LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B. Rama Devi
Course Name & Code : **Artificial Intelligence & 17CI23**
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., IT., V-Sem., Sections- A A.Y : 2021-22.

PRE-REQUISITE: Basic Mathematical Knowledge.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course is used to provide the description of agents and various types of agents and how they used to solve various AI problems. This gives a clear view of analyzing AI problems, types of problems techniques of solving problems. It gives a clear view of knowledge, representation of knowledge, types of logic and its algorithms. It provides a better understanding of uncertainty and certainty, its factors various theories of uncertainty and appropriate examples. It provides a clear view of state space in search, game playing procedures, expert systems and advanced concepts like swarm intelligent systems.

.

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

CO1	Analyze the design specifications for the structure of agents and distinguish among heuristic techniques
CO2	Identify approaches and issues in knowledge representation and formulate Propositional and predicate logic
CO3	Formulate the logic of non-monotonic reasoning and apply the techniques in Uncertainty domain
CO4	Analyze the planning and learning techniques in state space search.
CO5	Formulate the design specification of game playing techniques, analyze expert systems, robotics and swarm intelligence systems.

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

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

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

TEXT BOOK:

1. Elaine Rich, Kevin Knight and Shivashankar B.Nair, ―Artificial Intelligence‖, TMH, Third edition, 2009. (UNITs I, II, III & V).
2. Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia, Second edition, 2003. (UNIT IV).
3. N. P. Padhy, ―Artificial Intelligence and Intelligent System‖, Oxford University Press, Second edition, 2005. (UNIT V).

REFERENCE BOOKS:

1. RajendraAkerkar, ―Introduction to Artificial Intelligence‖, PHI, 2005.
2. Patrick Henry Winston, ―Artificial Intelligence‖, Pearson Education Inc., Third edition,2001.
3. Eugene Charniak and Drew Mc Dermott, ―Introduction to Artificial Intelligence", Addison Wesley, ISE Reprint, 1998.
4. Nils J.Nilsson, ―Artificial Intelligence - A New Synthesis", Harcourt Asia Pvt.Ltd.,Morgan Kaufmann, 1988.
5. www.nptel.ac.in
6. https://www.britannica.com/technology/artificial-intelligence
7. https://www.tutorialspoint.com / Artificial Intelligence / AI – Overview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Course Outcomes and Introduction to UNIT-I Motivation, Goals	1	22/09/2021		TLM-1	
2	Introduction, History of AI	1	23/09/2021		TLM-1	
3	Intelligent agents	1	24/09/2021		TLM-1	
4	Structure of agents and its functions	1	29/09/2021		TLM-1	
5	Problem spaces and search	1	30/09/2021		TLM-1	
6	Heuristic Search techniques	1	01/10/2021		TLM-1	
7	Best-first search, Problem reduction	1	06/10/2021		TLM-1	
8	Constraint Satisfaction, Means Ends Analysis	1	07/10/2021		TLM-1	
9	Assignment/Quiz-1	1	08/10/2021		TLM-3	
No. of classes required to complete UNIT-I		09	No. of classes taken:			

UNIT-II: Knowledge Representation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10	Approaches and issues in knowledge representation	1	20/10/2021		TLM1	
11	Knowledge - Based Agent	1	21/10/2021		TLM1	
12	Propositional Logic	1	22/10/2021		TLM1	
13	Predicate logic, Unification	1	27/10/2021		TLM1	
14	Resolution	1	28/10/2021		TLM1	
15	Weak slot, filler structure,	1	29/10/2021		TLM1	
16	Strong slot, filler structure	1	03/11/2021		TLM1	
17	Assignment/Quiz-2	1	05/11/2021		TLM3	
No. of classes required to complete UNIT-II		08	No. of classes taken:			

UNIT-III: **Reasoning under uncertainty**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18	Logics of non-monotonic reasoning	1	17/11/2021		TLM1	
19	Implementation	1	18/11/2021		TLM1	
20	Basic probability notation	1	19/11/2021		TLM1	
21	Bayes rule	1	24/11/2021		TLM1	
22	Certainty factors and rule based systems	1	25/11/2021		TLM2	
23	Bayesian networks	1	26/11/2021		TLM2	
24	Dempster - Shafer Theory	1	01/12/2021		TLM1	
25	Fuzzy Logic.	1	02/12/2021		TLM1	
26	Assignment/Quiz-3	1	03/12/2021		TLM3	
No. of classes required to complete UNIT-III		09	No. of classes taken:			

UNIT-IV: Planning and Learning

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27	Planning with state space search	1	08/12/2021		TLM1	
28	conditional planning-	1	09/12/2021		TLM1	
29	Continuous planning	1	10/12/2021		TLM1	
30	Multi-Agent planning	1	15/12/2021		TLM1	
31	Forms of learning	1	16/12/2021		TLM1	
32	Inductive learning	1	17/12/2021		TLM1	
33	Reinforcement Learning	1	22/12/2021		TLM1	
34	Learning decision trees	1	23/12/2021		TLM1	
35	Neural Net learning and Genetic learning.	1	24/12/2021		TLM3	
No. of classes required to complete UNIT-IV			09	No. of classes taken:		

UNIT-V: Advanced Topics: Game Playing, Expert System

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36	Minimax search procedure	1	29/12/2021		TLM1	
37	Adding alpha-beta cutoffs.	1	30/12/2021		TLM1	
38	Representation, Expert system shells, Knowledge Acquisition	1	31/12/2021		TLM1	
39	Robotics: Hardware, Robotic Perception	1	05/01/2022		TLM2	
40	Planning - Application	1	06/01/2022		TLM2	

	domains					
41	Swarm Intelligent Systems Ant Colony System,	1	07/01/2022		TLM2	
42	Application and Working of Ant Colony System	1	12/01/2022		TLM1	
43	Assignment/Quiz-5	1	14/01/2022		TLM3	
No. of classes required to complete UNIT-V		08	No. of classes taken:			

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

PART-C

EVALUATION PROCESS (R17 Regulations):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

	Course Instructor	Module Coordinator	HOD
Signature of the Faculty			
Name of the Faculty	(Dr.B.Rama Devi)	(Mrs. K. Lavanya)	(Dr.B. Srinivasa Rao)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. B. Rama Devi
Course Name & Code : **Artificial Intelligence & 17CI23**
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., IT., V-Sem., Sections- B A.Y : 2021-22.

PRE-REQUISITE: Basic Mathematical Knowledge.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course is used to provide the description of agents and various types of agents and how they used to solve various AI problems. This gives a clear view of analyzing AI problems, types of problems techniques of solving problems. It gives a clear view of knowledge, representation of knowledge, types of logic and its algorithms. It provides a better understanding of uncertainty and certainty, its factors various theories of uncertainty and appropriate examples. It provides a clear view of state space in search, game playing procedures, expert systems and advanced concepts like swarm intelligent systems.

.

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

CO1	Analyze the design specifications for the structure of agents and distinguish among heuristic techniques
CO2	Identify approaches and issues in knowledge representation and formulate Propositional and predicate logic
CO3	Formulate the logic of non-monotonic reasoning and apply the techniques in Uncertainty domain
CO4	Analyze the planning and learning techniques in state space search.
CO5	Formulate the design specification of game playing techniques, analyze expert systems, robotics and swarm intelligence systems.

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

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

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

TEXT BOOK:

1. Elaine Rich, Kevin Knight and Shivashankar B.Nair, ―Artificial Intelligence‖, TMH, Third edition, 2009. (UNITs I, II, III & V).
2. Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education Asia, Second edition, 2003. (UNIT IV).
3. N. P. Padhy, ―Artificial Intelligence and Intelligent System‖, Oxford University Press, Second edition, 2005. (UNIT V).

REFERENCE BOOKS:

1. RajendraAkerkar, ―Introduction to Artificial Intelligence‖, PHI, 2005.
2. Patrick Henry Winston, ―Artificial Intelligence‖, Pearson Education Inc., Third edition,2001.
3. Eugene Charniak and Drew Mc Dermott, ―Introduction to Artificial Intelligence", Addison Wesley, ISE Reprint, 1998.
4. Nils J.Nilsson, ―Artificial Intelligence - A New Synthesis", Harcourt Asia Pvt.Ltd.,Morgan Kaufmann, 1988.
5. www.nptel.ac.in
6. https://www.britannica.com/technology/artificial-intelligence
7. https://www.tutorialspoint.com / Artificial Intelligence / AI – Overview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Course Outcomes and Introduction to UNIT-I Motivation, Goals	1	20/09/2021		TLM1	
2	Introduction, History of AI	1	22/09/2021		TLM1	
3	Intelligent agents	1	24/09/2021		TLM1	
4	Structure of agents and its functions	1	27/09/2021	Bundh	TLM1	
5	Problem spaces and search	1	29/09/2021		TLM1	
6	Heuristic Search techniques	1	04/10/2021		TLM1	
7	Best-first search, Problem reduction	1	06/10/2021		TLM1	
8	Constraint Satisfaction, Means Ends Analysis	1	08/10/2021		TLM1	
9	Assignment/Quiz-1	1	11/10/2021		TLM-3	
No. of classes required to complete UNIT-I		09	No. of classes taken:			

UNIT-II: Knowledge Representation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10	Approaches and issues in knowledge representation	1	18/10/2021		TLM1	
11	Knowledge - Based Agent	1	22/10/2021		TLM1	
12	Propositional Logic	1	25/10/2021		TLM1	
13	Predicate logic, Unification	1	27/10/2021		TLM1	
14	Resolution	1	29/10/2021		TLM1	
15	Weak slot, filler structure,	1	01/11/2021		TLM1	
16	Strong slot, filler structure		03/11/2021		TLM1	
17	Assignment/Quiz-2	1	05/11/2021		TLM3	
No. of classes required to complete UNIT-II		08	No. of classes taken:			

UNIT-III: **Reasoning under uncertainty**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18	Logics of non-monotonic reasoning	1	15/11/2021		TLM1	
19	Implementation	1	17/11/2021		TLM1	
20	Basic probability notation	1	19/11/2021		TLM1	
21	Bayes rule	1	22/11/2021		TLM1	
22	Certainty factors and rule based systems	1	24/11/2021		TLM1	
23	Bayesian networks	1	26/11/2021		TLM1	
24	Dempster - Shafer Theory	1	29/11/2021		TLM1	
25	Fuzzy Logic.	1	01/12/2021		TLM1	
26	Assignment/Quiz-3	1	03/12/2021		TLM3	
No. of classes required to complete UNIT-III		09	No. of classes taken:			

UNIT-IV: Planning and Learning

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27	Planning with state space search	1	06/12/2021		TLM1	
28	conditional planning-	1	08/12/2021		TLM1	
29	Continuous planning	1	10/12/2021		TLM1	
30	Multi-Agent planning	1	13/12/2021		TLM1	
31	Forms of learning	1	15/12/2021		TLM1	
32	Inductive learning	1	17/12/2021		TLM1	
33	Reinforcement Learning	1	20/12/2021		TLM1	
34	Learning decision trees	1	22/12/2021		TLM1	
35	Neural Net learning and Genetic learning.	1	24/12/2021		TLM1	
No. of classes required to complete UNIT-IV			09	No. of classes taken:		

UNIT-V: Advanced Topics: Game Playing, Expert System

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36	Minimax search procedure	1	27/12/2021		TLM1	
37	Adding alpha-beta cutoffs.	1	29/12/2021		TLM1	
38	Representation, Expert system shells, Knowledge Acquisition	1	31/12/2021		TLM1	
39	Robotics: Hardware, Robotic Perception	1	03/01/2022		TLM1	
40	Planning - Application	1	05/01/2022		TLM1	

	domains					
41	Swarm Intelligent Systems Ant Colony System,	1	07/01/2022		TLM1	
42	Application and Working of Ant Colony System	1	10/01/2022		TLM1	
43	Revision for all units	1	12/01/2022		TLM1	
44	Assignment/Quiz-5	1	14/01/2022		TLM3	
No. of classes required to complete UNIT-V		09	No. of classes taken:			

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

PART-C

EVALUATION PROCESS (R17 Regulations):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

	Course Instructor	Module Coordinator	HOD
Signature of the Faculty			
Name of the Faculty	(Dr.B.Rama Devi)	(Mrs. K. Lavanya)	(Dr.B. Srinivasa Rao)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PROGRAM : B.Tech., V-Sem., IT, R17Regulations

ACADEMICYEAR : 2021-2022

COURSE NAME & CODE : **SOFTWARE ENGINEERING**– 17CI10

L-T-PSTRUCTURE : 3-0-0

COURSECREDITS : 3

COURSEINSTRUCTOR : Mrs.S.Jyothi, Asst.Professor

PRE-REQUISITE : Concepts of Programming and Database Management Systems.

COURSE OBJECTIVE:

An understanding of different software processes and how to choose between them, How to understand requirements from a client and specify them Design in the large, including principled choice of software architecture, the use of modules and interfaces to enable separate development, and design patterns. Knowing various quality assurance techniques, including unit testing, integration testing and functional testing

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

CO1: Outline basic proofs for theorems using the techniques of direct proofs, example, Proof by contradiction and mathematical induction.

CO2: Illustrate by examples the basic terminology of functions, relations, sets and Demonstrate knowledge of their associated operations.

CO3: Designing Network application, data structures using Graph terminology..

CO4: Apply the graph algorithms for routing and scheduling in different operating systems.

CO5: Construct compilers, error detection code, solve practical applications with the use of basic Counting principles of permutations, combinations, inclusion/exclusion principle and the Pigeon hole methodology.

