LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAACwith'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, KRISHNA DIST., A.P.-521 230.
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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT
PART-A

Name of Course Instructor : J.GeethaRenuka
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.:** 2026-27
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	13-07-2026		TLM1	
2.	Propositional Calculus: Statements and Notations, Connectives	1	14-07-2026		TLM1	
3.	Well Formed Formulas, Truth Tables	1	15-07-2026		TLM1	
4.	Tautologies,	1	17-07-2026		TLM1	
5.	Equivalence of Formulas, Duality Law	1	20-07-2026		TLM1	
6.	Tautological Implications,	1	21-07-2026		TLM1	
7.	Normal Forms,	2	22-07-2026 24-07-2026		TLM1	
8.	Theory of Inference for Statement Calculus,	1	27-07-2026		TLM1	
9.	Consistency of Premises,	2	28-07-2026 29-07-2026		TLM1	
10.	Indirect Method of Proof, Predicate Calculus: Predicates	1	31-07-2026		TLM1	
11.	Predicative Logic, Statement Functions	1	3-08-2026		TLM1	
12.	Variables and Quantifiers	1	4-08-2026		TLM1	
13.	Free and Bound Variables	1	5-08-2026		TLM1	
14.	Inference Theory for Predicate Calculus	2	10-08-2026 11-08-2026		TLM1	
15.	Tutorial on Unit 1	1	12-08-2026		TLM3	
No. of classes required to complete UNIT-I: 18				**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	17-08-2026		TLM1	
17.	Principle of Inclusion-Exclusion	1	18-08-2026		TLM1	
18.	Relations: Properties, Operations	1	19-08-2026		TLM1	
19.	Partition and Covering,	1	21-08-2026		TLM1	
20.	Transitive Closure, Equivalence,	1	24-08-2026		TLM1	
21.	Compatibility and Partial Ordering, Hasse Diagrams	1	25-08-2026		TLM1	
22.	Functions: Bijective, Composition, Inverse,	1	28-08-2026		TLM1	
23.	Permutation, and Recursive Functions,	1	31-08-2026		TLM1	
24.	Seminar on Functions& Recursive Functions	1	1-09-2026		TLM6	
25.	Lattice and its Properties	1	2-09-2026		TLM1	
No. of classes required to complete UNIT-II: 10				**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
26.	Basis of Counting, Permutations, Permutations with Repetitions	1	11-09-2026		TLM1	
27.	Circular and Restricted Permutations, Combinations,	1	15-09-2026		TLM1	
28.	Restricted Combinations	1	16-09-2026		TLM1	
29.	Binomial and Multinomial Coefficients and Theorems.	1	18-09-2026		TLM1	
30.	Recurrence Relations: Generating Functions, Function of Sequences,	1	21-09-2026		TLM1	
31.	Partial Fractions, Calculating Coefficient of Generating Functions	1	22-09-2026		TLM1	
32.	Recurrence Relations, Formulation as Recurrence Relations	1	23-09-2026		TLM1	
33.	Solving Recurrence Relations by Substitution	1	25-09-2026		TLM1	
34.	Solving Recurrence Relations Generating Functions	1	28-09-2026		TLM1	
35.	Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations	2	29-09-2026 30-09-2026		TLM1	
36.	Tutorial on UNIT III	1	5-10-2026		TLM3	
No. of classes required to complete UNIT-III: 12				**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
37.	Basic Concepts, Graph Theory and its Applications	1	6-10-2026		TLM1	
38.	Subgraphs, Graph Representations: Adjacency and Incidence Matrices	2	7-10-2026 9-10-2026		TLM1	
39.	Isomorphic Graphs,	1	12-10-2026		TLM1	
40.	Paths and Circuits	1	13-10-2026		TLM1	
41.	Eulerian and Hamiltonian Graphs,	1	14-10-2026		TLM1	
42.	Tutorial on Graphs	1	16-10-2026		TLM3	
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
43.	Multigraphs,	1	26-10-2026		TLM1	
44.	Bipartite and Planar Graphs	1	27-10-2026		TLM1	
45.	Euler's Theorem	1	28-10-2026		TLM1	
46.	Graph Coloring	1	30-10-2026		TLM1	
47.	Covering	1	2-11-2026		TLM1	
48.	Chromatic Number	1	3-11-2026		TLM1	

49.	Spanning Trees, Prim's and Kruskal's Algorithms	1	4-11-2026		TLM1	
50.	BFS Spanning Trees.	1	6-11-2026		TLM1	
51.	DFS Spanning Trees	1	9-11-2026		TLM1	
52.	Tutorial on UNIT V	1	10-11-2026		TLM3	
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	11-11-2026		**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 J.GeethaRenuka**	**Mrs. B.Swathi**	**Dr. G. Rajendra**	**Dr D.Ratnakishore**

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DEPARTMENT OF COMPUTER SCIENCE AND 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** L-T-P Structure: **3-0-0** Credits: **3**
Program/Semester/Section : **B.Tech.(CS & IT)/III/A** A.Y. : **2026-27**

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 (**Understand-L2**)
CO2: Identify one's self, and one's surroundings (family, society nature) (**Understand-L2**)
CO3: Relate human values with human relationship and human society. (**Understand-L2**)
CO4: Illustrate the need for universal human values and harmonious existence (**Understand-L2**)
CO5: Develop as socially and ecologically responsible engineers (**Apply-L3**)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1			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.	Course Outcomes (COs)	1	13-07-2026		TLM2	
2.	Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)	2	14-07-2026 17-07-2026		TLM.2	
3.	Understanding Value Education	1	18-07-2026		TLM2	
4.	Practice Session PS1 Sharing about Oneself	2	20-07-2026 25-07-2026		TLM6	
5.	self-exploration as the Process for Value Education	2	27-07-2026 28-07-2026		TLM2	
6.	Continuous Happiness and Prosperity – the Basic Human Aspirations	2	31-07-2026 01-08-2026		TLM2	
7.	Practice Session PS2 Exploring Human Consciousness	2	01-08-2026 01-08-2026		TLM6	
8.	Happiness and Prosperity Current Scenario	1	04-08-2026		TLM2	
9.	Method to Fulfill the Basic Human Aspirations	1	07-08-2026		TLM2	
10.	Practice Session PS3 Exploring Natural Acceptance	2	08-08-2026 10-08-2026		TLM6	
No. of classes required to complete UNIT-I: 16				**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
11.	Understanding Human being as the Co-existence of the self and the body	1	11-08-2026		TLM2	
12.	Distinguishing between the Needs of the self and the body	2	14-08-2026 17-08-2026		TLM2	
13.	Practice Session PS4 Exploring the difference of Needs of self and body.	2	18-08-2026		TLM6	
14.	The body as an Instrument of the self	1	21-08-2026		TLM2	
15.	Understanding Harmony in the self	1	22-08-2026		TLM2	
16.	Practice Session PS5 Exploring Sources of	2	24-08-2026 28-08-2026		TLM6	

	Imagination in the self					
17.	Harmony of the self with the body	1	31-09-2026		TLM2	
18.	Programme to ensure self-regulation and Health	1	04-09-2026		TLM2	
19.	Practice Session PS6 Exploring Harmony of self with the body	1	05-09-2026		TLM2	
No. of classes required to complete UNIT-II: 12				**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
20.	Harmony in the Family – the Basic Unit of Human Interaction	2	11-09-2026 12-09-2026		TLM2	
21.	'Trust' – the Foundational Value in Relationship	1	15-09-2026		TLM2	
22.	Practice Session PS7 Exploring the Feeling of Trust	2	18-09-2026 19-09-2026		TLM6	
23.	'Respect' – as the Right Evaluation	1	17-09-2026		TLM1	
24.	Practice Session PS8 Exploring the Feeling of Respect	2	19-09-2026 21-09-2026		TLM6	
25.	Other Feelings, Justice in Human-to-Human Relationship	1	22-09-2026		TLM2	
26.	Understanding Harmony in the Society	2	25-09-2026 26-09-2026		TLM2	
27.	Vision for the Universal Human Order	1	28-09-2026		TLM2	
28.	Practice Session PS9 Exploring Systems to fulfil Human Goal	2	29-09-2026 05-10-2026		TLM6	
No. of classes required to complete UNIT-III: 14				**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
29.	Understanding Harmony in the Nature	2	06-10-2026 09-10-2026		TLM2	
30.	Interconnectedness, self-regulation	1	12-10-2026		TLM2	

