LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' GRADE & NBA (Under Tier - I), ISO 9001:2015 Certified
Institution Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs. M. Hemalatha
Course Name & Code **:** Discrete Mathematics & Graph Theory & 23FE11
L-T-P Structure **: 3-0-0** **Credits:** 3
Program/Sem/Sec : IT-B.Tech/III/A **A.Y.:** 2025-26
Regulations : R23

PREREQUISITE: Mathematics courses of first year of study.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

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

CO1	Construct mathematical arguments using logical connectives and quantifiers and verify them. (Apply- L3)
CO2	Demonstrate the basic terminology of functions, relations, lattices and their operations. (Understand -L2)
CO3	Illustrate the basic principles/techniques to solve different combinatorial problems and linear recurrence relations.(Apply- L3)
CO4	Demonstrate the different types of graphs.(Understand -L2)
CO5	Apply the properties of graphs to solve the graph theory problems in computer science.(Apply- L3)

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

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

TEXTBOOKS:

T1 Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.

T2 Elements of Discrete Mathematics-A Computer Oriented Approach, C. L.Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.

T3 Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill

REFERENCE BOOKS:

R1	Discrete Mathematics for Computer Scientists and Mathematicians, J. L.Mott, A. Kandel and T. P. Baker, 2nd Edition, Prentice Hall of India.
R2	Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby and Sharon Cutler Ross, PHI.
R3	Discrete Mathematics, S. K. Chakraborty and B.K. Sarkar, Oxford, 2011.
R4	Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: MATHEMATICAL LOGIC

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to course, outcomes	1	30-06-2025			
2.	Propositional Calculus: Statements and Notations, Connectives	1	01-07-2025		TLM1	
3.	Well Formed Formulas, Truth Tables	1	03-07-2025		TLM1	
4.	Tutorial on : Statements and Notations, Connectives, Truth Tables	1	05-07-2025		TLM3	
5.	Tautologies, Equivalence of Formulas, Duality Law	1	07-07-2025		TLM1	
6.	Tautological Implications, Normal Forms,	1	08-07-2025		TLM1	
7.	Theory of Inference for Statement Calculus, Consistency of Premises,	1	10-07-2025		TLM1	
8.	Tutorial on : Theory of Inference for Statement Calculus, Consistency of Premises	1	14-07-2025		TLM3	
9.	Indirect Method of Proof, Predicate Calculus: Predicates	1	15-07-2025		TLM1	
10.	Predicative Logic, Statement Functions	1	17-07-2025		TLM1	
11.	Variables and Quantifiers	1	19-07-2025		TLM1	
12.	Tutorial on : Predicates, Predicative Logic, Statement Functions,	1	21-07-2025		TLM3	
13.	Free and Bound Variables	1	22-07-2025		TLM1	
14.	Inference Theory for Predicate Calculus	2	24-07-2025		TLM1	
15.	Tutorial on Unit 1	1	26-07-2025		TLM3	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: SET THEORY

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Sets: Operations on Sets	1	28-07-2025		TLM1	
17.	Principle of Inclusion-Exclusion	1	29-07-2025		TLM1	
18.	Relations: Properties, Operations	1	31-07-2025		TLM1	
19.	Tutorial on Practice the sets and Relations Problems	1	02-08-2025		TLM3	
20.	Partition and Covering,	1	04-08-2025		TLM1	
21.	Transitive Closure, Equivalence,	1	05-08-2025		TLM1	
22.	Compatibility and Partial Ordering, Hasse Diagrams	1	07-08-2025		TLM1	
23.	Tutorial on Transitive Closure, Equivalence, Hasse Diagrams	1	11-08-2025		TLM3	
24.	Functions: Bijective, Composition, Inverse,	1	12-08-2025		TLM1	
25.	Permutation, and Recursive Functions,	1	14-08-2025		TLM1	
26.	Tutorial on Functions& Recursive Functions	1	16-08-2025		TLM3	
27.	Lattice and its Properties	1	18-08-2025		TLM1	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: COMBINATORICS AND RECURRENCE RELATIONS:

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.	Basis of Counting, Permutations, Permutations with Repetitions	1	01-09-2025		TLM1	
29.	Circular and Restricted Permutations, Combinations,	1	02-09-2025		TLM1	
30.	Tutorial on Permutations, Combinations,	1	04-09-2025		TLM3	
31.	Restricted Combinations	1	06-09-2025		TLM1	
32.	Binomial and Multinomial Coefficients and Theorems.	1	08-09-2025		TLM1	
33.	Tutorial on Binomial and Multinomial Coefficients and Theorems.	1	09-09-2025		TLM3	
34.	Recurrence Relations: Generating Functions, Function of Sequences,	1	11-09-2025		TLM1	
35.	Partial Fractions, Calculating Coefficient of Generating Functions	1	15-09-2025		TLM1	
36.	Recurrence Relations, Formulation as Recurrence Relations	1	16-09-2025		TLM1	
37.	Tutorial on Partial Fractions, Recurrence Relations	1	18-09-2025		TLM3	
38.	Solving Recurrence Relations by Substitution and Generating Functions	1	20-09-2025		TLM1	
39.	Method of Characteristic Roots, Solving Inhomogeneous Recurrence	2	22-09-2025		TLM1	

	Relations					
40.	Tutorial on UNIT III	1	23-09-2025		TLM3	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Graph Theory:

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.	Basic Concepts, Graph Theory and its Applications	1	25-09-2025		TLM1	
42.	Subgraphs, Graph Representations: Adjacency and Incidence Matrices	2	27-09-2025		TLM1	
43.	Isomorphic Graphs,	1	29-09-2025		TLM1	
44.	Paths and Circuits	1	04-10-2025		TLM1	
45.	Tutorial on Graphs	1	06-10-2025		TLM3	
46.	Eulerian and Hamiltonian Graphs,	1	07-10-2025		TLM1	
No. of classes required to complete UNIT-IV: 7				**No. of classes taken:**		

UNIT-V: Multi Graphs

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
47.	Multigraphs,	1	09-10-2025		TLM1	
48.	Bipartite and Planar Graphs	1	13-10-2025		TLM1	
49.	Tutorial on Bipartite and Planar Graphs	1	14-10-2025		TLM3	
50.	Euler's Theorem	1	16-10-2025		TLM1	
51.	Graph Coloring	1	18-10-2025		TLM1	
52.	Covering	1	20-10-2025		TLM1	
53.	Tutorial on Graph Coloring, Euler Theorem	1	23-10-2025		TLM3	
54.	Chromatic Number	1	25-10-2025		TLM1	
55.	Spanning Trees, Prim's and Kruskal's Algorithms	1	27-10-2025		TLM1	
56.	BFS Spanning Trees.	1	28-10-2025		TLM1	
57.	Tutorial on UNIT V	1	30-10-2025		TLM3	
58.	DFS Spanning Trees	1	01-11-2025		TLM1	
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Pigeon Hole Principle	1	13-09-2025		**TLM1**	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Signature				
Name of the Faculty	**Mrs M.Hemalatha**	**Mr. TNVS Praveen**	**Mr. G. Rajendra**	**Dr D.Ratnakishore**

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COURSE HANDOUT

PART-A

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- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

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CO2	Demonstrate the basic terminology of functions, relations, lattices and their operations. (Understand -L2)
CO3	Illustrate the basic principles/techniques to solve different combinatorial problems and linear recurrence relations.(Apply- L3)
CO4	Demonstrate the different types of graphs.(Understand -L2)
CO5	Apply the properties of graphs to solve the graph theory problems in computer science.(Apply- L3)

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

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

TEXTBOOKS:

T1 Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.

T2 Elements of Discrete Mathematics-A Computer Oriented Approach, C. L.Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.

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R2	Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby and Sharon Cutler Ross, PHI.
R3	Discrete Mathematics, S. K. Chakraborty and B.K. Sarkar, Oxford, 2011.
R4	Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: MATHEMATICAL LOGIC

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to course, outcomes	1	30-06-2025			
2.	Propositional Calculus: Statements and Notations, Connectives	1	01-07-2025		TLM1	
3.	Well Formed Formulas, Truth Tables	1	03-07-2025		TLM1	
4.	Tutorial on : Statements and Notations, Connectives, Truth Tables	1	04-07-2025		TLM3	
5.	Tautologies, Equivalence of Formulas, Duality Law	1	07-07-2025		TLM1	
6.	Tautological Implications, Normal Forms,	1	08-07-2025		TLM1	
7.	Theory of Inference for Statement Calculus, Consistency of Premises,	1	10-07-2025		TLM1	
8.	Tutorial on : Theory of Inference for Statement Calculus, Consistency of Premises	1	11-07-2025		TLM3	
9.	Indirect Method of Proof, Predicate Calculus: Predicates	1	14-07-2025		TLM1	
10.	Predicative Logic, Statement Functions	1	17-07-2025		TLM1	
11.	Variables and Quantifiers	1	18-07-2025		TLM1	
12.	Tutorial on : Predicates, Predicative Logic, Statement Functions,	1	21-07-2025		TLM3	
13.	Free and Bound Variables	1	22-07-2025		TLM1	
14.	Inference Theory for Predicate Calculus	2	24-07-2025		TLM1	
15.	Tutorial on Unit 1	1	25-07-2025		TLM3	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: SET THEORY

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Sets: Operations on Sets	1	28-07-2025		TLM1	
17.	Principle of Inclusion-Exclusion	1	29-07-2025		TLM1	
18.	Relations: Properties, Operations	1	31-07-2025		TLM1	
19.	Tutorial on Practice the sets and Relations Problems	1	01-08-2025		TLM3	
20.	Partition and Covering,	1	04-08-2025		TLM1	
21.	Transitive Closure, Equivalence,	1	05-08-2025		TLM1	
22.	Compatibility and Partial Ordering, Hasse Diagrams	1	07-08-2025		TLM1	
23.	Tutorial on Transitive Closure, Equivalence, Hasse Diagrams	1	08-08-2025		TLM3	
24.	Functions: Bijective, Composition, Inverse,	1	11-08-2025		TLM1	
25.	Permutation, and Recursive Functions,	1	12-08-2025		TLM1	
26.	Tutorial on Functions& Recursive Functions	1	14-08-2025		TLM3	
27.	Lattice and its Properties	1	18-08-2025		TLM1	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: COMBINATORICS AND RECURRENCE RELATIONS:

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.	Basis of Counting, Permutations, Permutations with Repetitions	1	01-09-2025		TLM1	
29.	Circular and Restricted Permutations, Combinations,	1	02-09-2025		TLM1	
30.	Tutorial on Permutations, Combinations,	1	04-09-2025		TLM3	
31.	Restricted Combinations	1	08-09-2025		TLM1	
32.	Binomial and Multinomial Coefficients and Theorems.	1	09-09-2025		TLM1	
33.	Tutorial on Binomial and Multinomial Coefficients and Theorems.	1	11-09-2025		TLM3	
34.	Recurrence Relations: Generating Functions, Function of Sequences,	1	12-09-2025		TLM1	
35.	Partial Fractions, Calculating Coefficient of Generating Functions	1	15-09-2025		TLM1	
36.	Recurrence Relations, Formulation as Recurrence Relations	1	16-09-2025		TLM1	
37.	Tutorial on Partial Fractions, Recurrence Relations	1	18-09-2025		TLM3	
38.	Solving Recurrence Relations by Substitution and Generating Functions	1	19-09-2025		TLM1	
39.	Method of Characteristic Roots, Solving Inhomogeneous Recurrence	2	22-09-2025		TLM1	

	Relations					
40.	Tutorial on UNIT III	1	23-09-2025		TLM3	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Graph Theory:

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.	Basic Concepts, Graph Theory and its Applications	1	25-09-2025		TLM1	
42.	Subgraphs, Graph Representations: Adjacency and Incidence Matrices	2	26-09-2025		TLM1	
43.	Isomorphic Graphs,	1	29-09-2025		TLM1	
44.	Paths and Circuits	1	03-10-2025		TLM1	
45.	Tutorial on Graphs	1	06-10-2025		TLM3	
46.	Eulerian and Hamiltonian Graphs,	1	07-10-2025		TLM1	
No. of classes required to complete UNIT-IV: 7				**No. of classes taken:**		

UNIT-V: Multi Graphs

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
47.	Multigraphs,	1	09-10-2025		TLM1	
48.	Bipartite and Planar Graphs	1	13-10-2025		TLM1	
49.	Tutorial on Bipartite and Planar Graphs	1	14-10-2025		TLM3	
50.	Euler's Theorem	1	16-10-2025		TLM1	
51.	Graph Coloring	1	17-10-2025		TLM1	
52.	Covering	1	20-10-2025		TLM1	
53.	Tutorial on Graph Coloring, Euler Theorem	1	23-10-2025		TLM3	
54.	Chromatic Number	1	24-10-2025		TLM1	
55.	Spanning Trees, Prim's and Kruskal's Algorithms	1	27-10-2025		TLM1	
56.	BFS Spanning Trees.	1	28-10-2025		TLM1	
57.	Tutorial on UNIT V	1	30-10-2025		TLM3	
58.	DFS Spanning Trees	1	31-11-2025		TLM1	
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Pigeon Hole Principle	1	13-09-2025		**TLM1**	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Signature				
Name of the Faculty	**Mrs M.Hemalatha**	**Mr. TNVS Praveen**	**Mr. G. Rajendra**	**Dr D.Ratnakishore**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: *Dr.B.SRINIVASA RAO*
Course Name : *UHV- II: Understanding Harmony and Ethical Human Conduct*
Course Code : *23HS01* **Credits:** *3* **L-T-P Structure:** *3-0-0*
Program/Sem/Sec *: B.Tech/III Semester – IT Section- A* **A.Y.** : *2025-26*

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To become more aware of themselves and their surroundings (family, society, nature); they would become more responsible in life and in handling problems with sustainable solutions while keeping human relationships and human nature in mind.

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

CO1: Describe the terms like Natural Acceptance, Happiness and Prosperity (L2)
CO2: Identify one's self, and one's surroundings (family, society nature) (L2)
CO3: Relate human values with human relationship and human society. (L2)
CO4: Illustrate the need for universal human values and harmonious existence (L2)
CO5: Develop as socially and ecologically responsible engineers (L3)

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

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

TEXTBOOKS:

T1 R R Gaur, r singal, G P Bagaria, "Human values and Professional Ethics", Excel Books, New Delhi,2010

REFERENCE BOOKS:

R1 Jeevan vidya: Ek Parichaya, A.Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999
R2 Human values, A N Tripathi, New Age Publishers, New Delhi, 2004
R3 The story of my experiments with Truth, Mohandas Karamchand Gandhi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Value Education

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	30-06-2025		TLM2	
2.	Process for self exploration: Natural Acceptance	1	03-07-2025		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	2	04-07-2025 05-07-2025		TLM2	
4.	Understanding Value Education	1	07-07-2025		TLM2	
5.	self-exploration as the Process for Value Education	1	10-07-2025		TLM2	
6.	Continuous Happiness and Prosperity	2	11-07-2025 14-07-2025		TLM2	
7.	Happiness and Prosperity	1	17-07-2025		TLM2	
8.	Method to Fulfill the Basic Human Aspirations	1	18-07-2025		TLM2	
9.	Tutorial	1	19-07-2025		TLM2	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Harmony in the Human Being

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.	Understanding Human being as the Co-existence of the self and the body	1	21-07-2025	1-08-24	TLM2	
11.	Distinguishing between the Needs of the self and the body	2	24-07-2025 25-07-2025	02-08-24	TLM2	
12.	The body as an Instrument of the self	1	28-07-2025	03-8-24	TLM2	
13.	Understanding Harmony in the self	2	29-07-2025	6-08-24	TLM2	
14.	Harmony of the self with the body	1	30-07-2025	08-08-24	TLM2	
15.	Programme to ensure self-regulation and Health	1	23-07-2025	09-8-24	TLM2	
16.	Tutorial - 1	1	25-07-2025	13-8-24	TLM2	
17.	Tutorial -2	1	25-07-2025	16-8-24	TLM1	

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

UNIT III: Harmony in the Family and Society

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.	Harmony in the Family	2	28-07-2025 31-07-2025		TLM2	
19.	'Trust' – the Foundational Value in Relationship	1	31-07-2025		TLM2	
20.	Practice Session PS7 Exploring the Feeling of Trust	1	01-08-2025		TLM2	
21.	'Respect' – as the Right Evaluation	1	01-08-2025		TLM1	
22.	Practice Session PS8 Exploring the Feeling of Respect	2	02-08-2025 04-08-2025		TLM2	
23.	Other Feelings, Justice in Human-to-Human Relationship	1	07-08-2025		TLM2	
24.	Understanding Harmony in the Society	2	08-08-2025 11-08-2025		TLM2	
25.	Vision for the Universal Human Order	1	14-08-2025		TLM2	
No. of classes required to complete UNIT-III: 11				No. of classes taken:		

UNIT-IV: Harmony in the Nature/Existence

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Understanding Harmony in the Nature	2	18-08-2025 21-08-2025		TLM2	
27.	Interconnectedness, self-regulation	1	22-08-2025		TLM2	
28.	Mutual Fulfilment among the Four Orders of Nature	1	22-08-2025		TLM2	
29.	Realizing Existence as Co-existence at All Levels	2	22-08-2025 23-08-2025		TLM2	
30.	The Holistic Perception of Harmony in Existence	2	01-09-2025 04-08-2025		TLM2	
31.	Tutorial -1	2	05-08-2025 06-08-2025		TLM2	
No. of classes required to complete UNIT-IV: 10				No. of classes taken:		

UNIT-V: Implications of the Holistic Understanding

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

32.	Natural acceptance of human values	1	08-09-2025		TLM2	
33.	Definitiveness of ethical human conduct	1	11-09-2025		TLM2	
34.	Basis for humanistic education	1	12-09-2025		TLM2	
35.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human	2	13-09-2025 15-09-2025 18-09-2025		TLM2	
36.	Competence in professional ethics	1	19-09-2025		TLM2	
37.	Strategy for transition from the present state to universal human order	1	20-09-2025		TLM2	
38.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	22-09-2025		TLM2	
No. of classes required to complete UNIT-V: 8				**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 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

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

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.

ACADEMIC CALENDAR: A.Y 2024-25

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2 W**

Signature				
Name of the	**Dr. B. SRINIVASA RAO**	**Dr. B. SRINIVASA RAO**	**Dr. B. SRINIVASA RAO**	**Dr.D.RATHNA KISHORE**

Faculty				
Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: *T. KARUNA LATHA*
Course Name : *UHV- II: Understanding Harmony and Ethical Human Conduct*
Course Code : *23HS01* **Credits:** *3* **L-T-P Structure:** *3-0-0*
Program/Sem/Sec : *B.Tech/III Semester – IT Section- B* **A.Y.** : *2025-26*

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To become more aware of themselves and their surroundings (family, society, nature); they would become more responsible in life and in handling problems with sustainable solutions while keeping human relationships and human nature in mind.