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

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

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

BOS APPROVED TEXT BOOKS:

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

BOS APPROVED REFERENCE BOOKS:

1. Ian Sommerville, Software engineering, Pearson education, 8th edition, 2008.
2. Ali Behforooz and Frederick J Hudson, ―Software Engineering Fundamentals‖, Oxford University Press, New Delhi, 1996.
3. Stephan Schach, Software Engineering, TMH Publications, 2007.
4. Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson education, 2001,1995, PHI,2nd edition.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

Unit-I Introduction to Software Engineering

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Software, Co's, Po's	1	22-09-2021		TLM 2	CO1	T1	
2.	The evolving role of Software, Changing nature of software	1	23-09-2021		TLM 2	CO1	T1	
3.	Legacy software, Software myths	1	25-09-2021		TLM 2	CO1	T1	
4.	Layered technology, Process frame work	1	29-09-2021		TLM 2	CO1	T1	
5.	CMMI, Process patterns	1	30-09-2021		TLM 2	CO1	T1	
6.	Process Assessment	1	06-10-2021		TLM 2	CO1	T1	
7.	Personal and team process models ,Process technology	1	07-10-2021		TLM 2	CO1	T1	

8.	Product and Process ,Revision for Unit-1	1	09-10-2021		TLM 2	CO1	T1	
9	Discussion on Assignment-1	1	20-10-2021					
No. of classes required to complete UNIT-I		9	No. of classes taken:					

Unit-II -Process models, Software Engineering practice.

S.No.	Topics to be covered	No. ofClasses Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD1 Sign Weekly
10.	Process models, Prescriptive models,Waterfall model	1	21-10-2021		TLM 2	CO2	T1	
11	Incremental Model, Prototype, Rapid Application Development Model	1	23-10-2021		TLM 2	CO2	T1	
12	Evolutionary Process Models, Concurrent Development model, Unified process	1	27-10-2021		TLM 2	CO2	T1	
13.	Software engineering practice ,Communication practices, Planning practices	1	28-10-2021		TLM 2	CO2	T1	
14.	Modeling practices, Construction practice and deployment	1	30-10-2021		TLM 2	CO2	T1	
15	Revision	1	03-11-2021		TLM 2			
16	Discussion on Assignment-2	1	06-11-2021		TLM 2			
No. of classes required to complete UNIT-II		**7**			No. of classes taken:			

UNIT-III: Requirements Engineering

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
17	Bridge to design and construction	1	17-11-2021		TLM 2	CO3	T1	
18	RE tasks, initiating the RE process	1	18-11-2021		TLM 2	CO3	T1	
19	Eliciting Requirements, Developing use cases	1	20-11-2021		TLM 2	CO3	T1	
20	Building the analysis models, Negotiating and validating requirements.	1	24-11-2021		TLM 2	CO3	T1	
21	Requirements analysis, Analysis modeling approaches	1	25-11-2021		TLM 2	CO3	T1,R1	
22	Data modeling concepts OOA, Scenario-based modeling	1	27-11-2021		TLM 2	CO3		
23	Flow-oriented modeling Class-based modeling,Creating behavior model	1	01-12-2021		TLM 2	CO3		
24	Discussion on Assignment-3	1	02-12-2021		TLM 2	CO3		
No. of classes required to complete UNIT-III		8			No. of classes taken:			

UNIT-IV:Design Engineering

S.No.	Topics to be covered	No. ofClasses Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
25	Design within the context of software engineering	1	04-12-2021		TLM 2	CO4	T1	
26	Design process and software quality	1	08-12-2021		TLM 2	CO4	T1	
27	Design concepts, Design model	1	09-12-2021		TLM 2	CO4	T1,R3	
28	Pattern based software design. Creating an architectural design	1	11-12-2021		TLM 2	CO4	T1,R3	
29	Software architecture, Data design	1	15-12-2021		TLM 2	CO4	T1	
30	Architectural styles and patterns	1	16-12-2021		TLM 2	CO4	T1	
31	Architectural design, Revision for UNIT-IV	1	18-12-2021		TLM 2	CO4	T1	
32	Discussion on Assignment-4	1	22-12-2021		TLM 2	CO4	T1,R2	
No. of classes required to complete UNIT- IV		8			No. of classes taken:			

UNIT-V: Testing Strategies

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
33	A strategic to software testing, Strategic issues	1	23-12-2021		TLM 2	CO5	T1	
34	Test strategies for conventional software,Object oriented software	1	29-12-2021		TLM 2	CO5	T1	
35	Validation testing, System testing	1	30-12-2021		TLM 2	CO5	T1,R2	
36	The art of debugging Testing tactics Software testing fundamentals	1	05-01-2022		TLM 2	CO5	T1	
37	White-box testing, Basis path testing	1	06-01-2022		TLM 2	CO5	T1	
38	Control structure testing, Black-box testing, OO-testing methods	1	08-01-2022		TLM 2	CO5	T1	
39	Discussion on Assignment-5	1	12-01-2022		TLM 2	CO5	T1	
No. of classes required to complete UNIT-V		7			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. ofClasses Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign
1	Advancements in Software Testing	1	12-01-2022		TLM2		T1	

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	20-09-2021	06-11-2021	7W
I Mid Examinations	08-11-2021	13-11-2021	1W
II Phase of Instructions	15-11-2021	15-01-2022	9W
II Mid Examinations	17-01-2021	22-01-2022	1W
Preparation and Practical's	24-01-2022	29-01-2022	1W
Semester End Examinations	31-01-2022	12-02-2022	2W

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
Online Quiz-1	1,2	C1=10
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
Online Quiz-2	3,4,5	C2=10
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
Evaluation of Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=10
Attendance		D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**A+B+C+D=40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

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

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 modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or Leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the 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	**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)

Graduate of the Information Technology will have the ability to

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

	Course Instructor	**Module Coordinator**	**HOD**
Signature			
Name of the Faculty	**Mrs.S.Jyothi**	**Dr.B.RamaDevi**	**Dr.B. Srinivasa Rao**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PROGRAM : B.Tech.,V-Sem., IT, R17Regulations

ACADEMICYEAR : 2021-2022

COURSE NAME & CODE : **SOFTWARE ENGINEERING**– 17CI10

L-T-PSTRUCTURE : 3-0-0

COURSECREDITS : 3

COURSEINSTRUCTOR : Mrs.S.Jyothi, Asst.Professor

PRE-REQUISITE : Concepts of Programming and Database Management Systems.

COURSE OBJECTIVE:

An understanding of different software processes and how to choose between them, How to understand requirements from a client and specify them Design in the large, including principled choice of software architecture, the use of modules and interfaces to enable separate development, and design patterns. Knowing various quality assurance techniques, including unit testing, integration testing and functional testing

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

CO1: Outline basic proofs for theorems using the techniques of direct proofs, example, Proof by contradiction and mathematical induction.

CO2: Illustrate by examples the basic terminology of functions, relations, sets and Demonstrate knowledge of their associated operations.

CO3: Designing Network application, data structures using Graph terminology..

CO4: Apply the graph algorithms for routing and scheduling in different operating systems.

CO5: Construct compilers, error detection code, solve practical applications with the use of basic Counting principles of permutations, combinations, inclusion/exclusion principle and the Pigeon hole methodology.

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

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

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

BOS APPROVED TEXT BOOKS:

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

BOS APPROVED REFERENCE BOOKS:

1. Ian Sommerville, Software engineering, Pearson education, 8th edition, 2008.
2. Ali Behforooz and Frederick J Hudson, ―Software Engineering Fundamentals‖, Oxford University Press, New Delhi, 1996.
3. Stephan Schach, Software Engineering, TMH Publications, 2007.
4. Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson education, 2001,1995, PHI,2nd edition.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

Unit-I: Introduction to Software Engineering

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Software, Co's, Po's	1	21/09/2021		TLM 2	CO1	T1	
2.	The evolving role of Software, Changing nature of software	1	23/09/2021		TLM 2	CO1	T1	
3.	Legacy software, Software myths	1	24/09/2021		TLM 2	CO1	T1	
4.	Layered technology, Process frame work	1	28-09-2021		TLM 2	CO1	T1	
5.	CMMI, Process patterns	1	30-09-2021		TLM 2	CO1	T1	
6.	Process Assessment	1	01-10-2021		TLM 2	CO1	T1	
7.	Personal and team process models ,Process technology	1	05-10-2021		TLM 2	CO1	T1	

8.	Product and Process ,Revision for Unit-1	1	07-10-2021		TLM 2	CO1	T1	
9	Assignment-1	1	08-10-2021					
No. of classes required to complete UNIT-I		9			No. of classes taken:			

Unit-II: Process models, Software Engineering practice.

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
10.	Process models, Prescriptive models	1	12-10-2021		TLM 2	CO2	T1	
11.	Water fall model, Incremental model	1	21-10-2021		TLM 2	CO2	T1	
12.	Prototype, Rapid Application Development Model	1	22-10-2021		TLM 2	CO2	T1	
13.	Evolutionary Process Models, Concurrent Development model	1	26-10-2021		TLM 2	CO2	T1	
14.	Unified process, Software engineering practice	1	28-10-2021		TLM 2	CO2	T1	
15.	Communication practices, Planning practices	1	29-10-2021		TLM 2	CO2	T1	
16.	Modeling practices, Construction practice and deployment	1	02-11-2021		TLM 2	CO2	T1	
17	Revision & Assignment -2	1	05-11-2021		TLM 2	CO2	T1	
No. of classes required to complete UNIT-II		**9**			No. of classes taken:			

UNIT-III: Requirements Engineering

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
18	Bridge to design and construction	1	16-11-2021		TLM 2	CO3	T1	
19	RE tasks, initiating the RE process	1	18-11-2021		TLM 2	CO3	T1	
20	Eliciting Requirements, Developing use cases	1	19-11-2021		TLM 2	CO3	T1	
21	Building the analysis models, Negotiating and validating requirements.	1	23-11-2021		TLM 2	CO3	T1	
22	Requirements analysis, Analysis modeling approaches	1	25-11-2021		TLM 2	CO3	T1,R1	
23	Data modeling concepts OOA, Scenario-based modeling	1	26-11-2021		TLM 2	CO3		
24	Flow-oriented modeling Class-based modeling, Creating behavior model	1	30-11-2021		TLM 2	CO3		
25	Assignment-3	1	02-12-2021		TLM 2	CO3		
No. of classes required to complete UNIT-III		8						

UNIT-IV: Design Engineering

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
26.	Design within the context of software engineering	1	03-12-2021		TLM 2	CO4	T1	
27.	Design process and software quality	1	07-12-2021		TLM 2	CO4	T1	
28.	Design concepts, Design model	1	09-12-2021		TLM 2	CO4	T1,R3	
29.	Pattern based software design. Creating an architectural design	1	10-12-2021		TLM 2	CO4	T1,R3	
30.	Software architecture, Data design	1	14-12-2021		TLM 2	CO4	T1	
31.	Architectural styles and patterns	1	16-12-2021		TLM 2	CO4	T1	
32.	Architectural design, Revision for UNIT-IV	1	17-12-2021		TLM 2	CO4	T1	
33.	Assignment-4	1	21-12-2021		TLM 2	CO4	T1,R2	
No. of classes required to complete UNIT- IV		8			No. of classes taken:			

UNIT-V: Testing Strategies

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
34.	A strategic to software testing, Strategic issues	1	23-12-2021		TLM 2	CO5	T1	
35.	Test strategies for conventional software, Object oriented software	1	24-12-2021		TLM 2	CO5	T1	
36.	Validation testing, System testing	1	28-12-2021		TLM 2	CO5	T1,R2	
37.	The art of debugging Testing tactics Software testing fundamentals	1	30-12-2021		TLM 2	CO5	T1	
38.	White-box testing, Basis path testing	1	31-12-2021		TLM 2	CO5	T1	
39.	Control structure testing, Black-box testing	1	04-01-2022		TLM 2	CO5	T1	
40.	OO-testing methods	1	06-01-2022		TLM 2	CO5	T1	
41	Assignment-5	1	07-01-2022		TLM 2	CO5	T1	
No. of classes required to complete UNIT-V		8			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
1	Advancements in Software Testing	1	11-01-2022		TLM2		T1	

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	20-09-2021	06-11-2021	7W
I Mid Examinations	08-11-2021	13-11-2021	1W
II Phase of Instructions	15-11-2021	15-01-2022	9W
II Mid Examinations	17-01-2021	22-01-2022	1W
Preparation and Practical's	24-01-2022	29-01-2022	1W
Semester End Examinations	31-01-2022	12-02-2022	2W

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
Online Quiz-1	1,2	C1=10
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
Online Quiz-2	3,4,5	C2=10
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
Evaluation of Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=10
Attendance		D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**A+B+C+D=40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

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

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 modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or Leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the 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	**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)

Graduate of the Information Technology will have the ability to

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

	Course Instructor	**Module Coordinator**	**HOD**
Signature			
Name of the Faculty	**Mrs.S.Jyothi**	**Dr.B.RamaDevi**	**Dr.B. Srinivasa Rao**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PROGRAM : B.Tech. V-Sem, IT, R17 Regulations

ACADEMIC YEAR : 2021-22

COURSE NAME & CODE: DESIGN AND ANALYSIS OF ALGORITHMS & S181

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

COURSE CREDITS : 3

COURSE INSTRUCTOR : A. SARVANI

PRE-REQUISITE : Knowledge of Programming, Discrete Mathematics and Data Structures

COURSE OBJECTIVE:

Students undergoing this course are expected to identify 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 new algorithms for various problems.

COURSE OUTCOMES (CO)

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 Backtracking search methods on state space trees for few example problems.

CO5: Analyse branch and Bound search methods through problems such as 0/1 knapsack problem,Travelling sales personn 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	3	2	-	-	-	-	-	-	-	-	1	2	3	2
CO2	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2
CO3	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2
CO4	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2
CO5	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2

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

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

BOS APPROVED TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni, 'Fundamentals of Computer Algorithms', Galgotia Publications.
2. Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, PEA, 2007.