31.	Practice Session PS10 Exploring the Four Orders of Nature	1	13-10-2026		TLM3	
32.	Realizing Existence as Co-existence at All Levels	1	16-10-2026		TLM2	
33.	The Holistic Perception of Harmony in Existence	1	17-10-2026		TLM2	
34.	Practice Session PS11 Exploring Co-existence in Existence.	1	26-10-2026		TLM6	
No. of classes required to complete UNIT-IV: 7				**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
35.	Natural acceptance of human values	1	27-10-2026		TLM2	
36.	Definitiveness of ethical human conduct	1	30-10-2026		TLM2	
37.	Practice Session PS12 Exploring Ethical Human Conduct	1	31-10-2026		TLM6	
38.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order	1	02-11-2026		TLM2	
39.	Competence in professional ethics	1	03-11-2026		TLM2	
40.	Practice Session PS13 Exploring Humanistic Models in Education	1	06-11-2026		TLM6	
41.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	07-11-2026		TLM2	
42.	Strategy for transition from the present state to universal human order	1	09-11-2026		TLM2	
43.	Practice Session PS14 Exploring Steps of Transition towards Universal Human Order	1	10-11-2026		TLM6	
No. of classes required to complete UNIT-V: 9				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 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: 2026-27

Description	From	To	Weeks
I Phase of Instructions	13-07-2026	05-09-2026	8W
I Mid Examinations	**07-09-2026**	**09-09-2026**	**½ W**
II Phase of Instructions	10-09-2026	17-10-2026	5 ½ W
Dussehra Holidays	19-10-2026	24-10-2026	1W
II Phase of Instructions continued…..	26-10-2026	11-11-2026	2 ½ W
II Mid Examinations	**12-11-2026**	**14-11-2026**	**½ W**
Preparation and Practical	16-11-2026	21-11-2026	1 W
Semester End Examinations	**23-11-2026**	**05-12-2026**	**2 W**

Signature				
Name of the Faculty	**Dr. B. SRINIVASA RAO**	**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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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. 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.: 2026-27**

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	13-07-2026		TLM1	
2.	Introduction to DLD, Number systems	1	14-07-2026		TLM2	
3.	Different Number systems	1	16-07-2026		TLM2	
4.	Conversions of one number to another number	1	18-07-2026		TLM2, TLM4.	
5.	Data Representations	1	20-07-2026		TLM2	
6.	**TUTORIAL-1**	1	21-07-2026		TLM3	
7.	Binary codes	1	23-07-2026		TLM2	
8.	Basic Logic gates and Universal gates	1	25-07-2026		TLM2, TLM4.	
9.	Boolean Logic functions	1	27-07-2026		TLM2	
10.	K-Maps Simplifications	1	28-07-2026		TLM2, TLM5.	
11.	Combinational circuits	1	30-07-2026		TLM2	
12.	Designing Decoder and	1	01-08-2026		TLM2	
13.	Multiplexers		03-08-2026		TLM2	
14.	Assignment / Quiz /Activity Based Learning	1	04-08-2026		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
15.	Introduction to sequential circuits,	1	06-08-2026		TLM2	
16.	Flip-flops (RS, JK, T, D),	1	08-08-2026		TLM2, TLM6	
17.	Master slave flip-flop	1	10-08-2026		TLM1, TLM2	
18.	Conversion of flip-flops, Truth & excitation, Activity Based Learning	2	11-08-2026 13-08-2026		TLM1, TLM2.	
19.	**TUTORIAL-2**	1	17-08-2026		TLM3	
20.	Registers	1	18-08-2026		TLM2	
21.	counters	1	20-08-2026		TLM1, TLM2	
22.	Basic structure of computer	1	22-08-2026		TLM2	
23.	Bus structure	1	24-08-2026		TLM2	
24.	Multi processors and multi computers	1	25-08-2026		TLM2	
25.	Computer generations	1	27-08-2026		TLM2	
26.	Von- Neumann Architecture	1	29-08-2026		TLM2	
27.	Assignment / Quiz	1	31-08-2026		TLM6	
No. of classes required to complete UNIT-II: 14				**No. of classes taken:**		

I-MID EXAMINATIONS **07-09-2026 TO 09-09-2026**

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
28.	Signed Number representation	1	01-09-2026		TLM2	
29.	Addition and Subtraction of Signed Numbers	1	03-09-2026		TLM2	
30.	Design of Fast Adders	1	05-09-2026		TLM2, TLM4.	
31.	Multiplication of Positive Numbers	1	10-09-2026		TLM2	
32.	Signed-operand Multiplication	1	12-09-2026		TLM2	
33.	**TUTORIAL-3**	1	15-09-2026		TLM3	
34.	Fast Multiplication	1	17-09-2026		TLM2	
35.	Integer Division,	1	19-09-2026		TLM2	
36.	Floating-Point Numbers and Operations	1	21-09-2026		TLM2	
37.	Processor Organization of Fundamental Concepts	1	22-09-2026		TLM2	
38.	Execution of a Complete Instruction	1	24-09-2026		TLM2	
39.	Multiple-Bus Organization	1	26-09-2026		TLM2	
40.	Hardwired Control	1	28-09-2026		TLM2	
41.	Micro programmed Control	1	29-09-2026		TLM2	
42.	Assignment / Quiz	1	01-10-2026		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
43.	Memory organization	1	03-10-2026		TLM2	
44.	Semiconductor RAM Memories	1	05-10-2026		TLM2	
45.	Concept of memory hierarchical organization	1	06-10-2026		TLM2	
46.	Read-Only Memories, Speed, Size and Cost	1	08-10-2026		TLM2	
47.	**TUTORIAL-4**	1	10-10-2026		TLM3	
48.	Cache memory	1	12-10-2026		TLM2	
49.	Virtual Memories	1	13-10-2026		TLM2	
50.	Memory Management Requirements, Secondary Storage	1	15-10-2026		TLM2	
51.	Assignment / Quiz	1	17-10-2026		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
52.	Input/Output Organization: Accessing I/O Devices	1	26-10-2026		TLM2	
53.	Interrupts	1	27-10-2026		TLM2	
54.	Processor Examples, Interface Circuits	1	29-10-2026		TLM2	
55.	Peripheral devices –I/O sub-systems	1	31-10-2026		TLM2	
56.	**TUTORIAL-5**	1	02-11-2026		TLM2	
57.	I/O device interface, I/O transfers-program controlled	1	03-11-2026		TLM3	
58.	Interrupt driven, DMA.	1	05-11-2026		TLM2	
59.	Assignment / Quiz	1	07-11-2026		TLM6	
No. of classes required to complete UNIT-V: 08				**No. of classes taken:**		

II-MID EXAMINATIONS **12-11-2026 TO 14-11-2026**

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	09-11-2026		TLM2	
2.	Multicore Processors	1	10-11-2026		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	**13-07-2026**		
I Phase of Instructions	**13-07-2026**	05-09-2026	8W
I Mid Examinations	**07-09-2026**	**09-09-2026**	**3 Days**
II Phase of Instructions	10-09-2026	17-10-2026	5 ½ W
Dussehra Holidays	19-10-2026	24-10-2026	1 W
II Phase of Instructions Contd..	26-10-2026	11-11-2026	2 ½ W
II Mid Examinations	**12-11-2026**	**14-11-2026**	**3 Days**
Preparation and Practical's	16-11-2026	21-11-2026	1W
Semester End Examinations	**23-11-2026**	**05-12-2026**	**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	Dr. G. Rajendra	Dr. Ch. Venkata Narayana	Dr. 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
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DEPARTMENT OF COMPUTER SCIENCE AND 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 / A **A.Y.:** 2026-27

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	14-07-2026		TLM1&2	
2.	Introduction to Algorithm-Characteristics	1	15-07-2026		TLM1&2	
3.	Pseudo code specifications-Sample Algorithm	2	16-07-2026 17-07-2026		TLM1&2	
4.	Algorithm Analysis- Time and Space Complexity - Examples	2	18-07-2026 21-07-2026		TLM1&2	
5.	Problems on finding space & time complexity of algorithms	1	22-07-2026		TLM1&2	
6.	Asymptotic Notations	2	23-07-2026 24-07-2026		TLM1&2	
7.	AVL Tree Operations	2	25-07-2026 28-07-2026		TLM1&2	
8.	**Tutorial:** AVL Tree operations	1	29-07-2026		TLM3	
9.	B-Tree operations	2	30-07-2026 31-07-2026		TLM1&2	
10.	Revision on Unit-1	1	01-08-2026			
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	04-08-2026		TLM1&2	
2.	Max Heap, Min Heap Construction-operations	1	05-08-2026		TLM1&2	
3.	Problems on Heap Tree Construction	1	06-08-2026		TLM1&2	
4.	Implementation of Heap Tree	1	07-08-2026		TLM1&2	
5.	Graph Terminology	1	11-08-2026		TLM1&2	
6.	Representations of Graphs	1	12-08-2026		TLM1&2	

