LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
**(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi,
NAAC Accredited with 'A' grade, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.**

COURSE HANDOUT

PROGRAM : B.Tech., V-Sem., CSE-A-Sec

ACADEMIC YEAR : 2017-18

COURSE NAME & CODE : DESIGN ANALYSIS OF ALGORITHMS

L-T-P STRUCTURE : 3-1-3

COURSE CREDITS : 3

COURSE INSTRUCTOR : D.SRINIVASA RAO

COURSE COORDINATOR :

1. **Pre-requisites:** Basic mathematical knowledge, Data structures basics

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.Introduce the concepts of P&NP-class problems/

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

CO1: Identify the basic properties and analysis methods of algorithms and design divide and conquer paradigm for solving a few example problems and analyze them.

CO2:Design Greedy algorithms for knapsack problem, minimum cost spanning tree,single source shortest path problem and analyze them.

CO3:Apply dynamic programming paradigm to solve travelling sales person problem,0/1 knapsack problem,Optimal binary search tree.

CO4:Apply traversal methods on search trees and search methods on graphs and backtracking search methods on state space trees for few example problems and Analyse branch and Bound search methods through problems such as 0/1 knapsack problem,Travelling sales personn problem.

CO5: Evaluate P ,NP,NP hard,NP complete class of problems and algorithms.

4. Course Articulation Matrix:

Course Code	COs	Programme Outcomes												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
S197	**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).

BOS APPROVED TEXT BOOKS:
   T1: Ellis Horowitz, SartajSahni, 'Fundamentals of Computer Algorithms', Galgotia Pubications.

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

BOS APPROVED REFERENCE BOOKS:
    R1: Aho, Hopcroft& Ullman, 'The Design and Analysis of Computer Algorithms', Addison Wesley publications
   R2:. Thomas H. Corman et al, 'Introduction to Algorithms', PHI.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT –I: INTRODUCTION

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	1	11-06-18		**TLM1**	CO1	T1	
2.	Algorithm	1	14-06-18		**TLM1**	CO1	T1	
3.	Design & analysis of Algorithms	1	15-06-18		**TLM1**	CO1	T1	
4.	Space Complexity	1	16-06-18		**TLM1**	CO1	T1	
5.	Time complexity	1	18-06-18		**TLM1**	CO1	T1,R1	
6.	Asymptotic Notations	1	21-06-18		**TLM1**	CO1	T1,R1	
7.	Tutorial-1	1	22-06-18		**TLM1**	CO1	T1,R1	

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
8.	Divide & Conquer Generalmethod	1	23-06-18		**TLM1**	CO1	T1,R1	
9.	Binary Search	1	25-06-18		**TLM1**	CO1	T1	
10.	Finding Maximun and Minimum	1	28-06-18		**TLM1**	CO1	T1	
11.	Example	1	29-06-18		**TLM1**	CO1	T1	
12.	Merge sort	1	30-06-18		**TLM1**	CO1	T1	
13.	Example	1	02-07-18		**TLM1**	CO1	T1	
14.	Tutorial-2	1	05-07-18		**TLM1**	CO1	T1	
No. of classes required to complete UNIT-I		**14**			No. of classes taken:			

UNIT –II: Greedy Method

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
15.	Greedy Method General method	1	06-07-18		**TLM1**	CO2	T1	
16.	Knapsack problem	1	07-07-18		**TLM1**	CO2	T1	
17.	Example	1	09-07-18		**TLM1**	CO2	T1	
18.	Tree Vertex Splitting	1	12-07-18		**TLM1**	CO2	T1	
19.	Example	1	13-07-18		**TLM1**	CO2	T1	
20.	Job –Sequencing with deadlines	1	14-07-18		**TLM1**	CO2	T1,R1	
21.	Example	1	16-07-18		**TLM1**	CO2	T1	
22.	Tutorial-3	1	19-07-18		**TLM1**	CO2	T1,R1	
23.	Minimum cost spanning tree-prims algorithm	1	20-07-18		**TLM1**	CO2	T1	
24.	Krushkals algorithm	1	21-07-18		**TLM1**	CO2	T1,R1	
25.	Optimal Storage on Tapes	1	23-07-18		**TLM1**	CO2	T1,R1	
26.	Optimal Merge Pattern	1	26-07-18		**TLM1**	CO2	T1	
27.	Single source Shortest path	1	27-07-18		**TLM1**	CO2	T1	
28.	EXAMPLE & TUTORIAL-4	1	28-07-18		**TLM1**	CO2	T1	
No. of classes required to complete **UNIT-2**		14			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
29.	Dynamic Programming-General method	1	06-08-18		**TLM1**	CO3	T1	
30.	Multistage Graph	1	09-08-18		**TLM1**	CO3	T1	
31.	All pairs Shortest path	1	10-08-18		**TLM1**	CO3	T1	
32.	Example	1	11-08-18		**TLM1**	CO3	T1,R1	
33.	Single source Shortest path	1	11-08-18		**TLM1**	CO3	T1,R1	
34.	Example, Optimal Binary Search Trees	1	13-8-18		**TLM1**	CO3	T1,R1	
35.	Tutorial-5	1	16-08-18		**TLM1**	CO3	T1	
36.	String Editing	1	17-08-18		**TLM1**	CO3	T1	
37.	0/1 Knapsack	1	18-08-18		**TLM1**	CO3	T1	
38.	Reliabilty Design	1	20-08-18		**TLM1**	CO3	T1	
39.	Travelling Salesman Problem	1	23-08-18		**TLM1**	CO3	T1,R1	
40.	Flow shop Scheduling	1	24-08-18		**TLM1**	CO3	T1,R1	
41.	Example, Tutorial-6	1	25-08-18		**TLM1**	CO3	T1	
No. of classes required to complete **UNIT-3**		13			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
42.	Techniques for Binary trees	1	27-08-18		**TLM1**	CO4	T1	
43.	Techniques for Graphs	1	30-08-18		**TLM1**	CO4	T1	
44.	Connected components	1	31-08-18		**TLM1**	CO4	T1	
45.	Spanning Trees	1	01-09-18		**TLM1**	CO4	T1,R1	
46.	Bi-Connected Components	1	03-09-18		**TLM1**	CO4	T1,R1	
47.	DFS	1	06-09-18		**TLM1**	CO4	T1	
48.	Tutorial-7	1	07-09-18		**TLM1**	CO4	T1	
49.	Back tracking –General method	1	08-09-18		**TLM1**	CO4	T1,R1	
50.	The 8-Queens Problem	1	10-09-18		**TLM1**	CO4	T1	
51.	Sum of Subsets	1	13-09-18		**TLM1**	CO4	T1	

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
52.	Graph Coloring	1	14-09-18		**TLM1**	CO4	T1	
53.	Hamiltonian cycle	1	15-09-18		**TLM1**	CO4	T1	
54.	Knapsack problem	1	17-09-18		**TLM1**	CO4	T1	
55.	Tutorial-8	1	20-10-18		**TLM1**	CO4	T1	
56.	Branch and Bound – method	1	21-09-18		**TLM1**	CO4	T1	
57.	0/1 Knapsack Problem	1	22-09-18		**TLM1**	CO4	T1	
58.	Travelling Sales person	1	24-09-18		**TLM1**	CO4	T1	
59.	Example, Efficiency Considerations	1	27-09-18		**TLM1**	CO4	T1	
60.	Tutorial-9	1	28-09-18		**TLM1**	CO4	T1,R1	
No. of classes required to complete **UNIT-4**		19			No. of classes taken:			

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
61.	NP hard and NP complete- Basic concepts	1	29-09-18		**TLM1**	CO5	T1	
62.	Cook's Theorem	1	01-10-18		**TLM1**	CO5	T1	
63.	NP-hard Graph Problems	1	04-10-18		**TLM1**	CO5	T1,R1	
64.	NP –hard Scheduling Problem	1	05-10-18		**TLM1**	CO5	T1,R1	
65.	Some Simplified NP –hard Problems, Tutorial-10	1	06-10-18		**TLM1**	CO5	T1	
No. of classes required to complete **UNIT-5**		5			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
66.	Rules of Inference and Automatic Theorem Proving	1			**TLM1**	CO1		
67.	Polish theorem	1			**TLM1**	CO4		
68.	DFS & BFS algorithm	1			**TLM1**	CO5	T1,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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

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

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

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

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

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

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

8. **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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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 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.

Course Instructor   Course Coordinator   Module Coordinator   HOD

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COURSE HANDOUT

PROGRAM   : B.Tech., V-Sem., CSE-B-sec

ACADEMIC YEAR   : 2017-18

COURSE NAME & CODE : DESIGN ANALYSIS OF ALGORITHMS

L-T-P STRUCTURE   : 3-1-3

COURSE CREDITS   : 3

COURSE INSTRUCTOR   : D.SRINIVASA RAO

COURSE COORDINATOR :

2. Pre-requisites: Basic mathematical knowledge, Data structures basics

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.Introduce the concepts of P&NP-class problems/

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

CO1: Identify the basic properties and analysis methods of algorithms and design divide and conquer paradigm for solving a few example problems and analyze them.

CO2:Design Greedy algorithms for knapsack problem, minimum cost spanning tree,single source shortest path problem and analyze them.

CO3:Apply dynamic programming paradigm to solve travelling sales person problem,0/1 knapsack problem,Optimal binary search tree.

CO4:Apply traversal methods on search trees and search methods on graphs and backtracking search methods on state space trees for few example problems and Analyse branch and Bound search methods through problems such as 0/1 knapsack problem,Travelling sales personn problem.

CO5: Evaluate P ,NP,NP hard,NP complete class of problems and algorithms.

4. Course Articulation Matrix:

Course Code	COs	Programme Outcomes												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
S197	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).

BOS APPROVED TEXT BOOKS:

   **T1: Ellis Horowitz, SartajSahni, 'Fundamentals of Computer Algorithms',
   Galgotia Pubications.**

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

BOS APPROVED REFERENCE BOOKS:

   **R1: Aho, Hopcroft& Ullman, 'The Design and Analysis of Computer Algorithms',
Addison Wesley publications**
   R2:. Thomas H. Corman et al, 'Introduction to Algorithms', PHI.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT –I: INTRODUCTION

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
69.	Introduction	1	11-06-18		**TLM1**	CO1	T1	
70.	Algorithm	1	12-06-18		**TLM1**	CO1	T1	
71.	Design & analysis of Algorithms	1	13-06-18		**TLM1**	CO1	T1	
72.	Space Complexity	1	16-06-18		**TLM1**	CO1	T1	
73.	Time complexity	1	18-06-18		**TLM1**	CO1	T1,R1	
74.	Asymptotic Notations	1	19-06-18		**TLM1**	CO1	T1,R1	
75.	Tutorial-1	1	20-06-18		**TLM1**	CO1	T1,R1	
76.	Divide & Conquer Generalmethod	1	23-06-18		**TLM1**	CO1	T1,R1	
77.	Binary Search	1	25-06-18		**TLM1**	CO1	T1	
78.	Finding Maximun and Minimum	1	26-06-18		**TLM1**	CO1	T1	

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
79.	Example	1	27-06-18		**TLM1**	CO1	T1	
80.	Merge sort	1	30-06-18		**TLM1**	CO1	T1	
81.	Example	1	02-07-18		**TLM1**	CO1	T1	
82.	Tutorial-2	1	03-07-18		**TLM1**	CO1	T1	
No. of classes required to complete UNIT-I		**14**			No. of classes taken:			

UNIT –II: Greedy Method

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
83.	Greedy Method General method	1	04-07-18		**TLM1**	CO2	T1	
84.	Knapsack problem	1	07-07-18		**TLM1**	CO2	T1	
85.	Example	1	09-07-18		**TLM1**	CO2	T1	
86.	Tree Vertex Splitting	1	10-07-18		**TLM1**	CO2	T1	
87.	Example	1	11-07-18		**TLM1**	CO2	T1	
88.	Job –Sequencing with deadlines	1	14-07-18		**TLM1**	CO2	T1,R1	
89.	Example	1	16-07-18		**TLM1**	CO2	T1	
90.	Tutorial-3	1	17-07-18		**TLM1**	CO2	T1,R1	
91.	Minimum cost spanning tree-prims algorithm	1	18-07-18		**TLM1**	CO2	T1	
92.	Krushkals algorithm	1	21-07-18		**TLM1**	CO2	T1,R1	
93.	Optimal Storage on Tapes	1	23-07-18		**TLM1**	CO2	T1,R1	
94.	Optimal Merge Pattern	1	24-07-18		**TLM1**	CO2	T1	
95.	Single source Shortest path	1	28-07-18		**TLM1**	CO2	T1	
96.	EXAMPLE & TUTORIAL-4	1	28-07-18		**TLM1**	CO2	T1	
No. of classes required to complete **UNIT-2**		14			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
97.	Dynamic Programming-General method	1	30-07-18		**TLM1**	CO3	T1	