BOS APPROVED REFERENCE BOOKS:

1 Aho, Hopcroft & Ullman, 'The Design and Analysis of Algorithms', Addison Wesely Publications.

2 Thomas H. Corman et al, 'Introduction to Algorithms', PHI.

COURSE DELIVERY PLAN (LESSON PLAN): 21-12-2020 to 26-12-2020,

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, Algorithm Specifications	1	20.09.2021		**TLM1,2**	CO1	T1	
2.	Space Complexity	1	22.09.2021		**TLM1,2**	CO1	T1	
3.	Time complexity, Asymptotic Notations	2	25.09.2021 29.09.2021		**TLM1,2**	CO1	T1,R1	
4.	Divide &Conquer General method	1	04.10.2021		**TLM1,2**	CO1	T1	
5.	Binary Search	1	06.10.2021		**TLM1,2**	CO1	T1	
6.	Finding Maximum and Minimum	1	09.10.2021		**TLM1,2**	CO1	T1	
7.	Merge sort	1	11.10.2021		**TLM1,2**	CO1	T1	
8.	Quick sort, Assignment-1	1	16.10.2021		**TLM1,2, TLM 6**	CO1	T1	
No. of classes required to complete UNIT-I		09			No. of classes taken:			

UNIT-II: THE 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
1.	Greedy Method General method	1	18.10.2021		**TLM1,2**	CO2	T1	
2.	Knapsack problem	1	20.10.2021		**TLM1,2**	CO2		
3.	Job –Sequencing with deadlines	1	23.10.2021		**TLM1,2**	CO2	T1	
4.	Minimum cost spanning tree-prims algorithm	1	25.10.2021		**TLM1,2**	CO2		
5.	Krushkals algorithm	1	27.10.2021		**TLM1,2**	CO2	T1	
6.	Optimal Storage on Tapes	1	01.11.2021		**TLM1,2**	CO2	T1	
7.	Optimal Merge Pattern	1	03.11.2021		**TLM1,2**	CO2	T1	
8.	Single source Shortest paths, Assignment-2	1	06.11.2021		**TLM2,6**	CO2	T1	
No. of classes required to complete UNIT-II		08			No. of classes taken:			
I Mid Examination – 08.11.2021 TO 13.11.2021								

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
1.	Dynamic Programming-General Method	1	15.11.2021		**TLM1,2**	CO3	T1	
2.	Multistage Graph, All Pairs Shortest Path	1	17.11.2021		**TLM1,2**	CO3	T1	
3.	Single Source Shortest path	2	20.11.2021 22.11.2021		**TLM1,2**	CO3	T1,R1	
4.	Optimal Binary Search Trees, 0/1 Knapsack	2	24.11.2021 27.11.2021		**TLM1,2**	CO3	T1	
5.	Reliability Design	2	29.11.2021 01.12.2021		**TLM1,2**	CO3	T1	
6.	Travelling Salesman Problem, Assignment	2	04.12.2021 06.12.2021		**TLM2, TLM6**	CO3	T1,R1	
No. of classes required to complete UNIT-III		10			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
1.	Back tracking –General method	2	08.12.2021 11.12.2021		**TLM1,2**	CO4	T1,R1	
2.	The 8-Queens Problem,	1	13.12.2021		**TLM1,2**	CO4	T1	
3.	Sum of Subsets	1	15.12.2021		**TLM1,2**	CO4	T1	
4.	Graph Coloring	2	18.12.2021 20.12.2021		**TLM1,2**	CO4	T1	
5.	Hamiltonian cycle, Assigment	1	22.12.2021		**TLM1,2 TLM6**	CO4	T1	
No. of classes required to complete UNIT-IV		07			No. of classes taken:			

UNIT-V: Branch and Bound

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	General method	1	27.12.2021		**TLM1,2**	CO5	T1	
2.	0/1 Knapsack problem - LC Branch and Bound solution	3	29.12.2021 03.01.2022 05.01.2022		**TLM1,2**	CO5	T1, R1	
3.	0/1 Knapsack problem - FIFO Branch and Bound solution	2	08.01.2022 10.01.2022		**TLM1,2**	CO5	T1	
4.	Travelling salesperson Problem – LC Branch and Bound solution	2	12.01.2022 15.01.2022		**TLM1,2**	CO5	T1	
No. of classes required to complete UNIT-V		8			No. of classes taken:			
II Mid Examination : 17.1.2022 TO 22.1.2022								

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Some more practice problems	1	15.01.2022		**TLM2**	CO2		

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	20.09.2021	06.11.2021	7W
I Mid Examinations	08.11.2021	13.11.2021	1W
II Phase of Instructions	15.11.2021	15.01.2022	9W
II Mid Examinations	17.01.2022	22.01.2022	1W
Preparation and Practicals	24.01.2022	29.01.2022	1W
Semester End Examinations	31.01.2022	12.02.2022	2W

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**

TEXT BOOKS

1. Ellis Horowitz, Sartaj Sahni, ―Fundamentals of Computer Algorithms", Galgotia Publications.

REFERENCES

1. Mark Allen Weiss, ―Data Structures and Algorithm Analysis in C++‖, Pearson, 3/e , 2007.

2. Aho, Hopcroft & Ullman, ―The Design and Analysis of Computer Algorithms", Addison Wesley publications.

3. Thomas H.Corman et al, ―Introduction to Algorithms", PHI.

4. Anany Levitin, ―Introduction to the Design and Analysis of Algorithms‖, PEA

5. P. H. Dave, H. B. Dave, ―Design and Analysis of Algorithms‖, Pearson Education, 2008.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: Pursue a successful career in the area of Information Technology or its allied fields.

PEO II: Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.

PEO III: Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.

PEO IV: Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication, team work and leadership skills in their job.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutionsin 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 ofthe engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineeringcommunity and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of theengineer**ing 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 inindependent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

A.Sarvani	Dr. K.Lavanya	Dr. B. Srinivasa Rao
Course Instructor	**Module Coordinator**	**Head of the Department**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PROGRAM : B.Tech. V-Sem, IT, R17 Regulations

ACADEMIC YEAR : 2021-22

COURSE NAME & CODE: DESIGN AND ANALYSIS OF ALGORITHMS & S181

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

COURSE CREDITS : 3

COURSE INSTRUCTOR : A. SARVANI

PRE-REQUISITE : Knowledge of Programming, Discrete Mathematics and Data Structures

COURSE OBJECTIVE:

Students undergoing this course are expected to identify 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 new algorithms for various problems.

COURSE OUTCOMES (CO)

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 Backtracking search methods on state space trees for few example problems.

CO5: Analyse branch and Bound search methods through problems such as 0/1 knapsack problem,Travelling sales personn 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	3	2	-	-	-	-	-	-	-	-	1	2	3	2
CO2	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2
CO3	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2
CO4	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2
CO5	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2

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

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

BOS APPROVED TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni, 'Fundamentals of Computer Algorithms', Galgotia Publications.
2. Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, PEA, 2007.

BOS APPROVED REFERENCE BOOKS:

1 Aho, Hopcroft & Ullman, 'The Design and Analysis of Algorithms', Addison Wesely Publications.

2 Thomas H. Corman et al, 'Introduction to Algorithms', PHI.

COURSE DELIVERY PLAN (LESSON PLAN): 21-12-2020 to 26-12-2020,

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, Algorithm Specifications	1	20.09.2021		**TLM1,2**	CO1	T1	
2.	Space Complexity	1	22.09.2021		**TLM1,2**	CO1	T1	
3.	Time complexity, Asymptotic Notations	2	25.09.2021 29.09.2021		**TLM1,2**	CO1	T1,R1	
4.	Divide &Conquer General method	1	04.10.2021		**TLM1,2**	CO1	T1	
5.	Binary Search	1	06.10.2021		**TLM1,2**	CO1	T1	
6.	Finding Maximum and Minimum	1	09.10.2021		**TLM1,2**	CO1	T1	
7.	Merge sort	1	11.10.2021		**TLM1,2**	CO1	T1	
8.	Quick sort, Assignment-1	1	16.10.2021		**TLM1,2, TLM 6**	CO1	T1	
No. of classes required to complete UNIT-I		09			No. of classes taken:			

UNIT-II: THE 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
1.	Greedy Method General method	1	18.10.2021		**TLM1,2**	CO2	T1	
2.	Knapsack problem	1	20.10.2021		**TLM1,2**	CO2		
3.	Job –Sequencing with deadlines	1	23.10.2021		**TLM1,2**	CO2	T1	
4.	Minimum cost spanning tree-prims algorithm	1	25.10.2021		**TLM1,2**	CO2		
5.	Krushkals algorithm	1	27.10.2021		**TLM1,2**	CO2	T1	
6.	Optimal Storage on Tapes	1	01.11.2021		**TLM1,2**	CO2	T1	
7.	Optimal Merge Pattern	1	03.11.2021		**TLM1,2**	CO2	T1	
8.	Single source Shortest paths, Assignment-2	1	06.11.2021		**TLM2,6**	CO2	T1	
No. of classes required to complete UNIT-II		08			No. of classes taken:			
I Mid Examination – 08.11.2021 TO 13.11.2021								

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
1.	Dynamic Programming-General Method	1	15.11.2021		**TLM1,2**	CO3	T1	
2.	Multistage Graph, All Pairs Shortest Path	1	17.11.2021		**TLM1,2**	CO3	T1	
3.	Single Source Shortest path	2	20.11.2021 22.11.2021		**TLM1,2**	CO3	T1,R1	
4.	Optimal Binary Search Trees, 0/1 Knapsack	2	24.11.2021 27.11.2021		**TLM1,2**	CO3	T1	
5.	Reliability Design	2	29.11.2021 01.12.2021		**TLM1,2**	CO3	T1	
6.	Travelling Salesman Problem, Assignment	2	04.12.2021 06.12.2021		**TLM2, TLM6**	CO3	T1,R1	
No. of classes required to complete UNIT-III		10			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
1.	Back tracking –General method	2	08.12.2021 11.12.2021		**TLM1,2**	CO4	T1,R1	
2.	The 8-Queens Problem,	1	13.12.2021		**TLM1,2**	CO4	T1	
3.	Sum of Subsets	1	15.12.2021		**TLM1,2**	CO4	T1	
4.	Graph Coloring	2	18.12.2021 20.12.2021		**TLM1,2**	CO4	T1	
5.	Hamiltonian cycle, Assigment	1	22.12.2021		**TLM1,2 TLM6**	CO4	T1	
No. of classes required to complete UNIT-IV		07			No. of classes taken:			

UNIT-V: Branch and Bound

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	General method	1	27.12.2021		**TLM1,2**	CO5	T1	
2.	0/1 Knapsack problem - LC Branch and Bound solution	3	29.12.2021 03.01.2022 05.01.2022		**TLM1,2**	CO5	T1, R1	
3.	0/1 Knapsack problem - FIFO Branch and Bound solution	2	08.01.2022 10.01.2022		**TLM1,2**	CO5	T1	
4.	Travelling salesperson Problem – LC Branch and Bound solution	2	12.01.2022 15.01.2022		**TLM1,2**	CO5	T1	
No. of classes required to complete UNIT-V		8			No. of classes taken:			
II Mid Examination : 17.1.2022 TO 22.1.2022								

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Some more practice problems	1	15.01.2022		**TLM2**	CO2		

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	20.09.2021	06.11.2021	7W
I Mid Examinations	08.11.2021	13.11.2021	1W
II Phase of Instructions	15.11.2021	15.01.2022	9W
II Mid Examinations	17.01.2022	22.01.2022	1W
Preparation and Practicals	24.01.2022	29.01.2022	1W
Semester End Examinations	31.01.2022	12.02.2022	2W

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**

TEXT BOOKS

1. Ellis Horowitz, Sartaj Sahni, ―Fundamentals of Computer Algorithms", Galgotia Publications.

REFERENCES

1. Mark Allen Weiss, ―Data Structures and Algorithm Analysis in C++‖, Pearson, 3/e , 2007.

2. Aho, Hopcroft & Ullman, ―The Design and Analysis of Computer Algorithms", Addison Wesley publications.

3. Thomas H.Corman et al, ―Introduction to Algorithms", PHI.

4. Anany Levitin, ―Introduction to the Design and Analysis of Algorithms‖, PEA

5. P. H. Dave, H. B. Dave, ―Design and Analysis of Algorithms‖, Pearson Education, 2008.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: Pursue a successful career in the area of Information Technology or its allied fields.

PEO II: Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.

PEO III: Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.

PEO IV: Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication, team work and leadership skills in their job.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutionsin 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 ofthe engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineeringcommunity and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of theengineer**ing 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 inindependent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

A.Sarvani	Dr. K.Lavanya	Dr. B. Srinivasa Rao
Course Instructor	**Module Coordinator**	**Head of the Department**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PROGRAM : B.Tech. V-Sem, IT, R17 Regulations

ACADEMIC YEAR : 2021-22

COURSE NAME & CODE: DESIGN AND ANALYSIS OF ALGORITHMS & 17CI08

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

COURSE CREDITS : 3

COURSE INSTRUCTOR : V.V.KRISHNA REDDY

PRE-REQUISITE : Knowledge of Programming, Discrete Mathematics and Data Structures

COURSE OBJECTIVE:

Students undergoing this course are expected to identify 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 new algorithms for various problems.

COURSE OUTCOMES (CO)

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 Backtracking search methods on state space trees for few example problems.

CO5: Analyse branch and Bound search methods through problems such as 0/1 knapsack problem,Travelling sales personn 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	3	2	-	-	-	-	-	-	-	-	1	2	3	2
CO2	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2
CO3	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2

CO4	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2
CO5	2	3	1	-	-	-	-	-	-	-	-	1	2	3	2

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

BOS APPROVED TEXT BOOKS:

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

2.Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, PEA, 2007.

