | -     | -     | -     | 3     |
| CO2 | 1    | 1    | 3    | -    | -    | -    | -    | -    | -    | 1     | 2     | -     | -     | -     | 3     |
| CO3 | 1    | 2    | -    | -    | -    | -    | -    | -    | -    | 1     | 2     | -     | -     | -     | 3     |
| CO4 | 1    | -    | 3    | 2    | -    | -    | 1    | -    | -    | 1     | -     | -     | -     | -     | 3     |
| CO5 | 1    | -    | -    | 2    | -    | -    | -    | -    | -    | -     | -     | -     | -     | -     | 3     |

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

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

#### TEXT BOOKS:

T1 Roger S.Pressman, Software engineering- A practitioner's Approach, TMH International Edition, 6th edition, 2005.

**REFERENCE BOOKS:**

- R1** Ian Sommerville, Software engineering, Pearson education, 8th edition, 2008.  
**R2** Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.  
**R3** Stephan Schach, Software Engineering, TMH Publications, 2007.  
**R4** Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson education, 2001, 1995, PHI, 2<sup>nd</sup> edition.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I: Introduction to Software Engineering**

| 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 Software Engineering                                  | 1                       | 27-11-19                     |                           | TLM1                      |                 |
| 2.  | Evolving role of Software   | 1                       | 28-11-19                     |                           | TLM1                      |                 |
| 3.  | Software Definition and Characteristics                               | 1                       | 30-11-19                     |                           | TLM1                      |                 |
| 4.  | Changing nature of Software   | 1                       | 04-12-19                     |                           | TLM1                      |                 |
| 5.  | Software Myths  | 1                       | 05-12-19                     |                           | TLM1                      |                 |
| 6.  | Software Engineering – A layered technology                           | 1                       | 07-12-19                     |                           | TLM2                      |                 |
| 7.  | Process Framework – Generic Framework Activities, Umbrella Activities | 2                       | 11-12-19& 12-12-19           |                           | TLM1                      |                 |
| 8.  | CMMI Model  | 1                       | 18-12-19                     |                           | TLM1                      |                 |
| 9.  | Process Patterns, Process Assessment an Approaches                    | 1                       | 19-12-19                     |                           | TLM2                      |                 |
| 10.   | TSP, PSP, Process Technology  | 1                       | 21-12-19                     |                           | TLM1                      |                 |
| 11.   | Product and Process, review on 1 <sup>st</sup> unit                   | 1                       | 26-12-19                     |                           | TLM1                      |                 |
| No. of classes required to complete UNIT-I:12 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-II: : Process Models**

| 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 UNIT-II, Prescriptive Models, Waterfall Model | 1                       | 28-12-19                     |                           | TLM1                      |                 |
| 2.   | Incremental Model   | 1                       | 02-01-20                     |                           | TLM1                      |                 |
| 3.   | RAD Model   | 1                       | 04-01-20                     |                           | TLM1                      |                 |
| 4.   | Evolutionary Process Models                                   | 1                       | 08-01-20                     |                           | TLM1                      |                 |
| 5.   | Specialized Process Models                                    | 1                       | 09-01-20                     |                           | TLM1                      |                 |
| 6.   | Unified Process, Software Engineering Practices               | 1                       | 11-01-20                     |                           | TLM1                      |                 |
| 7.   | Software Engineering Practices                                | 1                       | 29-01-20                     |                           | TLM1                      |                 |
| 8.   | Assignment/Quiz   | 1                       | 30-01-20                     |                           | TLM1                      |                 |
| No. of classes required to complete UNIT-II:08 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-III: Requirements Engineering**