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
98.	Multistage Graph	1	31-07-18		**TLM1**	CO3	T1	
99.	All pairs Shortest path	1	01-08-18		**TLM1**	CO3	T1	
100.	Example	1	04-08-18		**TLM1**	CO3	T1,R1	
101.	Single source Shortest path	1	06-08-18		**TLM1**	CO3	T1,R1	
102.	Example, Optimal Binary Search Trees	1	07-08-18		**TLM1**	CO3	T1,R1	
103.	Tutorial-5	1	08-08-18		**TLM1**	CO3	T1	
104.	String Editing	1	11-08-18		**TLM1**	CO3	T1	
105.	0/1 Knapsack	1	13-08-18		**TLM1**	CO3	T1	
106.	Reliabilty Design	1	14-08-18		**TLM1**	CO3	T1	
107.	Travelling Salesman Problem	1	15-08-18		**TLM1**	CO3	T1,R1	
108.	Flow shop Scheduling	1	18-08-18		**TLM1**	CO3	T1,R1	
109.	Example, Tutorial-6	1	20-08-18		**TLM1**	CO3	T1	
No. of classes required to complete **UNIT-3**		13			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
110.	Techniques for Binary trees	1	21-08-18		**TLM1**	CO4	T1	
111.	Techniques for Graphs	1	22-08-18		**TLM1**	CO4	T1	
112.	Connected components	1	25-08-18		**TLM1**	CO4	T1	
113.	Spanning Trees	1	27-08-18		**TLM1**	CO4	T1,R1	
114.	Bi-Connected Components	1	28-08-18		**TLM1**	CO4	T1,R1	
115.	DFS	1	29-08-18		**TLM1**	CO4	T1	
116.	Tutorial-7	1	01-09-18		**TLM1**	CO4	T1	
117.	Back tracking –General method	1	03-09-18		**TLM1**	CO4	T1,R1	
118.	The 8-Queens Problem	1	04-09-18		**TLM1**	CO4	T1	
119.	Sum of Subsets	1	05-09-18		**TLM1**	CO4	T1	
120.	Graph Coloring	1	08-09-18		**TLM1**	CO4	T1	
121.	Hamiltonian cycle	1	10-09-18		**TLM1**	CO4	T1	
122.	Knapsack problem	1	11-09-18		**TLM1**	CO4	T1	

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
123.	Tutorial-8	1	12-10-18		**TLM1**	CO4	T1	
124.	Branch and Bound – method	1	15-09-18		**TLM1**	CO4	T1	
125.	0/1 Knapsack Problem	1	17-09-18		**TLM1**	CO4	T1	
126.	Travelling Sales person	1	18-09-18		**TLM1**	CO4	T1	
127.	Example, Efficiency Considerations	1	19-09-18		**TLM1**	CO4	T1	
128.	Tutorial-9	1	22-09-18		**TLM1**	CO4	T1,R1	
No. of classes required to complete **UNIT-4**		19			No. of classes taken:			

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
129.	NP hard and NP complete- Basic concepts	1	24-09-18		**TLM1**	CO5	T1	
130.	Cook's Theorem	1	25-09-18		**TLM1**	CO5	T1	
131.	NP-hard Graph Problems	1	26-09-18		**TLM1**	CO5	T1,R1	
132.	NP –hard Scheduling Problem	1	29-09-18		**TLM1**	CO5	T1,R1	
133.	Some Simplified NP –hard Problems, Tutorial-10	1	01-10-18		**TLM1**	CO5	T1	
No. of classes required to complete **UNIT-5**		5			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
134.	Rules of Inference and Automatic Theorem Proving	1	02-10-18		**TLM1**	CO1		
135.	Polish theorem	1	03-10-18		**TLM1**	CO4		
136.	DFS & BFS algorithm	1	06-10-18		**TLM1**	CO5	T1,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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

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

14. **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.

15. **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.

16. **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.

17. **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.

18. **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.

19. **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.

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

21. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

22. **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.

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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 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.

Course Instructor   Course Coordinator   Module Coordinator   HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)
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L.B.REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PROGRAM   **:** B.Tech.V-Sem., CSE
ACADEMIC YEAR   **:** 2018-19
COURSE NAME & CODE   **:** THEORY OF COMPUTATION-S401

L-T-P STRUCTURE : 3-1-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **Dr.D.Veeraiah**

COURSE COORDINATOR : **Dr.D.Veeraiah**

PRE-REQUISITE:Knowledge in mathematics, including a course in discrete mathematics and programming.

COURSE OBJECTIVE:

This course enables the students to know about

✓ Basic understanding of the notion of a regular set and its representation by DFA's, NFA's, and regular expressions, abstract models of information processing machines and limits of digitalcomputation, and understanding of the notion of a context-free language and its representation bycontext-free grammars and push-down automata.

COURSE OUTCOMES (CO): After completion of this course, a student can able to

CO1:Design Finite Automata to accept regular languages.
CO2: Design Regular expression for regular languages and equivalence of Finite Automata And Regular Expression.
CO3:Design Context free Grammar for CFL.
CO4: Design a Push down Automata for CFG and equivalence of CFG and PDA
CO5:Design the Turing Machines and understand the notion of an Undecidable problem

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	3	2											1		
CO2	3	2											1		
CO3	3	2											1		
CO4	3	2											1		
CO5	3	2	2										1		

Note: Enter Correlation Levels **1** or **2** or **3.**
1- Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High).

BOS APPROVED TEXT BOOKS:
T1: John E. Hopcroft and J.D.Ullman "Introduction to Automata Theory Languages and Computation", Narosa Publications, 1999.

T2: Daniel I.A. Cohen "Introduction to Computer Theory", John Wiley.2Nd Edition 1997.

BOS APPROVED REFERENCE BOOKS:
R1: John C Martin "Introduction to languages and the Theory of Computation", TMH.

R2: Lewis H.P. &Papadimitriou C.H. "Elements of Theory of Computation", Pearson /PHI.

R3: Mishra and Chandrasekhar "Theory of Computer Science – Automata languages and computation" --2nd edition, PHI.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT –I: Introduction to Finite Automata

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
137.	Strings, alphabets and languages	1	11-06-18		TLM1	CO1	T1,T2,R1,R2	
138.	Finite state systems, basic definitions	1	12-06-18		TLM1	CO1	T1,T2,R1,R2	
139.	Non-deterministic finite automaton	1	13-06-18		TLM1	CO1	T1,T2,R1,R2	
140.	Acceptance of languages	1	14-06-18		TLM1	CO1	T1,T2,R1,R2	
141.	Equivalence between NFA with and without ^transitions	1	18-06-18		TLM1	CO1	T1,T2,R1,R2	
142.	NFA to DFA conversion	1	19-06-18		TLM1	CO1	T1,T2,R1,R2	
143.	Tutorial – I	1	20-06-18		TLM3	CO1		
144.	Minimization of FSM	1	21-06-18		TLM1	CO1	T1,T2,R1,R2	
145.	Equivalence between two FSMs	1	25-06-18		TLM1	CO1	T1,T2,R1,R2	
146.	Finite Automata with output	1	26-06-18		TLM1	CO1	T1,T2,R1,R2	
147.	Moore and Melay machines.	1	27-06-18		TLM1	CO1	T1,T2,R1,R2	
148.	Overview/Revision of UNIT-1	1	28-06-18		TLM1	CO1		
149.	Tutorial – II	1	02-07-18		TLM3			
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT –II: Regular Expressions

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
150.	Regular sets	1	03-07-18		TLM1	CO2	T1,R1	
151.	Regular expressions	1	04-07-18		TLM1	CO2	T1,R1	
152.	Regular expressions	1	05-07-18		TLM1	CO2	T1,R1	
153.	Constructing finite Automata for a given regular expressions	2	09-07-18 10-07-18		TLM1	CO2	T1,R1	

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
154.	Conversion of Finite Automata to Regular expressions.	2	11-07-18 12-07-18		**TLM1**	CO2	T1,R1	
155.	Tutorial – III	1	16-07-18		**TLM3**	CO2		
156.	Pumping lemma of regular sets	1	17-07-18		**TLM1**	CO2	T1,R1	
157.	closure properties of regular sets	1	18-07-18		**TLM1**	CO2	T1,R1	
158.	Tutorial – IV	1	19-07-18		**TLM3**	CO2		
No. of classes required to complete **UNIT-2**		11			No. of classes taken:			

UNIT –III: Context Free Grammar

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
159.	Regular grammars-right linear and left linear grammars	1	20-07-18		**TLM1**	CO3	T1,T2,R3	
160.	Context free grammar	1	23-07-18		**TLM1**	CO3	T1,T2,R3	
161.	Derivation trees, Right most and leftmost derivation of strings	1	24-07-18		**TLM1**	CO3	T1,T2,R3	
162.	Ambiguity in context free grammars	1	25-07-18		**TLM1**	CO3	T1,T2,R3	
163.	Simplification of Context Free Grammars	1	26-06-18		**TLM1**	CO3	T1,T2,R3	
164.	Chomsky normal form	1	06-08-18		**TLM1**	CO3	T1,T2,R3	
165.	GNF	1	07-08-18		**TLM1**	CO3	T1,T2,R3	
166.	Pumping Lemma for Context Free Languages	1	08-08-18		**TLM1**	CO3	T1,T2,R3	
167.	Closure properties of CFL's	1	09-08-18		**TLM1**	CO3	T1,T2,R3	
168.	Overview/Revision of UNIT-3	1	13-08-18		**TLM1**	CO3	T1,T2,R3	
169.	Tutorial – V	1	14-08-18		**TLM3**	CO3		
No. of classes required to complete **UNIT-3**		11			No. of classes taken:			

UNIT –IV: Push Down Automata

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
170.	Introduction, definition, model	1	16-08-18		**TLM1**	CO4	T1,T2,R3	
171.	Acceptance of CFL	1	20-08-18		**TLM1**	CO4	T1,T2,R3	

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
172.	Acceptance by final state and acceptance by empty stack and its equivalence	1	21-08-18		**TLM1**	CO4	T1,T2,R3	
173.	Acceptance by final state and acceptance by empty stack and its equivalence	1	22-08-18		**TLM1**	CO4	T1,T2,R3	
174.	Equivalence of CFL and PDA and Interco version	1	23-08-18		**TLM1**	CO4	T1,T2,R3	
175.	Equivalence of CFL and PDA and Interco version	1	27-08-18		**TLM1**	CO4	T1,T2,R3	
176.	Equivalence of CFL and PDA and Interco version	1	28-08-18		**TLM3**	CO4	T1,T2,R3	
177.	Equivalence of CFL and PDA and Interco version	1	29-08-18		**TLM1**	CO4	T1,T2,R3	
178.	Overview/Revision of UNIT-4	1	30-08-18		**TLM1**	CO4	T1,T2,R3	
179.	Tutorial – VI	1	03-09-18		**TLM3**	CO4		
No. of classes required to complete **UNIT-4**		10			No. of classes taken:			

UNIT-V: Turing Machine

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
180.	Introduction	1	04-09-18		**TLM1**	CO5	T2,R1	
181.	The Turing machine model	1	05-09-18		**TLM1**	CO5	T2,R1	
182.	Computable languages and functions	1	06-09-18		**TLM1**	CO5	T2,R1	
183.	Techniques of Turing Machine Construction	1	10-09-18		**TLM1**	CO5	T2,R1	
184.	**Undesirability:** Properties of Recursive and Recursively Enumerable Languages;,	1	11-09-18		**TLM1**	CO5	T2,R1	
185.	Properties of Recursive and Recursively Enumerable Languages	1	12-09-18		**TLM1**	CO5	T2,R1	
186.	Universal Turing Machines	1	17-09-18		**TLM1**	CO5	T2,R1	
187.	Undesirability of posts-	1	18-09-18		**TLM1**	CO5	T2,R1	

S.No.	Topics to be covered							
	Correspondence problem.							
188.	The Chomsky Hierarchy of grammars	1	19-09-18		**TLM1**	CO5	T2,R1	
189.	The Chomsky Hierarchy of grammars	1	20-09-18		**TLM1**	CO5	T2,R1	
190.	Overview/Revision of UNIT-5	1	24-09-18		**TLM1**	CO5	T2,R1	
191.	Tutorial – VII	1	25-10-18		**TLM3**	CO5		
192.	Review	1	26-10-18		**TLM1**			
No. of classes required to complete **UNIT-5**		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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
193.	Phases of Compiler	1	01-10-18		**TLM1**			
194.	Phases of Compiler	1	03-10-18		**TLM1**			

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

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
Cumulative Internal Examination : A+B	1,2,3,4,5	A+B=25
Semester End Examinations	1,2,3,4,5	C=75
Total Marks: A+B+C	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

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

26. **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.