BOS APPROVED REFERENCE BOOKS:

1 Aho, Hopcroft & Ullman, 'The Design and Analysis of Algorithms', Addison Wesely Publications.

2 Thomas H. Corman et al, 'Introduction to Algorithms', PHI.

COURSE DELIVERY PLAN (LESSON PLAN): 21-12-2020 to 26-12-2020,

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, Algorithm Specifications	1	20-09-2021		**TLM2**	CO1	T1	
2.	Space Complexity	1	22-09-2021		**TLM2**	CO1	T1	
3.	Time complexity, Asymptotic Notations	1	25-09-2021		**TLM2**	CO1	T1,R1	
4.	Divide &Conquer General method	1	27-09-2021		**TLM2**	CO1	T1,T2	
5.	Binary Search	1	29-09-2021		**TLM2**	CO1	T1	
6.	Finding Maximun and Minimum	2	04-10-2021		**TLM2**	CO1	T1	
7.	Merge sort	1	06-10-2021		**TLM2**	CO1	T1	
8.	Quick sort, Assignment-1	1	09-10-2021		**TLM2,6**	CO1	T1	
No. of classes required to complete UNIT-I		9			No. of classes taken:			

UNIT-II: THE 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
1.	Greedy Method General method	1	11-10-2021		**TLM2**	CO2	T1,T2	
2.	Knapsack problem	1	16-10-2021		**TLM2**	CO2		
3.	Job – Sequencing with deadlines	1	18-10-2021		**TLM2**	CO2	T1,T2	
4.	Minimum cost spanning tree-prims algorithm	2	23-10-2021 25-10-2021		**TLM2**	CO2		
5.	Krushkals	1	27-10-2021		**TLM2**	CO2	T1,T2	

	algorithm							
6.	Optimal Storage on Tapes	1	30-10-2021		**TLM2**	CO2	T1,T2	
7.	Optimal Merge Pattern	2	01-11-2021 03-11-2021		**TLM2**	CO2	T1	
8.	Single source Shortest paths, Assignment-2	1	06-11-2021		**TLM2,6**	CO2	T1	
No. of classes required to complete UNIT-II		10			No. of classes taken:			
I Mid Examination - 08-11-2021 to 13-11-2021								

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
1.	Dynamic Programming-General Method	1	15-11-2021		**TLM2**	CO3	T1	
2.	Multistage Graph, All Pairs Shortest Path	2	17-11-2021 20-11-2021		**TLM2**	CO3	T1	
3.	Single Source Shortest path	1	22-11-2021		**TLM2**	CO3	T1,R1	
4.	Optimal Binary Search Trees, 0/1 Knapsack	2	24-11-2021 27-11-2021		**TLM2**	CO3	T1	
5.	Reliability Design	2	29-11-2021 01-12-2021		**TLM2**	CO3	T1	
6.	Travelling Salesman Problem, Assignment	2	04-12-2021 06-12-2021		**TLM2, TLM6**	CO3	T1,R1	
No. of classes required to complete UNIT-III		10			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
1.	Back tracking –General method	2	08-12-2021 11-12-2021		**TLM2**	CO4	T1,R1	
2.	The 8-Queens Problem,	1	13-12-2021		**TLM2**	CO4	T1	
3.	Sum of Subsets	1	15-12-2021		**TLM2**	CO4	T1	
4.	Graph Coloring	2	18-12-2021 20-12-2021		**TLM2**	CO4	T1	
5.	Hamiltonian cycle, Assigment	1	22-12-2021		**TLM2, TLM6**	CO4	T1	
No. of classes required to complete UNIT-IV		07			No. of classes taken:			

UNIT-V: Branch and Bound

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	General method	1	27-12-2021		**TLM2**	CO5	T1	
2.	0/1 Knapsack problem - LC Branch and Bound solution	3	29-12-2021 01-01-2022 03-01-2022		**TLM2**	CO5	T1, R1	
3.	0/1 Knapsack problem - FIFO Branch and Bound solution	2	05-01-2022 08-01-2022		**TLM2**	CO5	T1	
4.	Travelling salesperson Problem – LC Branch and Bound solution	2	10-01-2022 12.01.2022		**TLM2**	CO5	T1	
No. of classes required to complete UNIT-V		8			No. of classes taken:			
II Mid Examination : 17-01-2022 to 22-01-2022								

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Some more practice problems	1	12.01.2022		**TLM2**	CO2		

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: Pursue a successful career in the area of Information Technology or its allied fields.

PEO II: Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.

PEO III: Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.

PEO IV: Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication, team work and leadership skills in their job.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutionsin 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 ofthe engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineeringcommunity and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of theengineer**ing 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 inindependent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. V.V. Krishna Reddy	**Mr. V.V. Krishna Reddy**	**Dr. K. Lavanya**	**Dr. B.Srinivasa Rao**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

Part-A

PROGRAM	:	**B.Tech.(IT), V-Semester**
ACADEMIC YEAR	:	**2020-2021**
COURSE CODE&NAME	:	**17CI17&Data Communications and Computer Networks**
L-T-P STRUCTURE	:	**3 - -**
COURSE CREDITS	:	**3**
COURSE INSTRUCTOR	:	**Rajasekhar Kommaraju**
PRE-REQUISITES	:	Communication systems.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

In this course student will learn:

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):

On successful completion of the course, students will be able to:

CO 1	Understand how the data is transmitted from point-to-point.
CO 2	Summarize Data Link Layer Protocols.
CO 3	Analyze of different Medium Access Control protocols.
CO 4	Evaluate different routing protocols and Transport layer protocols.
CO 5	Understand the concepts of Presentation and Application Layer Protocols.

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

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

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

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

BOS APPROVED TEXT BOOKS:

T1 A. S. Tanenbaum —Computer Network: Second Ed. Prentice Hall, India (tan).

T2 B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

BOS APPROVED REFERENCE BOOKS:

R1 D. Berekas an R. Gallager, —Data Networks: second Ed. Prentice Hall, India.

R2 D. E. Coner, —Intertworking with TCP/IP‖ , Vol-I.Prentice Hall India.

R3 G. E. Keiser, —Local Area Network‖ , Mc Graw Hill, International Ed.

R4 W. Stalling, —Data & Computer Communications‖ , Maxwell Macmillan Internation Ed.

R5 http://web.mit.edu/dimitrib/www/datanets.html

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: INTRODUCTION TO DATA COMMUNICATION TECHNIQUES & PHYSICAL LAYER

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Discussion of Cos and CEOs of the course	1	17-08-2020		TLM2	
2.	Introduction to Data Communication and Computer Networks	1	19-08-2020		TLM2	
3.	Reference models: ISO OSI model, TCP/IP model	1	21-08-2020		TLM2	
4.	Reference models: ISO OSI model, TCP/IP model	1	24-08-2020		TLM2	
5.	Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM)	1	26-08-2020		TLM2	
6.	Delta Modulation (DM), Multiplexing Techniques	2	28-08-2020		TLM2	
7.	The theoretical basis for Data communication		31-08-2020		TLM2	
8.	Twisted pair, Coaxial cable, Fiber optics	2	02-09-2020		TLM2	
9.	Error detection and correction Single and Parity check codes		04-09-2020		TLM2	
10.	CRC	1	07-09-2020		TLM2	
11.	Hamming Code	1	09-09-2020		TLM2	
12.	**TUTORIAL-1, Quiz-1 & Assignment-1**		10-09-2020		**TLM3**	
No. of classes required to complete UNIT-I		12				

UNIT-II: DATA LINK LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to DLL, Data link layer design issues	1	11-09-2020		TLM2	
14.	Elementary data link protocols	1	14-09-2020		TLM2	
15.	Stop & Wait protocols	1	16-09-2020		TLM2	
16.	Sliding window protocols-one-bit, go-back N, selective repeat	1	17-09-2020		TLM2	
17.	Sliding window protocols-one-bit, go-back N, selective repeat	1	18-09-2020		TLM2	

18.	performance and efficiency, verification of protocol, HDLC Protocol	1	21-09-2020		TLM2	
19.	**TUTORIAL-2, Quiz-2 ASSIGNMENT-2**	1	23-09-2020		**TLM3**	
No. of classes required to complete UNIT-II		07				

UNIT-III: MEDIUM ACCESS CONTROL SUB LAYER

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20.	Network layer design issues	1	24-09-2020		TLM2	
21.	Concept of Random Access, Pure ALOHA	1	25-09-2020		TLM2	
22.	throughput characteristics of ALOHA, S-ALOHA.	1	28-09-2020		TLM2	
23.	IEEE 802.3 Protocol	1	30-09-2020		TLM2	
24.	IEEE 802.4 and 802.5 Protocols	1	01-10-2020		TLM2	
25.	performance of Ethernet. Token Ring Protocol	1	05-10-2020		TLM2	
26.	FDDI Protocol	1	07-10-2020		TLM2	
27.	Virtual circuits and datagram ‘s	1	08-10-2020		TLM2	
28.	Windows flow control, Packet Discarding, Traffic Shaping	1	09-10-2020		TLM2	
29.	Choke RSVP, Bridges, Routers and Gateways	1	12-10-2020		TLM2	
30.	**TUTORIAL-3, Quiz-3 ASSIGNMENT-3**	1	14-10-2020		**TLM3**	
No. of classes required to complete UNIT-III		11				

UNIT-IV: NETWORK AND TRANSPORT LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Introduction to Transport Layer and Network Layer, Optimality Principle	1	15-10-2020		TLM2	
32.	Dijkstra, Flooding and broadcasting	1	16-10-2020		TLM2	
33.	Dijkstra, Flooding and broadcasting	1	19-10-2020		TLM2	
34.	distance vector routing, link state routing	1	21-10-2020		TLM2	
35.	flow based routing, Multicasting routing	1	22-10-2020		TLM2	
36.	Flow and congestion control	1	26-10-2020		TLM2	
37.	Internet Architecture and	1	28-10-2020		TLM2	

	Addressing.					
38.	Design issues, Quality of Services Connection Establishment and Releases, TCP, UDP	1	30-10-2020		TLM2	
39.	Design issues, Quality of Services Connection Establishment and Releases, TCP, UDP	1	02-11-2020		TLM2	
40.	**TUTORIAL4, Quiz-4 ASSIGNMENT-4**	1	04-11-2020		**TLM3**	
No. of classes required to complete UNIT-IV		10				

UNIT-V: PRESENTATION AND APPLICATION LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Introduction to Application Layer	1	05-11-2020		TLM2	
42.	Electronic Mail SMTP,	1	06-11-2020		TLM2	
43.	HTTP	1	09-11-2020		TLM2	
44.	Substitutions and Transposition Ciphers	1	11-11-2020		TLM2	
45.	Data Encryption Standard (DES)	1	12-11-2020		TLM2	
46.	RSA algorithm	1	13-11-2020		TLM2	
47.	. **TUTORIAL-5, Quiz-5 ASSIGNMENT-5**	1	16-11-2020		**TLM3**	
No. of classes required to complete UNIT-V		07				

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign
48.	DNS	1	18-11-2020		TLM2	
49.	N/W Layer Design Issues	1	19-11-2020		TLM2	
50.	Revision	1	20-11-2020		TLM2	

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	Units	Marks
Assignment– 1	1	A1=5
Assignment– 2	2	A2=5
I-Mid Examination	1,2	B1=20
Online Quiz-1	1,2	C1=10
Assignment– 3	3	A3=5
Assignment– 4	4	A4=5
Assignment– 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Online Quiz-2	3,4,5	C2=10
Evaluation of Assignment: A=Avg (Best of Four (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 (B1, B2)	1,2,3,4,5	B=20
Evaluation of Online Quiz Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=10
Attendance Marks based on Percentage of attendance		D=5
Cumulative Internal Examination: A+B+C+D	**1,2,3,4,5**	**40**
Semester End Examinations: E	**1,2,3,4,5**	**60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	17/08/2020		
I Phase of Instructions	17/08/20	03/10/20	7W
I Mid Examinations	28/09/20	03/10/20	1W
II Phase of Instructions	05/10/20	28/11/20	7W
II Mid Examinations	23/11/20	28/11/20	1W
Preparation and Practical's	30/11/20	05/12/20	1W
Semester End Examinations	07/12/20	21/12/20	2W

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1 Pursue a successful career in the area of Information Technology or its allied fields.

PEO 2 Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.

PEO 3 Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.

PEO 4 Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication and team work and leadership skills in their job.

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 modeling to complex engineering activities with an understanding of the limitations.

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

PO7 **Environment and sustainability**: Understand the impact of the professional engineering solution sin 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 Organize, Analyze and Interpret the data to extract meaningful conclusions.

PSO2 Design, Implement and Evaluate a computer-based system to meet desired needs.

PSO3 Develop IT application services with the help of different current engineering tools.

	Course Instructor	**Module Coordinator**	**HOD**
Signature			
Name of the Faculty	**K. Rajasekhar**	**Dr.K. Anupriya**	**Dr. B. Srinivasa Rao**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

Part-A

PROGRAM	:	**B.Tech.(IT), V-Semester**
ACADEMIC YEAR	:	**2020-2021**
COURSE CODE&NAME	:	**17CI17&Data Communications and Computer Networks**
L-T-P STRUCTURE	:	**3 - -**
COURSE CREDITS	:	**3**
COURSE INSTRUCTOR	:	**Rajasekhar Kommaraju**
PRE-REQUISITES	:	Communication systems.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

In this course student will learn:

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):

On successful completion of the course, students will be able to:

CO 1	Understand how the data is transmitted from point-to-point.
CO 2	Summarize Data Link Layer Protocols.
CO 3	Analyze of different Medium Access Control protocols.
CO 4	Evaluate different routing protocols and Transport layer protocols.
CO 5	Understand the concepts of Presentation and Application Layer Protocols.

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

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

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

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

BOS APPROVED TEXT BOOKS:

T1 A. S. Tanenbaum —Computer Network: Second Ed. Prentice Hall, India (tan).

T2 B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

BOS APPROVED REFERENCE BOOKS:

R1 D. Berekas an R. Gallager, —Data Networks: second Ed. Prentice Hall, India.

R2 D. E. Coner, —Intertworking with TCP/IP‖ , Vol-I.Prentice Hall India.

R3 G. E. Keiser, —Local Area Network‖ , Mc Graw Hill, International Ed.

R4 W. Stalling, —Data & Computer Communications‖ , Maxwell Macmillan Internation Ed.