| 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 UNIT-III                                     | 1                       | 01-02-20                     |                           | TLM1                      |                 |
| 2.  | Requirements Engineering: Description                        | 1                       | 05-02-20                     |                           | TLM1                      |                 |
| 3.  | RE Tasks, Initiating the RE Process                          | 1                       | 06-02-20                     |                           | TLM1                      |                 |
| 4.  | Eliciting Requirements, Developing Use-Cases                 | 1                       | 08-02-20                     |                           | TLM1                      |                 |
| 5.  | Building the Analysis Models                                 | 1                       | 12-02-20                     |                           | TLM1                      |                 |
| 6.  | Negotiating and Validating Requirements                      | 1                       | 13-02-20                     |                           | TLM2                      |                 |
| 7.  | Building the Analysis Model: Requirements Analysis           | 1                       | 15-02-20                     |                           | TLM2                      |                 |
| 8.  | Analysis Modeling Approaches and Data Modeling               | 1                       | 19-02-20                     |                           | TLM2                      |                 |
| 9.  | Object Oriented Analysis, Creating a Behavioral Model        | 1                       | 20-02-20                     |                           | TLM2                      |                 |
| 10.   | Scenario Based Modeling, Flow Oriented Modeling, unit Review | 1                       | 22-02-20                     |                           | TLM2                      |                 |
| No. of classes required to complete UNIT-III:10 |  |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-IV : Design Engineering**

| 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.  | Design Engineering: Design within context of Software Engineering | 1                       | 26-02-20                     |                           | TLM1                      |                 |
| 2.  | Design Process and Design Quality                                 | 1                       | 27-02-20                     |                           | TLM1                      |                 |
| 3.  | Design Concepts, Design Model                                     | 1                       | 29-02-20                     |                           | TLM1                      |                 |
| 4.  | Pattern Based Software Design                                     | 1                       | 04-03-20                     |                           | TLM1                      |                 |
| 5.  | Software Architecture and Data Design                             | 1                       | 05-03-20                     |                           | TLM1                      |                 |
| 6.  | Architectural Styles and Patterns , Architectural Design          | 1                       | 07-03-20                     |                           | TLM1                      |                 |
| 7.  | Assignment/Quiz   | 1                       |                              |                           | TLM3                      |                 |
| No. of classes required to complete UNIT-IV:7 |   |                         |                              | No. of classes taken:     |                           |                 |

**UNIT-V : Testing Strategies**

| 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.    | A Strategic Approach to Software Testing, Strategic Issues | 1                       | 11-03-20                     |                           | TLM1                      |                 |
| 2.    | Test Strategies for Conventional Software                  | 1                       | 12-03-20                     |                           | TLM1                      |                 |
| 3.    | Test Strategies for Object Oriented Software               | 1                       | 14-03-20                     |                           | TLM1                      |                 |
| 4.    | Validation Testing, System Testing, The art of Debugging   | 1                       | 18-03-20                     |                           | TLM1                      |                 |
| 5.    | Software Testing Fundamentals, White Box Testing           | 1                       | 19-03-20                     |                           | TLM1                      |                 |
| 6.    | White Box Testing- Basis Path Testing                      | 1                       | 21-03-20                     |                           | TLM1                      |                 |
| 7.    | Control Structure and Black Box Testing                    | 1                       | 25-03-20                     |                           | TLM2                      |                 |
| 8.    | Black Box Testing and OO Testing                           | 1                       | 26-03-20                     |                           | TLM2                      |                 |

|   |  |   |          |                       |      |  |
|---|--|---|----------|-----------------------|------|--|
| 9.  | Black Box Testing and OO Testing, Review on 5 <sup>th</sup> unit | 1 | 28-03-20 |                       | TLM2 |  |
| No. of classes required to complete UNIT-V: 9 |  |   |          | 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 (R17 Regulations):

| Evaluation Task  | Marks |
|--|-------|
| Assignment-I (Unit-I)                                      | A1=5  |
| Assignment-II (Unit-II)                                    | A2=5  |
| I-Mid Examination (Units-I & II)                           | M1=20 |
| 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=20 |
| II-Quiz Examination (Units-III, IV & V)                    | Q2=10 |
| Attendance   | B=5   |
| Assignment Marks = Best Four Average of A1, A2, A3, A4, A5 | A=5   |
| Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)            | M=20  |
| Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)           | B=10  |
| Cumulative Internal Examination (CIE) : A+B+M+Q            | 40    |
| Semester End Examination (SEE)                             | 60    |
| Total Marks = CIE + SEE                                    | 100   |