7.	Basic Search and Traversal Techniques – DFS	1	13-08-2026		TLM1&2	
8.	Problems on DFS traversal	1	14-08-2026		TLM1&2	
9.	BFS – Example, Implementation	1	18-08-2026		TLM1&2	
10.	Connected Components, Bi-connected Components	2	19-08-2026 20-08-2026		TLM1&2	
11.	Examples of Connected Components	2	21-08-2026 22-08-2026		TLM1&2	
12.	Divide and Conquer General Method	1	25-08-2026		TLM1&2	
13.	Finding Max and Min	1	27-08-2026		TLM1&2	
14.	Merge Sort & Analysis	1	28-08-2026		TLM1&2	
15.	Quick sort & Analysis	2	29-08-2026 01-09-2026		TLM1&2	
16.	**Group Discussion:** Merge Sort & Quick Sort Complexity Analysis	1	02-09-2026		TLM6	
17.	Strassen' Matrix Multiplication	1	03-09-2026		TLM1&2	
18.	Revision on Unit-2	1	05-09-2026			
No. of classes required to complete UNIT-II: 21				**No. of classes taken:**		
I MID EXAMINATIONS (07-09-2026 TO 09-09-2026)						

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	10-09-2026		TLM1&2	
2.	Job Sequencing with dead Lines	1	11-09-2026		TLM1&2	
3.	Knapsack Problem	2	15-09-2026 16-09-2026		TLM1&2	
4.	Minimum Cost Spanning Tree-Kruskal Algorithm	1	17-09-2026		TLM1&2	
5.	Problems on different knapsack problem instances	2	18-09-2026 19-09-2026		TLM1,2	
6.	Prims Algorithm	1	22-09-2026		TLM1,2	
7.	Single Source Shortest Path	1	23-09-2026		TLM1,2	
8.	Optimal Storage on tapes	1	24-09-2026		TLM1,2	
9.	**Tutorial:** Analysis of Prims & Kruskal's algorithm	1	25-09-2026		TLM3	
10.	Huffman Coding	1	26-09-2026		TLM1&2	
11.	Revision on Unit-3	1	29-09-2026			
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	30-09-2026		TLM1&2	
2.	All pairs shortest path	1	01-10-2026		TLM1&2	
3.	Bellman Ford Algorithm	1	03-10-2026		TLM1&2	
4.	0/1 knapsack problem	2	06-10-2026 07-10-2026		TLM1&2	
5.	Optimal binary search tree	2	08-10-2026 09-10-2026		TLM1&2	
6.	String editing	1	13-10-2026		TLM1&2	
7.	**Tutorial:** Analysis of OBST	1	14-10-2026		TLM3	
8.	Travelling salesperson problem	2	15-10-2026 16-10-2026		TLM1&2	
9.	Revision on Unit-4	1	17-10-2026			
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	27-10-2026		TLM1&2	
2.	N-queens Problem	1	28-10-2026		TLM1&2	
3.	Graph Coloring	1	29-10-2026		TLM1&2	
4.	Sum of subsets problem	1	30-10-2026		TLM1&2	
5.	Introduction to Branch and Bound	1	31-10-2026		TLM1&2	
6.	0/1 Knapsack-LCBB, FIFOBB	1	03-11-2026		TLM1&2	
7.	**Tutorial:** Least Cost BB	1	04-10-2026		TLM3	
8.	Travelling Salesperson Problem -LC Search	1	05-11-2026		TLM1&2	
9.	Introduction to P and NP	1	06-11-2026		TLM1&2	
10.	NP-Complete Problems	1	07-11-2026		TLM1&2	
11.	Revision on Unit-5	1	10-11-2026			
No. of classes required to complete UNIT-V: 11				**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	11-11-2026		TLM1&2			
No. of classes required to complete - 1					No. of classes taken:			
II MID EXAMINATIONS (12-11-2026 TO 14-11-2026)								

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 2026-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2026	23-08-2026	8W
I Mid Examinations	**25-08-2026**	**30-08-2026**	**1 W**
II Phase of Instructions	01-09-2026	01-11-2026	9W
II Mid Examinations	**03-11-2026**	**08-11-2026**	**1 W**
Preparation and Practical	10-11-2026	15-11-2026	1 W
Semester End Examinations	**17-11-2026**	**29-11-2026**	**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. D. Srinivasa Rao**	**Dr. G. Rajendra**	**Dr. D. Ratna Kishore**
Signature				

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http://lbrce.ac.in/csit/index.php,hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : **Mrs M. HEMALATHA**
Course Name & Code : **Object Oriented Programming Through Java (23CS05)**
L-T-P Structure : **3-0-0** Credits: **3**
Program/Sem/Sec : **B.Tech.–IT /III Sem-A** A.Y.: **2026-27**

PRE-REQUISITE: Introduction to Programming

COURSE EDUCATIONAL OBJECTIVE (CEO):

The learning objectives of this course are to:

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

COURSE OUTCOMES (COs):

After successfil completeion of the course, the student will be able to:

CO1	Identify the syntax and semantics of java programming language and basic concepts of Java.	Understand – Level 2
CO2	Understand the basic concepts of object-oriented programming.	Understand – Level 2
CO3	Develop reusable programs using the concepts of inheritance, polymorphism, and interfaces.	Apply – Level 3
CO4	Apply the concepts of packages, exception handling & I/O streams to develop secure, error free, and efficient applications.	Apply - Level 3
CO5	Design multithreaded and GUI based applications which mimic the real word scenarios.	Apply – Level 3

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		

Text Books:

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, 11th edition, Herbert Schildt, TMH
R2:	Introduction to Java Programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:

L1:	https://nptel.ac.in/courses/106/105/106105191/
L2:	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0128804645816347_shared/overview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Object Oriented Programming, Datatypes, variables, Introduction to operators, 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.	Discussion of CEO's and CO's, Basic Concepts, Principles.	1	14-07-26		**TLM1**	
2.	Program Structure in java, writing Simple java Program	1	15-07-26		**TLM1**	
3.	Elements or tokens in java programs, Java programs, Java Statements, Command line arguments.	1	16-07-26		**TLM1**	
4.	User input to Programs, Escape sequences, comments, programe style.	1	17-07-26		**TLM1**	
5.	Data types, Declaration of variables, type casting. Scope of variables	1	18-07-26		**TLM1**	
6.	Literal constants, Symbolic Constants, formatted output with printf() Method,	1	21-07-26		**TLM1&4**	
7.	Static Variables and methods, Attribute Final.	1	22-07-26		**TLM1**	
8	Operators : Arithmetic, assignment, incr/decr , relational, ternary	1	23-07-26		**TLM2**	
9.	Operators : Logical Boolean, Logical Bitwise, precedance and associativity.	1	24-07-26		**TLM2**	
10.	If, nested if, if-else expressions	1	25-07-26		**TLM1 & 4**	
11.	Switch stament, iteration examples	1	28-07-26		**TLM1 & 4**	
12	While, do-while loops, break, continue statements.	1	29-07-26		**TLM 1 & 4**	
13.	for loop, nested for loop, for-each loop.	1	30-07-26		**TLM 1&4**	
14.	Sample Programs.	1	31-07-26		**TLM4**	
15.	Tutorial –I	1	01-08-26		**TLM 3 & 5**	
No. of classes required to complete UNIT – I: 15				**No. of classes taken:**		

UNIT – II: Classes & Objects, Constructors and Methods, 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
16.	Class, declaring members, methods, access modifiers. Creating objects.	1	04-08-26		TLM1	
17	Access the private and public members of class,assigning one object to another	1	05-08-26		TLM1	
18.	Constructor methods, overloading constructor methods.	1	06-08-26		TLM2	
19.	Nested classes, passing arguments by value, by reference.	1	07-08-26		TLM1	
20.	'this' keyword, class objects as parameters in methods, access control	1	11-08-26		TLM2	
21.	Recursive methods, nesting of methods	1	12-08-26		TLM1&4	
22.	final and static attributes.	1	13-08-26		TLM1	
23.	String handling, string class methods	1	14-08-26		TLM1&4	
24.	String Buffer Class, Interface char sequence	1	18-08-26		TLM1 &4	
25.	Programs on classes , construcors	1	19-08-26		TLM4	
26	Programs on string Handling	1	20-08-26		TLM4	

27	Programs on this, final, static, recursive methods.	1	21-08-26		TLM4	
28	Tutorial –II	1	22-08-26		**TLM 3 & 5**	
No. of classes required to complete UNIT – II: **13**				No. of classes taken:		

UNIT – III: Arrays , Inheritance, 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
29.	Declaration and initialization of arrays, storing array in computer memory. Accessing array elements.	1	25-08-26		**TLM1**	
30.	Operations on array elements, assigning array to another array, dynamic change of array size.	1	27-08-26		**TLM1&4**	
31.	Sorting Arrays, searching for value in an array.	1	28-08-26		**TLM1&4**	
32.	Class Arrays, 2D arrays, Arrays of Varying lengths.	1	29-08-26		**TLM2**	
33.	3D Arrays, Arrays as Vectors	1	01-09-26		**TLM2**	
34.	Relationship between classes – Has-a, Is-a, process of Inheritance	1	02-09-26		**TLM1**	
35.	Types of Inheritance. Universal super class – object class,	1	03-09-26		**TLM1**	
36.	Inhibiting inheritance of class using Final, Access control and inheritance	1	05-09-26		**TLM1**	
37.	Multi level Inheritance, Super keyword, constructor inheritance	1	10-09-26		**TLM1**	
38.	Method Overriding, Dynamic Method Dispatch, Abstract Classes.	1	11-09-26		**TLM1&4**	
39	Interfaces declaration and implementation.	1	15-09-26		**TLM1**	
40	Multiple interfaces and nested interfaces, inheritance of interfaces	1	16-09-26		**TLM1**	
41	Default and static methods in interfaces, functional interfaces, annotations.	1	17-09-26		**TLM1**	
42	Tutorial-III	1	18-09-26		**TLM3 & 5**	
No. of classes required to complete UNIT – III: 14				**No. of classes taken:**		