R5 http://web.mit.edu/dimitrib/www/datanets.html

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: INTRODUCTION TO DATA COMMUNICATION TECHNIQUES & PHYSICAL LAYER

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Discussion of Cos and CEOs of the course	1	17-08-2020		TLM2	
2.	Introduction to Data Communication and Computer Networks	1	19-08-2020		TLM2	
3.	Reference models: ISO OSI model, TCP/IP model	1	21-08-2020		TLM2	
4.	Reference models: ISO OSI model, TCP/IP model	1	24-08-2020		TLM2	
5.	Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM)	1	26-08-2020		TLM2	
6.	Delta Modulation (DM), Multiplexing Techniques	2	28-08-2020		TLM2	
7.	The theoretical basis for Data communication		31-08-2020		TLM2	
8.	Twisted pair, Coaxial cable, Fiber optics	2	02-09-2020		TLM2	
9.	Error detection and correction Single and Parity check codes		04-09-2020		TLM2	
10.	CRC	1	07-09-2020		TLM2	
11.	Hamming Code	1	09-09-2020		TLM2	
12.	**TUTORIAL-1, Quiz-1 & Assignment-1**		10-09-2020		**TLM3**	
No. of classes required to complete UNIT-I		12				

UNIT-II: DATA LINK LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to DLL, Data link layer design issues	1	11-09-2020		TLM2	
14.	Elementary data link protocols	1	14-09-2020		TLM2	
15.	Stop & Wait protocols	1	16-09-2020		TLM2	
16.	Sliding window protocols-one-bit, go-back N, selective repeat	1	17-09-2020		TLM2	
17.	Sliding window protocols-one-bit, go-back N, selective repeat	1	18-09-2020		TLM2	

18.	performance and efficiency, verification of protocol, HDLC Protocol	1	21-09-2020		TLM2	
19.	**TUTORIAL-2, Quiz-2 ASSIGNMENT-2**	1	23-09-2020		**TLM3**	
No. of classes required to complete UNIT-II		07				

UNIT-III: MEDIUM ACCESS CONTROL SUB LAYER

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20.	Network layer design issues	1	24-09-2020		TLM2	
21.	Concept of Random Access, Pure ALOHA	1	25-09-2020		TLM2	
22.	throughput characteristics of ALOHA, S-ALOHA.	1	28-09-2020		TLM2	
23.	IEEE 802.3 Protocol	1	30-09-2020		TLM2	
24.	IEEE 802.4 and 802.5 Protocols	1	01-10-2020		TLM2	
25.	performance of Ethernet. Token Ring Protocol	1	05-10-2020		TLM2	
26.	FDDI Protocol	1	07-10-2020		TLM2	
27.	Virtual circuits and datagram ‘s	1	08-10-2020		TLM2	
28.	Windows flow control, Packet Discarding, Traffic Shaping	1	09-10-2020		TLM2	
29.	Choke RSVP, Bridges, Routers and Gateways	1	12-10-2020		TLM2	
30.	**TUTORIAL-3, Quiz-3 ASSIGNMENT-3**	1	14-10-2020		**TLM3**	
No. of classes required to complete UNIT-III		11				

UNIT-IV: NETWORK AND TRANSPORT LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Introduction to Transport Layer and Network Layer, Optimality Principle	1	15-10-2020		TLM2	
32.	Dijkstra, Flooding and broadcasting	1	16-10-2020		TLM2	
33.	Dijkstra, Flooding and broadcasting	1	19-10-2020		TLM2	
34.	distance vector routing, link state routing	1	21-10-2020		TLM2	
35.	flow based routing, Multicasting routing	1	22-10-2020		TLM2	
36.	Flow and congestion control	1	26-10-2020		TLM2	
37.	Internet Architecture and	1	28-10-2020		TLM2	

	Addressing.					
38.	Design issues, Quality of Services Connection Establishment and Releases, TCP, UDP	1	30-10-2020		TLM2	
39.	Design issues, Quality of Services Connection Establishment and Releases, TCP, UDP	1	02-11-2020		TLM2	
40.	**TUTORIAL4, Quiz-4 ASSIGNMENT-4**	1	04-11-2020		**TLM3**	
No. of classes required to complete UNIT-IV		10				

UNIT-V: PRESENTATION AND APPLICATION LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Introduction to Application Layer	1	05-11-2020		TLM2	
42.	Electronic Mail SMTP,	1	06-11-2020		TLM2	
43.	HTTP	1	09-11-2020		TLM2	
44.	Substitutions and Transposition Ciphers	1	11-11-2020		TLM2	
45.	Data Encryption Standard (DES)	1	12-11-2020		TLM2	
46.	RSA algorithm	1	13-11-2020		TLM2	
47.	. **TUTORIAL-5, Quiz-5 ASSIGNMENT-5**	1	16-11-2020		**TLM3**	
No. of classes required to complete UNIT-V		07				

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign
48.	DNS	1	18-11-2020		TLM2	
49.	N/W Layer Design Issues	1	19-11-2020		TLM2	
50.	Revision	1	20-11-2020		TLM2	

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	Units	Marks
Assignment– 1	1	A1=5
Assignment– 2	2	A2=5
I-Mid Examination	1,2	B1=20
Online Quiz-1	1,2	C1=10
Assignment– 3	3	A3=5
Assignment– 4	4	A4=5
Assignment– 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Online Quiz-2	3,4,5	C2=10
Evaluation of Assignment: A=Avg (Best of Four (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 (B1, B2)	1,2,3,4,5	B=20
Evaluation of Online Quiz Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=10
Attendance Marks based on Percentage of attendance		D=5
Cumulative Internal Examination: A+B+C+D	**1,2,3,4,5**	**40**
Semester End Examinations: E	**1,2,3,4,5**	**60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	17/08/2020		
I Phase of Instructions	17/08/20	03/10/20	7W
I Mid Examinations	28/09/20	03/10/20	1W
II Phase of Instructions	05/10/20	28/11/20	7W
II Mid Examinations	23/11/20	28/11/20	1W
Preparation and Practical's	30/11/20	05/12/20	1W
Semester End Examinations	07/12/20	21/12/20	2W

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1 Pursue a successful career in the area of Information Technology or its allied fields.

PEO 2 Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.

PEO 3 Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.

PEO 4 Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication and team work and leadership skills in their job.

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 modeling to complex engineering activities with an understanding of the limitations.

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

PO7 **Environment and sustainability**: Understand the impact of the professional engineering solution sin 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 Organize, Analyze and Interpret the data to extract meaningful conclusions.

PSO2 Design, Implement and Evaluate a computer-based system to meet desired needs.

PSO3 Develop IT application services with the help of different current engineering tools.

	Course Instructor	**Module Coordinator**	**HOD**
Signature			
Name of the Faculty	**K. Rajasekhar**	**Dr.K. Anupriya**	**Dr. B. Srinivasa Rao**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

Part-A

PROGRAM	:	**B.Tech.(IT), V-Semester**
ACADEMIC YEAR	:	**2021-2022**
COURSE CODE&NAME	:	**17CI17&Data Communications and Computer Networks**
L-T-P STRUCTURE	:	**3 - -**
COURSE CREDITS	:	**3**
COURSE INSTRUCTOR	:	**Rajasekhar Kommaraju**
PRE-REQUISITES	:	Communication systems.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

In this course student will learn:

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):

On successful completion of the course, students will be able to:

CO 1	Understand how the data is transmitted from point-to-point.
CO 2	Summarize Data Link Layer Protocols.
CO 3	Analyze of different Medium Access Control protocols.
CO 4	Evaluate different routing protocols and Transport layer protocols.
CO 5	Understand the concepts of Presentation and Application Layer Protocols.

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

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

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

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

BOS APPROVED TEXT BOOKS:

T1 A. S. Tanenbaum —Computer Network: Second Ed. Prentice Hall, India (tan).

T2 B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

BOS APPROVED REFERENCE BOOKS:

R1 D. Berekas an R. Gallager, —Data Networks: second Ed. Prentice Hall, India.

R2 D. E. Coner, —Intertworking with TCP/IP‖ , Vol-I.Prentice Hall India.

R3 G. E. Keiser, —Local Area Network‖ , Mc Graw Hill, International Ed.

R4 W. Stalling, —Data & Computer Communications‖ , Maxwell Macmillan Internation Ed.

R5 http://web.mit.edu/dimitrib/www/datanets.html

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: INTRODUCTION TO DATA COMMUNICATION TECHNIQUES & PHYSICAL LAYER

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Discussion of Cos and CEOs of the course	1	21-09-2021		TLM2	
2.	Introduction to Data Communication and Computer Networks	1	24-09-2021		TLM2	
3.	Reference models: ISO OSI model, TCP/IP model	1	25-09-2021		TLM2	
4.	Reference models: ISO OSI model, TCP/IP model	1	28-09-2021		TLM2	
5.	Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM)	1	01-10-2021		TLM2	
6.	Delta Modulation (DM), Multiplexing Techniques	2	05-10-2021		TLM2	
7.	The theoretical basis for Data communication		08-10-2021		TLM2	
8.	Twisted pair, Coaxial cable, Fiber optics	2	09-10-2021		TLM2	
9.	Error detection and correction Single and Parity check codes		12-10-2021		TLM2	
10.	CRC	1	19-10-2021		TLM2	
11.	Hamming Code	1	22-10-2021		TLM2	
12.	**TUTORIAL-1, Quiz-1 & Assignment-1**		23-10-2021		**TLM3**	
No. of classes required to complete UNIT-I		12				

UNIT-II: DATA LINK LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to DLL, Data link layer design issues	1	26-10-2021		TLM2	
14.	Elementary data link protocols	1	29-10-2021		TLM2	
15.	Stop & Wait protocols	1	30-10-2021		TLM2	
16.	Sliding window protocols-one-bit, go-back N, selective repeat	1	02-11-2021		TLM2	
17.	Sliding window protocols-one-bit, go-back N, selective repeat	1	05-11-2021		TLM2	

18.	performance and efficiency, verification of protocol, HDLC Protocol	1	05-11-2021		TLM2	
19.	**TUTORIAL-2, Quiz-2 ASSIGNMENT-2**	1	06-11-2021		**TLM3**	
No. of classes required to complete UNIT-II		07				

UNIT-III: MEDIUM ACCESS CONTROL SUB LAYER

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20.	Network layer design issues	1	16-11-2021		TLM2	
21.	Concept of Random Access, Pure ALOHA	1	19-11-2021		TLM2	
22.	throughput characteristics of ALOHA, S-ALOHA.	1	20-11-2021		TLM2	
23.	IEEE 802.3 Protocol	1	23-11-2021		TLM2	
24.	IEEE 802.4 and 802.5 Protocols	1	26-11-2021		TLM2	
25.	performance of Ethernet. Token Ring Protocol	1	27-11-2021		TLM2	
26.	FDDI Protocol	1	30-11-2021			
27.	Virtual circuits and datagram ‘s	1	03-12-2021		TLM2	
28.	Windows flow control, Packet Discarding, Traffic Shaping	1	04-12-2021		TLM2	
29.	Choke RSVP, Bridges, Routers and Gateways	1	07-12-2021		TLM2	
30.	**TUTORIAL-3, Quiz-3 ASSIGNMENT-3**	1	10-12-2021		TLM2	
No. of classes required to complete UNIT-III		11				

UNIT-IV: NETWORK AND TRANSPORT LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Introduction to Transport Layer and Network Layer, Optimality Principle	1	11-12-2021		TLM2	
32.	Dijkstra, Flooding and broadcasting	1	14-12-2021		TLM2	
33.	Dijkstra, Flooding and broadcasting	1	17-12-2021		TLM2	
34.	distance vector routing, link state routing	1	18-12-2021		TLM2	
35.	flow based routing, Multicasting routing	1	21-12-2021		TLM2	
36.	Flow and congestion control	1	24-12-2021		TLM2	
37.	Internet Architecture and	1	28-12-2021		TLM2	

	Addressing.					
38.	Design issues, Quality of Services Connection Establishment and Releases, TCP, UDP	1	31-12-2021		TLM2	
39.	Design issues, Quality of Services Connection Establishment and Releases, TCP, UDP	1	31-12-2021		TLM2	
40.	**TUTORIAL4, Quiz-4 ASSIGNMENT-4**	1	04-01-2022		**TLM3**	
No. of classes required to complete UNIT-IV		10				

UNIT-V: PRESENTATION AND APPLICATION LAYER PROTOCOLS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Introduction to Application Layer, Electronic Mail SMTP, and HTTP	1	07-01-2022		TLM2	
42.	Substitutions and Transposition Ciphers	1	08-01-2022		TLM2	
43.	Data Encryption Standard (DES), RSA algorithm	1	11-01-2022		TLM2	
44.	. **TUTORIAL-5, Quiz-5 ASSIGNMENT-5**	1	14-01-2022		**TLM3**	
No. of classes required to complete UNIT-V		04				

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign
45.	DNS, N/W Layer Design Issues	1	15-01-2022		TLM2	

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	Units	Marks
Assignment– 1	1	A1=5
Assignment– 2	2	A2=5
I-Mid Examination	1,2	B1=20
Online Quiz-1	1,2	C1=10
Assignment– 3	3	A3=5
Assignment– 4	4	A4=5

Assignment– 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Online Quiz-2	3,4,5	C2=10
Evaluation of Assignment: A=Avg (Best of Four (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 (B1, B2)	1,2,3,4,5	B=20
Evaluation of Online Quiz Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=10
Attendance Marks based on Percentage of attendance		D=5
Cumulative Internal Examination: A+B+C+D	**1,2,3,4,5**	**40**
Semester End Examinations: E	**1,2,3,4,5**	**60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	20-09-2021		
I Phase of Instructions	20-09-2021	06-11-2021	7W
I Mid Examinations	08-11-2021	13-11-2021	1W
II Phase of Instructions	15-11-2021	15-01-2022	7W
II Mid Examinations	17-01-2022	22-01-2022	1W
Preparation and Practical's	24-01-2022	29-01-2022	1W
Semester End Examinations	31-01-2022	12-02-2022	2W

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1 Pursue a successful career in the area of Information Technology or its allied fields.

PEO 2 Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.

PEO 3 Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.

PEO 4 Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication and team work and leadership skills in their job.

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 modeling to complex engineering activities with an understanding of the limitations.

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

PO7 **Environment and sustainability**: Understand the impact of the professional engineering solution sin 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 Organize, Analyze and Interpret the data to extract meaningful conclusions.

PSO2 Design, Implement and Evaluate a computer-based system to meet desired needs.

PSO3 Develop IT application services with the help of different current engineering tools.