## PART-D

### PROGRAMME OUTCOMES (POs):

|             |  |
|-------------|--|
| <b>PO 1</b> | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b> | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b> | <b>Design/development of solutions:</b> 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. |

|              |  |
|--------------|--|
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b> To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.     |
| <b>PSO 2</b> | <b>Data Engineering:</b> To inculcate an ability to Analyze, Design and implement data driven applications into the students.   |
| <b>PSO 3</b> | <b>Software Engineering:</b> Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |

Course Instructor  
Dr.Ch.V.Narayana

Course Coordinator  
Dr.Ch.V.Narayana

Module Coordinator  
Dr.Ch.V.Narayana

HOD  
Dr.D.Veeraiah



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

## COURSE HANDOUT

### PART-A

Name of Course Instructor : G.V.Suresh  
Course Name & Code : Software Engineering - 17CI10  
L-T-P Structure : 3-0-0 Credits : 3  
Program/Sem/Sec : B.Tech., IV-Sem., CSE-B A.Y : 2019-20

**PRE-REQUISITE:** C Programming, Database Management Systems..

**COURSE OBJECTIVE:** This course provides the knowledge on importance of software engineering and software development process concepts and learn about different software development process models and how to choose an appropriate model for a project in specific domain.

#### **COURSE OUTCOMES (CO)**

CO1: Outline the fundamentals of software engineering concepts and software process standards

CO2: Demonstrate appropriate process model and software engineering practices

CO3: Analyze requirements of software system and explore all requirements gathering approaches

CO4: Creating an architectural design using design engineering process

CO5: Apply software strategies and software testing tactics for testing real time projects effectively

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

|      |   |
|------|---|
| CO 1 | Outline the fundamentals of software engineering concepts and software process standards          |
| CO 2 | Demonstrate appropriate process model and software engineering practices.                         |
| CO 3 | Analyze requirements of software system and explore all requirements gathering approaches         |
| CO 4 | Creating an architectural design using design engineering process                                 |
| CO 5 | Apply software strategies and software testing tactics for testing real time projects effectively |

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

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

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

**BOS APPROVED TEXT BOOKS:**

**T1** Roger S.Pressman, Software engineering- A practitioner's Approach, TMH International Edition, 6th edition, 2005

**BOS APPROVED REFERENCE BOOKS:**

**R1** Ian Sommerville, Software engineering, Pearson education, 8th edition, 2008.

**R2** Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.

**R3** Stephan Schach, Software Engineering, TMH Publications, 2007.

**R4** Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson education, 2001, 1995, PHI, 2<sup>nd</sup> edition.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN): Section-B****UNIT-I: Introduction to Software Engineering**

| S.No.                                      | Topics to be covered                             | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|--|--|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 1.   | Introduction to Software Engineering             | 1                       | 25/11/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 2.   | Evolving role of Software                        | 1                       | 29/11/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 3.   | Software Definition and Characteristics          | 1                       | 30/11/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 4.   | Changing nature of Software                      | 1                       | 02/12/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 5.   | Software Myths                                   | 1                       | 06/12/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 6.   | Software Engineering – A layered technology      | 1                       | 07/12/19                     |                           | TLM2                      | CO1                  | T1                 |                 |
| 7.   | Process Framework – Generic Framework Activities | 1                       | 09/12/19                     |                           | TLM2                      | CO1                  | R1                 |                 |
| 8.   | Umbrella Activities                              | 1                       | 13/12/19                     |                           | TLM2                      | CO1                  | T1                 |                 |
| 9.   | CMMI Model                                       | 1                       | 14/12/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 10.  | Process Patterns                                 | 1                       | 16/12/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 11.  | Process Assessment an Approaches                 | 1                       | 20/12/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 12.  | Software Process Models                          | 1                       | 21/12/19                     |                           | TLM1                      | CO1                  | T1                 |                 |
| 13.  | Process Technology & Product and Process         | 1                       | 23/12/19<br>27/12/19         |                           | TLM1                      | CO1                  | T1                 |                 |
| 14.  | Assignment/Quiz-1                                | 1                       | 28/12/19                     |                           | TLM6                      | CO1                  |                    |                 |
| No. of classes required to complete UNIT-I |  | 15                      | No. of classes taken:        |                           |                           |                      |                    |                 |