UNIT – IV: Packages and Java library, Exception Handling, Java I/O and 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
43.	Introduction, Defining Package, Importing Packages and Classes into Programs.	1	19-09-26		**TLM1**	
44.	Path and Class Path, Access Control, Java. Lang Package and its Classes	1	22-09-26		**TLM1**	
45.	Class Object, Enumeration, class Math, Wrapper Classes	1	23-09-26		**TLM1&4**	
46.	Auto-boxing and Auto-unboxing, Java util Classes and Interfaces.	1	24-09-26		**TLM1&4**	
47.	Formatter Class, Random Class, Time Package, Formatting for Date/Time in Java, Temporal Adjusters Class	1	25-09-26		**TLM1&4**	
48.	Hierarchy of Standard Exception Classes, Keywords try, catch, throw, throws, and finally Blocks	1	26-09-26		**TLM1**	
49.	Multiple Catch Clauses, Class Throwable	1	29-09-26		**TLM1&4**	

50.	Unchecked Exceptions, Checked Exceptions, Generating user defined exception	1	30-09-26		**TLM1&4**	
51.	Java I/O API, Standard I/O streams	1	01-10-26		**TLM1**	
52.	types, Byte streams, Character streams, Scanner class.	1	03-10-26		**TLM1**	
53	Files in Java	1	06-10-26		**TLM1**	
54	Files in Java	1	07-10-26		**TLM1**	
55	Tutorial -IV	1	08-10-26		**TLM3&5**	
No. of classes required to complete UNIT – IV: 13				**No. of classes taken:**		

UNIT – V: Multithreaded Programming, Java Collections, 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
56.	Need for Multiple Threads., Multithreaded Programming for Multi-core Processor, Thread Class	1	09-10-26		**TLM1**	
57.	Main Thread - Creation of New Threads, Thread States, Thread Priorities	1	13-10-26		**TLM1**	
58.	Synchronization, Inter-thread Communication- producer consumer problem.	1	14-10-26		**TLM1&4**	
59.	Purpose of Collection Framework, Hierarchy of collection Interfaces / classes	1	15-10-26		**TLM2**	
60.	Methods defined in Collection Interface, Interface Iterator	1	16-10-26		**TLM1&4**	
61.	Collection classes/Interfaces –List	1	17-10-26		**TLM2**	
62.	Collection classes/Interfaces –Set	1	27-10-26		**TLM2**	
63.	Collection classes/Interfaces –Map	1	28-10-26		**TLM2**	
64.	Overview of AWT	1	29-10-26		**TLM2**	
65.	Overview of Swings API, limitations	1	30-10-26		**TLM2**	
66	Java FX Scene Builder	1	31-10-26		**TLM2**	
67	Java FX App Window Structure	1	3-11-26		**TLM2**	
68	displaying text and image	1	4-11-26		**TLM2**	
69	event handling,	1	5-11-26		**TLM2**	
70	laying out nodes in scene graph,	1	6-11-26		**TLM2**	
71	mouse events	1	7-11-26		**TLM2**	
72	Tutorial - V	1	10-11-26		**TLM3&5**	
No. of classes required to complete UNIT – V : 17				**No. of classes taken :**		

Content Beyond the Syllabus:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
73.	JDBC	3	12-09-26 10-10-26 11-11-26		**TLM2**	

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

PART-C

EVALUATION PROCESS (R20 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):

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.
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PO12	**Life-long learning**: Recognize the need for and have the preparation and ability to engaging 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
Signature				
Name of the Faculty	**Mrs M. Hema Latha**	**Dr Y.Viajaya Bhaskar Reddy**	**Dr. B.Srinivasa Rao**	**Dr. D. Ratna Kishore**

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DEPARTMENT OF COMPUTER SCIENCE AND 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/A **A.Y.:** 2026-27

PREREQUISITE: DATA STRUCTURES LAB

COURSE EDUCATIONAL OBJECTIVES:
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)

Reference Books:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh, 2ndEdition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2ndEdition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill

Online Learning Resources:
1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

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.	06	29-07-2026 05-08-2026		
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	12-08-2026		
3.	Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.	03	19-08-2026		
4.	Implement BFT for given graph, when graph is represented by a) Adjacency Matrix b) Adjacency Lists	03	02-09-2026		
5.	Implement DFT for given graph, when graph is represented by a) Adjacency Matrix b) Adjacency Lists	03	16-09-2026		
6.	Write a program for finding the bi-connected components in a given graph.	03	23-09-2026		
7.	Write a program to find maximum and minimum element in array using Divide and conquer.	03	15-07-2026		
8.	Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).	03	22-07-2026		
9.	Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.	03	30-09-2026		
10.	Implement Job Sequencing with deadlines using Greedy strategy.	03	07-10-2026		
11.	Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.	03	14-10-2026		
12.	Implement N-Queens Problem Using Backtracking.	03	28-10-2026		
13.	Implement Travelling Sales Person problem using Branch and Bound approach.	03	04-11-2026		
14.	Internal Exam	03	11-11-2026		

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 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.
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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. D. Srinivasa Rao**	**Dr. G. Rajendra**	**Dr. D. Ratna Kishore**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT ----PART-A

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

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 Sem-A** **A.Y.: 2026-27**

PRE-REQUISITE: Computer Programming Lab

COURSE EDUCATIONAL OBJECTIVE (CEO): The aim of this course is 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, JDBC connectivity
- Construct Threads, Event Handling, implement packages, Java FX GUI

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

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	-	-	-	-	-
CO5	3	2	2	-	2	-	-	-	-	-	-	2	-	-	2
1 –Low **2** –Medium **3**– High															

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

Experiments covering the Topics:

- Object Oriented Programming fundamentals- datatypes, control structures
- Classes, methods, objects, Inheritance, polymorphism
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, Java FX GUI

INDEX					
Week	Expected Date of execution	IDX	PROGRAM	Completion date	Sign
1	**16-07-2026**	**Data Types and Operators**			
		1.1	**Write a JAVA program to display default value of all primitive data type of JAVA**		
		1.2	**Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.**		
		1.3	**Automated Smart Greenhouse Monitoring System**		
		1.4	**Smart Warehouse Inventory and Employee Performance System**		
		1.5	**Smart Building Access Control System**		
		1.6	**Smart Logistics Company – Package ID Generation and Container Allocation**		
		1.7	**Smart Parking Lot Management System**		
2	**23-07-2026**	**Control Structures – conditional controls -- if, switch**			
		2.1	**Online Banking – Minimum Balance Verification System.**		
		2.2	**University Scholarship Eligibility System**		
		2.3	**Smart Electricity Billing System**		
		2.4	**Smart Movie Theater Ticketing System**		
		2.5	**Smart Hospital Appointment & Billing System.**		
3	**30-07-2026**	**Control Structures – loop controls – while, do—while,for**			
		3.1	**ATM Cash Withdrawal System**		
		3.2	**Restaurant Food Ordering System**		
		3.3	**Employee Payroll Processing System**		
		3.4	**Smart Highway Toll Plaza Management System.**		
		3.5	**LED Display Board Pattern Generator**		

4	06-08-2026	**Class, Method, Object, Constructor, Overloading**			
		4.1	**Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method. -- Smart Library Management System**		
		4.2	**Write a JAVA program implements method overloading. -- Smart Courier Service Charge Calculator**		
		4.3	**Write a JAVA program to implement constructor. -- Online Hotel Room Reservation System**		
		4.4	**Write a JAVA program to implement constructor overloading. -- Online Food Delivery Order System**		
		4.5	**Smart University Student Registration System**		
5	13-08-2026	**String Handling Functions**			
		5.1	**Employee Email Verification System**		
		5.2	**Online Shopping Coupon Verification System**		
		5.3	**Student Result Analysis System**		
		5.4	**Online Movie Ticket Booking System**		
		5.5	**Smart Hospital Patient Record System**		
6	20-08-2026	**Arrays**			
		6.1	**Write a JAVA program to search for an element in a given list of elements using binary search mechanism.**		
		6.2	**Write a JAVA program to sort for an element in a given list of elements using bubble sort.**		
		6.3	**Write a JAVA program using String Buffer to delete, remove character.**		
		6.4	**Student Attendance Monitoring System**		
		6.5	**College Student Marks Management System.**		
7	27-08-2026	**Inheritance and polymorphism**			
		7.1	**Write a JAVA program to implement Single Inheritance -- Hospital Management System**		
		7.2	**Write a JAVA program to implement multilevel Inheritance -- Online Shopping Order Tracking System**		