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

CO1: Describe the terms like Natural Acceptance, Happiness and Prosperity (L2)
CO2: Identify one's self, and one's surroundings (family, society nature) (L2)
CO3: Relate human values with human relationship and human society. (L2)
CO4: Illustrate the need for universal human values and harmonious existence (L2)
CO5: Develop as socially and ecologically responsible engineers (L3)

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

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

TEXTBOOKS:

T1 R R Gaur, r singal, G P Bagaria, "Human values and Professional Ethics", Excel Books, New Delhi,2010

REFERENCE BOOKS:

R1 Jeevan vidya: Ek Parichaya, A.Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999
R2 Human values, A N Tripathi, New Age Publishers, New Delhi, 2004
R3 The story of my experiments with Truth, Mohandas Karamchand Gandhi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Value Education

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	01-07-2025		TLM2	
2.	Process for self exploration: Natural Acceptance	1	02-07-2025		TLM.2	
3.	Right Understanding, Relationship and Physical Facility	2	04-07-2025 05-07-2025		TLM2	
4.	Understanding Value Education	1	08-07-2025		TLM2	
5.	self-exploration as the Process for Value Education	1	09-07-2025		TLM2	
6.	Continuous Happiness and Prosperity	2	11-07-2025 12-07-2025		TLM2	
7.	Happiness and Prosperity	1	15-07-2025		TLM2	
8.	Method to Fulfill the Basic Human Aspirations	1	15-07-2025		TLM2	
9.	Tutorial	1	16-07-2025		TLM2	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Harmony in the Human Being

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.	Understanding Human being as the Co-existence of the self and the body	1	18-07-2025	1-08-24	TLM2	
11.	Distinguishing between the Needs of the self and the body	2	18-07-2025 19-07-2025	02-08-24	TLM2	
12.	The body as an Instrument of the self	1	19-07-2025	03-8-24	TLM2	
13.	Understanding Harmony in the self	2	22-07-2025	6-08-24	TLM2	
14.	Harmony of the self with the body	1	23-07-2025	08-08-24	TLM2	
15.	Programme to ensure self-regulation and Health	1	23-07-2025	09-8-24	TLM2	
16.	Tutorial - 1	1	25-07-2025	13-8-24	TLM2	
17.	Tutorial -2	1	25-07-2025	16-8-24	TLM1	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT III: Harmony in the Family and Society

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.	Harmony in the Family	2	29-07-2025 30-07-2025		TLM2	
19.	'Trust' – the Foundational Value in Relationship	1	30-07-2025		TLM2	
20.	Practice Session PS7 Exploring the Feeling of Trust	1	01-08-2025		TLM2	
21.	'Respect' – as the Right Evaluation	1	01-08-2025		TLM1	
22.	Practice Session PS8 Exploring the Feeling of Respect	2	02-08-2025 05-08-2025		TLM2	
23.	Other Feelings, Justice in Human-to-Human Relationship	1	05-08-2025		TLM2	
24.	Understanding Harmony in the Society	2	05-08-2025		TLM2	
25.	Vision for the Universal Human Order	1	06-08-2025		TLM2	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: Harmony in the Nature/Existence

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Understanding Harmony in the Nature	2	06-08-2025 08-08-2025		TLM2	
27.	Interconnectedness, self-regulation	1	09-08-2025		TLM2	
28.	Mutual Fulfilment among the Four Orders of Nature	1	09-08-2025		TLM2	
29.	Realizing Existence as Co-existence at All Levels	2	12-08-2025 13-08-2025		TLM2	
30.	The Holistic Perception of Harmony in Existence	2	19-08-2025 20-08-2025		TLM2	
31.	Tutorial -1	2	22-08-2025 23-08-2025		TLM2	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Implications of the Holistic Understanding

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Natural acceptance of human values	1	01-09-2025		TLM2	

33.	Definitiveness of ethical human conduct	1	02-09-2025		TLM2	
34.	Basis for humanistic education	1	02-09-2025		TLM2	
35.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human	2	03-09-2025 05-09-2025 06-09-2025		TLM2	
36.	Competence in professional ethics	1	09-09-2025		TLM2	
37.	Strategy for transition from the present state to universal human order	1	09-09-2025		TLM2	
38.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	12-09-2025		TLM2	
No. of classes required to complete UNIT-V: 8				**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 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex

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

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.

ACADEMIC CALENDAR: A.Y 2024-25

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2 W**

Signature				
Name of the Faculty	**T.KARUNA ATHA**	**Dr. B. SRINIVASA RAO**	**Dr. B. SRINIVASA RAO**	**Dr.D.RATHNA KISHORE**

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department

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http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. G. RAJENDRA
Course Name & Code : Digital Logic &Computer Organization & 23IT01
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : II B.Tech., III-Sem, A-Sec **A.Y.: 2025-26**

Prerequisites:

Course Objectives: The main objectives of the course

1. Provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals.
2. Describe memory hierarchy concepts.
3. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices.

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

CO1	Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical forms for digital logic circuit design. **(Understand- L2)**
CO2	Design Sequential logic circuits and understand basic functional blocks a computer system. **(Apply- L3)**
CO3	Understand computer architecture and Data representation to perform computer arithmetic operations and processor organization. **(Understand- L2)**
CO4	Analyze the memory hierarchy in a computer system. **(Understand- L2)**
CO5	Understand the I/O operations and the interfaces **(Understand-L2)**

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

CO	Program Outcomes (POs)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	1	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	1	1

Textbooks:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.
3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.

Reference Books:

1. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson
2. Computer Organization and Design, David A. Paterson, John L.Hennessy, Elsevier
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Number systems, Logic gates and Boolean algebra

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to course Cos, POs and PSOs	1	30-06-2025		TLM1	
2.	Introduction to DLD, Number systems	1	02-07-2025		TLM2	
3.	Different Number systems	1	03-07-2025		TLM2	
4.	Conversions of one number to another number	1	05-07-2025		TLM2, TLM4.	
5.	Data Representations	1	07-07-2025		TLM2	
6.	**TUTORIAL-1**	1	09-07-2025		TLM3	
7.	Binary codes	1	10-07-2025		TLM2	
8.	Basic Logic gates and Universal gates	1	14-07-2025		TLM2, TLM4.	
9.	Boolean Logic functions	1	16-07-2025		TLM2	
10.	K-Maps Simplifications	1	17-07-2025		TLM2, TLM5.	
11.	Combinational circuits	1	19-07-2025		TLM2	
12.	Designing Decoder and Multiplexers	1	21-07-2025		TLM2	
13.	Assignment / Quiz	1	23-07-2025		TLM6	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II: Combinational Logic Circuits and Sequential Logic Circuits

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Introduction to sequential circuits,	1	24-07-2025		TLM2	
15.	Flip-flops (RS, JK, T, D),	2	28-07-2025		TLM2, TLM6	
16.	Master slave flip-flop	1	30-07-2025		TLM1, TLM2	
17.	Conversion of flip-flops, Truth & excitation tables	2	31-07-2025		TLM1, TLM2.	
18.	**TUTORIAL-2**	1	02-08-2025		TLM3	
19.	Registers	1	04-08-2025		TLM2	
20.	counters	1	06-08-2025		TLM1, TLM2	
21.	Basic structure of computer	1	07-08-2025		TLM2	
22.	Bus structure	1	09-08-2025		TLM2	
23.	Multi processors and multi computers	1	11-08-2025		TLM2	
24.	Computer generations	1	13-08-2025		TLM2	
25.	Von- Neumann Architecture	1	14-08-2025		TLM2	
26.	Assignment / Quiz	1	18-08-2025		TLM6	
No. of classes required to complete UNIT-II: 15				**No. of classes taken:**		

I-MID EXAMINATIONS **25-08-2025 TO 30-08-2025**

UNIT-III: Functional Blocks of a Computer & Data 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
27.	Signed Number representation	1	20-08-2025		TLM2	
28.	Addition and Subtraction of Signed Numbers	1	21-08-2025		TLM2	
29.	Design of Fast Adders	1	23-08-2025		TLM2, TLM4.	
30.	Multiplication of Positive Numbers	1	01-09-2025		TLM2	
31.	Signed-operand Multiplication	1	03-09-2025		TLM2	
32.	**TUTORIAL-3**	1	04-09-2025		TLM3	
33.	Fast Multiplication	1	06-09-2025		TLM2	
34.	Integer Division,	1	08-09-2025		TLM2	
35.	Floating-Point Numbers and Operations	1	10-09-2025		TLM2	
36.	Processor Organization of Fundamental Concepts	1	11-09-2025		TLM2	
37.	Execution of a Complete Instruction	1	13-09-2025		TLM2	
38.	Multiple-Bus Organization	1	15-09-2025		TLM2	
39.	Hardwired Control	1	17-09-2025		TLM2	
40.	Micro programmed Control	1	18-09-2025		TLM2	
41.	Assignment / Quiz	1	20-09-2025		TLM6	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

UNIT-IV: CPU Control design & Parallel Processors

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Memory organization	1	22-09-2025		TLM2	
43.	Semiconductor RAM Memories	1	24-09-2025		TLM2	
44.	Concept of memory hierarchical organization	1	25-09-2025		TLM2	
45.	Read-Only Memories, Speed, Size and Cost	1	27-09-2025		TLM2	
46.	**TUTORIAL-4**	1	04-10-2025		TLM3	
47.	Cache memory	1	06-10-2025		TLM2	
48.	Virtual Memories	1	08-10-2025		TLM2	
49.	Memory Management Requirements, Secondary Storage	1	09-10-2025		TLM2	
50.	Assignment / Quiz	1	11-10-2025		TLM6	
No. of classes required to complete UNIT-IV: 09				**No. of classes taken:**		

UNIT-V: Memory system design & Peripheral devices and their characteristics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Input/Output Organization: Accessing I/O Devices	1	13-10-2025		TLM2	
52.	Interrupts	1	15-10-2025		TLM2	
53.	Processor Examples	1	16-10-2025		TLM2	
54.	Interface Circuits	1	18-10-2025		TLM2	
55.	Peripheral devices –I/O sub-systems	1	20-10-2025		TLM2	
56.	**TUTORIAL-5**	1	22-10-2025		TLM3	
57.	I/O device interface, I/O transfers-program controlled	1	23-10-2025		TLM2	
58.	Interrupt driven, DMA.	1	25-10-2025		TLM2	
59.	Assignment / Quiz	1	27-10-2025		TLM6	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

II-MID EXAMINATIONS **03-11-2025 TO 08-11-2025**

CONTENT BEYOND THE SYLLABUS:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Pipeline Processing	2	29-10-2025 30-10-2025		TLM2	
2.	Multicore Processors	1	01-11-2025		TLM2	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	**30-06-2025**		
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1W**
II Phase of Instructions	01-09-2025	01-11-2022	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1W**
Preparation and Practical's	10-11-2025	15-11-2025	1W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2W**

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. G. Rajendra	Dr. J. Nageswara Rao	Mr. G. Rajendra	Dr. D. Ratna Kishore
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. G. RAJENDRA
Course Name & Code : Digital Logic &Computer Organization & 20IT01
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : II B.Tech., III-Sem, B-Sec **A.Y.: 2025-26**

Prerequisites:

Course Objectives: The main objectives of the course

1. Provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals.
2. Describe memory hierarchy concepts.
3. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices.