27. **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.

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

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31. **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.

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

33. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

34. **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.

35. **Project management and finance**: Demonstrate knowledge and understanding of the engine**ering 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.

36. **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.

PSOs

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 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.

Dr.D.Veeraiah	Dr.D.Veeraiah		
Course Instructor	Course Coordinator	Module Coordinator	HOD

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http://www.lbrce.ac.in, cselbreddy@gmail.com, Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PROGRAM   : B.Tech.V-Sem., CSE

ACADEMIC YEAR   : 2018-19

COURSE NAME & CODE   : THEORY OF COMPUTATION-S401

L-T-P STRUCTURE   : 3-1-0

COURSE CREDITS   : 3

COURSE INSTRUCTOR : Dr.K.Venkateswara Rao

COURSE COORDINATOR : Dr.D.Veeraiah

PRE-REQUISITE:Knowledge in mathematics, including a course in discrete mathematics and programming.

COURSE OBJECTIVE:

This course enables the students to know about

- ✓ Basic understanding of the notion of a regular set and its representation by DFA's, NFA's, and regular expressions, abstract models of information processing machines and limits of digitalcomputation, and understanding of the notion of a context-free language and its representation bycontext-free grammars and push-down automata.

COURSE OUTCOMES (CO): After completion of this course, a student can able to

CO1:Design Finite Automata to accept regular languages.
CO2: Design Regular expression for regular languages and equivalence of Finite Automata
And Regular Expression.
CO3:Design Context free Grammar for CFL.
CO4: Design a Push down Automata for CFG and equivalence of CFG and PDA
CO5:Design the Turing Machines and understand the notion of an Undecidable problem

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	3	2											1		
CO2	3	2											1		
CO3	3	2											1		
CO4	3	2											1		
CO5	3	2	2										1		

Note: Enter Correlation Levels **1** or **2** or **3.**
1- Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High).

BOS APPROVED TEXT BOOKS:
T1: John E. Hopcroft and J.D.Ullman "Introduction to Automata Theory Languages and Computation", Narosa Publications, 1999.

T2: Daniel I.A. Cohen "Introduction to Computer Theory", John Wiley.2Nd Edition 1997.

BOS APPROVED REFERENCE BOOKS:
R1: John C Martin "Introduction to languages and the Theory of Computation", TMH.

R2: Lewis H.P. &Papadimitriou C.H. "Elements of Theory of Computation", Pearson /PHI.

R3: Mishra and Chandrasekhar "Theory of Computer Science – Automata languages and computation" --2nd edition, PHI.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT –I: Introduction to Finite Automata

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
195.	Strings, alphabets and languages	1	11-06-18		**TLM1**	CO1	T1,T2,R1,R2	
196.	Finite state systems, basic definitions	1	13-06-18		**TLM1**	CO1	T1,T2,R1,R2	
197.	Non-deterministic finite automaton	1	15-06-18		**TLM1**	CO1	T1,T2,R1,R2	
198.	Acceptance of languages	1	16-06-18		**TLM1**	CO1	T1,T2,R1,R2	
199.	Equivalence between NFA with and without ^transitions	1	18-06-18		**TLM1**	CO1	T1,T2,R1,R2	
200.	NFA to DFA conversion	1	20-06-18		**TLM1**	CO1	T1,T2,R1,R2	
201.	Tutorial – I	1	22-06-18		**TLM3**	CO1		
202.	Minimization of FSM	1	23-06-18		**TLM1**	CO1	T1,T2,R1,R2	
203.	Equivalence between two FSMs	1	25-06-18		**TLM1**	CO1	T1,T2,R1,R2	
204.	Finite Automata with output	1	27-06-18		**TLM1**	CO1	T1,T2,R1,R2	
205.	Moore and Melay machines.	1	29-06-18		**TLM1**	CO1	T1,T2,R1,R2	
206.	Overview/Revision of UNIT-1	1	30-06-18		**TLM1**	CO1		
207.	Tutorial – II	1	02-07-18		**TLM3**			
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT –II: Regular Expressions

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
208.	Regular sets	1	04-07-18		**TLM1**	CO2	T1,R1	
209.	Regular expressions	1	06-07-18		**TLM1**	CO2	T1,R1	
210.	Regular expressions	1	07-07-18		**TLM1**	CO2	T1,R1	
211.	Constructing finite Automata for a given regular expressions	2	09-07-18 / 11-07-18		**TLM1**	CO2	T1,R1	
212.	Conversion of Finite Automata	2	13-07-18		**TLM1**	CO2	T1,R1	

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
	to Regular expressions.		14-07-18					
213.	Tutorial – III	1	16-07-18		**TLM3**	CO2		
214.	Pumping lemma of regular sets	1	18-07-18		**TLM1**	CO2	T1,R1	
215.	closure properties of regular sets	1	20-07-18		**TLM1**	CO2	T1,R1	
216.	Tutorial – IV	1	21-07-18		**TLM3**	CO2		
No. of classes required to complete **UNIT-2**		11			No. of classes taken:			

UNIT –III: Context Free Grammar

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
217.	Regular grammars-right linear and left linear grammars	1	23-07-18		**TLM1**	CO3	T1,T2,R3	
218.	Context free grammar	1	25-07-18		**TLM1**	CO3	T1,T2,R3	
219.	Derivation trees, Right most and leftmost derivation of strings	1	27-07-18		**TLM1**	CO3	T1,T2,R3	
220.	Ambiguity in context free grammars	1	28-07-18		**TLM1**	CO3	T1,T2,R3	
221.	Simplification of Context Free Grammars	1	06-08-18		**TLM1**	CO3	T1,T2,R3	
222.	Chomsky normal form	1	08-08-18		**TLM1**	CO3	T1,T2,R3	
223.	GNF	1	10-08-18		**TLM1**	CO3	T1,T2,R3	
224.	Pumping Lemma for Context Free Languages	1	11-08-18		**TLM1**	CO3	T1,T2,R3	
225.	Closure properties of CFL's	1	13-08-18		**TLM1**	CO3	T1,T2,R3	
226.	Overview/Revision of UNIT-3	1	17-08-18		**TLM1**	CO3	T1,T2,R3	
227.	Tutorial – V	1	18-08-18		TLM3	CO3		
No. of classes required to complete **UNIT-3**		11			No. of classes taken:			

UNIT –IV: Push Down Automata

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
228.	Introduction, definition, model	1	20-08-18		**TLM1**	CO4	T1,T2,R3	
229.	Acceptance of CFL	1	24-08-18		**TLM1**	CO4	T1,T2,R3	

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
230.	Acceptance by final state and acceptance by empty stack and its equivalence	1	25-08-18		**TLM1**	CO4	T1,T2,R3	
231.	Acceptance by final state and acceptance by empty stack and its equivalence	1	27-08-18		**TLM1**	CO4	T1,T2,R3	
232.	Equivalence of CFL and PDA and Interco version	1	29-08-18		**TLM1**	CO4	T1,T2,R3	
233.	Equivalence of CFL and PDA and Interco version	1	31-08-18		**TLM1**	CO4	T1,T2,R3	
234.	Equivalence of CFL and PDA and Interco version	1	01-09-18		**TLM3**	CO4	T1,T2,R3	
235.	Equivalence of CFL and PDA and Interco version	1	05-09-18		**TLM1**	CO4	T1,T2,R3	
236.	Overview/Revision of UNIT-4	1	07-09-18		**TLM1**	CO4	T1,T2,R3	
237.	Tutorial – VI	1	08-09-18		**TLM3**	CO4		
No. of classes required to complete **UNIT-4**		10			No. of classes taken:			

UNIT-V: Turing Machine

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
238.	Introduction	1	10-09-18		**TLM1**	CO5	T2,R1	
239.	The Turing machine model	1	12-09-18		**TLM1**	CO5	T2,R1	
240.	Computable languages and functions	1	14-09-18		**TLM1**	CO5	T2,R1	
241.	Techniques of Turing Machine Construction	1	15-09-18		**TLM1**	CO5	T2,R1	
242.	**Undesirability:** Properties of Recursive and Recursively Enumerable Languages;,	1	17-09-18		**TLM1**	CO5	T2,R1	
243.	Properties of Recursive and Recursively Enumerable Languages	1	19-09-18		**TLM1**	CO5	T2,R1	
244.	Universal Turing Machines	1	22-09-18		**TLM1**	CO5	T2,R1	
245.	Undesirability of posts-	1	24-09-18		**TLM1**	CO5	T2,R1	

S.No.	Topics	No. of Classes	Tentative Date	Actual Date	TLM	CO	Text Book
	Correspondence problem.						
246.	The Chomsky Hierarchy of grammars	1	26-09-18		**TLM1**	CO5	T2,R1
247.	The Chomsky Hierarchy of grammars	1	28-09-18		**TLM1**	CO5	T2,R1
248.	Overview/Revision of UNIT-5	1	29-09-18		**TLM1**	CO5	T2,R1
249.	Tutorial – VII	1	01-10-18		**TLM3**	CO5	
250.	Review	1	03-10-18		**TLM1**		
No. of classes required to complete **UNIT-5**		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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
251.	Phases of Compiler	1	01-10-18		**TLM1**			
252.	Phases of Compiler	1	03-10-18		**TLM1**			

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

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
Cumulative Internal Examination : A+B	1,2,3,4,5	A+B=25
Semester End Examinations	1,2,3,4,5	C=75
Total Marks: A+B+C	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

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

38. **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.

39. **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.

40. **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.

41. **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.

42. **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.

43. **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.

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

45. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

46. **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.

47. **Project management and finance**: Demonstrate knowledge and understanding of the engine**ering 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.

48. 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.

PSOs

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 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.

Dr.K.Venkateswara Rao	Dr.D.Veeraiah		
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
COMPUTER SCIENCE AND ENGINEERING
**(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi,
NAAC Accredited with 'A' grade, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.**

COURSE HANDOUT

PROGRAM   : B.Tech., V-Sem., CSE

ACADEMIC YEAR   : 2018-19

COURSE NAME & CODE : Operating Systems & S327

L-T-P STRUCTURE   : 4-1-0

COURSE CREDITS   : 3

COURSE INSTRUCTOR   : Dr R Chandrasekharam

COURSE COORDINATOR: Dr R Chandrasekharam

PRE-REQUISITE: Knowledge of Computers fundamentals, Data structures & CO.

COURSE OBJECTIVE: The main objective of the course is to provide basic knowledge of computer operating system structure and functioning. Students able to understand how Operating Systems evolved with advent of computer architecture. Comprehend the different CPU scheduling algorithms, page replacement algorithms and identify best one.

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

CO 1	Identify the functional aspects and implementation methods (system call and system programs) of different modules in a general purpose operating system.
CO 2	Evaluate scheduling and communication methods of processes handled by operating systems through examples.
CO 3	Analyse the process synchronization methods and deadlock handling approaches employed in operating systems.
CO 4	Evaluate memory management strategies such as paging and segmentation, virtual memory, swapping, and page replacement algorithms.
CO 5	Analyse the implementation strategies of file systems regarding directory, allocation, free-space

	management and file recovery.	

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	2													
CO2	1	2													
CO3	1	2													
CO4	1														
CO5	1														

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

BOS APPROVED TEXT BOOKS:

T1 Silberschatz & Galvin, "Operating System Concepts", Wiley, 7th edition, 2007.

BOS APPROVED REFERENCE BOOKS:

R1 William Stallings, "Operating Systems", PHI, 5th Edition, 2004.

R2 Charles Crowley, "Operating Systems: A Design-Oriented Approach", TMH Publications, 1998.