		7.3	Write a JAVA program for abstract class to find areas of different shape		
		7.4	Digital Payment System		
		7.5	Smart Ride Booking System		
8	03-09-2026	Interfaces, Packages			
		8.1	Write a JAVA program to implement Interface. What kind of Inheritance can be achieved? -- Smart Home Appliance Control System		
		8.2	Write a JAVA program give example for “super” keyword. -- Employee Payroll Management System		
		8.3	Write a JAVA program that implements Runtime polymorphism -- Online Food Delivery System		
		8.4	University Library Management System		
		8.5	Online Shopping Cart System		
9	10-09-2026	Random, date/time class, Lang , util packages, Enumeration			
		9.1	Lucky Draw Winner Selection System		
		9.2	Hospital Appointment Scheduling System		
		9.3	Employee Information Processing System		
		9.4	Online Food Delivery Order Tracking System.		
		9.5	Smart Banking Transaction System		
10	17-09-2026	Exception Handling			
		10.1	Write a JAVA program that describes exception handling mechanism		
		10.2	Write a JAVA program Illustrating Multiple catch clauses		
		10.3	Write a JAVA program for creation of Java Built-in Exceptions		
		10.4	Write a JAVA program for creation of User Defined Exception		
		10.5	Write a JAVA program that import and use the user defined packages		
11	24-09-2026	Files			
		11.1	Student Assignment Submission System		
		11.2	Student Result File Analyzer		
		11.3	Hospital Medical Report Backup System		
		11.4	College Feedback Report Generator		
		11.5	Bank Customer Record Management System.		

12	**01-10-2026**	**Multi threading**			
		12.1	Write a JAVA program that creates threads by extending Thread class.First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds,(Repeat the same by implementing Runnable)		
		12.2	Write a program illustrating is Alive and join ()		
		12.3	Write a Program illustrating Daemon Threads.		
		12.4	Write a JAVA program Producer Consumer Problem		
13	**08-10-2026**	**Java Fx**			
		13.1	Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)		
		13.2	Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI		
14	**15-10-2026**	**Colletion frame work**			
		14.1	Implement the programs using List Interface and its implemented classes.		
		14.2	Implement the programs using Set Interface and its implemented classes.		
		14.3	Implement the programs using Map Interface and its implemented classes.		
15	**29-10-2026**	**Rivision**			
16	**05-11-2026**	**Lab Internal Exam**			

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**
Signature				
Name of the Faculty	**Mrs M. Hemalatha**	**Dr. Y. Vijaya Bhaskara Reddy**	**Dr.B.Srinivasa rao**	**Dr.D. Ratna kishore**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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http://lbrce.ac.in/csit/index.php,hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs. Pavitra Ramachandrapuram
Course Name & Code : FULL SATCK DEVELOPMENT-I & 23CSS2
L-T-P Structure : **0-1-2** **Credits:** 2
Program/Sem/Sec : B. Tech/IT/III/A **A.Y.:** 2026-27

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	-	-	-	-	-

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	13/07/2026 & 14/7/2026		
2.	Introduction to Web and its applications & basic tags in HTML programming	4	20/07/2026& 21/7/2026		
3.	Lists, Links and Images	4	27/07/2026& 28/7/2026		
4.	HTML Tables, Forms and Frames	4	03/08/2026& 04/8/2026		
5.	HTML Tables, Forms and Frames	4	10/08/2026& 11/8/2026		
6.	HTML 5 and Cascading Style Sheets, Types of CSS	4	17/08/2026& 18/8/2026		
7.	HTML 5 and Cascading Style Sheets, Types of CSS	4	24/08/2026& 25/8/2026		
8.	Selector forms	4	31/08/2026& 01/09/2026		
9.	Selector forms	4	07/09/2026 & 08/09/2026		
10.	CSS with Color, Background, Font, Text and CSS Box Model	4	21/09/2026& 22/09/2026		
11.	CSS with Color, Background, Font, Text and CSS Box Model	4	28/09/2026 & 29/09/2026		
12.	Introduction to Java script and how to embedded JS in html	4	05/10/2026& 06/10/2026		
13.	Applying JavaScript - internal and external, I/O, Type Conversion	4	12/10/2026& 13/10/2026		
14.	JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects	4	26/10/2026& 27/10/2026		
15.	JavaScript Functions and Events	4	30/10/2026& 01/11/2026		
16.	Node.js	4	02/11/2026		
17.	Small project FSD-I Activity	01	03/11/2026		
18.	Add-On: Database connectivity using NodeJS Project	4	09/11/2026		

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.
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Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Signature				
Name of the Faculty	**Pavitra Ramachandrapuram**	**Dr.G. Rajendra**	**Dr.B.Srinivasa Rao**	**Dr.D. Ratna Kishore**

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT
PART-A

Name of Course Instructor : J.GeethaRenuka
Course Name & Code : Discrete Mathematics & Graph Theory & 23FE11
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : IT-B.Tech/III/B **A.Y.:** 2026-27
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	14-07-2026		TLM1	
2.	Propositional Calculus: Statements and Notations, Connectives	1	15-07-2026		TLM1	
3.	Well Formed Formulas, Truth Tables	1	16-07-2026		TLM1	
4.	Tautologies,	1	18-07-2026		TLM1	
5.	Equivalence of Formulas, Duality Law	1	21-07-2026		TLM1	
6.	Tautological Implications,	1	22-07-2026		TLM1	
7.	Normal Forms,	2	23-07-2026 25-07-2026		TLM1	
8.	Theory of Inference for Statement Calculus,	1	28-07-2026		TLM1	
9.	Consistency of Premises,	2	29-07-2026 30-07-2026		TLM1	
10.	Indirect Method of Proof, Predicate Calculus: Predicates	1	1-08-2026		TLM1	
11.	Predicative Logic, Statement Functions	1	4-08-2026		TLM1	
12.	Variables and Quantifiers	1	5-08-2026		TLM1	
13.	Free and Bound Variables	1	6-08-2026		TLM1	
14.	Inference Theory for Predicate Calculus	2	8-08-2026 11-08-2026		TLM1	
15.	Tutorial on Unit 1	1	12-08-2026		TLM3	
No. of classes required to complete UNIT-I: 18				**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	13-08-2026		TLM1	
17.	Principle of Inclusion-Exclusion	1	18-08-2026		TLM1	
18.	Relations: Properties, Operations	1	19-08-2026		TLM1	
19.	Partition and Covering,	1	20-08-2026		TLM1	
20.	Transitive Closure, Equivalence,	1	22-08-2026		TLM1	
21.	Compatibility and Partial Ordering, Hasse Diagrams	1	25-08-2026		TLM1	
22.	Functions: Bijective, Composition, Inverse,	1	27-08-2026		TLM1	
23.	Permutation, and Recursive Functions,	1	29-08-2026		TLM1	
24.	Seminar on Functions& Recursive Functions	1	01-09-2026		TLM6	

25.	Lattice and its Properties	1	02-09-2026		TLM1	
26.	Tutorial on Unit 2	1	03-09-2026		TLM3	
No. of classes required to complete UNIT-II: 10				**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**
27.	Basis of Counting, Permutations, Permutations with Repetitions	1	10-09-2026		TLM1	
28.	Circular and Restricted Permutations, Combinations,	1	12-09-2026		TLM1	
29.	Restricted Combinations	1	15-09-2026		TLM1	
30.	Binomial and Multinomial Coefficients and Theorems.	1	16-09-2026		TLM1	
31.	Recurrence Relations: Generating Functions, Function of Sequences,	1	17-09-2026		TLM1	
32.	Partial Fractions, Calculating Coefficient of Generating Functions	1	19-09-2026		TLM1	
33.	Recurrence Relations, Formulation as Recurrence Relations	1	22-09-2026		TLM1	
34.	Solving Recurrence Relations by Substitution	1	23-09-2026		TLM1	
35.	Solving Recurrence Relations Generating Functions	1	24-09-2026		TLM1	
36.	Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations	2	26-09-2026 29-09-2026		TLM1	
37.	Tutorial on UNIT III	1	30-09-2026		TLM3	
No. of classes required to complete UNIT-III: 12				**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**
38.	Basic Concepts, Graph Theory and its Applications	1	01-10-2026		TLM1	
39.	Subgraphs, Graph Representations: Adjacency and Incidence Matrices	2	03-10-2026 06-10-2026		TLM1	
40.	Isomorphic Graphs,	1	07-10-2026		TLM1	
41.	Paths and Circuits	1	08-10-2026		TLM1	
42.	Eulerian and Hamiltonian Graphs,	1	10-10-2026		TLM1	
43.	Tutorial on Graphs	1	13-10-2026		TLM3	
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
44.	Multigraphs,	1	14-10-2026		TLM1	
45.	Bipartite and Planar Graphs	1	15-10-2026		TLM1	
46.	Euler's Theorem	1	17-10-2026		TLM1	
47.	Graph Coloring	1	27-10-2026		TLM1	
48.	Covering	1	28-10-2026		TLM1	
49.	Chromatic Number	1	29-10-2026		TLM1	
50.	Spanning Trees, Prim's and Kruskal's Algorithms	1	31-10-2026		TLM1	
51.	BFS Spanning Trees.	1	03-11-2026		TLM1	
52.	DFS Spanning Trees	1	04-11-2026		TLM1	
53.	Tutorial on UNIT V	1	05-11-2026		TLM3	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Pigeon Hole Principle	1	11-Nov-26		**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 J.GeethaRenuka**	**Mrs. B.Swathi**	**Dr. G. Rajendra**	**Dr D.Ratnakishore**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr. BHANU PRATAP REDDY**
Course Name : **UHV- II: Understanding Harmony and Ethical Human Conduct**
Course Code : **23HS01** L-T-P Structure: **3-0-0** Credits: **3**
Program/Semester/Section : **B.Tech.(CS & IT)/III/B** A.Y. : **2026-27**