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

CO1	Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical forms for digital logic circuit design. **(Understand- L2)**
CO2	Design Sequential logic circuits and understand basic functional blocks a computer system. **(Apply- L3)**
CO3	Understand computer architecture and Data representation to perform computer arithmetic operations and processor organization. **(Understand- L2)**
CO4	Analyze the memory hierarchy in a computer system. **(Understand- L2)**
CO5	Understand the I/O operations and the interfaces **(Understand-L2)**

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

CO	Program Outcomes (POs)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	1	1	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	1	1

Textbooks:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.
3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.

Reference Books:

1. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson
2. Computer Organization and Design, David A. Paterson, John L.Hennessy, Elsevier
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Number systems, Logic gates and Boolean algebra

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to course Cos, POs and PSOs	1	30-06-2025		TLM1	
2.	Introduction to DLD, Number systems	1	02-07-2025		TLM2	
3.	Different Number systems	1	04-07-2025		TLM2	
4.	Conversions of one number to another number	1	05-07-2025		TLM2	
5.	Data Representations	1	07-07-2025		TLM2	
6.	**TUTORIAL-1**	1	09-07-2025		TLM3	
7.	Binary codes	1	11-07-2025		TLM2	
8.	Basic Logic gates and Universal gates	1	12-07-2025		TLM2, TLM4.	
9.	Boolean Logic functions	1	14-07-2025		TLM2	
10.	K-Maps Simplifications	2	16-07-2025		TLM2	
11.	Combinational circuits	1	18-07-2025		TLM2	
12.	Designing Decoder and Multiplexers	1	19-07-2025		TLM2	
13.	Assignment / Quiz	1	21-07-2025		TLM6.	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Combinational Logic Circuits and Sequential Logic Circuits

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Introduction to sequential circuits,	1	23-07-2025		TLM2	
15.	Flip-flops(RS,JK,T,D),	2	25-07-2025 28-07-2025		TLM2, TLM6	
16.	Master slave flip-flop	1	30-07-2025		TLM1, TLM2	
17.	Conversion of flip-flops, Truth & excitation tables	2	01-08-2025 02-08-2025		TLM1, TLM2.	
18.	**TUTORIAL-2**	1	04-08-2025		TLM3	
19.	Registers	1	06-08-2025		TLM2	
20.	counters	1	08-08-2025		TLM1, TLM2	
21.	Basic structure of computer	1	11-08-2025		TLM2	
22.	Bus structure	1	13-08-2025		TLM2	
23.	Multi processors and multi computers	1	18-08-2025		TLM2	
24.	Computer generations	1	20-08-2025		TLM2	
25.	Von- Neumann Architecture	1	22-08-2025		TLM2	
26.	Assignment / Quiz	1	23-08-2025		TLM3, TLM6.	
No. of classes required to complete UNIT-II: 15				**No. of classes taken:**		

I-MID EXAMINATIONS **25-08-2025 TO 30-08-2025**

UNIT-III: Functional Blocks of a Computer & Data 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
27.	Signed Number representation	1	01-09-2025		TLM2	
28.	Addition and Subtraction of Signed Numbers	1	03-09-2025		TLM2	
29.	Design of Fast Adders	1	05-09-2025		TLM2, TLM4.	
30.	Multiplication of Positive Numbers	1	06-09-2025		TLM2	
31.	Signed-operand Multiplication	1	08-09-2025		TLM2	
32.	**TUTORIAL-3**	1	10-09-2025		TLM3	
33.	Fast Multiplication	1	12-09-2025		TLM2	
34.	Integer Division,	1	13-09-2025		TLM2	
35.	Floating-Point Numbers and Operations	1	15-09-2025		TLM2	
36.	Processor Organization of Fundamental Concepts	1	17-09-2025		TLM2	
37.	Execution of a Complete Instruction	1	19-09-2025		TLM2	
38.	Multiple-Bus Organization	1	20-09-2025		TLM2	
39.	Hardwired Control	1	22-09-2025		TLM2	
40.	Micro programmed Control	1	24-09-2025		TLM2	
41.	Assignment / Quiz	1	26-09-2025		TLM6	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

UNIT-IV: CPU Control design & Parallel Processors

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Memory organization	1	27-09-2025		TLM2	
43.	Semiconductor RAM Memories	1	04-10-2025		TLM2	
44.	Concept of memory hierarchical organization	1	06-10-2025		TLM2	
45.	Read-Only Memories, Speed, Size and Cost	1	08-10-2025		TLM2	
46.	**TUTORIAL-4**	1	10-10-2025		TLM3	
47.	Cache memory	1	11-10-2025		TLM2	
48.	Virtual Memories	1	13-10-2025		TLM2	
49.	Memory Management Requirements, Secondary Storage	1	15-10-2025		TLM2	
50.	Assignment / Quiz / **Tutorial -8**	1	17-10-2025		TLM6	
No. of classes required to complete UNIT-IV: 09				**No. of classes taken:**		

UNIT-V: Memory system design & Peripheral devices and their characteristics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Input/Output Organization: Accessing I/O Devices	1	18-10-2025		TLM2	
52.	Interrupts	1	20-10-2025		TLM2	
53.	Processor Examples, Interface Circuits	1	22-10-2025		TLM2	
54.	Peripheral devices –I/O sub-systems	1	24-10-2025		TLM2	
55.	**TUTORIAL-5**	1	25-10-2025		TLM3	
56.	I/O device interface	1	27-10-2025		TLM2	
57.	I/O transfers-program controlled, Interrupt driven, DMA.	1	29-10-2025		TLM2	
58.	Assignment / Quiz	1	31-10-2025		TLM6	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

II-MID EXAMINATIONS **03-11-2025 TO 08-11-2025**

CONTENT BEYOND THE SYLLABUS:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Pipeline Processing	1	31-10-2025		TLM2	
2.	Multicore Processors	1	01-11-2025		TLM2	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	**30-06-2025**		
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1W**
II Phase of Instructions	01-09-2025	01-11-2022	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1W**
Preparation and Practical's	10-11-2025	15-11-2025	1W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2W**

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.G.Rajendra	Dr. J. Nageswara Rao	Mr. G. Rajendra	Dr. D. Ratna Kishore

Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr D Ratna Kishore

Course Name & Code : ADVANCED DATA STRUCTURES & ALGOTITHM ANALYSIS, 23CS04
L-T-P Structure : **3-0-0** **Credits:** 03
Program/Sem/Sec : B.Tech-IT / III SEM / A **A.Y.:** 2025-26

PREREQUISITE : **Data Structures**

COURSE EDUCATIONAL OBJECTIVES (CEO):

The main objectives of the course are to

1. Provide knowledge on advance data structures frequently used in Computer Science domain
2. Develop skills in algorithm design techniques popularly used
3. Understand the use of various data structures in the algorithm design

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

CO1	Identify the characteristics of an algorithm, analyze its time and space complexity and construct balanced binary trees. **(Apply-L3)**
CO2	Understand Heap structures and graph terminology to perform various operations on non-linear data structures. **(Understand-L2)**
CO3	Apply Divide and Conquer, Greedy algorithm and dynamic programming for solving problems. **(Apply - L3)**
CO4	Analyze the backtracking and branch-and-bound search methods on optimization problems **(Apply - L3)**
CO5	Summarize the importance of NP-Hard and its applications. **(Understand-L2)**

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

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

TEXTBOOKS:

T1 Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2ndEdition Universities Press

T2 Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press

REFERENCE BOOKS:

R1 Data Structures and program design in C, Robert Kruse, Pearson Education Asia
R2 An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill
R3 The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
R4 Data Structures using C & C++: Langsam, Augenstein &Tanenbaum, Pearson, 1995 Algorithms + Data Structures & Programs: N.Wirth, PHI
R5 Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.
R6 Data structures in Java: Thomas Standish, Pearson Education Asia

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction, AVL Tree, B-Tree

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and CO discussion	1	30-06-2025		TLM1&2	
2.	Introduction to Algorithm-Characteristics	1	01-07-2025		TLM1&2	
3.	Pseudo code specifications-Sample Algorithm	2	02-07-2025 04-07-2025		TLM1&2	
4.	Algorithm Analysis- Time and Space Complexity - Examples	2	05-07-2025 07-07-2025		TLM1&2	
5.	Problems on finding space & time complexity of algorithms	1	08-07-2025		TLM1&2	
6.	Asymptotic Notations	2	9-07-2025 11-07-2025		TLM1&2	
7.	AVL Tree Operations	2	14-07-2025 15-07-2025		TLM1&2	
8.	**Tutorial:** AVL Tree operations	1	16-07-2025		TLM3	
9.	B-Tree operations	2	18-07-2025 19-07-2025		TLM1&2	
10.	Revision on Unit-1	1	21-07-2025			
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: Heap Tress, Graphs, Divide and Conquer

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.	Heap Trees (Priority Queue) - Introduction	1	22-07-2025		TLM1&2	
2.	Max Heap, Min Heap Construction-operations	1	23-07-2025		TLM1&2	
3.	Problems on Heap Tree Construction	1	25-07-2025		TLM1&2	
4.	Implementation of Heap Tree	1	28-07-2025		TLM1&2	
5.	Graph Terminology	1	29-07-2025		TLM1&2	
6.	Representations of Graphs	1	30-07-2025		TLM1&2	

7.	Basic Search and Traversal Techniques – DFS	1	01-08-2025		TLM1&2	
8.	Problems on DFS traversal	1	02-08-2025		TLM1&2	
9.	BFS – Example, Implementation	1	04-08-2025		TLM1&2	
10.	Connected Components, Bi-connected Components	2	05-08-2025 06-08-2025		TLM1&2	
11.	Examples of Connected Components	1	08-08-2025		TLM1&2	
12.	Divide and Conquer General Method	1	11-08-2025		TLM1&2	
13.	Finding Max and Min	1	12-08-2025		TLM1&2	
14.	Merge Sort	1	13-08-2025		TLM1&2	
15.	Quick sort	1	18-08-2025		TLM1&2	
16.	**Group Discussion:** Merge Sort & Quick Sort Analysis	2	19-08-2025 20-08-2025		TLM6	
17.	Strassen' Matrix Multiplication	1	22-08-2025		TLM1&2	
18.	Revision on Unit-2	1	23-08-2025			
No. of classes required to complete UNIT-II: 20				**No. of classes taken:**		
I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)						