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
Signature				
Name of the Faculty	**K. Rajasekhar**	**K. Rajasekhar**	**Dr.K. Anupriya**	**Dr. B. Srinivasa Rao**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PROGRAM	**:** B.Tech.,V-Sem., IT - R17 Regulation
ACADEMIC YEAR	**:** 2020-21
COURSE NAME & CODE	**:** Data Communications and Computer Networks Lab–17IT62
L-T-P STRUCTURE	**: 0**-0-2
COURSE CREDITS	**:** 1
COURSE INSTRUCTOR	**:K.Rajasekhar/ K. Raviteja**
PRE-REQUISITE	**: Basic Computer Fundamentals, Programming on C**

COURSE OBJECTIVE: In this course student will learn about how to build and understanding the fundamental concepts of computer networking and gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

COURSE OUTCOMES (CO)

CO1: Independently understand basic computer network technology

CO2: Manage Data Communications System and its components

CO3: Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

CO4: Improve individual / team work skills, communication & report writing skills with ethical values.

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	2									1	2	2	2
CO2	2	3	2									1	2	3	3
CO3	2	2	2									1	3	2	2
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

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

BOS APPROVED TEXT BOOKS:

T1 A. S. Tanenbaum ―Computer Network: Second Ed. Prentice Hall, India (tan).

T2 B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

BOS APPROVED REFERENCE BOOKS:

R1 D. Berekas an R. Gallager, ―Data Networks: second Ed. Prentice Hall, India.

R2 D. E. Coner, ―Intertworking with TCP/IP‖ , Vol-I.Prentice Hall India.

R3 G. E. Keiser, ―Local Area Network‖ , Mc Graw Hill, International Ed.

R4 W. Stalling, ―Data & Computer Communications‖ , Maxwell Macmillan Internation Ed.

R5 http://web.mit.edu/dimitrib/www/datanets.html

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Programs to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Study of different types of network cables and practically implement the cross wired cable and straight through cable using crimping tool. • Study of Network devices in detail • Study of network IP	2	20-08-2020		**TLM8/TLM5**	
2.	Understanding and using of commands like ipconfig,netstat, ping, ARP, Telnet, FTP, finger, tracert, whois etc	2	27-08-2020		**TLM8/TLM5**	
3.	Implement data link layer framing methods such as character stuffing and bit stuffing.	2	03-09-2020 07-09-2020		**TLM8/TLM5/TLM4**	
4.	Write a program for Hamming code generation for error detection and correction	2	14-09-2020 21-09-2020		**TLM8/TLM5/TLM4**	
5.	Implement the three CRC polynomials – CRC12, CRC16 and CRC CCIP on a data set	2	28-09-2020 05-10-2020		**TLM8/TLM5/TLM4**	

	of characters					
6.	Implementation of Dijkstra's algorithm to compute the shortest path of a graph.	2	12-10-2020 19-10-2020		**TLM8/TLM5**	
7.	Write a program for Distance vector Algorithm find suitable path for transmission.	2	26-10-2020 02-11-2020		**TLM8/TLM5**	
8.	Write a program for congestion control using leaky bucket algorithm.	2	09-11-2020		**TLM8/TLM5**	
9.	**Lab-Internal-**	2	16-11-2020			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	17/08/2020		
I Phase of Instructions	17/08/20	03/10/20	7W
I Mid Examinations	28/09/20	03/10/20	1W
II Phase of Instructions	05/10/20	28/11/20	7W
II Mid Examinations	23/11/20	28/11/20	1W
Preparation and Practical's	30/11/20	05/12/20	1W
Semester End Examinations	07/12/20	21/12/20	2W

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Internal Lab Exam-I	1,2,3	A1= 20
Internal Lab Exam-II	1,2,3	A2= 20
Day to Day Evaluation	1,2,3	B= 10
Record	1,2,3	C= 5
Attendance		D= 5
Evaluation of Internal Lab Exam Marks: A=(A1+A2)/2	1,2,3	A= 20
Cumulative Internal Examination: A+B+C	**1,2,3**	**A+B+C+D =40**
Semester End Examinations	**1,2,3**	**E=60**
Total Marks: A+B+C+D	**1,2,3**	**100**

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

K.Rajasekhar/K.Ravi Teja	**K. AnuPriya**	**DrB. Srinivasa Rao**
Course Instructor	**Module Coordinator**	**HOD**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PROGRAM	**:** B.Tech.,V-Sem., IT - R17 Regulation
ACADEMIC YEAR	**:** 2020-21
COURSE NAME & CODE	**:** Data Communications and Computer Networks Lab–17IT62
L-T-P STRUCTURE	**: 0**-0-2
COURSE CREDITS	**:** 1
COURSE INSTRUCTOR	**:K.Rajasekhar/ K. Raviteja**
PRE-REQUISITE	**: Basic Computer Fundamentals, Programming on C**

COURSE OBJECTIVE: In this course student will learn about how to build and understanding the fundamental concepts of computer networking and gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

COURSE OUTCOMES (CO)

CO1: Independently understand basic computer network technology

CO2: Manage Data Communications System and its components

CO3: Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

CO4: Improve individual / team work skills, communication & report writing skills with ethical values.

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	2									1	2	2	2
CO2	2	3	2									1	2	3	3
CO3	2	2	2									1	3	2	2
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

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

BOS APPROVED TEXT BOOKS:

T1 A. S. Tanenbaum ―Computer Network: Second Ed. Prentice Hall, India (tan).

T2 B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

BOS APPROVED REFERENCE BOOKS:

R1 D. Berekas an R. Gallager, ―Data Networks: second Ed. Prentice Hall, India.

R2 D. E. Coner, ―Intertworking with TCP/IP‖ , Vol-I.Prentice Hall India.

R3 G. E. Keiser, ―Local Area Network‖ , Mc Graw Hill, International Ed.

R4 W. Stalling, ―Data & Computer Communications‖ , Maxwell Macmillan Internation Ed.

R5 http://web.mit.edu/dimitrib/www/datanets.html

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Programs to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Study of different types of network cables and practically implement the cross wired cable and straight through cable using crimping tool. • Study of Network devices in detail • Study of network IP	2	20-08-2020		**TLM8/TLM5**	
2.	Understanding and using of commands like ipconfig,netstat, ping, ARP, Telnet, FTP, finger, tracert, whois etc	2	27-08-2020		**TLM8/TLM5**	
3.	Implement data link layer framing methods such as character stuffing and bit stuffing.	2	03-09-2020 07-09-2020		**TLM8/TLM5/TLM4**	
4.	Write a program for Hamming code generation for error detection and correction	2	14-09-2020 21-09-2020		**TLM8/TLM5/TLM4**	
5.	Implement the three CRC polynomials – CRC12, CRC16 and CRC CCIP on a data set	2	28-09-2020 05-10-2020		**TLM8/TLM5/TLM4**	

	of characters					
6.	Implementation of Dijkstra's algorithm to compute the shortest path of a graph.	2	12-10-2020 19-10-2020		**TLM8/TLM5**	
7.	Write a program for Distance vector Algorithm find suitable path for transmission.	2	26-10-2020 02-11-2020		**TLM8/TLM5**	
8.	Write a program for congestion control using leaky bucket algorithm.	2	09-11-2020		**TLM8/TLM5**	
9.	**Lab-Internal-**	2	16-11-2020			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	17/08/2020		
I Phase of Instructions	17/08/20	03/10/20	7W
I Mid Examinations	28/09/20	03/10/20	1W
II Phase of Instructions	05/10/20	28/11/20	7W
II Mid Examinations	23/11/20	28/11/20	1W
Preparation and Practical's	30/11/20	05/12/20	1W
Semester End Examinations	07/12/20	21/12/20	2W

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Internal Lab Exam-I	1,2,3	A1= 20
Internal Lab Exam-II	1,2,3	A2= 20
Day to Day Evaluation	1,2,3	B= 10
Record	1,2,3	C= 5
Attendance		D= 5
Evaluation of Internal Lab Exam Marks: A=(A1+A2)/2	1,2,3	A= 20
Cumulative Internal Examination: A+B+C	**1,2,3**	**A+B+C+D =40**
Semester End Examinations	**1,2,3**	**E=60**
Total Marks: A+B+C+D	**1,2,3**	**100**

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

K.Rajasekhar/K.Ravi Teja	**K. AnuPriya**	**DrB. Srinivasa Rao**
Course Instructor	**Module Coordinator**	**HOD**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. REDDY NAGAR, MYLAVARAM – 521230. A.P. INDIA
Affiliated to JNTUK Kakinada & Approved by AICTE, New Delhi
Accredited By NAAC, Accredited By NBA Tier-I & Certified by ISO 9001:2015
http://www.lbrce.ac.in, Phone: 08659 – 222933, Fax: 08659 – 222931 Extn:109
DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PROGRAM	**:** B.Tech.,V-Sem., IT - R17 Regulation
ACADEMIC YEAR	**:** 2021-22
COURSE NAME & CODE	**:** Data Communications and Computer Networks Lab–17IT62
L-T-P STRUCTURE	**: 0**-0-2
COURSE CREDITS	**:** 1
COURSE INSTRUCTOR	**:K.Rajasekhar/ J.Geetha Renuka**
PRE-REQUISITE	**: Basic Computer Fundamentals, Programming on C**

COURSE OBJECTIVE: In this course student will learn about how to build and understanding the fundamental concepts of computer networking and gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

COURSE OUTCOMES (CO)

CO1: Independently understand basic computer network technology

CO2: Manage Data Communications System and its components

CO3: Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

CO4: Improve individual / team work skills, communication & report writing skills with ethical values.

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	2									1	2	2	2
CO2	2	3	2									1	2	3	3
CO3	2	2	2									1	3	2	2
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

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

BOS APPROVED TEXT BOOKS:

T1 A. S. Tanenbaum ―Computer Network: Second Ed. Prentice Hall, India (tan).

T2 B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

BOS APPROVED REFERENCE BOOKS:

R1 D. Berekas an R. Gallager, ―Data Networks: second Ed. Prentice Hall, India.

R2 D. E. Coner, ―Intertworking with TCP/IP‖ , Vol-I.Prentice Hall India.

R3 G. E. Keiser, ―Local Area Network‖ , Mc Graw Hill, International Ed.

R4 W. Stalling, ―Data & Computer Communications‖ , Maxwell Macmillan Internation Ed.

R5 http://web.mit.edu/dimitrib/www/datanets.html

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Programs to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Study of different types of network cables and practically implement the cross wired cable and straight through cable using crimping tool. • Study of Network devices in detail • Study of network IP	2	22-09-2021 & 25-09-2021		**TLM8/TLM5**	
2.	Understanding and using of commands like ipconfig,netstat, ping, ARP, Telnet, FTP, finger, tracert, whois etc	2	29-09-2021		**TLM8/TLM5**	
3.	Implement data link layer framing methods such as character stuffing and bit stuffing.	2	06-11-2021 09-11-2021		**TLM8/TLM5/TLM4**	
4.	Write a program for Hamming code generation for error detection and correction	2	20-11-2021 23-11-2021		**TLM8/TLM5/TLM4**	
5.	Implement the three CRC polynomials – CRC12, CRC16 and CRC CCIP on a data set	2	27-11-2021 30-11-2021		**TLM8/TLM5/TLM4**	

	of characters					
6.	Implementation of Dijkstra's algorithm to compute the shortest path of a graph.	2	03-11-2021 06-11-2021		**TLM8/TLM5**	
7.	Write a program for Distance vector Algorithm find suitable path for transmission.	2	10-11-2021 13-11-2021		**TLM8/TLM5**	
8.	Write a program for congestion control using leaky bucket algorithm.	2	17-11-2021 20-11-2021		**TLM8/TLM5**	
9.	RSA algorithm	2	08-12-2021 11-12-2021		**TLM8/TLM5**	
10.	DES Algorithm	2	15-12-2021 18-12-2021		**TLM8/TLM5**	
11.	**Lab-Internal-**	2	05-01-2022 08-01-2022			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	20-09-2021		
I Phase of Instructions	20-09-2021	06-11-2021	7W
I Mid Examinations	08-11-2021	13-11-2021	1W
II Phase of Instructions	15-11-2021	15-01-2022	7W
II Mid Examinations	17-01-2022	22-01-2022	1W
Preparation and Practical's	24-01-2022	29-01-2022	1W
Semester End Examinations	31-01-2022	12-02-2022	2W

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Internal Lab Exam-I	1,2,3	A1= 20
Internal Lab Exam-II	1,2,3	A2= 20
Day to Day Evaluation	1,2,3	B= 10
Record	1,2,3	C= 5
Attendance		D= 5
Evaluation of Internal Lab Exam Marks: A=(A1+A2)/2	1,2,3	A= 20
Cumulative Internal Examination: A+B+C	**1,2,3**	**A+B+C+D =40**
Semester End Examinations	**1,2,3**	**E=60**
Total Marks: A+B+C+D	**1,2,3**	**100**

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

K.Rajasekhar/J.Geetha Renuka	**Mr.K.Rajasekhar**	**Dr.K. AnuPriya**	**DrB. Srinivasa Rao**
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART – A

Name of Course Instructor : **Mr. K.SASI BHUSHAN**
Course Name & Code : **MICROPROCESSORS AND MICROCONTROLLERS** [17EC22]
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., IT., V-Sem., Sections- A A.Y : 2021-22

Pre-requisites: Digital Circuits, Computer organization

Course Educational Objectives: In this course student will learn about the Architecture of 8086 Microprocessor and 8051 Microcontroller and their Assembly Language Programming, interfacing Memory and Various Peripherals with 8086 Microprocessor/8051 Microcontroller and concepts of Interrupts and Serial Communication in reference to 8086

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

CO 1 : **Understand** the architecture and operation of 8086 µprocessor & 8051µcontroller
CO 2 : **Apply** the instructions of 8086/8051 for various applications.
CO 3 : **Analyze** the operation of peripherals and devices for interfacing applications.
CO4 : **Design** a 8086/8051 based system by interfacing memory, peripherals and I/O devices

COURSE ARTICULATION MATRIX:

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

Note: 1- Slight (Low), **2** – Moderate (Medium), **3 -** Substantial (High), no correlation **'-'**

BOS APPROVED TEXT BOOKS:

T1 Douglas V. Hall, "Micro Processors & Interfacing", TMH, 2007.
T2 A. K. Ray and K.M. Bhurchandi, Advanced Microprocessor And Peripherals,2nd Edition TMH Publishers.
T3 Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay "Microcontrollers and Embedded System", Pearson Education Publishers, 2nd Edition

BOS APPROVED REFERENCE BOOKS:

R1 Raj Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education Publishers.
R2 J. K. Uffenbeck, "The 8088 and 8086 Micro Processors", PHI, 4th Edition, 2003.
R3 Ajay Deshmukh, "Micro Controllers-Theory and Applications", Tata McGraw Hill Publishers.
R4 Kenneth J. Ayala, "The 8051 Micro Controller", Cengage Learning Publishers, 3rd Edition, 2000.