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 (**Understand-L2**)
CO2: Identify one's self, and one's surroundings (family, society nature) (**Understand-L2**)
CO3: Relate human values with human relationship and human society. (**Understand-L2**)
CO4: Illustrate the need for universal human values and harmonious existence (**Understand-L2**)
CO5: Develop as socially and ecologically responsible engineers (**Apply-L3**)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1			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.	Course Outcomes (COs)	1	15-07-2026		TLM2	
2.	Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)	2	16-07-2026 17-07-2026		TLM.2	
3.	Understanding Value Education	1	18-07-2026		TLM2	
4.	Practice Session PS1 Sharing about Oneself	2	22-07-2026 23-07-2026		TLM6	
5.	self-exploration as the Process for Value Education	2	24-07-2026 25-07-2026		TLM2	
6.	Continuous Happiness and Prosperity – the Basic Human Aspirations	2	29-07-2026 30-07-2026		TLM2	
7.	Practice Session PS2 Exploring Human Consciousness	2	31-07-2026 01-08-2026		TLM6	
8.	Happiness and Prosperity Current Scenario	1	05-08-2026		TLM2	
9.	Method to Fulfill the Basic Human Aspirations	1	06-08-2026		TLM2	
10.	Practice Session PS3 Exploring Natural Acceptance	2	07-08-2026 08-08-2026		TLM6	
No. of classes required to complete UNIT-I: 16				**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
11.	Understanding Human being as the Co-existence of the self and the body	1	12-08-2026		TLM2	
12.	Distinguishing between the Needs of the self and the body	2	13-08-2026 14-08-2026		TLM2	
13.	Practice Session PS4 Exploring the difference of Needs of self and body.	2	19-08-2026		TLM6	
14.	The body as an Instrument of the self	1	20-08-2026		TLM2	
15.	Understanding Harmony in the self	1	21-08-2026		TLM2	
16.	Practice Session PS5 Exploring Sources of	2	22-08-2026 27-08-2026		TLM6	

	Imagination in the self					
17.	Harmony of the self with the body	1	28-09-2026		TLM2	
18.	Programme to ensure self-regulation and Health	1	29-09-2026		TLM2	
19.	Practice Session PS6 Exploring Harmony of self with the body	1	03-09-2026		TLM6	
No. of classes required to complete UNIT-II: 12				**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
20.	Harmony in the Family – the Basic Unit of Human Interaction	2	10-09-2026 11-09-2026		TLM2	
21.	'Trust' – the Foundational Value in Relationship	1	12-09-2026		TLM2	
22.	Practice Session PS7 Exploring the Feeling of Trust	2	16-09-2026 17-09-2026		TLM6	
23.	'Respect' – as the Right Evaluation	1	18-09-2026		TLM1	
24.	Practice Session PS8 Exploring the Feeling of Respect	2	19-09-2026 23-09-2026		TLM6	
25.	Other Feelings, Justice in Human-to-Human Relationship	1	24-09-2026		TLM2	
26.	Understanding Harmony in the Society	2	25-09-2026 26-09-2026		TLM2	
27.	Vision for the Universal Human Order	1	30-09-2026		TLM2	
28.	Practice Session PS9 Exploring Systems to fulfil Human Goal	2	01-10-2026 07-10-2026		TLM6	
No. of classes required to complete UNIT-III: 14				**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
29.	Understanding Harmony in the Nature	2	08-10-2026 09-10-2026		TLM2	
30.	Interconnectedness, self-regulation	1	10-10-2026		TLM2	

31.	Practice Session PS10 Exploring the Four Orders of Nature	1	14-10-2026		TLM6	
32.	Realizing Existence as Co-existence at All Levels	1	15-10-2026		TLM2	
33.	The Holistic Perception of Harmony in Existence	1	16-10-2026		TLM2	
34.	Practice Session PS11 Exploring Co-existence in Existence.	1	17-10-2026		TLM6	
No. of classes required to complete UNIT-IV: 7				**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
35.	Natural acceptance of human values, Definitiveness of ethical human conduct	1	28-10-2026		TLM2	
36.	Practice Session PS12 Exploring Ethical Human Conduct	1	29-10-2026		TLM6	
37.	A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order	1	30-10-2026		TLM2	
38.	Competence in professional ethics	1	04-11-2026		TLM2	
39.	Practice Session PS13 Exploring Humanistic Models in Education	1	05-11-2026		TLM6	
40.	Holistic Technologies, Production Systems and Management Models-Typical Case	1	06-11-2026		TLM2	
41.	Strategy for transition from the present state to universal human order	1	07-11-2026		TLM2	
42.	Practice Session PS14 Exploring Steps of Transition towards Universal Human Order	1	11-11-2026		TLM6	
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: 2026-27

Description	From	To	Weeks
I Phase of Instructions	13-07-2026	05-09-2026	8W
I Mid Examinations	**07-09-2026**	**09-09-2026**	**½ W**
II Phase of Instructions	10-09-2026	17-10-2026	5 ½ W
Dussehra Holidays	19-10-2026	24-10-2026	1W
II Phase of Instructions continued…..	26-10-2026	11-11-2026	2 ½ W
II Mid Examinations	**12-11-2026**	**14-11-2026**	**½ W**
Preparation and Practical	16-11-2026	21-11-2026	1 W
Semester End Examinations	**23-11-2026**	**05-12-2026**	**2 W**

Signature				
Name of the Faculty	**Dr. BHANU PRATAP REDDY B**	**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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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. 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.: 2026-27**

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	13-07-2026		TLM1	
2.	Introduction to DLD, Number systems	1	15-07-2026		TLM2	
3.	Different Number systems	1	17-07-2026		TLM2	
4.	Conversions of one number to another number	1	18-07-2026		TLM2	
5.	Data Representations	1	20-07-2026		TLM2	
6.	**TUTORIAL-1**	1	22-07-2026		TLM3	
7.	Binary codes	1	24-07-2026		TLM2	
8.	Basic Logic gates and Universal gates	1	25-07-2026		TLM2, TLM4.	
9.	Boolean Logic functions	1	27-07-2026		TLM2	
10.	K-Maps Simplifications	2	29-07-2026		TLM2	
11.	Combinational circuits	1	31-07-2026		TLM2	
12.	Designing Decoder and Multiplexers	1	01-08-2026		TLM2	
13.	Assignment / Quiz	1	03-08-2026		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	05-08-2026		TLM2	
15.	Flip-flops(RS,JK,T,D),	2	07-08-2026 08-08-2026		TLM2, TLM6	
16.	Master slave flip-flop	1	10-08-2026		TLM1, TLM2	
17.	Conversion of flip-flops, Truth & excitation tables	2	12-08-2026 14-08-2026		TLM1, TLM2.	
18.	**TUTORIAL-2** **Activity Based Learning**	1	17-08-2026		TLM3	
19.	Registers	1	19-08-2026		TLM2	
20.	counters	1	21-08-2026		TLM1, TLM2	
21.	Basic structure of computer	1	22-08-2026		TLM2	
22.	Bus structure	1	24-08-2026		TLM2	
23.	Multi processors and multi computers	1	28-08-2026		TLM2	
24.	Computer generations	1	29-08-2026		TLM2	
25.	Von- Neumann Architecture	1	31-08-2026		TLM2	
26.	Assignment / Quiz	1			TLM3, TLM6.	
No. of classes required to complete UNIT-II: 15				**No. of classes taken:**		