R3 Andrew S.Tanenbaum, "Modern Operating Systems", PHI, 2nd edition, 1995.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: Introduction &Operating-System Structures

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
25	Introduction to Operating Systems, Evolution Operating Systems, Computer-System Organization, Computer-System Architecture	1	11/6/2018		**TLM1**	CO1	T1	
25	Operating System Structures, Operating-System Operations	1	12/6/2018		**TLM1**	CO1	T1	
25	Process Management, Memory Management	1	14/6/2018		**TLM1**	CO1	T1	
25	Storage Management, Protection and Security	1	18/6/2018		**TLM1**	CO1	T1	
25	Distributed Systems Special-Purpose	1	19/6/2018		**TLM2**	CO1	T1	

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
	Systems Operating-System Services							
25	User Operating-System Interface Difference between CLI and GUI	1	21/6/2018		**TLM1**	CO1	T1	
25	System Calls Types of System Calls System Programs	1	23/6/2018		**TLM1**	CO1	T1	
26	Operating-System Design and Implementation	1	25/6/2018		**TLM2**	CO1	T1	
26	Virtual Machines, Operating-System Generation and System Boot	1	26/6/2018		**TLM2**	CO1	T1	
26	TUTORIAL-1	1	28/6/2018		**TLM3**			
26	Assignment/Quiz-1	1	30/6/2018		**TLM6**			
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT-II: **Processes-Concept** and **Multithreaded Programming** and **Process Scheduling**

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	Introduction to Processes in Operating Systems, Explanation about Process State Diagram, Process Scheduling	1	02/7/2018		**TLM1**	CO2	T1	
26	Operations on Processes, Inter-process Communication	1	03/7/2018		**TLM2**	CO2	T1	
26	Examples of IPC Systems, Communication in Client-Server Systems	1	05/7/2018		**TLM1**	CO2	T1	
26	Introduction Multithreading Programming, Multithreading Models, Thread Libraries	1	07/7/2018		**TLM1**	CO2	T1	
26	Threading Issues, Introduction Process Scheduling	1	09/7/2018		**TLM1**	CO2	T1	
26	Scheduling Criteria, Scheduling Algorithms	3	10/7/2018 12/7/2018 14/7/2018		**TLM2**	CO2	T1	
27	Multiple-Processor Scheduling	1	16/7/2018		**TLM2**	CO2	T1	

27	Tutorial 2	1	17/7/2018		**TLM3**			
27	Assignment/Quiz-2	1	19/7/2018		**TLM6**			
No. of classes required to complete UNIT-II		11			No. of classes taken:			

UNIT-III: Synchronization and Deadlocks

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
27	The Critical-Section Problem, Peterson's Solution	1	06/8/18		**TLM1**	CO3	T1	
27	Synchronization Hardware, Semaphores	1	07/8/2018		**TLM1**	CO3	T1	
27	Classic Problems of Synchronization	1	09/8/2018		**TLM1**	CO3	T1	
27	Monitors, Synchronization Examples	1	11/8/2018		**TLM2**	CO3	T1	
27	Atomic Transactions, System Model	1	13/8/2018		**TLM2**	CO3	T1	
27	Deadlock Characterization, Methods for Handling Deadlocks	1	14/8/2018		**TLM2**	CO3	T1	
27	Deadlock Prevention	1	16/8/2018		**TLM2**	CO3	T1	
28	Deadlock Avoidance	1	18/8/2018		**TLM2**	CO3	T1	
28	Deadlock Detection, Recovery from deadlock	1	20/8/2018		**TLM2**	CO3	T1	
28	Tutorial 3	1	21/8/2018		**TLM3**			
28	Assignment/Quiz-3	1	23/8/2018		**TLM6**			
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV: Memory Management Strategies, Virtual Memory Management

S.No.	Topics to be covered	No. of	Tentative	Actual	Teaching	Learning	Text	HOD

S.No.	Topics	Classes Required	Date of Completion	Date of Completion	Learning Methods	Outcome COs	Book followed	Sign Weekly
28	Swapping	1	25/8/2018		**TLM2**	CO4	T1	
28	Contiguous Memory Allocation	1	27/8/2018		**TLM2**	CO4	T1	
28	Paging, Structure of the Page Table	1	28/8/2018		**TLM2**	CO4	T1	
28	Segmentation	1	30/8/2018		**TLM2**	CO4	T1	
28	Demand Paging	1	01/9/2018		**TLM2**	CO4	T1	
28	Page Replacement	1	03/09/2018		**TLM2**	CO4	T1	
29	Allocation of Frames	1	04/9/2018		**TLM2**	CO4	T1	
29	Thrashing, Memory-Mapped Files	1	06/9/2018		**TLM2**	CO4	T1	
29	Allocating Kernel Memory	1	08/9/2018		**TLM2**	CO4	T1	
29	TUTORIAL-4	1	10/9/2018		**TLM3**			
29	Assignment/Quiz-4	1	11/9/2018		**TLM6**			
No. of classes required to complete UNIT-IV		11			No. of classes taken:			

UNIT-V: Implementing File System

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
29	The Concept of a File, Access Methods	1	15/9/2018		**TLM2**	CO5	T1	
29	Directory Structure, File-System Mounting	1	17/9/2018		**TLM2**	CO5	T1	
29	File Sharing, Protection	1	18/9/18		**TLM2**	CO5	T1	
29	File-System Structure	1	20/9/18		**TLM2**	CO5	T1	
29	File-System Implementation	1	22/9/18		**TLM2**	CO5	T1	
30	Directory Implementation	1	24/9/18		**TLM2**	CO5	T1	
30	Allocation Methods	1	25/9/18		**TLM2**	CO5	T1	
30	Free-Space Management	1	27/9/18		**TLM2**	CO5	T1	

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
30	Efficiency and Performance, Recovery	1	29/10/18		**TLM2**	CO5	T1	
30	Tutorial 5	1	01/10/18		**TLM3**			
30	Assignment 5/Quiz	1	04/10/18		**TLM6**			
No. of classes required to complete UNIT-V		11	06/10/18		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
30	Latest operating systems and its structures and functionality	1	24/10/18					

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

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
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

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PROGRAM OUTCOMES

Engineering Graduates will be able to:

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

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51. **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.

52. **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.

53. **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.

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60. **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-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM   : B.Tech., V-Sem., CSE

ACADEMIC YEAR   : 2018-19

COURSE NAME & CODE : Operating Systems & S327

L-T-P STRUCTURE   : 4-1-0

COURSE CREDITS   : 3

COURSE INSTRUCTOR   : Dr R Chandrasekharam

COURSE COORDINATOR: Dr R Chandrasekharam

PRE-REQUISITE: Knowledge of Computers fundamentals, Data structures & CO.

COURSE OBJECTIVE: The main objective of the course is to provide basic knowledge of computer operating system structure and functioning. Students able to understand how Operating Systems evolved with advent of computer architecture. Comprehend the different CPU scheduling algorithms, page replacement algorithms and identify best one.

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

CO 1	Identify the functional aspects and implementation methods (system call and system programs) of different modules in a general purpose operating system.
CO 2	Evaluate scheduling and communication methods of processes handled by operating systems through examples.
CO 3	Analyse the process synchronization methods and deadlock handling approaches employed in operating systems.
CO 4	Evaluate memory management strategies such as paging and segmentation, virtual memory, swapping, and page replacement algorithms.
CO 5	Analyse the implementation strategies of file systems regarding directory, allocation, free-space management and file recovery.

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	2													
CO2	1	2													
CO3	1	2													
CO4	1														
CO5	1														

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

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

BOS APPROVED TEXT BOOKS:

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COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: Introduction &Operating-System Structures

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
30	Introduction to Operating Systems, Evolution Operating Systems, Computer-System Organization, Computer-System Architecture	1	12/6/2018		**TLM1**	CO1	T1	
30	Operating System Structures, Operating-System Operations	1	14/6/2018		**TLM1**	CO1	T1	
30	Process Management, Memory Management	1	15/6/2018		**TLM1**	CO1	T1	
31	Storage Management, Protection and Security	1	19/6/2018		**TLM1**	CO1	T1	
31	Distributed Systems Special-Purpose Systems Operating-System Services	1	21/6/2018		**TLM2**	CO1	T1	
31	User Operating-System Interface Difference between CLI and GUI	1	22/6/2018		**TLM1**	CO1	T1	
31	System Calls Types of System Calls System Programs	1	23/6/2018		**TLM1**	CO1	T1	
31	Operating-System Design and Implementation	1	26/6/2018		**TLM2**	CO1	T1	
31	Virtual Machines, Operating-System Generation and System Boot	1	28/6/2018		**TLM2**	CO1	T1	
31	TUTORIAL-1	1	29/6/2018		**TLM3**			

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
31	Assignment/Quiz-1	1	30/6/2018		**TLM6**			
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT-II: **Processes-Concept** and **Multithreaded Programming** and **Process Scheduling**

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
31	Introduction to Processes in Operating Systems, Explanation about Process State Diagram, Process Scheduling	1	03/7/2018		**TLM1**	CO2	T1	
31	Operations on Processes, Inter-process Communication	1	05/7/2018		**TLM2**	CO2	T1	
32	Examples of IPC Systems, Communication in Client-Server Systems	1	06/7/2018		**TLM1**	CO2	T1	
32	Introduction Multithreading Programming, Multithreading Models, Thread Libraries	1	07/7/2018		**TLM1**	CO2	T1	
32	Threading Issues, Introduction Process Scheduling	1	10/7/2018		**TLM1**	CO2	T1	
32	Scheduling Criteria, Scheduling Algorithms	3	12/7/2018 13/7/2018 14/7/2018		**TLM2**	CO2	T1	
32	Multiple-Processor Scheduling	1	17/7/2018		**TLM2**	CO2	T1	
32	Tutorial 2	1	19/7/2018		**TLM3**			
32	Assignment/Quiz-2	1	20/7/2018		**TLM6**			
No. of classes required to complete UNIT-II		11			No. of classes taken:			

UNIT-III: Synchronization and Deadlocks

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
32	The Critical-Section Problem, Peterson's Solution	1	7/8/18		**TLM1**	CO3	T1	
32	Synchronization Hardware,	1	09/8/2018		**TLM1**	CO3	T1	

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
	Semaphores							
32	Classic Problems of Synchronization	1	10/8/2018		**TLM1**	CO3	T1	
33	Monitors, Synchronization Examples	1	11/8/2018		**TLM2**	CO3	T1	
33	Atomic Transactions, System Model	1	14/8/2018		**TLM2**	CO3	T1	
33	Deadlock Characterization, Methods for Handling Deadlocks	1	16/8/2018		**TLM2**	CO3	T1	
33	Deadlock Prevention	1	17/8/2018		**TLM2**	CO3	T1	
33	Deadlock Avoidance	1	18/8/2018		**TLM2**	CO3	T1	
33	Deadlock Detection, Recovery from deadlock	1	21/8/2018		**TLM2**	CO3	T1	
33	Tutorial 3	1	23/8/2018		**TLM3**			
33	Assignment/Quiz-3	1	24/8/2018		**TLM6**			
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV: Memory Management Strategies, Virtual Memory Management

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
33	Swapping	1	25/8/2018		**TLM2**	CO4	T1	
33	Contiguous Memory Allocation	1	28/8/2018		**TLM2**	CO4	T1	
34	Paging, Structure of the Page Table	1	30/8/2018		**TLM2**	CO4	T1	
34	Segmentation	1	31/8/2018		**TLM2**	CO4	T1	
34	Demand Paging	1	01/9/2018		**TLM2**	CO4	T1	
34	Page Replacement	1	04/09/2018		**TLM2**	CO4	T1	
34	Allocation of Frames	1	06/9/2018		**TLM2**	CO4	T1	

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
34	Thrashing, Memory-Mapped Files	1	07/9/2018		**TLM2**	CO4	T1	
34	Allocating Kernel Memory	1	08/9/2018		**TLM2**	CO4	T1	
34	TUTORIAL-4	1	11/9/2018		**TLM3**			
34	Assignment/Quiz-4	1	14/9/2018		**TLM6**			
No. of classes required to complete UNIT-IV		11			No. of classes taken:			

UNIT-V: Implementing File System

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
34	The Concept of a File, Access Methods	1	15/9/2018		**TLM2**	CO5	T1	
35	Directory Structure, File-System Mounting	1	18/9/2018		**TLM2**	CO5	T1	
35	File Sharing, Protection	1	20/9/18		**TLM2**	CO5	T1	
35	File-System Structure	1	21/9/18		**TLM2**	CO5	T1	
35	File-System Implementation	1	22/9/18		**TLM2**	CO5	T1	
35	Directory Implementation	1	25/9/18		**TLM2**	CO5	T1	
35	Allocation Methods	1	27/9/18		**TLM2**	CO5	T1	
35	Free-Space Management	1	28/9/18		**TLM2**	CO5	T1	
35	Efficiency and Performance, Recovery	1	29/10/18		**TLM2**	CO5	T1	
35	Tutorial 5	1	04/10/18		**TLM3**			
35	Assignment 5/Quiz	1	05/10/18		**TLM6**			
No. of classes required to complete UNIT-V		11	06/10/18		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
36	Latest operating systems and its structures and	1	24/10/18					

functionality								

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

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
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

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

62. **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.