UNIT-III: Greedy Method

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Greedy Method	1	01-09-2025		TLM1&2	
2.	Job Sequencing with dead Lines	1	02-09-2025		TLM1&2	
3.	Knapsack Problem	2	03-09-2025 05-09-2025		TLM1&2	
4.	Minimum Cost Spanning Tree-Kruskal Algorithm	1	06-09-2025		TLM1&2	
5.	Problems on different knapsack problem instances	2	08-09-2025 09-09-2025		TLM1,2	
6.	Prims Algorithm	1	10-09-2025		TLM1,2	
7.	Single Source Shortest Path	1	12-09-2025		TLM1,2	
8.	Optimal Storage on tapes	1	15-09-2025		TLM1,2	
9.	**Tutorial:** Analysis of Prims & Kruskal's algorithm	1	16-09-2025		TLM3	
10.	Huffman Coding	1	17-09-2025		TLM1&2	
11.	Revision on Unit-3	1	19-09-2025			
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Dynamic Programming

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Dynamic Programming	1	20-09-2025		TLM1&2	
2.	All pairs shortest path	1	22-09-2025		TLM1&2	
3.	Bellman Ford Algorithm	1	23-09-2025		TLM1&2	
4.	0/1 knapsack problem	2	24-09-2025 26-09-2025		TLM1&2	
5.	Optimal binary search tree	2	27-09-2025 29-09-2025		TLM1&2	
6.	String editing	1	01-10-2025		TLM1&2	
7.	**Tutorial:** Analysis of OBST	1	03-10-2025		TLM3	
8.	Travelling salesperson problem	2	04-10-2025 06-10-2025		TLM1&2	
9.	Revision on Unit-4	1	07-10-2025			
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Back tracking & Branch and bound

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Backtracking Introduction	1	08-10-2025		TLM1&2	
2.	N-queens Problem	2	10-10-2025		TLM1&2	
3.	Graph Coloring	1	13-10-2025		TLM1&2	
4.	Sum of subsets problem	1	14-10-2025		TLM1&2	
5.	Introduction to Branch and Bound	1	15-10-2025		TLM1&2	
6.	0/1 Knapsack-LCBB, FIFOBB	1	17-10-2025		TLM1&2	
7.	**Tutorial:** Least Cost BB	1	18-10-2025		TLM3	
8.	Travelling Salesperson Problem -LC Search	2	20-10-2025 22-10-2025		TLM1&2	
9.	Introduction to P and NP	1	24-10-2025		TLM1&2	
10.	NP-Complete Problems	1	25-10-2025		TLM1&2	
11.	Revision on Unit-5	1	31-10-2025			
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

Content Beyond Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text book followed	HOD Sign Weekly
1.	Np-Hard Problems	1	01-11-2025		TLM1&2			
No. of classes required to complete - 1					No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

Teaching Learning Methods

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

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2 W**

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	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	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. D. Ratna Kishore**	**Dr. S. Nagarjuna Reddy**	**Mr. G. Rajendra**	**Dr. D. Ratna Kishore**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. M. Rajesh Reddy

Course Name & Code : ADVANCED DATA STRUCTURES & ALGOTITHM ANALYSIS, 23CS04
L-T-P Structure : **3-0-0** **Credits:** 03
Program/Sem/Sec : B.Tech-IT / III SEM / B **A.Y.:** 2025-26

PREREQUISITE : **Data Structures**

COURSE EDUCATIONAL OBJECTIVES (CEO):

The main objectives of the course are to

1. Provide knowledge on advance data structures frequently used in Computer Science domain
2. Develop skills in algorithm design techniques popularly used
3. Understand the use of various data structures in the algorithm design

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

CO1	Identify the characteristics of an algorithm, analyze its time and space complexity and construct balanced binary trees. **(Apply-L3)**
CO2	Understand Heap structures and graph terminology to perform various operations on non-linear data structures. **(Understand-L2)**
CO3	Apply Divide and Conquer, Greedy algorithm and dynamic programming for solving problems. **(Apply - L3)**
CO4	Analyze the backtracking and branch-and-bound search methods on optimization problems **(Apply - L3)**
CO5	Summarize the importance of NP-Hard and its applications. **(Understand-L2)**

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

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

TEXTBOOKS:

T1 Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2ndEdition Universities Press

T2 Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press

REFERENCE BOOKS:

R1 Data Structures and program design in C, Robert Kruse, Pearson Education Asia
R2 An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill
R3 The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
R4 Data Structures using C & C++: Langsam, Augenstein &Tanenbaum, Pearson, 1995 Algorithms + Data Structures & Programs: N.Wirth, PHI
R5 Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.
R6 Data structures in Java: Thomas Standish, Pearson Education Asia

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction, AVL Tree, B-Tree

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and CO discussion	1	30-06-2025		TLM1&2	
2.	Introduction to Algorithm-Characteristics	1	02-07-2025		TLM1&2	
3.	Pseudo code specifications-Sample Algorithm	2	03-07-2025 04-07-2025		TLM1&2	
4.	Algorithm Analysis- Time and Space Complexity - Examples	2	05-07-2025 07-07-2025		TLM1&2	
5.	Problems on finding space & time complexity of algorithms	1	09-07-2025		TLM1&2	
6.	Asymptotic Notations	2	10-07-2025 11-07-2025		TLM1&2	
7.	AVL Tree Operations	2	14-07-2025 16-07-2025		TLM1&2	
8.	**Tutorial:** AVL Tree operations	1	17-07-2025		TLM3	
9.	B-Tree operations	2	18-07-2025 19-07-2025		TLM1&2	
10.	Revision on Unit-1	1	21-07-2025			
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: Heap Tress, Graphs, Divide and Conquer

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.	Heap Trees (Priority Queue) - Introduction	1	23-07-2025		TLM1&2	
2.	Max Heap, Min Heap Construction-operations	1	24-07-2025		TLM1&2	
3.	Problems on Heap Tree Construction	1	25-07-2025		TLM1&2	
4.	Implementation of Heap Tree	1	28-07-2025		TLM1&2	
5.	Graph Terminology	1	30-07-2025		TLM1&2	
6.	Representations of Graphs	1	31-07-2025		TLM1&2	

7.	Basic Search and Traversal Techniques – DFS	1	01-08-2025		TLM1&2	
8.	Problems on DFS traversal	1	02-08-2025		TLM1&2	
9.	BFS – Example, Implementation	1	04-08-2025		TLM1&2	
10.	Connected Components, Bi-connected Components	2	06-08-2025 07-08-2025		TLM1&2	
11.	Examples of Connected Components	1	08-08-2025		TLM1&2	
12.	Divide and Conquer General Method	1	11-08-2025		TLM1&2	
13.	Finding Max and Min	1	13-08-2025		TLM1&2	
14.	Merge Sort	1	14-08-2025		TLM1&2	
15.	Quick sort	1	18-08-2025		TLM1&2	
16.	**Tutorial:** Merge Sort & Quick Sort Analysis	2	20-08-2025 21-08-2025		TLM3	
17.	Strassen' Matrix Multiplication	1	22-08-2025		TLM1&2	
18.	Revision on Unit-2	1	23-08-2025			
No. of classes required to complete UNIT-II: 20				**No. of classes taken:**		
I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)						

UNIT-III: Greedy Method

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Greedy Method	1	01-09-2025		TLM1&2	
2.	Job Sequencing with dead Lines	1	03-09-2025		TLM1&2	
3.	Knapsack Problem	2	04-09-2025 05-09-2025		TLM1&2	
4.	Minimum Cost Spanning Tree-Kruskal Algorithm	1	06-09-2025		TLM1&2	
5.	Problems on different knapsack problem instances	2	08-09-2025 10-09-2025		TLM1,2	
6.	Prims Algorithm	1	11-09-2025		TLM1,2	
7.	Single Source Shortest Path	1	12-09-2025		TLM1,2	
8.	Optimal Storage on tapes	1	15-09-2025		TLM1,2	
9.	**Tutorial:** Analysis of Prims & Kruskal's algorithm	1	17-09-2025		TLM3	
10.	Huffman Coding	1	18-09-2025		TLM1&2	
11.	Revision on Unit-3	1	19-09-2025			
No. of classes required to complete UNIT-III: 13				**No. of classes taken:**		

UNIT-IV: Dynamic Programming

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Dynamic Programming	1	20-09-2025		TLM1&2	
2.	All pairs shortest path	1	22-09-2025		TLM1&2	
3.	Bellman Ford Algorithm	1	24-09-2025		TLM1&2	
4.	0/1 knapsack problem	2	25-09-2025 26-09-2025		TLM1&2	
5.	Optimal binary search tree	2	26-09-2025 06-10-2025		TLM1&2	
6.	String editing	1	08-10-2025		TLM1&2	
7.	**Tutorial:** Analysis of OBST	1	09-10-2025		TLM3	
8.	Travelling salesperson problem	2	10-10-2025 13-10-2025		TLM1&2	
9.	Revision on Unit-4	1	15-10-2025			
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Back tracking & Branch and bound

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Backtracking Introduction	1	16-10-2025		TLM1&2	
2.	N-queens Problem	2	17-10-2025		TLM1&2	
3.	Graph Coloring	1	18-10-2025		TLM1&2	
4.	Sum of subsets problem	1	20-10-2025		TLM1&2	
5.	Introduction to Branch and Bound	1	22-10-2025		TLM1&2	
6.	0/1 Knapsack-LCBB, FIFOBB	1	23-10-2025		TLM1&2	
7.	**Tutorial:** Least Cost BB	1	24-10-2025		TLM3	
8.	Travelling Salesperson Problem -LC Search	2	25-10-2025 27-10-2025		TLM1&2	
9.	Introduction to P and NP	1	29-10-2025		TLM1&2	
10.	NP-Complete Problems	1	30-10-2025		TLM1&2	
11.	Revision on Unit-5	1	31-11-2025			
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