I-MID EXAMINATIONS **07-09-2026 TO 09-09-2026**

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	02-09-2026		TLM2	
28.	Addition and Subtraction of Signed Numbers	1	05-09-2026		TLM2	
29.	Design of Fast Adders	1	11-09-2026		TLM2, TLM4.	
30.	Multiplication of Positive Numbers	1	12-09-2026		TLM2	
31.	Signed-operand Multiplication	1	16-09-2026		TLM2	
32.	**TUTORIAL-3**	1	18-09-2026		TLM3	
33.	Fast Multiplication	1	19-09-2026		TLM2	
34.	Integer Division,	1	21-09-2026		TLM2	
35.	Floating-Point Numbers and Operations	1	23-09-2026		TLM2	
36.	Processor Organization of Fundamental Concepts	1	25-09-2026		TLM2	
37.	Execution of a Complete Instruction	1	26-09-2026		TLM2	
38.	Multiple-Bus Organization	1	28-09-2026		TLM2	
39.	Hardwired Control	1	30-09-2026		TLM2	
40.	Micro programmed Control	1	03-10-2026		TLM2	
41.	Assignment / Quiz	1	05-10-2026		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	07-10-2026		TLM2	
43.	Semiconductor RAM Memories	1	09-10-2026		TLM2	
44.	Concept of memory hierarchical organization	1	10-10-2026		TLM2	
45.	Read-Only Memories, Speed, Size and Cost	1	12-10-2026		TLM2	
46.	**TUTORIAL-4**	1	14-10-2026		TLM3	
47.	Cache memory, Virtual Memories	1	16-10-2026		TLM2	
48.	Memory Management Requirements, Secondary Storage	1	17-10-2026		TLM2	
49.	Assignment / Quiz /	1	26-10-2026		TLM6	
No. of classes required to complete UNIT-IV: 08				**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
50.	Input/Output Organization: Accessing I/O Devices	1	28-10-2026		TLM2	
51.	Interrupts, Processor Examples	1	30-10-2026		TLM2	
52.	Peripheral devices –I/O sub-systems, Interface Circuits	1	31-10-2026		TLM2	
53.	**TUTORIAL-5**	1	02-11-2026		TLM3	
54.	I/O device interface	1	04-11-2026		TLM2	
55.	I/O transfers-program controlled, Interrupt driven, DMA.	1	06-11-2026		TLM2	
56.	Assignment / Quiz	1	07-11-2026		TLM6	
No. of classes required to complete UNIT-V: 07				**No. of classes taken:**		

II-MID EXAMINATIONS **12-11-2026 TO 14-11-2026**

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	09-11-2026		TLM2	
2.	Multicore Processors	1	11-11-2026		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	**13-07-2026**		
I Phase of Instructions	**13-07-2026**	05-09-2026	8W
I Mid Examinations	**07-09-2026**	**09-09-2026**	**3 Days**
II Phase of Instructions	10-09-2026	17-10-2026	5 ½ W
Dussehra Holidays	19-10-2026	24-10-2026	1 W
II Phase of Instructions Contd..	26-10-2026	11-11-2026	2 ½ W
II Mid Examinations	**12-11-2026**	**14-11-2026**	**3 Days**
Preparation and Practical's	16-11-2026	21-11-2026	1W
Semester End Examinations	**23-11-2026**	**05-12-2026**	**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	Dr. G. Rajendra	Dr. Ch. Venkata Narayana	Dr. G. Rajendra	Dr. D. Ratna Kishore
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND 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 / B **A.Y.:** 2026-27

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	13-07-2026		TLM1&2	
2.	Introduction to Algorithm-Characteristics	1	14-07-2026		TLM1&2	
3.	Pseudo code specifications-Sample Algorithm	2	15-07-2026 17-07-2026		TLM1&2	
4.	Algorithm Analysis- Time and Space Complexity - Examples	2	18-07-2026 20-07-2026		TLM1&2	
5.	Problems on finding space & time complexity of algorithms	1	21-07-2026		TLM1&2	
6.	Asymptotic Notations	2	22-07-2026 24-07-2026		TLM1&2	
7.	AVL Tree Operations	2	25-07-2026 27-07-2026		TLM1&2	
8.	**Tutorial:** AVL Tree operations	1	28-07-2026		TLM3	
9.	B-Tree operations	2	29-07-2026 31-07-2026		TLM1&2	
10.	Revision on Unit-1	1	01-08-2026			
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	03-08-2026		TLM1&2	
2.	Max Heap, Min Heap Construction-operations	1	04-08-2026		TLM1&2	
3.	Problems on Heap Tree Construction	1	05-08-2026		TLM1&2	
4.	Implementation of Heap Tree	1	07-08-2026		TLM1&2	
5.	Graph Terminology	1	10-08-2026		TLM1&2	
6.	Representations of Graphs	1	11-08-2026		TLM1&2	

7.	Basic Search and Traversal Techniques – DFS	1	12-08-2026		TLM1&2	
8.	Problems on DFS traversal	1	14-08-2026		TLM1&2	
9.	BFS – Example, Implementation	1	17-08-2026		TLM1&2	
10.	Connected Components, Bi-connected Components	2	18-08-2026 19-08-2026		TLM1&2	
11.	Examples of Connected Components	2	21-08-2026 22-08-2026		TLM1&2	
12.	Divide and Conquer General Method	1	24-08-2026		TLM1&2	
13.	Finding Max and Min	1	25-08-2026		TLM1&2	
14.	Merge Sort & Analysis	1	28-08-2026		TLM1&2	
15.	Quick sort & Analysis	2	29-08-2026 31-09-2026		TLM1&2	
16.	**Group Discussion:** Merge Sort & Quick Sort Complexity Analysis	1	01-09-2026		TLM6	
17.	Strassen' Matrix Multiplication	1	02-09-2026		TLM1&2	
18.	Revision on Unit-2	1	05-09-2026			
No. of classes required to complete UNIT-II: 21				**No. of classes taken:**		
I MID EXAMINATIONS (07-09-2026 TO 09-09-2026)						

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	11-09-2026		TLM1&2	
2.	Job Sequencing with dead Lines	1	15-09-2026		TLM1&2	
3.	Knapsack Problem	2	16-09-2026 18-09-2026		TLM1&2	
4.	Minimum Cost Spanning Tree-Kruskal Algorithm	1	19-09-2026		TLM1&2	
5.	Problems on different knapsack problem instances	2	21-09-2026 22-09-2026		TLM1,2	
6.	Prims Algorithm	1	23-09-2026		TLM1,2	
7.	Single Source Shortest Path	1	25-09-2026		TLM1,2	
8.	Optimal Storage on tapes	1	26-09-2026		TLM1,2	
9.	**Tutorial:** Analysis of Prims & Kruskal's algorithm	1	28-09-2026		TLM3	
10.	Huffman Coding	1	29-09-2026		TLM1&2	
11.	Revision on Unit-3	1	30-09-2026			
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	03-10-2026		TLM1&2	
2.	All pairs shortest path	1	05-10-2026		TLM1&2	
3.	Bellman Ford Algorithm	1	06-10-2026		TLM1&2	
4.	0/1 knapsack problem	2	07-10-2026 09-10-2026		TLM1&2	
5.	Optimal binary search tree	2	10-10-2026 12-10-2026		TLM1&2	
6.	String editing	1	13-10-2026		TLM1&2	
7.	**Tutorial:** Analysis of OBST	1	14-10-2026		TLM3	
8.	Travelling salesperson problem	1	16-10-2026		TLM1&2	
9.	Revision on Unit-4	1	17-10-2026			
No. of classes required to complete UNIT-IV: 11				**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	26-10-2026		TLM1&2	
2.	N-queens Problem	1	27-10-2026		TLM1&2	
3.	Graph Coloring	1	28-10-2026		TLM1&2	
4.	Sum of subsets problem	1	30-10-2026		TLM1&2	
5.	Introduction to Branch and Bound	1	31-10-2026		TLM1&2	
6.	0/1 Knapsack-LCBB, FIFOBB	1	02-11-2026		TLM1&2	
7.	**Tutorial:** Least Cost BB	1	03-10-2026		TLM3	
8.	Travelling Salesperson Problem -LC Search	1	06-11-2026		TLM1&2	
9.	Introduction to P and NP	1	07-11-2026		TLM1&2	
10.	NP-Complete Problems	1	09-11-2026		TLM1&2	
11.	Revision on Unit-5	1	10-11-2026			
No. of classes required to complete UNIT-V: 11				**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	11-11-2026		TLM1&2			
No. of classes required to complete - 1					No. of classes taken:			
II MID EXAMINATIONS (12-11-2026 TO 14-11-2026)								

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 2026-26

Description	From	To	Weeks
I Phase of Instructions	30-06-2026	23-08-2026	8W
I Mid Examinations	**25-08-2026**	**30-08-2026**	**1 W**
II Phase of Instructions	01-09-2026	01-11-2026	9W
II Mid Examinations	**03-11-2026**	**08-11-2026**	**1 W**
Preparation and Practical	10-11-2026	15-11-2026	1 W
Semester End Examinations	**17-11-2026**	**29-11-2026**	**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.
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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.
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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. D. Srinivasa Rao**	**Dr. G. Rajendra**	**Dr. D. Ratna Kishore**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : **Mr. Ch.Sambasivarao**
Course Name & Code : **Object Oriented Programming Through Java (23CS05)**
L-T-P Structure : **3-0-0** Credits: **3**
Program/Sem/Sec : **B.Tech.–IT /III Sem-B** A.Y.: **2026-27**