63. **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.

64. **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.

65. **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.

66. **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.

67. **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.

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

69. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

70. **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.

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

72. **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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
COMPUTER SCIENCE AND ENGINEERING
**(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi,
NAAC Accredited with 'A' grade, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.**

COURSE HANDOUT

PROGRAM   : B.Tech., V-Sem., CSE-A/S

ACADEMIC YEAR : 2018-19

COURSE NAME & CODE : Computer Networks & S168

L-T-P STRUCTURE : **4-1-0**

COURSE CREDITS : 3

COURSE INSTRUCTOR : Dr. CH V NARAYANA

COURSE COORDINATOR : Dr. CH V NARAYANA

PRE-REQUISITE: Communication systems

COURSE OBJECTIVE:

In this course, students will learn about Protocols, network standards, the OSI model, IP addressing, cabling, networking components and basic LAN design. Existing state of art in network protocols, architectures and its applications. Functionalities and Applications of Various OSI and TCP/IP layers.

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

CO1: Outline the basic concepts of reference models and Identify the functionality of physical layer in computer communications

CO2: Examine the data link layer design issues

CO3: Analyze the network layer functions

CO4: Explore the intricacies in the design of transport layer

CO5: Examine various application layer functionalities

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	2	3													
CO2	1		3											3	1
CO3	1	3	2											3	
CO4		2	3											3	
CO5	1													2	

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

BOS APPROVED TEXT BOOKS:

T1 Andrews S. Tanenbaum, "Computer Networks", PHI, Fourth Edition.

BOS APPROVED REFERENCE BOOKS:

R1	William Stallings, "Data and Computer Communications", Pearson Education, seventh Edition.
R2	James F.Kurose, Keith W.ROSS, "Computer Networking a Top-Down Approach featuring the Internet", Pearson Education.

R3	Behrouz A .Fourouzan, "TCP/IP Protocol Suite", Tata-McGraw Hill, Fourth Edition
L1	https://www.netacad.com/courses/packet-tracer/introduction-packet-tracer
L2	https://learningnetwork.cisco.com/community/certifications/ccna/ccna-exam/study-material

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Reference models and identify the functionality of physical layer in computer communications.

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
361.	Discussion of Cos and CEOs of the course	1	11-06-2018		TLM1	CO1	T1	
362.	Introduction to Computer Networks	1	12-06-2018		TLM1	CO1	T1	
363.	Use of Computer Networks	1	13-06-2018		TLM1	CO1	T1	
364.	Network Hardware, Network software	1	18-06-2018		TLM1	CO1	T1	
365.	Reference models: ISO OSI model	2	19-06-2018 ,20-06-18		TLM1,TLM2	CO1	T1	
366.	TCP/IP model	1	21-06-2018		TLM2	CO1	R3	
367.	TUTORIAL-1	1	23-06-2018		TLM3	CO1	-	
368.	Example Networks: The Internet	1	25-06-2018		TLM2	CO1	T1	--
369.	X.25,Frame relay and ATM	1	26-06-2018		TLM1	CO1	T1	
370.	Ethernet and Wireless LAN, Network Standardization	1	27-06-2018		TLM1	CO1	R3	
371.	The theoretical basis for Data communication	1	30-07-2018		TLM1	CO1	T1	
372.	Twisted pair, Coaxial cable, Fiber optics	2	02-07-2018 ,3-07-2018		TLM1,TLM8	CO1	T1	
373.	ASSIGNMENT-1/REVISION/QUIZ-1	1	04-07-2018		TLM6	CO1	--	
No. of classes required to complete UNIT-I:		**15**	**No. of classes taken:**					

UNIT – II: Data link layer design issues and MAC sub layer

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
374	Introduction to DLL, Data link layer design issues	1	05-07-18		TLM1	CO2	T1	
375	Error detection and correction, CRC technique, Hamming code technique	2	07-07-18, 09-07-18		TLM1, TLM4	CO2	T1	
376	Elementary data link protocols- Simplex, Stop&Wait protocols	2	10-07-18 , 11-07-18		TLM2	CO2	R3	
377	Sliding window protocols-one-bit, go-back N, selective repeat	2	12-07-18 , 14-07-18		TLM2	CO2	R2	
378	Channel allocation problem	1	16-07-18		TLM1	CO2	T1	
379	multiple access protocols-ALOHA,CSMA	1	17-07-18		TLM1	CO2	R3	
380	TUTORIAL-2	1	18-07-18		TLM3	CO2	--	
381	Collision free protocols	1	21-07-18		TLM2	CO2	T1	
382	token bus, token ring	1	23-07-18		TLM1	CO2	T1	
383	Ethernet	1	24-07-18		TLM1	CO2	T1	
384	Data link layer switching: ,bridges from 802.x to 802.y	1	25-07-18		TLM1	CO2	T1	
385	Local internetworking, spanning Tree bridges, Remote bridges.	1	26-07-18		TLM7	CO2	T1	
386	ASSIGNMENT-2/REVISION/QUIZ-2	1	28-07-18		TLM6	--	--	
No. of classes required to complete UNIT-II:		**16**	**No. of classes taken:** MID EXAMINATION:30-07-2018 to 04-08-2018					

UNIT – III: Network Layer

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
387	Network layer design issues	1	06-08-18		TLM1	CO3	T1	

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
388	Routing algorithms- Shortest path, Flooding, Distance vector routing	1	07-08-18		TLM1	CO3	T1	
389	Link State routing , Hierarchical Routing, Broadcast routing & Multicast Routing	1	08-08-18		TLM7	CO3	R3	
390	ICMP, ARP, RARP, BOOTP ,DHCP	2	09-08-2018 10-08-2018		TLM2,TLM 8	CO3	R3	
391	Congestion control algorithms	2	13-08-2018, 14-08-2018		TLM1	CO3	T1	
392	Quality of service	1	18-08-2018		TLM1	CO3	T1	
393	Internetworking	1	20-08-2018		TLM1	CO3	T1	
394	TUTORIAL-3	1	21-08-2018		TLM3	CO3	--	
395	Tunneling, Internetwork routing	1	25-08-2018		TLM1	CO3	T1	
396	network layer in the Internet: IP, Mobile IP, IPV6	1	27-08-2018		TLM1	CO3	T1	
397	ASSIGNMENT-3/REVISION/QUIZ-3	1	28-08-2018		TLM6	--	--	
No. of classes required to complete UNIT-III:		**13**	**No. of classes taken:**					

UNIT-IV: TRANSPORT LAYER FUNCTIONS

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
398	Transport layer Introduction	1	29-08-2018		TLM1	CO4	T1	
399	Transport service: addressing, connection establishment, connection release	1	30-08-2018		TLM1	CO4	T1	
400	Flow control and buffering, multiplexing, crash	2	01-09-2018 03-09-2018		TLM1/ TLM7	CO4	T1	

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
	recovery							
401	Internet transport protocols: TCP	2	04-09-2018 05-09-2018		TLM2	CO4	R3	
402	TUTORIAL-4	1	08-09-2018		TLM2	CO4	--	
403	Internet transport protocols: UDP	2	10-09-2018 11-09-2018		TLM1	CO4	T1	
404	Flow control-Segments	1	12-09-2018		TLM1	CO4	T1	
405	TCP Timers, Revision	1	15-09-2018		TLM1	CO4	T1	
406	ASSIGNMENT-4/REVISION/QUIZ-4	1	17-09-2018		TLM6	--	--	
No. of classes required to complete UNIT-IV		**12**	**No. of classes taken:**					

UNIT – V: APPLICATION LAYER

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
407	Introduction to Application Layer	1	18-09-2018		TLM1	CO5	T1	
408	Domain Name System	1	19-09-2018		TLM2	CO5	R3	
409	Electronic Mail	1	22-09-2018		TLM1	CO5	R3	
410	World Wide Web	1	24-09-2018		TLM1	CO5	T1	
411	Network Security: Cryptography, Symmetric key algorithms	2	25-09-2018 26-09-2018		TLM2	CO5	T1	
412	Public key algorithms, digital signatures	1	27-09-2018		TLM2	CO5	T1	
413	Authentication protocols, Communication	1	29-09-2018		TLM1	CO5	T1	
414	Email security, web security, Revision	1	01-10-2018		TLM1	CO5	T1	
415	TUTORIAL-5	1	03-10-2018		TLM3	CO5	--	
416	ASSIGNMENT-5/REVISION/QUIZ-5	1	06-10-2018		TLM6	--	--	
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
417.	CSICO Packet tracer tool	1	19-06-2018		TLM8	CO5	L1	
418.	IPV4 Subnetting	2	14-08-2018 21-08-2018		TLM1, TLM4, TLM8	CO5	L1,L2	
419.	HSRP protocol	1	29-09-2018		TLM1,TLM8	CO5	L1,L2	

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

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)	1,2,3,4,5	A=5
Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

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

74. **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.

75. **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.

76. **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.

77. **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.

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and norms of the engineering practice.

81. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

82. **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.

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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 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.

Course Instructor   Course Coordinator   Module Coordinator   HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
COMPUTER SCIENCE AND ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi,
NAAC Accredited with 'A' grade, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM   **:** B.Tech., V-Sem., CSE-B/S

ACADEMIC YEAR   : 2018-19
COURSE NAME & CODE : Computer Networks & S168
L-T-P STRUCTURE   : **4-1-0**
COURSE CREDITS   : 3
COURSE INSTRUCTOR   : **K.RANGACHARY**
COURSE COORDINATOR : Dr. CH V NARAYANA
PRE-REQUISITE: Communication systems

COURSE OBJECTIVE:

In this course, students will learn about Protocols, network standards, the OSI model, IP addressing, cabling, networking components and basic LAN design. Existing state of art in network protocols, architectures and its applications. Functionalities and Applications of Various OSI and TCP/IP layers.

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

CO1: Outline the basic concepts of reference models and Identify the functionality of physical layer in computer communications

CO2: Examine the data link layer design issues

CO3: Analyze the network layer functions

CO4: Explore the intricacies in the design of transport layer

CO5: Examine various application layer functionalities

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	2	3													
CO2	1		3											3	1
CO3	1	3	2											3	
CO4		2	3											3	
CO5	1													2	

Note: 1- Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High)
BOS APPROVED TEXT BOOKS:
T1 Andrews S. Tanenbaum, "Computer Networks", PHI, Fourth Edition.

BOS APPROVED REFERENCE BOOKS:

R1	William Stallings, "Data and Computer Communications", Pearson Education, seventh Edition.
R2	James F.Kurose, Keith W.ROSS, "Computer Networking a Top-Down Approach featuring the Internet", Pearson Education.

R3	Behrouz A .Fourouzan, "TCP/IP Protocol Suite", Tata-McGraw Hill, Fourth Edition
L1	https://www.netacad.com/courses/packet-tracer/introduction-packet-tracer
L2	https://learningnetwork.cisco.com/community/certifications/ccna/ccna-exam/study-material

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Reference models and identify the functionality of physical layer in computer communications.