Prescribed Syllabus:

17EC22 - MICROPROCESSORS AND MICROCONTROLLERS

UNIT – I

Microprocessor Architecture: Introduction to Microprocessors-Purpose of a Microprocessor, different types of Microprocessors, their features and their comparison; 8086 Microprocessor-Architecture , Special functions of General purpose registers, 8086 flag register and function of 8086 Flags, Addressing modes of 8086.

Instruction Set: Instruction set of 8086, Assembly language programs involving logical, Branch and Call instructions, Sorting, Evaluation of Arithmetic Expressions, String manipulation, Assembler directives, simple programs, procedures and macros.

UNIT – II

8086 Memory and I/O Interfacing: Pin diagram of 8086, Minimum mode and maximum mode of operation, Timing diagram, Memory (Static RAM & EPROM) and I/O interfacing to 8086. Interrupt structure of 8086, Interrupt Vector table, Interrupt service routines.

UNIT – III

Peripherals and Devices: DMA Controller 8237, Interrupt Controller 8259 and Cascading, USART 8251 8255 PPI – various modes of operation, Keyboard, D/A and A/D converter interfacing.

UNIT – IV

Microcontroller: 8051 Microcontroller Architecture, Pin Diagram, Addressing modes, Instruction Set and Programs, 8051 Memory and I/O interfacing .

UNIT – V

8051 Interfacing: Modes of timer operation, Serial port operation, Interrupt structure of 8051, Interfacing of Seven segment Displays, Stepper Motor and Serial/Parallel Printer

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Microprocessor Architecture & Instruction Set

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Discussion of Syllabus, Course Outcomes and Introduction to µprocessors	1	21-09-2021			
2.	Types of µprocessors, features & comparison, µprocessor- Architecture	1	23-09-2021			
3.	General purpose registers , their special functions, Flag register and function of flags	1	25-09-2021			
4.	Addressing modes and Instruction set of 8086	1	28-09-2021			
5.	Assembler directives, Procedures and macros	1	30-09-2021			
6.	Assembly language programs involving logical, Branch and Call instructions.	1	05-10-2021			
7.	Assembly language programs for Sorting and Arithmetic Expressions	1	07-10-2021			
8.	String manipulation Instructions	1	09-10-2021			
9.	**Tutorial,/Assignment**	1	12-10-2021			

UNIT-II : 8086 Memory and I/O Interfacing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Pin diagram of 8086	1	16-10-2021			
11.	Minimum mode of operation	1	19-10-2021			
12.	Maximum mode of operation	1	21-10-2021			
13.	Timing diagrams	1	23-10-2021			
14.	Memory interfacing to 8086	1	26-10-2021			
15.	Static RAM , EPROM and I/O interfacing to 8086	1	28-10-2021			
16.	Interrupt structure of 8086	1	30-10-2021			
17.	Interrupt service routines and Interrupt Vector table	1	02-11-2021			
18.	**Tutorial,/Assignment**	1	06-11-2021			

UNIT-III : Peripherals and Devices

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	DMA Controller 8237	1	16-11-2021			
20.	Interrupt Controller 8259	1	18-11-2021			
21.	Cascading of 8259	1	20-11-2021			
22.	USART 8251	1	23-11-2021			
23.	8255 PPI Modes of operation	1	25-11-2021			
24.	Keyboard interfacing	1	27-11-2021			
25.	Digital to Analog Converter interfacing	1	30-11-2021			
26.	Analog to Digital Converter interfacing	1	02-12-2021			
27.	**Tutorial,/Assignment**	1	04-12-2021			

UNIT-IV : Microcontroller

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	8051 µcontroller Architecture	1	07-12-2021			
29.	8051Pin Diagram	1	09-12-2021			
30.	Addressing modes of µcontroller	1	11-12-2021			
31.	8051 Instruction Set	1	14-12-2021			
32.	8051 Programs	1	16-12-2021			
33.	8051 Memory interfacing	1	18-12-2021			
34.	8051 I/O interfacing	1	21-12-2021			
35.	**Tutorial,/Assignment**	1	23-12-2021			

UNIT-V : 8051 Interfacing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
36.	Modes of timer operation	1	28-12-2021			
37.	Serial port operation	1	30-12-2021			
38.	Interrupt structure of 8051	1	04-01-2022			
39.	Interfacing of Seven segment Displays	1	06-01-2022			
40.	Stepper Motor interfacing, Serial/Parallel Printer interfacing	1	08-01-2022			
41.	**Tutorial,/Assignment**	1	11-01-2022			

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

Academic Calendar: 2019 – 20 (IV Semester)

B.Tech VI Semester - 2017 Admitted Batch			
Class work Commence From		**20-09-2021**	
Description	**From**	**To**	**Weeks**
I Phase of Instructions	20-09-2021	05-11-2021	7 Weeks
I Mid Examinations	08-11-2021	13-11-2021	1 Week
II Phase Instructions	15-11-2021	15-01-2022	9 Weeks
II Mid Examinations	17-01-2022	22-01-2022	1 Week
Preparation & Practicals	24-01-2022	29-01-2022	1 Week
Semester End Examinations	31-01-2022	12-02-2022	2 Weeks

EVALUATION PROCESS:

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

CO 1	**Understand** the architecture and operation of 8086 µprocessor & 8051µcontroller	Describe, Explain, Paraphrase, Restate ,Associate, Contrast, Summarize, Differentiate, Interpret, Discuss
CO 2	**Apply** the instructions of 8086/8051 for various applications.	Calculate, Predict, Apply, Solve, Illustrate, Use, Demonstrate, Determine, Model, Experiment, Show, Examine, Modify
CO 3	Analyze the operation and interfacing of peripherals like memory and I/O devices to 8086/8051 for different applications.	Classify, Outline, Break down, Categorize, Analyze, Diagram, Illustrate, Infer, Select
CO 4	**Design** a 8086/8051 based system by interfacing memory, peripherals and I/O devices	Categorize, Analyze, Illustrate, Infer Select

PART – D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** 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
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
[Mr. K.SASI BHUSHAN]	[Mr. K.SASI BHUSHAN]	[Dr.P.Lachi Reddy]	[Dr.Y.Amar Babu]

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART – A

Name of Course Instructor : **Mr. K.SASI BHUSHAN**
Course Name & Code : **MICROPROCESSORS AND MICROCONTROLLERS** [17EC22]
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., IT., V-Sem., Sections- B A.Y : 2021-22

Pre-requisites: Digital Circuits, Computer organization

Course Educational Objectives: In this course student will learn about the Architecture of 8086 Microprocessor and 8051 Microcontroller and their Assembly Language Programming, interfacing Memory and Various Peripherals with 8086 Microprocessor/8051 Microcontroller and concepts of Interrupts and Serial Communication in reference to 8086

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

CO 1 : **Understand** the architecture and operation of 8086 µprocessor & 8051µcontroller
CO 2 : **Apply** the instructions of 8086/8051 for various applications.
CO 3 : **Analyze** the operation of peripherals and devices for interfacing applications.
CO4 : **Design** a 8086/8051 based system by interfacing memory, peripherals and I/O devices

COURSE ARTICULATION MATRIX:

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

Note: 1- Slight (Low), **2** – Moderate (Medium), **3 -** Substantial (High), no correlation **'-'**

BOS APPROVED TEXT BOOKS:

T1 Douglas V. Hall, "Micro Processors & Interfacing", TMH, 2007.
T2 A. K. Ray and K.M. Bhurchandi, Advanced Microprocessor And Peripherals,2nd Edition TMH Publishers.
T3 Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay "Microcontrollers and Embedded System", Pearson Education Publishers, 2nd Edition

BOS APPROVED REFERENCE BOOKS:

R1 Raj Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education Publishers.
R2 J. K. Uffenbeck, "The 8088 and 8086 Micro Processors", PHI, 4th Edition, 2003.
R3 Ajay Deshmukh, "Micro Controllers-Theory and Applications", Tata McGraw Hill Publishers.
R4 Kenneth J. Ayala, "The 8051 Micro Controller", Cengage Learning Publishers, 3rd Edition, 2000.

Prescribed Syllabus:

17EC22 - MICROPROCESSORS AND MICROCONTROLLERS

UNIT – I

Microprocessor Architecture: Introduction to Microprocessors-Purpose of a Microprocessor, different types of Microprocessors, their features and their comparison; 8086 Microprocessor-Architecture , Special functions of General purpose registers, 8086 flag register and function of 8086 Flags, Addressing modes of 8086.

Instruction Set: Instruction set of 8086, Assembly language programs involving logical, Branch and Call instructions, Sorting, Evaluation of Arithmetic Expressions, String manipulation, Assembler directives, simple programs, procedures and macros.

UNIT – II

8086 Memory and I/O Interfacing: Pin diagram of 8086, Minimum mode and maximum mode of operation, Timing diagram, Memory (Static RAM & EPROM) and I/O interfacing to 8086. Interrupt structure of 8086, Interrupt Vector table, Interrupt service routines.

UNIT – III

Peripherals and Devices: DMA Controller 8237, Interrupt Controller 8259 and Cascading, USART 8251 8255 PPI – various modes of operation, Keyboard, D/A and A/D converter interfacing.

UNIT – IV

Microcontroller: 8051 Microcontroller Architecture, Pin Diagram, Addressing modes, Instruction Set and Programs, 8051 Memory and I/O interfacing .

UNIT – V

8051 Interfacing: Modes of timer operation, Serial port operation, Interrupt structure of 8051, Interfacing of Seven segment Displays, Stepper Motor and Serial/Parallel Printer

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : Microprocessor Architecture & Instruction Set

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Discussion of Syllabus, Course Outcomes and Introduction to µprocessors	1	21-09-2021			
2.	Types of µprocessors, features & comparison, µprocessor- Architecture	1	23-09-2021			
3.	General purpose registers , their special functions, Flag register and function of flags	1	24-09-2021			
4.	Addressing modes and Instruction set of 8086	1	28-09-2021			
5.	Assembler directives, Procedures and macros	1	30-09-2021			
6.	Assembly language programs involving logical, Branch and Call instructions.	1	01-10-2021			
7.	Assembly language programs for Sorting and Arithmetic Expressions	1	05-10-2021			
8.	String manipulation Instructions	1	07-10-2021			
9.	**Tutorial,/Assignment**	1	08-10-2021			

UNIT-II : 8086 Memory and I/O Interfacing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Pin diagram of 8086	1	12-10-2021			
11.	Minimum mode of operation with Timing diagram.	1	21-10-2021			
12.	Maximum mode of operation with Timing diagram.	1	22-10-2021			
13.	Memory interfacing to 8086	1	26-10-2021			
14.	Static RAM , EPROM and I/O interfacing to 8086	1	28-10-2021			
15.	Interrupt structure of 8086	1	29-10-2021			
16.	Interrupt service routines and Interrupt Vector table	1	02-11-2021			
17.	**Tutorial,/Assignment**	1	05-11-2021			

UNIT-III : Peripherals and Devices

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	DMA Controller 8237	1	16-11-2021			
19.	Interrupt Controller 8259	1	18-11-2021			
20.	Cascading of 8259	1	19-11-2021			
21.	USART 8251	1	23-11-2021			
22.	8255 PPI Modes of operation	1	25-11-2021			
23.	Keyboard interfacing	1	26-11-2021			
24.	Digital to Analog Converter interfacing	1	30-11-2021			
25.	Analog to Digital Converter interfacing	1	02-12-2021			
26.	**Tutorial,/Assignment**	1	03-12-2021			

UNIT-IV : Microcontroller

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
27.	8051 µcontroller Architecture	1	07-12-2021			
28.	8051Pin Diagram	1	09-12-2021			
29.	Addressing modes of µcontroller	1	10-12-2021			
30.	8051 Instruction Set	1	14-12-2021			
31.	8051 Programs	1	16-12-2021			
32.	8051 Memory interfacing	1	17-12-2021			
33.	8051 I/O interfacing	1	21-12-2021			
34.	**Tutorial,/Assignment**	1	23-12-2021			

UNIT-V : 8051 Interfacing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Modes of timer operation	1	24-12-2021			
36.	Serial port operation	1	28-12-2021			
37.	Interrupt structure of 8051	1	30-12-2021			
38.	Interfacing of Seven segment Displays	1	31-12-2021			
39.	Stepper Motor interfacing,	1	04-01-2022			
40.	Serial/Parallel Printer interfacing	1	06-01-2022			
41.	**Tutorial,/Assignment**	1	07-01-2022			

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

Academic Calendar: 2019 – 20 (IV Semester)

B.Tech VI Semester - 2017 Admitted Batch			
Class work Commence From		**20-09-2021**	
Description	**From**	**To**	**Weeks**
I Phase of Instructions	20-09-2021	05-11-2021	7 Weeks
I Mid Examinations	08-11-2021	13-11-2021	1 Week
II Phase Instructions	15-11-2021	15-01-2022	9 Weeks
II Mid Examinations	17-01-2022	22-01-2022	1 Week
Preparation & Practicals	24-01-2022	29-01-2022	1 Week
Semester End Examinations	31-01-2022	12-02-2022	2 Weeks

EVALUATION PROCESS:

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

CO 1	**Understand** the architecture and operation of 8086 µprocessor & 8051µcontroller	Describe, Explain, Paraphrase, Restate ,Associate, Contrast, Summarize, Differentiate, Interpret, Discuss
CO 2	**Apply** the instructions of 8086/8051 for various applications.	Calculate, Predict, Apply, Solve, Illustrate, Use, Demonstrate, Determine, Model, Experiment, Show, Examine, Modify
CO 3	Analyze the operation and interfacing of peripherals like memory and I/O devices to 8086/8051 for different applications.	Classify, Outline, Break down, Categorize, Analyze, Diagram, Illustrate, Infer, Select
CO 4	**Design** a 8086/8051 based system by interfacing memory, peripherals and I/O devices	Categorize, Analyze, Illustrate, Infer Select

PART – D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** 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
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
[Mr. K.SASI BHUSHAN]	[Mr. K.SASI BHUSHAN]	[Dr.P.Lachi Reddy]	[Dr.Y.Amar Babu]

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART – A

Name of Course Instructor	: Mr. K. SASI BHUSHAN		
Course Name	: **MICROPROCESSORS AND MICROCONTROLLERS LAB**		
Course Code	: **17EC70**		
L-T-P Structure	: 0-2-0		Credits : 2
Program/Sem/Sec	: B.Tech., IT., V-Sem., Sections- A	A.Y	: 2021 - 22

Pre-requisites: Pulse and switching circuits lab

Course Educational Objectives: In this course, student will understand working of instructions by practicing programs of 8086 / 8051 and develop applications by interfacing devices.