Content Beyond Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text book followed	HOD Sign Weekly
1.	Np-Hard Problems	1	01-11-2025		TLM1&2			
No. of classes required to complete - 1					No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

Teaching Learning Methods

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

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2 W**

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	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	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**M. Rajesh Reddy**	**Dr. S. Nagarjuna Reddy**	**Mr. G. Rajendra**	**Dr. D. Ratna Kishore**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. M. Rajesh Reddy
Course Name & Code : OBJECT ORIENTED PROGRAMMING THROUGH JAVA, 23CS05
L-T-P Structure : **3-0-0** **Credits:** 03
Program/Sem/Sec : B.Tech-IT / III SEM / A
A.Y. : 2025-26

PREREQUISITE : **Introduction to Programming**

COURSE EDUCATIONAL OBJECTIVES (CEO):

The main objectives of the course is to:

1. Identify Java language components and how they work together in applications
2. Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
3. Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
4. Understand how to design applications with threads in Java
5. Understand how to use Java APIs for program development

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

CO1	Identify the syntax and semantics of java programming language and basic concepts of Java. **(Understand-L2)**
CO2	Understand the basic concepts of object-oriented programming **(Understand-L2)**
CO3	Develop reusable programs using the concepts of inheritance, polymorphism, and interfaces. **(Apply-L3)**
CO4	Apply the concepts of packages, exception handling & I/O streams to develop secure, error free, and efficient applications **(Apply-L3)**
CO5	Design multithreaded and GUI based applications which mimic the real word scenarios. **(Apply-L3)**

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

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

TEXTBOOKS:

T1 JAVA one step ahead, Anitha Seth, B. L. Juneja, Oxford.

T2 Joy with JAVA, Fundamentals of Object-Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.

T3 JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

REFERENCE BOOKS:

R1 The complete Reference Java, 11thedition, Herbert Schildt, TMH

R2 Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Object Oriented Programming, Data Types, Variables, Introduction to Operators and Control Statements

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and CO discussion	1	30-06-2025		TLM1&2	
2.	Basic concepts, Principles	2	01-07-2025 02-07-2025		TLM1&2	
3.	Program Structure in Java	2	04-07-2025 05-07-2025		TLM1&2	
4.	Command Line Arguments, User Input to Programs	2	07-07-2025 08-07-2025		TLM1&2	
5.	Data Types, Variables	2	09-07-2025 11-07-2025		TLM1&2	
6.	Static Variables and Methods, Attribute Final	2	14-07-2025 15-07-2025		TLM1&2	
7.	Introduction to Operators	1	16-07-2025		TLM1&2	
8.	Control Statements	1	18-07-2025		TLM1&2	
9.	**Tutorial:** Application Programs on Control statements	1	19-07-2025		TLM3	
10.	Revision on Unit-1	1	21-07-2025			
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: Classes and Objects, Constructors and Methods and String Handling in Java

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.	Classes and Objects	1	22-07-2025		TLM1&2	
2.	Class Declaration and Modifiers, Class Members	1	23-07-2025		TLM1&2	
3.	Declaration of Class Objects, Assigning One Object to Another	1	25-07-2025		TLM1&2	
4.	Access Control for Class Members, Accessing Private Members of Class	2	28-07-2025 29-07-2025		TLM1&2	
5.	Constructors and Methods Introduction ,Defining Methods, Constructor Methods for Class ,Overloaded Constructor Methods	2	30-07-2025 01-08-2025		TLM1&2	

6.	Overloaded Methods, Nested Classes	2	02-08-2025 04-08-2025		TLM1&2	
7.	Passing Arguments by Value and by Reference, Keyword this	2	05-08-2025 06-08-2025		TLM1&2	
8.	Class Objects as Parameters in Methods, Access Control	1	08-08-2025		TLM1&2	
9.	Recursive Methods, Nesting of Methods, Attributes Final and Static	2	11-08-2025 12-07-2025		TLM1&2	
10.	**Tutorial:** Application Programs on Classes and Objects	1	13-08-2025		TLM3	
11.	String Handling in Java, String class	2	18-08-2025 19-08-2025		TLM1&2	
12.	StringTokenizer, StringBuffer classes	2	20-08-2025 22-08-2025		TLM1&2	
13.	Revision on Unit-2	1	23-08-2025			
No. of classes required to complete UNIT-II: 20				**No. of classes taken:**		
I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)						

UNIT-III: Arrays, Inheritance and Interfaces

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays	1	01-09-2025		TLM1&2	
2.	Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size	1	02-09-2025		TLM1&2	
3.	Sorting & Searching values in Arrays	2	03-09-2025 05-09-2025		TLM1&2	
4.	Class Arrays, Two & Three-Dimensional Arrays and Vectors	1	06-09-2025		TLM1&2	
5.	Introduction, Relationship between classes- Has-a, Is-a, Process of Inheritance, Types of Inheritances	1	08-09-2025		TLM1,2	
6.	Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance	1	09-09-2025		TLM1,2	
7.	Application of Keyword Super, Constructor Method and Inheritance	1	10-09-2025		TLM1,2	
8.	Method Overriding, Dynamic Method Dispatch, Abstract Classes	2	12-09-2025 15-09-2025		TLM1&2	
9.	Interface: Introduction, Declaration of Interface, Implementation of Interface,	1	16-09-2025		TLM1&2	

	Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces,					
10.	Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.	1	17-09-2025		TLM1&2	
11.	**Tutorial:** Application Programs on Inheritance and Interfaces	1	19-09-2025		TLM3	
12.	Revision on Unit-3	1	20-09-2025			
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Packages and Java Library, Exception Handling and Java I/O, File

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.	Packages: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path	1	22-09-2025		TLM1&2	
2.	Access Control, Packages in Java SE- Java. Lang Package and its Classes, Class Object, Enumeration, class Math	2	23-09-2025 24-09-2025		TLM1&2	
3.	Wrapper Classes, Auto-boxing and Auto-unboxing	1	26-09-2025		TLM1&2	
4.	java.util Classes and Interfaces: Formatter Class, Random Class, Time Package, Formatting for Date/Time in Java, Temporal Adjusters Class	2	27-09-2025 06-10-2025		TLM1&2	
5.	Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords try, catch, throw, throws, and finally Blocks	1	07-10-2025		TLM1&2	
6.	Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions, Generating user defined exception	1	08-10-2025		TLM1&2	
7.	**Tutorial:** Application Programs on Exception Handling	1	10-10-2025		TLM3	
8.	Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java	1	13-10-2025		TLM1&2	
9.	Revision on Unit-4	1	14-10-2025			
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: Multithreaded Programming, Java Collections and Java FX GUI

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.	Multithreaded Programming: Introduction, Need for Multiple Threads., Multithreaded Programming for Multi-core Processor, Thread Class	1	15-10-2025		TLM1&2	
2.	Thread life cycle, naming, priories of the threads, states	1	17-10-2025		TLM1&2	
3.	Synchronization & Inter-thread communication-producer consumer problem.	1	18-10-2025 20-10-2025		TLM1&2	
4.	Java Collections: Introduction, Purpose of Collection Framework, Hierarchy of collection Interfaces / classes, Methods defined in Collection Interface	1	20-10-2025		TLM1&2	
5.	Methods defined in Collection Interface, Interface Iterator	1	22-10-2025		TLM1&2	
6.	Collection classes / Interfaces –List, Set, Map.	1	24-10-2025		TLM1&2	
7.	Java FX, Overview of AWT & Swings API	1	25-10-2025		TLM1&2	
8.	Event handling	1	27-10-2025		TLM1&2	
9.	Java FX Scene Builder, Java FX App Window Structure, displaying text and image,	1	28-10-2025		TLM1&2	
10.	Laying out nodes in scene graph, mouse events	1	29-10-2025		TLM1&2	
11.	Revision on Unit-5	1	31-10-2025			
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

Content Beyond Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text book followed	HOD Sign Weekly
1.	Generic Programming-Introduction	1	01-11-2025		TLM1&2			
No. of classes required to complete - 1					No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

Teaching Learning Methods

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

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2 W**

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor	: **Dr. B. SRINIVASA RAO**		
Course Name & Code	: **OBJECT ORIENTED PROGRAMMING THROUGH JAVA, 23CS05**		
L-T-P Structure	: **3-0-0**	Credits	: **03**
Program/Sem/Sec	: **B.Tech-IT / III SEM / B**	A.Y.	: **2025-26**
Prerequisite	**: INTRODUCTION TO PROGRAMMING**		

COURSE EDUCATIONAL OBJECTIVES (CEO): The main objectives of the course is to:

1. Identify Java language components and how they work together in applications
2. Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
3. Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
4. Understand how to design applications with threads in Java
5. Understand how to use Java APIs for program development

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

CO1	Identify the syntax and semantics of java programming language and basic concepts of Java. **(Understand-L2)**
CO2	Understand the basic concepts of object-oriented programming **(Understand-L2)**
CO3	Develop reusable programs using the concepts of inheritance, polymorphism, and interfaces. **(Apply-L3)**
CO4	Apply the concepts of packages, exception handling & I/O streams to develop secure, error free, and efficient applications **(Apply-L3)**
CO5	Design multithreaded and GUI based applications which mimic the real word scenarios. **(Apply-L3)**

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

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

TEXTBOOKS:

T1 JAVA one step ahead, Anitha Seth, B. L. Juneja, Oxford.

T2 Joy with JAVA, Fundamentals of Object-Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.