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
420.	Discussion of Cos and CEOs of the course	1	11-06-2018		TLM1	CO1	T1	
421.	Introduction to Computer Networks	1	12-06-2018		TLM1	CO1	T1	
422.	Use of Computer Networks	1	13-06-2018		TLM1	CO1	T1	
423.	Network Hardware, Network software	1	18-06-2018		TLM1	CO1	T1	
424.	Reference models: ISO OSI model	2	19-06-2018 ,20-06-18		TLM1,TLM2	CO1	T1	
425.	TCP/IP model	1	21-06-2018		TLM2	CO1	R3	
426.	TUTORIAL-1	1	23-06-2018		TLM3	CO1	-	
427.	Example Networks: The Internet	1	25-06-2018		TLM2	CO1	T1	--
428.	X.25,Frame relay and ATM	1	26-06-2018		TLM1	CO1	T1	
429.	Ethernet and Wireless LAN, Network Standardization	1	27-06-2018		TLM1	CO1	R3	
430.	The theoretical basis for Data communication	1	30-07-2018		TLM1	CO1	T1	
431.	Twisted pair, Coaxial cable, Fiber optics	2	02-07-2018 ,3-07-2018		TLM1,TLM8	CO1	T1	
432.	ASSIGNMENT-1/REVISION/QUIZ-1	1	04-07-2018		TLM6	CO1	--	
No. of classes required to complete UNIT-I:		**15**	**No. of classes taken:**					

UNIT – II: Data link layer design issues and MAC sub layer

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
433	Introduction to DLL, Data link layer design issues	1	05-07-18		TLM1	CO2	T1	
434	Error detection and correction, CRC technique, Hamming code technique	2	07-07-18, 09-07-18		TLM1, TLM4	CO2	T1	
435	Elementary data link protocols- Simplex, Stop&Wait protocols	2	10-07-18 , 11-07-18		TLM2	CO2	R3	
436	Sliding window protocols-one-bit, go-back N, selective repeat	2	12-07-18 , 14-07-18		TLM2	CO2	R2	
437	Channel allocation problem	1	16-07-18		TLM1	CO2	T1	
438	multiple access protocols-ALOHA,CSMA	1	17-07-18		TLM1	CO2	R3	
439	TUTORIAL-2	1	18-07-18		TLM3	CO2	--	
440	Collision free protocols	1	21-07-18		TLM2	CO2	T1	
441	token bus, token ring	1	23-07-18		TLM1	CO2	T1	
442	Ethernet	1	24-07-18		TLM1	CO2	T1	
443	Data link layer switching: ,bridges from 802.x to 802.y	1	25-07-18		TLM1	CO2	T1	
444	Local internetworking, spanning Tree bridges, Remote bridges.	1	26-07-18		TLM7	CO2	T1	
445	ASSIGNMENT-2/REVISION/QUIZ-2	1	28-07-18		TLM6	--	--	
No. of classes required to complete UNIT-II:		16	No. of classes taken: MID EXAMINATION:30-07-2018 to 04-08-2018					

UNIT – III: Network Layer

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
446	Network layer design issues	1	06-08-18		TLM1	CO3	T1	
447	Routing	1	07-08-18		TLM1	CO3	T1	

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
	algorithms-Shortest path, Flooding, Distance vector routing							
448	Link State routing , Hierarchical Routing, Broadcast routing & Multicast Routing	1	08-08-18		TLM7	CO3	R3	
449	ICMP, ARP, RARP, BOOTP ,DHCP	2	09-08-2018 10-08-2018		TLM2,TLM8	CO3	R3	
450	Congestion control algorithms	2	13-08-2018, 14-08-2018		TLM1	CO3	T1	
451	Quality of service	1	18-08-2018		TLM1	CO3	T1	
452	Internetworking	1	20-08-2018		TLM1	CO3	T1	
453	TUTORIAL-3	1	21-08-2018		TLM3	CO3	--	
454	Tunneling, Internetwork routing	1	25-08-2018		TLM1	CO3	T1	
455	network layer in the Internet: IP, Mobile IP, IPV6	1	27-08-2018		TLM1	CO3	T1	
456	ASSIGNMENT-3/REVISION/QUIZ-3	1	28-08-2018		TLM6	--	--	
No. of classes required to complete UNIT-III:		**13**	**No. of classes taken:**					

UNIT-IV: TRANSPORT LAYER FUNCTIONS

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
457	Transport layer Introduction	1	29-08-2018		TLM1	CO4	T1	
458	Transport service: addressing, connection establishment, connection release	1	30-08-2018		TLM1	CO4	T1	
459	Flow control and buffering, multiplexing, crash recovery	2	01-09-2018 03-09-2018		TLM1/ TLM7	CO4	T1	
460	Internet transport	2	04-09-2018		TLM2	CO4	R3	

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
	protocols: TCP		05-09-2018					
461	TUTORIAL-4	1	08-09-2018		TLM2	CO4	--	
462	Internet transport protocols: UDP	2	10-09-2018 11-09-2018		TLM1	CO4	T1	
463	Flow control-Segments	1	12-09-2018		TLM1	CO4	T1	
464	TCP Timers, Revision	1	15-09-2018		TLM1	CO4	T1	
465	ASSIGNMENT-4/REVISION/QUIZ-4	1	17-09-2018		TLM6	--	--	
No. of classes required to complete UNIT-IV		**12**	**No. of classes taken:**					

UNIT – V: APPLICATION LAYER

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
466	Introduction to Application Layer	1	18-09-2018		TLM1	CO5	T1	
467	Domain Name System	1	19-09-2018		TLM2	CO5	R3	
468	Electronic Mail	1	22-09-2018		TLM1	CO5	R3	
469	World Wide Web	1	24-09-2018		TLM1	CO5	T1	
470	Network Security: Cryptography, Symmetric key algorithms	2	25-09-2018 26-09-2018		TLM2	CO5	T1	
471	Public key algorithms, digital signatures	1	27-09-2018		TLM2	CO5	T1	
472	Authentication protocols, Communication	1	29-09-2018		TLM1	CO5	T1	
473	Email security, web security, Revision	1	01-10-2018		TLM1	CO5	T1	
474	TUTORIAL-5	1	03-10-2018		TLM3	CO5	--	
475	ASSIGNMENT-5/REVISION/QUIZ-5	1	06-10-2018		TLM6	--	--	
No. of classes required to complete UNIT-V		**11**	**No. of classes taken:**					

Contents beyond the Syllabus:

S.	Topics to be	No. of	Tentative	Actual	Teaching	Learning	Text	HOD

No.	covered	Classes Required	Date of Completion	Date of Completion	Learning Methods	Outcome Cos	Book followed	Sign Weekly
476.	CSICO Packet tracer tool	1	19-06-2018		TLM8	CO5	L1	
477.	IPV4 Subnetting	2	14-08-2018 21-08-2018		TLM1, TLM4, TLM8	CO5	L1,L2	
478.	HSRP protocol	1	29-09-2018		TLM1,TLM8	CO5	L1,L2	

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

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)	1,2,3,4,5	A=5
Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(E	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

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

86. **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.

87. **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.

88. **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.

89. **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.

90. **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.

91. **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.

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

93. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

94. **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.

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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 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.

Course Instructor   **Course Coordinator**   **Module Coordinator**   **HOD**

LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi,
NAAC Accredited with 'A' grade, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., V-Sem., CSE-A
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Microprocessors and Interfacing – S312
L-T-P STRUCTURE : 3-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : **R. Harikishan**
COURSE COORDINATOR : **K.V.Ashok**

PRE-REQUISITE: Digital Logic Design, Computer Organization
COURSE OBJECTIVE : This course provides the Practical knowledge on Writing Assembly Language programs on 8086 microprocessor kit and MASM Software. This course also provides how to interface various peripherals to 8086 microprocessor.

COURSE OUTCOMES(CO)
CO1: **Describe** the internal architecture and operation of 8086 microprocessor.
CO2: **Develop** Assembly Language Programs for various applications using the instruction set of 8086.
CO3: **Design** a system by interfacing memory and peripherals to 8086
CO4: **Analyze** the working of peripherals and devices for different applications
CO5: **Build** a system for real-time application by interfacing suitable devices.

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-		3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	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: A.K.Ray and K.M. Bhurchandi, Advanced Microprocessor and Peripherals (2/e), TMH Publishers.
T2 Douglas V. Hall, "Micro Processors & Interfacing", TMH, 2007

BOS APPROVED REFERENCE BOOKS:
R1 J.K.Uffenbeck, "The 8088 and 8086 Micro Processors", PHI, 4th Edition, 2003.

R2 Ajay Deshmukh, "Micro Controllers-Theory and Applications", TMH Publications.

R3 Kenneth J.Ayala, "The 8051 Micro Controller", Cenage Learning Publishers.

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Microprocessor Architecture

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 Microprocessors-Purpose of Microprocessors, Different types of Microprocessors, their features and their comparison	1	11.6.18			CO1	T1	
2.	Special functions of General purpose registers, 8086 flag register and function of 8086 Flags	1	12.6.18			CO1	T1	
3.	**Tutorial-I**	1	13.6.18			CO1	T1	
4.	8086 Microprocessor-Architecture	1	15.6.18			CO1	T1	
5.	Addressing Modes of 8086	1	18.6.18			CO1	T1	
6.	Instruction set of 8086	5	19.6.18			CO1	T1	
7.	**Tutorial-II**	1	27.6.18			CO1	T1	
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT-II : 8086 Assembly Language Programs

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
8.	Assembler Directives	1	29.6.18			CO2	T1	
9.	Programs using Logical instructions	1	2.7.18			CO2	T1	
10.	**Tutorial III**	1	3.7.18			CO2	T1	
11.	Programs using String instructions	1	4.7.18			CO2	T1	
12.	Programs using branch instructions	1	6.7.18			CO2	T1	
13.	Sorting of numbers	1	9.7.18			CO2	T1	
14.	**Tutorial IV**	1	10.7.18			CO2	T1	
15.	Procedures and Macros	1	11.7.18			CO2	T1	
16.	Programs using CALL instructions	3	13.7.18			CO2	T1	

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
			14.7.18 16.7.18					
17.	Programs to evaluate arithmetic expressions	2	17.7.18 18.7.18			**CO2**	**T1**	
18.	Pin Description of 8086	1	20.7.18			**CO2**	**T1**	
19.	Max. Mode operation of 8086	2	23.7.18 24.7.18			**CO2**	**T1**	
20.	Min mode operation of 8086	1	25.7.18			**CO2**	**T1**	
21.	**Tutorial V**	1	27.7.18			**CO2**	**T1**	
No. of classes required to complete UNIT-II		18			No. of classes taken:			

UNIT-III : 8086 Memory & I/O Interfacing

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
22.	Machine cycles, T- States	1	6.8.18			**CO3**	**T1**	
23.	Bus Cycle operation	1	7.8.18			**CO3**	**T1**	
24.	Timing diagrams for read operation	1	8.8.18			**CO3**	**T1**	
25.	Timing diagrams for write operation	2	10.8.18 11.8.18			**CO3**	**T1**	
26.	Memory interfacing	1	13.8.18			**CO3**	**T1**	
27.	I/O Interfacing	1	14.8.18			**CO3**	**T1**	
28.	**Tutorial-VI**	1	17.8.18			**CO3**	**T1**	
29.	Need for DMA,DMA data transfer Method	1	20.8.18			**CO3**	**T1**	
30.	Interfacing with 8237/8257- Pin description of 8257	1	21.8.18			**CO3**	**T1**	
31.	Programs on DMA Data transfer	1	24.8.18			**CO3**	**T1**	
32.	**Tutorial-VII**	1	27.8.18			**CO3**	**T1**	
No. of classes required to complete UNIT-III		12			No. of classes taken:			

UNIT-IV : Peripherals and Interfacing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
33.	8255 PPI	1	28.8.18			**CO4**	**T1**	
34.	Various modes of	1	29.8.18			**CO4**	**T1**	

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
	operation.							
35.	Interfacing to 8086 Keyboard	1	31.8.18			CO4	T1	
36.	**Tutorial-VIII**	1	4.9.18			CO4	T1	
37.	Seven segment Displays	1	5.9.18			CO4	T1	
38.	Stepper Motor	2	7.9.18 8.9.18			CO4	T1	
39.	D/A converter interfacing	1	10.9.18			CO4	T1	
40.	A/D converter interfacing	1	11.9.18			CO4	T1	
41.	**Tutorial-IX**	1	12.9.18			CO4	T1	
No. of classes required to complete UNIT-IV		10			No. of classes taken:			

UNIT-V : Data transfer, Interrupts

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
42.	Serial data transfer schemes, RS 232C	1	14.9.18			CO5	T1	
43.	8251 USART architecture and pin description , USART interfacing with 8086	1	17.9.18			CO5	T1	
44.	**Tutorial-X**	1	18.9.18			CO5	T1	
45.	Interrupts: Interrupt structure of 8086, Interrupt Vector table;	1	19.9.18			CO5	T1	
46.	Interrupt service routines	1	24.9.18			CO5	T1	
47.	**Tutorial-XI**	1	25.9.18			CO5	T1	
48.	Introduction to DOS, BIOS interrupts	1	26.9.18			CO5	T1	
49.	8259 PIC Architecture and Pin Description	1	28.9.18			CO5	T1	
50.	Interfacing 8259 with 8086, Cascading of interrupt controller and its importance	1	1.10.18			CO5	T1	
51.	Introduction to microcontrollers	1	3.10.18			CO5	T1	
No. of classes required to complete UNIT-V		10			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
52.	Advanced Microprocessors	1	5.10.18					

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:

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
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.