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

CO 1 : **Demonstrate** program proficiency using the various instructions of the 8086 microprocessor / 8051 microcontroller.

CO 2 : **Apply** different programming techniques like loops, subroutines for various applications.

CO 3 : **Analyze** systems for different applications by interfacing external devices.

COURSE ARTICULATION MATRIX:

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

Note: 1- Slight (Low), **2** – Moderate (Medium), **3 -** Substantial (High), no correlation **'-'**

Prescribed Syllabus:

17EC70 - MICROPROCESSORS AND MICROCONTROLLERS LAB

LIST OF EXPERIMENTS

Part-1: 8086 programs:

1. Program to demonstrate data transfer operation
2. Program to demonstrate arithmetic operation
3. Program to demonstrate logical operation
4. Program to demonstrate shift operation
5. Program to demonstrate string operation
6. Program to demonstrate looping operation
7. Program to demonstrate decision making operations

PART-2: 8051 PROGRAMS:

8. Programs to demonstrate bit-manipulation operations.
9. Programs using Interrupts
10. Programming timer / counter.
11. Programming Serial communication application.
12. Program to demonstrate decision making operations
13. Program to demonstrate looping operations

PART-3: INTERFACING PROGRAMS (using 8086 & 8051 kits)

14. Interfacing ADC
15. Interfacing DAC .
16. Interfacing stepper motor.
17. Interfacing 7-segment display.
18. Interfacing keyboard.
19. Interfacing serial/parallel Printer.

PART-: INTERFACING PROGRAMS (using 8086 & 8051 kits or MASM Tool)

20. Interfacing Programs for content beyond the syllabus.

PART – B

LAB SCHEDULE (LESSON PLAN): Section-A

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-1					
1.	Program to demonstrate data transfer operation	2	20-09-2021		**TLM5&8**	
2.	Program to demonstrate arithmetic, logical and shift operations.	2	27-09-2021		**TLM5&8**	
3.	Program to demonstrate string operation.	2	04-10-2021		**TLM5&8**	
4.	Program to demonstrate looping operation.	2	11-10-2021		**TLM5&8**	
5.	Program to demonstrate decision making operations.	2	18-10-2021		**TLM5&8**	
	CYCLE-2					
6.	Programs to demonstrate bit-manipulation operations.	2	25-10-2021		**TLM5&8**	
7.	Programs using Interrupts.	2	01-11-2021		**TLM5&8**	
8.	Programming timer / counter.	2	15-11-2021		**TLM5&8**	
9.	Programming Serial communication application.	2	22-11-2021		**TLM5&8**	
10.	Program to demonstrate decision making & looping operations.	2	29-11-2021		**TLM5&8**	
	CYCLE-3					
11.	Interfacing ADC & DAC .	2	06-12-2021		**TLM5&8**	
12.	Interfacing stepper motor.	2	13-12-2021		**TLM5&8**	
13.	Interfacing 7-segment display & keyboard.	2	20-12-2021		**TLM5&8**	
14.	Interfacing serial/parallel Printer.	2	03-01-2022		**TLM5&8**	
15.	Interfacing Programs for content beyond the syllabus.	2	10-01-2022		**TLM5&8**	
16.	Internal Examination	2	17-01-2022		**TLM5&8**	
No. of classes required to complete:		32	No. of classes conducted:			

PART – B

LAB SCHEDULE (LESSON PLAN): Section-A

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-1					
1.	Program to demonstrate data transfer operation	2	24-09-2021		**TLM5&8**	
2.	Program to demonstrate arithmetic, logical and shift operations.	2	01-10-2021		**TLM5&8**	
3.	Program to demonstrate string operation.	2	08-10-2021		**TLM5&8**	
4.	Program to demonstrate looping operation.	2	22-10-2021		**TLM5&8**	
5.	Program to demonstrate decision making operations.	2	29-10-2021		**TLM5&8**	
	CYCLE-2					
6.	Programs to demonstrate bit-manipulation operations.	2	05-11-2021		**TLM5&8**	
7.	Programs using Interrupts.	2	12-11-2021		**TLM5&8**	
8.	Programming timer / counter.	2	19-11-2021		**TLM5&8**	
9.	Programming Serial communication application.	2	26-11-2021		**TLM5&8**	
10.	Program to demonstrate decision making & looping operations.	2	03-12-2021		**TLM5&8**	
	CYCLE-3					
11.	Interfacing ADC & DAC .	2	10-12-2021		**TLM5&8**	
12.	Interfacing stepper motor.	2	17-12-2021		**TLM5&8**	
13.	Interfacing 7-segment display & keyboard.	2	24-12-2021		**TLM5&8**	
14.	Interfacing serial/parallel Printer.	2	31-12-2021		**TLM5&8**	
15.	Interfacing Programs for content beyond the syllabus.	2	07-01-2022		**TLM5&8**	
16.	Internal Examination	2	21-01-2022		**TLM5&8**	
No. of classes required to complete:		32	No. of classes conducted:			

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

Academic Calendar: 2019 – 20 (VI Semester)

B.Tech VI Semester - 2017 Admitted Batch			
Class work Commence From		**20-09-2021**	
Description	**From**	**To**	**Weeks**
I Phase of Instructions	20-09-2021	05-11-2021	7 Weeks
I Mid Examinations	08-11-2021	13-11-2021	1 Week
II Phase Instructions	15-11-2021	15-01-2022	9 Weeks
II Mid Examinations	17-01-2022	22-01-2022	1 Week
Preparation & Practicals	24-01-2022	29-01-2022	1 Week
Semester End Examinations	31-01-2022	12-02-2022	2 Weeks

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Day to Day work	1,2,3,4	A1=20
Attendance (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		A2=5
Viva-Voce	1,2,3,4	A3=5
Internal Lab Examination	1,2,3,4	B=10
Total Internal Marks(A1+A2+A3+B)		**C=40**
Semester End Examinations	1,2,3,4	**D=60**
Total Marks: C+D	1,2,3,4	**100**

PART – D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** 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
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
[Mr. K.SASI BHUSHAN]	[Dr.P.Lachi Reddy]	[Dr.P.Lachi Reddy]	[Dr.Y.Amar Babu]

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART – A

Name of Course Instructor	: Mr. K. SASI BHUSHAN		
Course Name	: **MICROPROCESSORS AND MICROCONTROLLERS LAB**		
Course Code	: **17EC70**		
L-T-P Structure	: 0-2-0		Credits : 2
Program/Sem/Sec	: B.Tech., IT., V-Sem., Sections- B	A.Y	: 2019-20

Pre-requisites: Pulse and switching circuits lab

Course Educational Objectives: In this course, student will understand working of instructions by practicing programs of 8086 / 8051 and develop applications by interfacing devices.

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

CO 1 : **Demonstrate** program proficiency using the various instructions of the 8086 microprocessor / 8051 microcontroller.

CO 2 : **Apply** different programming techniques like loops, subroutines for various applications.

CO 3 : **Analyze** systems for different applications by interfacing external devices.

COURSE ARTICULATION MATRIX:

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

Note: 1- Slight (Low), **2** – Moderate (Medium), **3 -** Substantial (High), no correlation **'-'**

Prescribed Syllabus:

17EC70 - MICROPROCESSORS AND MICROCONTROLLERS LAB

LIST OF EXPERIMENTS

Part-1: 8086 programs:

1. Program to demonstrate data transfer operation
2. Program to demonstrate arithmetic operation
3. Program to demonstrate logical operation
4. Program to demonstrate shift operation
5. Program to demonstrate string operation
6. Program to demonstrate looping operation
7. Program to demonstrate decision making operations

PART-2: 8051 PROGRAMS:

8. Programs to demonstrate bit-manipulation operations.
9. Programs using Interrupts
10. Programming timer / counter.
11. Programming Serial communication application.
12. Program to demonstrate decision making operations
13. Program to demonstrate looping operations

PART-3: INTERFACING PROGRAMS (using 8086 & 8051 kits)

14. Interfacing ADC
15. Interfacing DAC .
16. Interfacing stepper motor.
17. Interfacing 7-segment display.
18. Interfacing keyboard.
19. Interfacing serial/parallel Printer.

PART-: INTERFACING PROGRAMS (using 8086 & 8051 kits or MASM Tool)

20. Interfacing Programs for content beyond the syllabus.

PART – B

LAB SCHEDULE (LESSON PLAN): Section-C

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-1					
1.	Program to demonstrate data transfer operation	2	22-09-2021		**TLM5&8**	
2.	Program to demonstrate arithmetic, logical and shift operations.	2	29-09-2021		**TLM5&8**	
3.	Program to demonstrate string operation.	2	06-10-2021		**TLM5&8**	
4.	Program to demonstrate looping operation.	2	20-10-2021		**TLM5&8**	
5.	Program to demonstrate decision making operations.	2	27-10-2021		**TLM5&8**	
	CYCLE-2					
6.	Programs to demonstrate bit-manipulation operations.	2	03-11-2021		**TLM5&8**	
7.	Programs using Interrupts.	2	10-11-2021		**TLM5&8**	
8.	Programming timer / counter.	2	17-11-2021		**TLM5&8**	
9.	Programming Serial communication application.	2	24-11-2021		**TLM5&8**	
10.	Program to demonstrate decision making & looping operations.	2	01-12-2021		**TLM5&8**	
	CYCLE-3					
11.	Interfacing ADC & DAC .	2	08-12-2021		**TLM5&8**	
12.	Interfacing stepper motor.	2	15-12-2021		**TLM5&8**	
13.	Interfacing 7-segment display & keyboard.	2	22-12-2021		**TLM5&8**	
14.	Interfacing serial/parallel Printer.	2	29-12-2021		**TLM5&8**	
15.	Interfacing Programs for content beyond the syllabus.	2	05-01-2022		**TLM5&8**	
16.	Internal Examination	2	20-01-2022		**TLM5&8**	
No. of classes required to complete:		32	No. of classes conducted:			

PART – B

LAB SCHEDULE (LESSON PLAN): Section-C

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	CYCLE-1					
1.	Program to demonstrate data transfer operation	2	26-09-2021		**TLM5&8**	
2.	Program to demonstrate arithmetic, logical and shift operations.	2	03-10-2021		**TLM5&8**	
3.	Program to demonstrate string operation.	2	10-10-2021		**TLM5&8**	
4.	Program to demonstrate looping operation.	2	24-10-2021		**TLM5&8**	
5.	Program to demonstrate decision making operations.	2	31-10-2021		**TLM5&8**	
	CYCLE-2					
6.	Programs to demonstrate bit-manipulation operations.	2	07-11-2021		**TLM5&8**	
7.	Programs using Interrupts.	2	14-11-2021		**TLM5&8**	
8.	Programming timer / counter.	2	21-11-2021		**TLM5&8**	
9.	Programming Serial communication application.	2	28-11-2021		**TLM5&8**	
10.	Program to demonstrate decision making & looping operations.	2	05-12-2021		**TLM5&8**	
	CYCLE-3					
11.	Interfacing ADC & DAC .	2	12-12-2021		**TLM5&8**	
12.	Interfacing stepper motor.	2	19-12-2021		**TLM5&8**	
13.	Interfacing 7-segment display & keyboard.	2	26-12-2021		**TLM5&8**	
14.	Interfacing serial/parallel Printer.	2	02-01-2022		**TLM5&8**	
15.	Interfacing Programs for content beyond the syllabus.	2	09-01-2022		**TLM5&8**	
16.	Internal Examination	2	23-01-2022		**TLM5&8**	
No. of classes required to complete:		32	No. of classes conducted:			

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

Academic Calendar: 2019 – 20 (VI Semester)

B.Tech VI Semester - 2017 Admitted Batch			
Class work Commence From		**20-09-2021**	
Description	**From**	**To**	**Weeks**
I Phase of Instructions	20-09-2021	05-11-2021	7 Weeks
I Mid Examinations	08-11-2021	13-11-2021	1 Week
II Phase Instructions	15-11-2021	15-01-2022	9 Weeks
II Mid Examinations	17-01-2022	22-01-2022	1 Week
Preparation & Practicals	24-01-2022	29-01-2022	1 Week
Semester End Examinations	31-01-2022	12-02-2022	2 Weeks

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Day to Day work	1,2,3,4	A1=20
Attendance (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		A2=5
Viva-Voce	1,2,3,4	A3=5
Internal Lab Examination	1,2,3,4	B=10
Total Internal Marks(A1+A2+A3+B)		**C=40**
Semester End Examinations	1,2,3,4	**D=60**
Total Marks: C+D	1,2,3,4	**100**

PART – D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	**VLSI and Embedded Systems:** 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
PSO 3:	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
[Mr. K.SASI BHUSHAN]	[Dr.P.Lachi Reddy]	[Dr.P.Lachi Reddy]	[Dr.Y.Amar Babu]