T3 JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

REFERENCE BOOKS:

R1 The complete Reference Java, 11thedition, Herbert Schildt, TMH

R2 Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Object Oriented Programming, Data Types, Variables, Introduction to Operators and Control Statements

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and CO discussion	1	01-07-2025		TLM1&2	
2.	Basic concepts, Principles	2	02-07-2025 03-07-2025		TLM1&2	
3.	Program Structure in Java	2	04-07-2025 05-07-2025		TLM1&2	
4.	Command Line Arguments, User Input to Programs	2	08-07-2025 09-07-2025		TLM1&2	
5.	Data Types, Variables	2	10-07-2025 11-07-2025		TLM1&2	
6.	Static Variables and Methods, Attribute Final	2	15-07-2025 16-07-2025		TLM1&2	
7.	Introduction to Operators	1	17-07-2025		TLM1&2	
8.	Control Statements	1	18-07-2025		TLM1&2	
9.	**Tutorial:** Application Programs on Control statements	1	19-07-2025		TLM3	
10.	Revision on Unit-1	1	22-07-2025			
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: Classes and Objects, Constructors and Methods and String Handling in Java

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.	Classes and Objects	1	23-07-2025		TLM1&2	
2.	Class Declaration and Modifiers, Class Members	1	24-07-2025		TLM1&2	
3.	Declaration of Class Objects, Assigning One Object to Another	1	25-07-2025		TLM1&2	
4.	Access Control for Class Members, Accessing Private Members of Class	2	29-07-2025 30-07-2025		TLM1&2	
5.	Constructors and Methods Introduction ,Defining Methods, Constructor Methods for Class ,Overloaded Constructor Methods	2	31-07-2025 01-08-2025		TLM1&2	
6.	Overloaded Methods, Nested Classes	2	02-08-2025 05-08-2025		TLM1&2	
7.	Passing Arguments by Value and by Reference, Keyword this	2	06-08-2025 07-08-2025		TLM1&2	
8.	Class Objects as Parameters in Methods, Access Control	1	08-08-2025		TLM1&2	

9.	Recursive Methods, Nesting of Methods, Attributes Final and Static	2	12-08-2025 13-07-2025		TLM1&2	
10.	**Tutorial:** Application Programs on Classes and Objects	1	14-08-2025		TLM3	
11.	String Handling in Java, String class	2	19-08-2025 20-08-2025		TLM1&2	
12.	StringTokenizer, StringBuffer classes	2	21-08-2025 22-08-2025		TLM1&2	
13.	Revision on Unit-2	1	23-08-2025		TLM1&2	
No. of classes required to complete UNIT-II: 20				**No. of classes taken:**		
I MID EXAMINATIONS (25-08-2025 TO 30-08-2025)						

UNIT-III: Arrays, Inheritance and Interfaces

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays	1	02-09-2025		TLM1&2	
2.	Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size	1	03-09-2025		TLM1&2	
3.	Sorting & Searching values in Arrays	2	04-09-2025 05-09-2025		TLM1&2	
4.	Class Arrays, Two & Three-Dimensional Arrays and Vectors	1	06-09-2025		TLM1&2	
5.	Introduction, Relationship between classes- Has-a, Is-a, Process of Inheritance, Types of Inheritances	1	09-09-2025		TLM1,2	
6.	Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance	1	10-09-2025		TLM1,2	
7.	Application of Keyword Super, Constructor Method and Inheritance	1	11-09-2025		TLM1,2	
8.	Method Overriding, Dynamic Method Dispatch, Abstract Classes	2	12-09-2025 16-09-2025		TLM1&2	
9.	Interface: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces,	1	17-09-2025		TLM1&2	
10.	Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.	1	18-09-2025		TLM1&2	

11.	**Tutorial:** Application Programs on Inheritance and Interfaces	1	19-09-2025		TLM3	
12.	Revision on Unit-3	1	20-09-2025			
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Packages and Java Library, Exception Handling and Java I/O, File

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.	Packages: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path	1	23-09-2025		TLM1&2	
2.	Access Control, Packages in Java SE- Java. Lang Package and its Classes, Class Object, Enumeration, class Math	2	24-09-2025 25-09-2025		TLM1&2	
3.	Wrapper Classes, Auto-boxing and Auto-unboxing	1	26-09-2025		TLM1&2	
4.	java.util Classes and Interfaces: Formatter Class, Random Class, Time Package, Formatting for Date/Time in Java, Temporal Adjusters Class	2	27-09-2025 07-10-2025		TLM1&2	
5.	Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords try, catch, throw, throws, and finally Blocks	1	08-10-2025		TLM1&2	
6.	Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions, Generating user defined exception	1	09-10-2025		TLM1&2	
7.	**Tutorial:** Application Programs on Exception Handling	1	10-10-2025		TLM3	
8.	Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java	1	14-10-2025		TLM1&2	
9.	Revision on Unit-4	1	15-10-2025			
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: Multithreaded Programming, Java Collections and Java FX GUI

S. No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	HOD Sign

		Required	Completion	Completion	Methods	Weekly
1.	Multithreaded Programming: Introduction, Need for Multiple Threads., Multithreaded Programming for Multi-core Processor, Thread Class	1	16-10-2025		TLM1&2	
2.	Thread life cycle, naming, priories of the threads, states	1	17-10-2025		TLM1&2	
3.	Synchronization & Inter-thread communication-producer consumer problem.	1	18-10-2025 21-10-2025		TLM1&2	
4.	Java Collections: Introduction, Purpose of Collection Framework, Hierarchy of collection Interfaces / classes, Methods defined in Collection Interface	1	22-10-2025		TLM1&2	
5.	Methods defined in Collection Interface, Interface Iterator	1	23-10-2025		TLM1&2	
6.	Collection classes / Interfaces –List, Set, Map.	1	24-10-2025		TLM1&2	
7.	Java FX, Overview of AWT & Swings API	1	25-10-2025		TLM1&2	
8.	Event handling	1	28-10-2025		TLM1&2	
9.	Java FX Scene Builder, Java FX App Window Structure, displaying text and image,	1	29-10-2025		TLM1&2	
10.	Laying out nodes in scene graph, mouse events	1	30-10-2025		TLM1&2	
11.	Revision on Unit-5	1	31-10-2025			
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

Content Beyond Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text book followed	HOD Sign Weekly
1.	Generic Programming-Introduction	1	01-11-2025		TLM1&2	CO4	T1	
No. of classes required to complete – 1					No. of classes taken:			
II MID EXAMINATIONS (03-11-2025 TO 08-11-2025)								

Teaching Learning Methods

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

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2 W**

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineer**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
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	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. B. SRINIVASA RAO**	**Dr. K. DEVI PRIYA**	**Dr. K. PHANEENDRA**	**Dr. D. RATNA KISHORE**
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT PART-A

Name of Course Instructor : **Mrs M.HEMALATA**

Course Name & Code : **23CS53-ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB**

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

Program/Sem/Sec : **B.Tech.–IT /III Sem – A Section** **A.Y. : 2025-26**

PRE-REQUISITE : Data Structures Lab

COURSE EDUCATIONAL OBJECTIVE (CEO): The objectives of the course is to

- Acquire practical skills in constructing and managing Data structures
- Apply the popular algorithm design methods in problem-solving scenarios

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

CO1	Implement balanced binary trees, heaps and graph traversals using arrays and linked list. **(Apply-L3)**
CO2	Implement Various Sorting Techniques. **(Apply-L3)**
CO3	Implement optimization problems using greedy, dynamic programming, backtracking and branch-and-bound techniques. **(Apply-L3)**
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values. **(Apply-L3)**

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

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

1 –Low **2 –**Medium **3–** High

PART-B --- COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Implement AVL Tree operations using linked list.	03	02-07-2025		
2.	Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations	03	09-07-2025		
3.	Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.	03	16-07-2025		
4.	Implement BFT for given graph, when graph is represented by a) Adjacency Matrix b) Adjacency Lists	03	23-07-2025		
5.	Implement DFT for given graph, when graph is represented by a) Adjacency Matrix Adjacency Lists	03	30-07-2025		
6.	Write a program for finding the biconnected components in a given graph.	03	06-08-2025		
7.	Write a program to find maximum and minimum element in array using Divide and conquer.	03	13-08-2025		
8.	Implement Quick sort and observe the execution time for various input sizes (Average, Worst and Best cases).	03	20-08-2025		
9.	Implement Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).	03	03-09-2025		
10.	Job sequencing with dead lines	03	10-09-2025		
11.	Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.	03	17-09-2025		
12.	Implement Job Sequencing with deadlines using Greedy strategy.	03	24-09-2025		
13.	Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.	03	01-10-25		
14.	Implement N-Queens Problem Using Backtracking.	03	08-10-25		
15.	Internal Exam	03	29-10-25		

Programs Covered Beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Finding Minimum Spanning tree	03	15-10-2025		
2.	All pairs Shortest path	03	22-10-2025		

Delivery Methods			
DM1	Chalk and Talk	**DM4**	Assignment/Test/Quiz
DM2	ICTTools	**DM5**	Laboratory/Field Visit
DM3	Tutorial	**DM6**	Web-based Learning

PART-C

EVALUATION PROCESS (R23 Regulations):

Evaluation Task	**Marks**
Day-to-day work	D1=10
Record	R1=05
Internal Test	IT1=15
Continuous Internal Evaluation(CIE)=D1+R1+IT1	**30**
Procedure/Algorithm	P1=20
Experimentation/Program execution	E1=10
Observations/Calculations/Validation	O1=10
Result/Inference	R1=10
Viva voce	V1=20
Semester End Examination (SEE)= P1+ E1+ O1+ V1	**70**
Total Marks = CIE+SEE	**100**

PART-D

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and teamwork**: 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.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mrs M. Hemalatha**	**Dr. S Nagarjuna Reddy**	**Dr. K. Phaneendra**	**Dr D.Ratnakishore**
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. M. Rajesh Reddy

Course Name & Code : ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB & 23CS53

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

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

PREREQUISITE: DATA STRUCTURES LAB

COURSE EDUCATIONAL OBJECTIVE:

The objectives of the course are to

- Acquire practical skills in constructing and managing Data structures
- Apply the popular algorithm design methods in problem-solving scenarios

COURSE OUTCOMES (CO):

CO1: Implement balanced binary trees, heaps and graph traversals using arrays and linked list. **(Apply-L3)**

CO2: Implement Various Sorting Techniques. **(Apply - L3)**

CO3: Implement optimization problems using greedy, dynamic programming, backtracking and branch-and-bound techniques. **(Apply - L3)**

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

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	AVL tree	06	03-07-2025 10-07-2025		
2.	B-Tree	03	17-07-2025		

3.	Heap Construction	03	24-07-2025		
4.	BFT	03	31-07-2025		
5.	DFT	03	07-08-2025		
6.	Finding Biconnected Components	03	14-08-2025		
7.	Finding Max and Min	03	21-08-2025		
8.	Merge sort, Quick sort	03	04-09-2025		
9.	Single source shortest path	03	11-09-2025		
10.	Job sequencing with dead lines	03	18-09-2025		
11.	0/1 knapsack -Dynamic Programming	03	25-09-2025		
12.	N-queens Problem	03	09-10-2025		
13.	Travelling Sales person Problem-Branch and bound	03	16-10-2025		
14.	Revision Session	03	23-10-2025		
15.	Internal Exam	03	30-10-2025		

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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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	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**M. Rajesh Reddy**	**Dr. S. Nagarjuna Reddy**	**Mr. G. Rajendra**	**Dr. D. Ratna Kishore**
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. M. Rajesh Reddy
Course Name & Code : OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB & 23CS54
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech/IT/III/A **A.Y.:** 2025-26

PREREQUISITE: Computer Programming Lab

COURSE EDUCATIONAL OBJECTIVE:

The objectives of the course are to

- Practice Object-Oriented Programming in the Java Programming Language.
- Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User Defined Exception Handling Mechanism.
- Illustrate Inheritance, Exception Handling Mechanism.
- Construct Threads, Event Handling, implement packages, Java FX GUI.