PEO2: To Function professionally in the rapidly changing world with advances in technology

PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.

PEO4: To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner

PROGRAMME OUTCOMES (POs)

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal,

and   environmental   considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

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

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

PO11: Project management and finance: Demonstrate knowledge and understanding of the 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.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Mr. R. Harikishan	Mr.K.V.Ashok	Dr. P.Lachi Reddy	Dr. Ch. V. Narayana
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi,
NAAC Accredited with 'A' grade, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., V-Sem., CSE-B
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Microprocessors and Interfacing – S312
L-T-P STRUCTURE : 3-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : **K.V.Ashok**
COURSE COORDINATOR : **K.V.Ashok**

PRE-REQUISITE: Digital Logic Design, Computer Organization

COURSE OBJECTIVE : This course provides the Practical knowledge on Writing Assembly Language programs on 8086 microprocessor kit and MASM Software. This course also provides how to interface various peripherals to 8086 microprocessor.

COURSE OUTCOMES(CO)

CO1: **Describe** the internal architecture and operation of 8086 microprocessor.

CO2: **Develop** Assembly Language Programs for various applications using the instruction set of 8086.

CO3: **Design** a system by interfacing memory and peripherals to 8086

CO4: **Analyze** the working of peripherals and devices for different applications

CO5: **Build** a system for real-time application by interfacing suitable devices.

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-		3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	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: A.K.Ray and K.M. Bhurchandi, Advanced Microprocessor and Peripherals (2/e), TMH Publishers.

T2 Douglas V. Hall, "Micro Processors & Interfacing", TMH, 2007

BOS APPROVED REFERENCE BOOKS:

R1 J.K.Uffenbeck, "The 8088 and 8086 Micro Processors", PHI, 4th Edition, 2003.

R2 Ajay Deshmukh, "Micro Controllers-Theory and Applications", TMH Publications.

R3 Kenneth J.Ayala, "The 8051 Micro Controller", Cenage Learning Publishers.

Part-B
COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Microprocessor Architecture

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 Microprocessors-Purpose of Microprocessors, Different types of Microprocessors, their features and their comparison	1	11-06-2018			**CO1**	**T1**	
2.	Special functions of General purpose registers, 8086 flag register and function of 8086 Flags	1	12-06-2018			**CO1**	**T1**	
3.	**Tutorial-I**	1	14-06-2018			**CO1**	**T1**	
4.	8086 Microprocessor-Architecture	1	15-06-2018			**CO1**	**T1**	
5.	Addressing Modes of 8086	1	18-06-2018			**CO1**	**T1**	
6.	Instruction set of 8086	5	19-06-2018			**CO1**	**T1**	
7.	**Tutorial-II**	1	28-06-2018			**CO1**	**T1**	
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT-II : 8086 Assembly Language Programs

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
8.	Assembler Directives	1	29-06-2018			**CO2**	**T1**	
9.	Programs using Logical instructions	1	02-07-2018			**CO2**	**T1**	
10.	**Tutorial III**	1	03-07-2018			**CO2**	**T1**	
11.	Programs using String instructions	1	05-07-2018			**CO2**	**T1**	
12.	Programs using branch instructions	1	06-07-2018			**CO2**	**T1**	
13.	Sorting of numbers	1	09-07-2018			**CO2**	**T1**	
14.	**Tutorial IV**	1	10-07-2018			**CO2**	**T1**	
15.	Procedures and Macros	1	12-07-2018			**CO2**	**T1**	

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
16.	Programs using CALL instructions	2	13-07-2018			**CO2**	**T1**	
17.	Programs to evaluate arithmetic expressions	2	17-07-2018			**CO2**	**T1**	
18.	Pin Description of 8086	2	19-07-2018			**CO2**	**T1**	
19.	Max. Mode operation of 8086	2	23-07-2018			**CO2**	**T1**	
20.	Min mode operation of 8086	2	24-07-2018			**CO2**	**T1**	
21.	**Tutorial V**	1	27-07-2018			**CO2**	**T1**	
No. of classes required to complete UNIT-II		19			No. of classes taken:			

UNIT-III : 8086 Memory & I/O Interfacing

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
22.	Machine cycles, T- States	1	06-08-2018			**CO3**	**T1**	
23.	Bus Cycle operation	1	07-08-2018			**CO3**	**T1**	
24.	Timing diagrams for read operation	1	09-08-2018			**CO3**	**T1**	
25.	Timing diagrams for write operation	1	10-08-2018			**CO3**	**T1**	
26.	Memory interfacing	1	13-08-2018			**CO3**	**T1**	
27.	I/O Interfacing	1	14-08-2018			**CO3**	**T1**	
28.	**Tutorial-VI**	1	16-08-2018			**CO3**	**T1**	
29.	Need for DMA,DMA data transfer Method	1	17-08-2018			**CO3**	**T1**	
30.	Interfacing with 8237/8257-Pin description of 8257	1	20-08-2018			**CO3**	**T1**	
31.	Programs on DMA Data transfer	1	21-08-2018			**CO3**	**T1**	
32.	**Tutorial-VII**	1	23-08-2018			**CO3**	**T1**	
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV : Peripherals and Interfacing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
33.	8255 PPI	1	24-08-2018			**CO4**	**T1**	
34.	Various modes of operation.	1	27-08-2018			**CO4**	**T1**	

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
35.	Interfacing to 8086 Keyboard	1	28-08-2018			**CO4**	**T1**	
36.	**Tutorial-VIII**	1	30-08-2018			**CO4**	**T1**	
37.	Seven segment Displays	1	31-08-2018			**CO4**	**T1**	
38.	Stepper Motor	1	04-09-2018			**CO4**	**T1**	
39.	D/A converter interfacing	1	06-09-2018			**CO4**	**T1**	
40.	A/D converter interfacing	1	07-09-2018			**CO4**	**T1**	
41.	**Tutorial-IX**	1	10-09-2018			**CO4**	**T1**	
No. of classes required to complete UNIT-IV		09			No. of classes taken:			

UNIT-V : Data transfer, Interrupts

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
42.	Serial data transfer schemes, RS 232C	1	11-09-2018			**CO5**	**T1**	
43.	8251 USART architecture and pin description , USART interfacing with 8086	1	13-09-2018			**CO5**	**T1**	
44.	**Tutorial-X**	1	14-09-2018			**CO5**	**T1**	
45.	Interrupts: Interrupt structure of 8086, Interrupt Vector table;	1	17-09-2018			**CO5**	**T1**	
46.	Interrupt service routines	1	18-09-2018			**CO5**	**T1**	
47.	**Tutorial-XI**	1	20-09-2018			**CO5**	**T1**	
48.	Introduction to DOS, BIOS interrupts	1	21-09-2018			**CO5**	**T1**	
49.	8259 PIC Architecture and Pin Description	2	24-09-2018			**CO5**	**T1**	
50.	Interfacing 8259 with 8086, Cascading of interrupt controller and its importance	3	27-09-2018			**CO5**	**T1**	
51.	Introduction to microcontrollers	1	04-10-2018			**CO5**	**T1**	
52.	**Tutorial-XII**	1	05-10-2018			**CO5**	**T1**	
No. of classes required to complete UNIT-V		16			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
53.								
54.								

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:

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
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.

PEO2: To Function professionally in the rapidly changing world with advances in technology

PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.

PEO4: To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner

PROGRAMME OUTCOMES (POs)

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering

problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

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

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

PO11: Project management and finance: Demonstrate knowledge and understanding of the 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.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

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COURSE HANDOUT

PROGRAM   : B.Tech., V-Sem., CSE-A/S

ACADEMIC YEAR   : 2018-19

COURSE NAME & CODE : HUMAN COMPUTER INTERACTION & S262

L-T-P STRUCTURE   : 4-1-0

COURSE CREDITS   : 3

COURSE INSTRUCTOR   : G NAGESWARA RAO

COURSE COORDINATOR : G NAGESWARA RAO

PRE-REQUISITE: Basic knowledge regarding computer, graphics and screen designs

COURSE OBJECTIVE:
In this course, students will learn about the guidelines, principles, and theories influencing human computer interaction. Recognize how a computer system may be modified to include human diversity. Design mock ups and carry out user and expert evaluation of interfaces. Carry out the steps of experimental design, usability, experimental testing, and evaluation of human computer interaction systems. Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI.

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

CO1: Identify the elements of good user interface design through effective GUI.

CO2: Identify the importance of human characteristics and understanding business functions.

CO3: Analyse screen design principles for making good decisions based on technological considerations in interface design.

CO4: Select the window, device and screen based controls through navigation schemes.

CO5: Identify the basic components and interaction devices to interact with the computers.

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		2	2										1		
CO2		2	2										1		
CO3		2	3										1		
CO4		2	3										1		
CO5		2	3										1		

BOS APPROVED TEXT BOOKS:

T1 The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.

BOS APPROVED REFERENCE BOOKS:

R1 Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.

R2 Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Introduction and the graphical user interface

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 Week
479	**Introduction :** Importance of user Interface	1	13/06/2018		TLM1	CO1	T1	
480	Overview of user Interface	1	14/06/2018		TLM1	CO1	T1	
481	Importance of good design	1	15/06/2018		TLM1, TLM2	CO1	T1	
482	Benefits of good design.	1	16/06/2018		TLM1	CO1	T1	
483	A brief history of Screen design	1	20/06/2018		TLM1, TLM2	CO1	T1	
484	**The graphical user interface** – popularity of graphics solve design problems	1	21/06/2018		TLM2	CO1	T1	
485	The concept of direct manipulation	1	22/06/2018		TLM1	CO1	T1	
486	Tutorial		23/06/2018		TLM3	CO1	--	
487	Graphical system Characteristics	1	27/06/2018		TLM2	CO1	T1	
488	Graphical system Characteristics	1	28/06/2018		TLM1	CO1	T1	
489	Web user – Interface popularity	1	29/06/2018		TLM1	CO1	T1	
490	Tutorial		30/06/2018		TLM3	CO1	--	
491	Web user – Interface popularity	1	04/07/2018		TLM1	CO1	T1	
492	Characteristics-Principles of user interface.	1	05/07/2018		TLM1	CO1	T1	

493	Characteristics-Principles of user interface.	1	06/07/2018		TLM1	CO1	T1	
494	**Assignment/Test 1**	1	07/07/2018		TLM6	CO1	--	
No. of classes required to complete UNIT-I:		**16**	**No. of classes taken:**					

UNIT – II: Design process

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 Week
495	**Design process** – Human interaction with computers	1	11/07/2018		TLM1	CO2	T1	
496	Importance of human characteristics	1	12/07/2018		TLM1	CO2	T1	
497	Human consideration	1	13/07/2018		TLM1	CO2	R3	
498	Tutorial	1	14/07/2018		TLM3	CO2	--	
499	Human interaction speeds	1	18/07/2018		TLM1, TLM2	CO2	T1	
500	Human interaction speeds	1	19/07/2018		TLM1	CO2	R2	
501	Understanding business junctions.	1	20/07/2018		TLM1	CO2	T1	
502	Tutorial	1	21/07/2018		TLM3	CO2	--	
503	Understanding business junctions.	1	25/07/2018		TLM1	CO2	R2	
504	Revision	1	26/07/2018		TLM1, TLM2	CO2	--	
505	Revision	1	27/07/2018		TLM1, TLM2	CO2	--	
506	**Assignment/Test2**	1	28/07/2018		TLM6	CO2	--	
No. of classes required to complete UNIT-II:		**12**	**No. of classes taken: MID EXAMINATION:30-07-2018 to 04-08-2018**					

UNIT – III: Screen Designing

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 Week
507	**Screen Designing :** Design goals, Screen planning and purpose	1	08/08/2018		TLM1	CO3	T1	
508	Organizing screen elements	1	09/08/2018		TLM1	CO3	T1	
509	Ordering of screen data and content	1	10/08/2018		TLM1	CO3	T1,R3	
510	Screen navigation and flow	1	11/08/2018		TLM1, TLM2	CO3	T1,R3	
511	Visually pleasing Composition	1	15/08/2018		TLM1	CO3	T1,R2	
512	Visually pleasing - Amount of information	1	16/08/2018		TLM1, TLM2	CO3	T1,R2	
513	Visually pleasing - Distinctiveness	1	17/08/2018		TLM1	CO3	T1,R2	
514	Visually pleasing - Focus and emphasis	1	18/08/2018		TLM1, TLM2	CO3	T1,R2	
515	Conveying Depth of levels or a Three	1	22/08/2018		TLM1, TLM2	CO3	T1	