**UNIT-II: Process Models**

| S.No. | Topics to be covered                | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|-------|-------------------------------------|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 1.    | Introduction to UNIT-II             | 1                       | 30/12/19                     |                           | TLM1                      | CO2                  | T1                 |                 |
| 2.    | Process Models: Prescriptive Models | 1                       | 03/01/20                     |                           | TLM1                      | CO2                  | T1                 |                 |
| 3.    | Waterfall Model                     | 1                       | 04/01/20                     |                           | TLM1                      | CO2                  | T1                 |                 |
| 4.    | Incremental Model                   | 1                       | 06/01/20                     |                           | TLM1                      | CO2                  | T1                 |                 |
| 5.    | RAD Model                           | 1                       | 10/01/20                     |                           | TLM1                      | CO2                  | T1                 |                 |
| 6.    | Evolutionary Process Models         | 1                       | 11/01/20                     |                           | TLM2                      | CO2                  | T1                 |                 |
| 7.    | Specialized Process Models          | 1                       | 20/01/20                     |                           | TLM2                      | CO2                  | T1                 |                 |



|   |                                |    |                       |  |             |     |    |  |
|---|--------------------------------|----|-----------------------|--|-------------|-----|----|--|
| 8.  | Unified Process                | 1  | 27/01/20              |  | <b>TLM2</b> | CO2 | T1 |  |
| 9.  | Software Engineering Practices | 1  | 31/01/20<br>01/02/20  |  | <b>TLM2</b> | CO2 | T1 |  |
| 10.   | Assignment/Quiz-2              | 1  | 03/02/20              |  | <b>TLM6</b> | CO2 |    |  |
| No. of classes required to complete UNIT-II |                                | 11 | No. of classes taken: |  |             |     |    |  |

#### UNIT-III: Requirements Engineering

| S.No.  | Topics to be covered                                  | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|--|---|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 1.   | Introduction to UNIT-III                              | 1                       | 03/02/20                     |                           | <b>TLM1</b>               | CO3                  | T1                 |                 |
| 2.   | Requirements Engineering: Description                 | 1                       | 07/02/20                     |                           | <b>TLM1</b>               | CO3                  | T1                 |                 |
| 3.   | RE Tasks, Initiating the RE Process                   | 1                       | 08/02/20                     |                           | <b>TLM1</b>               | CO3                  | T1                 |                 |
| 4.   | Eliciting Requirements                                | 1                       | 10/02/20                     |                           | <b>TLM1</b>               | CO3                  | T1                 |                 |
| 5.   | Developing Use-Cases                                  | 1                       | 14/02/20                     |                           | <b>TLM2</b>               | CO3                  | T1                 |                 |
| 6.   | Building the Analysis Models                          | 1                       | 15/02/20                     |                           | <b>TLM2</b>               | CO3                  | T1                 |                 |
| 7.   | Negotiating and Validating Requirements               | 1                       | 17/02/20                     |                           | <b>TLM2</b>               | CO3                  | T1                 |                 |
| 8.   | Building the Analysis Model: Requirements Analysis    | 1                       | 21/02/20                     |                           | <b>TLM1</b>               | CO3                  | T1                 |                 |
| 9.   | Analysis Modeling Approaches and Data Modeling        | 1                       | 22/02/20                     |                           | <b>TLM1</b>               | CO3                  | T1                 |                 |
| 10.  | Object Oriented Analysis, Creating a Behavioral Model | 1                       | 24/02/20                     |                           | <b>TLM1</b>               | CO3                  | T1                 |                 |
| 11.  | Scenario Based Modeling, Flow Oriented Modeling       | 1                       | 28/02/20                     |                           | <b>TLM1</b>               | CO3                  | T1                 |                 |
| 12.  | Assignment/Quiz-3                                     | 1                       | 29/02/20                     |                           | <b>TLM3</b>               | CO3                  | T1                 |                 |
| No. of classes required to complete UNIT-III |   | 12                      | No. of classes taken:        |                           |                           |                      |                    |                 |