COURSE OUTCOMES (CO):

CO1: Implement basic concepts of the java programming language. **(Apply-L3)**
CO2: Implement object-oriented programming concepts and exception handling **(Apply- L3)**
CO3: Design multithreaded and GUI based applications. **(Apply-L3)**
CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

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

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

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

PART-B:

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Exercise – 1	06	01-07-2025 08-07-2025		
2.	Exercise – 2	03	15-07-2025		
3.	Exercise – 3	06	22-07-2025 29-07-2025		
4.	Exercise – 4	03	05-08-2025		
5.	Exercise – 5	03	12-08-2025		
6.	Exercise – 6	06	19-08-2025 02-09-2025		
7.	Exercise – 7	06	09-09-2025 16-09-2025		
8.	Exercise – 8	03	23-09-2025		
9.	Exercise – 9	03	07-10-2025		
10.	**Add-on:** JDBC connectivity program	03	14-10-2025		
11.	Internal Exam	03	28-11-2025		

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2 W**

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr. M. Rajesh Reddy**	**Dr. K. Devi Priya**	**Dr. K. Phaneendra**	**Dr. D. Ratna Kishore**
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.B.Srinivasa Rao
Course Name & Code : OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB & 23CS54
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech/IT/III/B **A.Y.:** 2025-26

PREREQUISITE: Computer Programming Lab

COURSE EDUCATIONAL OBJECTIVE:

The objectives of the course are to

- Practice Object-Oriented Programming in the Java Programming Language.
- Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User Defined Exception Handling Mechanism.
- Illustrate Inheritance, Exception Handling Mechanism.
- Construct Threads, Event Handling, implement packages, Java FX GUI.

COURSE OUTCOMES (CO):

CO1: Implement basic concepts of the java programming language. **(Apply-L3)**
CO2: Implement object-oriented programming concepts and exception handling **(Apply- L3)**
CO3: Design multithreaded and GUI based applications. **(Apply-L3)**
CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

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

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

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

PART-B:

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Exercise – 1	06	01-07-2025 08-07-2025		
2.	Exercise – 2	03	15-07-2025		
3.	Exercise – 3	06	22-07-2025 29-07-2025		
4.	Exercise – 4	03	05-08-2025		
5.	Exercise – 5	03	12-08-2025		
6.	Exercise – 6	06	19-08-2025 02-09-2025		
7.	Exercise – 7	06	09-09-2025 16-09-2025		
8.	Exercise – 8	03	23-09-2025		
9.	Exercise – 9	03	07-10-2025		
10.	**Add-on:** JDBC connectivity program	03	14-10-2025		
11.	Internal Exam	03	28-11-2025		

ACADEMIC CALENDAR: A.Y 2025-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2025	23-08-2025	8W
I Mid Examinations	**25-08-2025**	**30-08-2025**	**1 W**
II Phase of Instructions	01-09-2025	01-11-2025	9W
II Mid Examinations	**03-11-2025**	**08-11-2025**	**1 W**
Preparation and Practical	10-11-2025	15-11-2025	1 W
Semester End Examinations	**17-11-2025**	**29-11-2025**	**2 W**

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr. M. Rajesh Reddy**	**Dr. K. Devi Priya**	**Dr. K. Phaneendra**	**Dr. D. Ratna Kishore**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.S.Naganjaneyulu
Course Name & Code : Full Stack Development-I & 23CSS2
L-T-P Structure : 0-1-2 **Credits:** 2
Program/Sem/Sec : B.Tech. - IT/III/A **A.Y.:** 2025-26

PREREQUISITE: Knowledge of basic Computer hardware & software.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objectives of the course are to
- Make use of HTML elements and their attributes for designing static web pages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms.

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

CO1	Design static web pages by using HTML elements. (Apply-L3)
CO2	Develop a web page by applying appropriate CSS styles to HTML elements. (Apply-L3)
CO3	Develop dynamic web pages and validate forms using JavaScript. (Apply-L3)
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values

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

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

REFERENCE BOOKS:

R1	Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
R2	Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 2019 (Chapters 1-11).
R3	Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, A Press, O'Reilly.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	**Lab Cycle-1**: Lists, Links and Images	4	30-06-2025 & 03-07-2025		**TLM5**	
2.	**Lab Cycle-2**: HTML Tables, Forms and Frames	4	07-07-2025 & 10-07-2025		**TLM5**	
3.	**Lab Cycle-3**: HTML 5 and Cascading Style Sheets, Types of CSS	4	14-07-2025 & 27-07-2025		**TLM5**	
4.	**Lab Cycle-3**: HTML 5 and Cascading Style Sheets, Types of CSS	4	21-07-2025 & 24-07-2025		**TLM5**	
5.	**Lab Cycle-4:** Selector forms	4	28-07-2025 & 31-07-2025		**TLM5**	
6.	**Lab Cycle-5**: CSS with Color, Background, Font, Text and CSS Box Model	4	04-08-2025 & 07-08-2025		**TLM5**	
7.	**Lab Cycle-6:** Applying JavaScript - internal and external, I/O, Type Conversion	4	11-08-2025 & 14-08-2025		**TLM5**	
8.	**Lab Cycle-6:** Applying JavaScript - internal and external, I/O, Type Conversion	4	18-08-2025 & 21-08-2025		**TLM5**	
9.	**Lab Cycle-7:** Java Script Pre-defined and User-defined Objects	4	01-09-2025 & 04-09-2025		**TLM5**	
10.	**Lab Cycle-7:** Java Script Pre-defined and User-defined Objects	4	08-09-2025 & 11-09-2025		**TLM5**	
11.	**Lab Cycle-8:** Java Script Conditional Statements and Loops	4	15-09-2025 & 18-09-2025		**TLM5**	
12.	**Lab Cycle-8:** Java Script Conditional Statements and Loops	4	22-09-2025 & 25-09-2025		**TLM5**	
13	Registration form with java script	1	29-09-2025			
14	**Lab Cycle-9:** Java Script Functions and Events, Node.js	4	06-10-2025 & 09-10-2025		**TLM5**	

15	**Lab Cycle-9:** Java Script Functions and Events, Node.js	4	13-10-2025 & 16-10-2025		**TLM5**	
16	**Content Beyond the Syllabus** Database connectivity using NodeJS Project	4	20-10-2025 & 23-10-2025		**TLM5**	
17	Revision	1	27-10-2025		**TLM5**	
18	Lab Internal Examination	3	30-10-2025		**TLM5**	

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

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
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.
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PO 9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to
PO 11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr.S.Naganjaneyulu	Dr.S.Naganjaneyulu	Dr.K.Phaneendra	Dr.D. Ratna Kishore
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. M. VIJAY KUMAR
Course Name & Code : FULL SATCK DEVELOPMENT-I & 23CSS2
L-T-P Structure : **0-1-2** **Credits:** 2
Program/Sem/Sec : B.Tech/IT/III/B **A.Y.:** 2025-26

Pre-requisite: Knowledge of basic Computer hardware & software.

COURSE EDUCATIONAL OBJECTIVE:

The main objectives of the course are to

- Make use of HTML elements and their attributes for designing static web pages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes: After successful completion of the course the students are able to

CO1: Design static web pages by using HTML elements. (Apply-L3)
CO2: Develop a web page by applying appropriate CSS styles to HTML elements. (Apply-L3)
CO3: Develop dynamic web pages and validate forms using JavaScript. (Apply-L3)
CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values

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

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

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

PART-B:

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Introduction to Web and its applications & basic tags in HTML programming	4	01/07/2025		
2.	Introduction to Web and its applications & basic tags in HTML programming	4	08/07/2025		
3.	Lists, Links and Images	4	15/08/2025		
4.	HTML Tables, Forms and Frames	4	22/08/2025		
5.	HTML Tables, Forms and Frames	4	29/08/2025		
6.	HTML 5 and Cascading Style Sheets, Types of CSS	4	05/08/2025		
7.	HTML 5 and Cascading Style Sheets, Types of CSS	4	12/08/2025		
8.	Selector forms	4	19/08/2025		
9.	Selector forms	4	02/09/2025		
10.	CSS with Color, Background, Font, Text and CSS Box Model	4	09/09/2025		
11.	CSS with Color, Background, Font, Text and CSS Box Model	4	16/09/2025		
12.	Introduction to Java script and how to embedded JS in html	4	23/09/2025		
13.	Applying JavaScript - internal and external, I/O, Type Conversion	4	07/10/2025		
14.	JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects	4	14/10/2025		
15.	JavaScript Functions and Events	4	21/10/2025		
16.	Node.js	4	28/10/2025		
17.	Add-ON: Database connectivity using NodeJS Project	4	04/11/2025		

PART-C

EVALUATION PROCESS (R23 Regulation):

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

PART-D

PROGRAMME OUTCOMES (POs):

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PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Signature				
Name of the Faculty	**Mr.M.Vijay Kumar**	**Mr.M. Vijay Kumar**	**Dr.K. Phaneendra**	**Dr.B.Srinivasa Rao**