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 Week
	dimensional appearance							
516	Presentation information simply and meaningfully	1	23/08/2018		TLM1	CO3	T1,R3	
517	Information retrieval on web	1	24/08/2018		TLM1, TLM2	CO3	T1,R3	
518	Reading, Browsing, and Searching on the Web	1	25/08/2018		TLM1	CO3	T1	
519	Intranet, extranet design guidelines	1	29/08/2018		TLM1	CO3	T1	
520	Statistical graphics	1	30/08/2018		TLM1, TLM2	CO3	T1	
521	Technological consideration in interface design	1	31/08/2018		TLM1	CO3	T1,R2	
522	Graphical systems, web systems	1	01/09/2018		TLM1, TLM2	CO3	T1,R2	
523	**Assignment/Test3**	1	05/09/2018		TLM6	CO3	--	
No. of classes required to complete UNIT-III:		**17**	**No. of classes taken:**					

UNIT – IV: Windows

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 Week
524	**Windows** :New and Navigation schemes	1	06/09/2018		TLM1, TLM2	CO4	T1,R2	
525	Structure of Menus, Functions of Menus	1	07/09/2018		TLM1, TLM2	CO4	T1,R2	
526	Content of Menus, Formatting Menus	1	08/09/2018		TLM1, TLM2	CO4	T1,R2	
527	Navigating Menus, Kinds of Graphical Menus	1	12/09/2018		TLM1, TLM2	CO4	T1,R2	
528	Selection of window Components of Window	1	13/09/2018		TLM1, TLM2	CO4	T1,R3	
529	Window Presentation Styles, Types of Windows	1	14/09/2018		TLM1, TLM2	CO4	T1,R3	
530	Selection of devices based controls	1	15/09/2018		TLM1, TLM2	CO4	T1,R3	
531	Selection of screen based controls.	1	19/09/2018		TLM1, TLM2	CO4	T1,R3	
532	**Assignment/Test4**	1	20/09/2018		TLM6	CO4	--	
No. of classes required to complete UNIT-III:		**09**	**No. of classes taken:**					

UNIT – V: Components and Interaction Devices

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 Week
533	**Components** – text	1	21/09/2018		TLM1	CO5	T1	

	and messages						
534	Icons and images	1	22/09/2018		TLM1, TLM2	CO5	T1
535	Kinds of Icons, characteristics of Icons	1	26/09/2018		TLM1, TLM2	CO5	T1
536	Multimedia, Colours uses	1	27/09/2018		TLM1, TLM2	CO5	T1,R3
537	Problems with choosing colors	1	28/09/2018		TLM1, TLM2	CO5	T1,R3
538	**Interaction Devices**	1	29/09/2018		TLM1	CO5	T1
539	Keyboard and function keys	1	03/10/2018		TLM1	CO5	T1
540	Pointing devices ,speech recognition	1	04/10/2018		TLM1, TLM2	CO5	T1
541	Digitization and generation	1	05/10/2018		TLM1	CO5	T1,R3
542	Image and video displays Drivers.	1	06/10/2018		TLM1, TLM2	CO5	T1,R3

No. of classes required to complete UNIT-II:	10	No. of classes taken: MID EXAMINATION:08-10-2018 to 13-10-2018

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

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
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

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

98. **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.

99. **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.

100. **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.

101. **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.

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103. **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.

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106. **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.

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PROGRAMME SPECIFIC OUTCOMES (PSOs):
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 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.

Course Instructor　　　　**Course Coordinator**　　　　**Module Coordinator**
HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

COMPUTER SCIENCE AND ENGINEERING

(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi,
NAAC Accredited with 'A' grade, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM   : B.Tech., V-Sem., CSE-B/S

ACADEMIC YEAR   : 2018-19

COURSE NAME & CODE   : HUMAN COMPUTER INTERACTION & S262

L-T-P STRUCTURE   : 4-1-0

COURSE CREDITS   : 3

COURSE INSTRUCTOR   : G NAGESWARA RAO

COURSE COORDINATOR   : G NAGESWARA RAO

PRE-REQUISITE: Basic knowledge regarding computer, graphics and screen designs

COURSE OBJECTIVE:

In this course, students will learn about the guidelines, principles, and theories influencing human computer interaction. Recognize how a computer system may be modified to include human diversity. Design mock ups and carry out user and expert evaluation of interfaces. Carry out the steps of experimental design, usability, experimental testing, and evaluation of human computer interaction systems. Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI.

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

CO1: Identify the elements of good user interface design through effective GUI.

CO2: Identify the importance of human characteristics and understanding business functions.

CO3: Analyse screen design principles for making good decisions based on technological considerations in interface design.

CO4: Select the window, device and screen based controls through navigation schemes.

CO5: Identify the basic components and interaction devices to interact with the computers.

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		2	2										1		
CO2		2	2										1		
CO3		2	3										1		
CO4		2	3										1		
CO5		2	3										1		

BOS APPROVED TEXT BOOKS:

T1 The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.

BOS APPROVED REFERENCE BOOKS:

R1 Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.

R2 Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Introduction and the graphical user interface

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 Week
543	**Introduction :** Importance of user Interface	1	11/06/2018		TLM1	CO1	T1	
544	Overview of user Interface	1	14/06/2018		TLM1	CO1	T1	
545	Importance of good design	1	15/06/2018		TLM1, TLM2	CO1	T1	
546	Benefits of good design.	1	16/06/2018		TLM1	CO1	T1	
547	A brief history of Screen design	1	18/06/2018		TLM1, TLM2	CO1	T1	
548	**The graphical user interface** – popularity of graphics solve design problems	1	21/06/2018		TLM2	CO1	T1	
549	The concept of direct manipulation	1	22/06/2018		TLM1	CO1	T1	
550	Tutorial		23/06/2018		TLM3	CO1	--	
551	Graphical system Characteristics	1	25/06/2018		TLM2	CO1	T1	
552	Graphical system Characteristics	1	28/06/2018		TLM1	CO1	T1	
553	Web user – Interface popularity	1	29/06/2018		TLM1	CO1	T1	
554	Tutorial		30/06/2018		TLM3	CO1	--	
555	Web user – Interface popularity	1	02/07/2018		TLM1	CO1	T1	
556	Characteristics- Principles of user interface.	1	05/07/2018		TLM1	CO1	T1	

557	Characteristics-Principles of user interface.	1	06/07/2018		TLM1	CO1	T1	
558	**Assignment/Test 1**	1	07/07/2018		TLM6	CO1	--	
No. of classes required to complete UNIT-I:		**16**	**No. of classes taken:**					

UNIT – II: Design process

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 Week
559	**Design process** – Human interaction with computers	1	09/07/2018		TLM1	CO2	T1	
560	Importance of human characteristics	1	12/07/2018		TLM1	CO2	T1	
561	Human consideration	1	13/07/2018		TLM1	CO2	R3	
562	Tutorial	1	14/07/2018		TLM3	CO2	--	
563	Human interaction speeds	1	16/07/2018		TLM1, TLM2	CO2	T1	
564	Human interaction speeds	1	19/07/2018		TLM1	CO2	R2	
565	Understanding business junctions.	1	20/07/2018		TLM1	CO2	T1	
566	Tutorial	1	21/07/2018		TLM3	CO2	--	
567	Understanding business junctions.	1	23/07/2018		TLM1	CO2	R2	
568	Revision	1	26/07/2018		TLM1, TLM2	CO2	--	
569	Revision	1	27/07/2018		TLM1, TLM2	CO2	--	
570	**Assignment/Test2**	1	28/07/2018		TLM6	CO2	--	
No. of classes required to complete UNIT-II:		**12**	**No. of classes taken: MID EXAMINATION:30-07-2018 to 04-08-2018**					

UNIT – III: Screen Designing

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 Week
571	**Screen Designing :** Design goals, Screen planning and purpose	1	06/08/2018		TLM1	CO3	T1	
572	Organizing screen elements	1	09/08/2018		TLM1	CO3	T1	
573	Ordering of screen data and content	1	10/08/2018		TLM1	CO3	T1,R3	
574	Screen navigation and flow	1	11/08/2018		TLM1, TLM2	CO3	T1,R3	
575	Visually pleasing Composition	1	13/08/2018		TLM1	CO3	T1,R2	
576	Visually pleasing - Amount of information	1	16/08/2018		TLM1, TLM2	CO3	T1,R2	
577	Visually pleasing - Distinctiveness	1	17/08/2018		TLM1	CO3	T1,R2	
578	Visually pleasing - Focus and emphasis	1	18/08/2018		TLM1, TLM2	CO3	T1,R2	
579	Conveying Depth of levels or a Three	1	20/08/2018		TLM1, TLM2	CO3	T1	

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	HO... Sig... Wee...
	dimensional appearance							
580	Presentation information simply and meaningfully	1	23/08/2018		TLM1	CO3	T1,R3	
581	Information retrieval on web	1	24/08/2018		TLM1, TLM2	CO3	T1,R3	
582	Reading, Browsing, and Searching on the Web	1	25/08/2018		TLM1	CO3	T1	
583	Intranet, extranet design guidelines	1	27/08/2018		TLM1	CO3	T1	
584	Statistical graphics	1	30/08/2018		TLM1, TLM2	CO3	T1	
585	Technological consideration in interface design	1	31/08/2018		TLM1	CO3	T1,R2	
586	Graphical systems, web systems	1	01/09/2018		TLM1, TLM2	CO3	T1,R2	
587	**Assignment/Test3**	1	03/09/2018		TLM6	CO3	--	
No. of classes required to complete UNIT-III:		**17**	**No. of classes taken:**					

UNIT – IV: Windows

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	HO... Sig... Wee...
588	**Windows** :New and Navigation schemes	1	06/09/2018		TLM1, TLM2	CO4	T1,R2	
589	Structure of Menus, Functions of Menus	1	07/09/2018		TLM1, TLM2	CO4	T1,R2	
590	Content of Menus, Formatting Menus	1	08/09/2018		TLM1, TLM2	CO4	T1,R2	
591	Navigating Menus, Kinds of Graphical Menus	1	10/09/2018		TLM1, TLM2	CO4	T1,R2	
592	Selection of window Components of Window	1	13/09/2018		TLM1, TLM2	CO4	T1,R3	
593	Window Presentation Styles, Types of Windows	1	14/09/2018		TLM1, TLM2	CO4	T1,R3	
594	Selection of devices based controls	1	15/09/2018		TLM1, TLM2	CO4	T1,R3	
595	Selection of screen based controls.	1	17/09/2018		TLM1, TLM2	CO4	T1,R3	
596	**Assignment/Test4**	1	20/09/2018		TLM6	CO4	--	
No. of classes required to complete UNIT-III:		**09**	**No. of classes taken:**					

UNIT – V: Components and Interaction Devices

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	HO... Sig... Wee...
597	**Components** – text	1	21/09/2018		TLM1	CO5	T1	

	and messages						
598	Icons and images	1	22/09/2018		TLM1, TLM2	CO5	T1
599	Kinds of Icons, characteristics of Icons	1	24/09/2018		TLM1, TLM2	CO5	T1
600	Multimedia, Colours uses	1	27/09/2018		TLM1, TLM2	CO5	T1,R3
601	Problems with choosing colors	1	28/09/2018		TLM1, TLM2	CO5	T1,R3
602	**Interaction Devices**	1	29/09/2018		TLM1	CO5	T1
603	Keyboard and function keys	1	01/10/2018		TLM1	CO5	T1
604	Pointing devices ,speech recognition	1	04/10/2018		TLM1, TLM2	CO5	T1
605	Digitization and generation	1	05/10/2018		TLM1	CO5	T1,R3
606	Image and video displays Drivers.	1	06/10/2018		TLM1, TLM2	CO5	T1,R3
No. of classes required to complete UNIT-II:		**10**	**No. of classes taken: MID EXAMINATION:08-10-2018 to 13-10-2018**				

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

EVALUATION PROCESS:

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Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
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Total Marks: A+B+C	**1,2,3,4,5**	**100**

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HOD