#### UNIT-IV: Design Engineering

| S.No.                                       | Topics to be covered  | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|---|---|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 1.  | Design Engineering: Design within context of Software Engineering | 1                       | 02/03/20                     |                           | <b>TLM1</b>               | CO4                  | T1                 |                 |
| 2.  | Design Process and Design Quality                                 | 1                       | 02/03/20                     |                           | <b>TLM1</b>               | CO4                  | T1                 |                 |
| 3.  | Design Concepts, Design Model                                     | 1                       | 06/03/20                     |                           | <b>TLM1</b>               | CO4                  | T1                 |                 |
| 4.  | Pattern Based Software Design                                     | 1                       | 07/03/20                     |                           | <b>TLM1</b>               | CO4                  | T1                 |                 |
| 5.  | Software Architecture and Data Design                             | 1                       | 07/03/20                     |                           | <b>TLM2</b>               | CO4                  | T1                 |                 |
| 6.  | Architectural Styles and Patterns , Architectural Design          | 1                       | 09/03/20                     |                           | <b>TLM1</b>               | CO4                  | T1                 |                 |
| 7.  | Assignment/Quiz-4   | 1                       | 09/03/20                     |                           | <b>TLM3</b>               | CO4                  |                    |                 |
| No. of classes required to complete UNIT-IV |   | 7                       | No. of classes taken:        |                           |                           |                      |                    |                 |

**UNIT-V: Testing Strategies**

| S.No.                                      | Topics to be covered                                       | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|--|--|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 1.   | A Strategic Approach to Software Testing, Strategic Issues | 1                       | 13/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 2.   | Test Strategies for Conventional Software                  | 1                       | 13/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 3.   | Test Strategies for Object Oriented Software               | 1                       | 14/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 4.   | Validation Testing, System Testing                         | 1                       | 14/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 5.   | The art of Debugging                                       | 1                       | 16/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 6.   | Software Testing Fundamentals                              | 1                       | 20/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 7.   | White Box Testing & Basis Path Testing                     | 1                       | 21/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 8.   | Control Structure and Black Box Testing                    | 1                       | 23/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 9.   | Black Box Testing and OO Testing                           | 1                       | 23/03/20                     |                           | <b>TLM2</b>               | CO5                  | T1                 |                 |
| 10.  | Assignment-5/Quiz  | 1                       | 27/03/20                     |                           | <b>TLM6</b>               | CO5                  |                    |                 |
| No. of classes required to complete UNIT-V |  | 11                      | No. of classes taken:        |                           |                           |                      |                    |                 |

**Contents beyond the Syllabus**

| S.No | Topics to be covered            | No. of Classes Required | Tentative Date of Completion | Actual Date of Completion | Teaching Learning Methods | Learning Outcome COs | Text Book followed | HOD Sign Weekly |
|------|---------------------------------|-------------------------|------------------------------|---------------------------|---------------------------|----------------------|--------------------|-----------------|
| 1.   | Code-Reading Tools              | 2                       | 28/03/20                     |                           |                           | CO3                  |                    |                 |
| 2.   | Documentation and Visualization | 1                       | 28/03/20                     |                           |                           | CO5                  |                    |                 |

**Teaching Learning Methods**

|             |                |             |                    |             |                |
|-------------|----------------|-------------|--------------------|-------------|----------------|
| <b>TLM1</b> | Chalk and Talk | <b>TLM4</b> | Problem Solving    | <b>TLM7</b> | Seminars or GD |
| <b>TLM2</b> | PPT            | <b>TLM5</b> | Programming        | <b>TLM8</b> | Lab Demo       |
| <b>TLM3</b> | Tutorial       | <b>TLM6</b> | Assignment or Quiz | <b>TLM9</b> | Case Study     |

**ACADEMIC CALENDAR:**

| Description               | From       | To         | Weeks |
|---------------------------|------------|------------|-------|
| I Phase of Instructions-1 | 25-11-2019 | 11-01-2020 | 7W    |
| I Mid Examinations        | 13-01-2020 | 18-01-2020 | 1W    |
| II Phase of Instructions  | 20-01-2020 | 25-03-2020 | 9W    |
| II Mid Examinations       | 30-03-2020 | 04-04-2020 | 1W    |

**EVALUATION PROCESS:**

| Evaluation Task     | COs   | Marks |
|---------------------|-------|-------|
| Assignment/Quiz – 1 | 1     | A1=5  |
| Assignment/Quiz – 2 | 2     | A2=5  |
| I-Mid Examination   | 1,2   | B1=20 |
| Assignment/Quiz – 3 | 3     | A3=5  |
| Assignment/Quiz – 4 | 4     | A4=5  |
| Assignment/Quiz – 5 | 5     | A5=5  |
| II-Mid Examination  | 3,4,5 | B2=20 |

|   |                  |               |
|---|------------------|---------------|
| Evaluation of Assignment/Quiz Marks: $A=(A1+A2+A3+A4+A5)/5$       | 1,2,3,4,5        | A=5           |
| Evaluation of Mid Marks: $B=75\%$ of Max(B1,B2)+25% of Min(B1,B2) | 1,2,3,4,5        | B=20          |
| <b>Cumulative Internal Examination : A+B</b>                      | <b>1,2,3,4,5</b> | <b>A+B=25</b> |
| <b>Semester End Examinations</b>                                  | <b>1,2,3,4,5</b> | <b>C=75</b>   |
| <b>Total Marks: A+B+C</b>   | <b>1,2,3,4,5</b> | <b>100</b>    |

### PART-D

#### PROGRAMME OUTCOMES (POs):

|              |  |
|--------------|--|
| <b>PO 1</b>  | <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.  |
| <b>PO 2</b>  | <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.   |
| <b>PO 3</b>  | <b>Design/development of solutions:</b> 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.         |
| <b>PO 4</b>  | <b>Conduct investigations of complex problems:</b> 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.  |
| <b>PO 5</b>  | <b>Modern tool usage:</b> 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   |
| <b>PO 6</b>  | <b>The engineer and society:</b> 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  |
| <b>PO 7</b>  | <b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.   |
| <b>PO 8</b>  | <b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.  |
| <b>PO 9</b>  | <b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.   |
| <b>PO 10</b> | <b>Communication:</b> 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. |
| <b>PO 11</b> | <b>Project management and finance:</b> 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.   |
| <b>PO 12</b> | <b>Life-long learning:</b> 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):

|              |   |
|--------------|---|
| <b>PSO 1</b> | <b>Programming Paradigms:</b> To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.     |
| <b>PSO 2</b> | <b>Data Engineering:</b> To inculcate ability to analyze, design and implement data driven applications into the students.  |
| <b>PSO 3</b> | <b>Software Engineering:</b> Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products. |

Course Instructor  
Dr.Ch.V.Narayana

Course Coordinator  
Dr.Ch.V.Narayana

Module Coordinator  
Dr.Ch.V.Narayana

HOD  
Dr.D.Veeraiah