PRE-REQUISITE: Introduction to Programming

COURSE EDUCATIONAL OBJECTIVE (CEO):

The learning objectives of this course are to:

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

COURSE OUTCOMES (COs):

After successfil completeion of the course, the student will be able to:

CO1	Identify the syntax and semantics of java programming language and basic concepts of Java.	Understand – Level 2
CO2	Understand the basic concepts of object-oriented programming.	Understand – Level 2
CO3	Develop reusable programs using the concepts of inheritance, polymorphism, and interfaces.	Apply – Level 3
CO4	Apply the concepts of packages, exception handling & I/O streams to develop secure, error free, and efficient applications.	Apply - Level 3
CO5	Design multithreaded and GUI based applications which mimic the real word scenarios.	Apply – Level 3

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		

Text Books:

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, 11th edition, Herbert Schildt, TMH
R2:	Introduction to Java Programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:

L1:	https://nptel.ac.in/courses/106/105/106105191/
L2:	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0128804645816347_shared/overview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT – I: Object Oriented Programming, Datatypes, variables, Introduction to operators, 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.	Discussion of CEO's and CO's, Basic Concepts, Principles.	1	13-07-26		**TLM1**	
2.	Program Structure in java, writing Simple java Program	1	15-07-26		**TLM1**	
3.	Elements or tokens in java programs, Java programs, Java Statements, Command line arguments.	1	16-07-26		**TLM1**	
4.	User input to Programs, Escape sequences, comments, programe style.	1	17-07-26		**TLM1**	
5.	Data types, Declaration of variables, type casting. Scope of variables	1	18-07-26		**TLM1**	
6.	Literal constants, Symbolic Constants, formatted output with printf() Method,	1	20-07-26		**TLM1&4**	
7.	Static Variables and methods, Attribute Final.	1	22-07-26		**TLM1**	
8	Operators : Arithmetic, assignment, incr/decr , relational, ternary	1	23-07-26		**TLM2**	
9.	Operators : Logical Boolean, Logical Bitwise, precedance and associativity.	1	24-07-26		**TLM2**	
10.	If, nested if, if-else expressions	1	25-07-26		**TLM1 & 4**	
11.	Switch stament, iteration examples	1	27-07-26		**TLM1 & 4**	
12	While, do-while loops, break, continue statements.	1	29-07-26		**TLM 1 & 4**	
13.	for loop, nested for loop, for-each loop.	1	30-07-26		**TLM 1&4**	
14.	Sample Programs.	1	31-07-26		**TLM4**	
15.	Tutorial –I	1	01-08-26		**TLM 3 & 5**	
No. of classes required to complete UNIT – I: 15				**No. of classes taken:**		

UNIT – II: Classes & Objects, Constructors and Methods, 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
16.	Class, declaring members, methods, access modifiers. Creating objects.	1	03-08-26		TLM1	
17	Access the private and public members of class,assigning one object to another	1	05-08-26		TLM1	
18.	Constructor methods, overloading constructor methods.	1	06-08-26		TLM2	
19.	Nested classes, passing arguments by value, by reference.	1	07-08-26		TLM1	
20.	'this' keyword, class objects as parameters in methods, access control	1	10-08-26		TLM2	
21.	Recursive methods, nesting of methods	1	12-08-26		TLM1&4	
22.	final and static attributes.	1	13-08-26		TLM1	
23.	String handling, string class methods	1	14-08-26		TLM1&4	
24.	String Buffer Class, Interface char sequence	1	17-08-26		TLM1 &4	
25.	Programs on classes , construcors	1	19-08-26		TLM4	
26	Programs on string Handling	1	20-08-26		TLM4	

27	Programs on this, final, static, recursive methods.	1	21-08-26		TLM4	
28	Tutorial –II	1	22-08-26		**TLM 3 & 5**	
No. of classes required to complete UNIT – II: **13**				No. of classes taken:		

UNIT – III: Arrays , Inheritance, 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
29.	Declaration and initialization of arrays, storing array in computer memory. Accessing array elements.	1	24-08-26		**TLM1**	
30.	Operations on array elements, assigning array to another array, dynamic change of array size.	1	26-08-26		**TLM1&4**	
31.	Sorting Arrays, searching for value in an array.	1	27-08-26		**TLM1&4**	
32.	Class Arrays, 2D arrays, Arrays of Varying lengths.	1	28-08-26		**TLM2**	
33.	3D Arrays, Arrays as Vectors	1	29-08-26		**TLM2**	
34.	Relationship between classes – Has-a, Is-a, process of Inheritance	1	31-08-26		**TLM1**	
35.	Types of Inheritance. Universal super class – object class,	1	01-09-26		**TLM1**	
36.	Inhibiting inheritance of class using Final, Access control and inheritance	1	02-09-26		**TLM1**	
37.	Multi level Inheritance, Super keyword, constructor inheritance	1	03-09-26		**TLM1**	
38.	Method Overriding, Dynamic Method Dispatch, Abstract Classes.	1	05-09-26		**TLM1&4**	
39	Interfaces declaration and implementation.	1	10-09-26		**TLM1**	
40	Multiple interfaces and nested interfaces, inheritance of interfaces	1	11-09-26		**TLM1**	
41	Default and static methods in interfaces, functional interfaces, annotations.	1	12-09-26		**TLM1**	
42	Tutorial-III	1	15-09-26		**TLM3 & 5**	
No. of classes required to complete UNIT – III: 14				**No. of classes taken:**		

UNIT – IV: Packages and Java library, Exception Handling, Java I/O and 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
43.	Introduction, Defining Package, Importing Packages and Classes into Programs.	1	16-09-26		**TLM1**	
44.	Path and Class Path, Access Control, Java. Lang Package and its Classes	1	17-09-26		**TLM1**	
45.	Class Object, Enumeration, class Math, Wrapper Classes	1	18-09-26		**TLM1&4**	
46.	Auto-boxing and Auto-unboxing, Java util Classes and Interfaces.	1	19-09-26		**TLM1&4**	
47.	Formatter Class, Random Class, Time Package, Formatting for Date/Time in Java, Temporal Adjusters Class	1	21-09-26		**TLM1&4**	
48.	Hierarchy of Standard Exception Classes, Keywords try, catch, throw, throws, and finally Blocks	1	22-09-26		**TLM1**	
49.	Multiple Catch Clauses, Class Throwable	1	23-09-26		**TLM1&4**	

50.	Unchecked Exceptions, Checked Exceptions, Generating user defined exception	1	24-09-26		**TLM1&4**	
51.	Java I/O API, Standard I/O streams	1	25-09-26		**TLM1**	
52.	types, Byte streams, Character streams, Scanner class.	1	26-09-26		**TLM1**	
53	Files in Java	1	28-09-26		**TLM1**	
54	Files in Java	1	29-09-26		**TLM1**	
55	Tutorial -IV	1	30-09-26		**TLM3&5**	
No. of classes required to complete UNIT – IV: 13				**No. of classes taken:**		

UNIT – V: Multithreaded Programming, Java Collections, 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
56.	Need for Multiple Threads., Multithreaded Programming for Multi-core Processor, Thread Class	1	01-10-26		**TLM1**	
57.	Main Thread - Creation of New Threads, Thread States, Thread Priorities	1	03-10-26		**TLM1**	
58.	Synchronization, Inter-thread Communication- producer consumer problem.	1	05-10-26		**TLM1&4**	
59.	Purpose of Collection Framework, Hierarchy of collection Interfaces / classes	1	06-10-26		**TLM2**	
60.	Methods defined in Collection Interface, Interface Iterator	1	07-10-26		**TLM1&4**	
61.	Collection classes/Interfaces –List	1	08-10-26		**TLM2**	
62.	Collection classes/Interfaces –Set	1	09-10-26		**TLM2**	
63.	Collection classes/Interfaces –Map	1	10-10-26		**TLM2**	
64.	Overview of AWT	1	12-10-26		**TLM2**	
65.	Overview of Swings API, limitations	1	13-10-26		**TLM2**	
66	Java FX Scene Builder	1	14-10-26		**TLM2**	
67	Java FX App Window Structure	1	15-10-26		**TLM2**	
68	displaying text and image	1	16-10-26		**TLM2**	
69	event handling,	1	17-10-26		**TLM2**	
70	laying out nodes in scene graph,	1	26-10-26		**TLM2**	
71	mouse events	1	27-10-26		**TLM2**	
72	Tutorial - V	1	28-10-26		**TLM3&5**	
73	Revision and logic building	1	30-10-26		**TLM1&2**	
No. of classes required to complete UNIT – V : 17				**No. of classes taken :**		

Content Beyond the Syllabus:

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

73.	JDBC	3	2-11-26 3-11-26 5-11-26		**TLM2**	

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

PART-C

EVALUATION PROCESS (R20 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):

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.
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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 engaging 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
Signature				
Name of the Faculty	**Mr. Ch.Sambasivarao**	**Dr Y.Viajaya Bhaskar Reddy**	**Dr. B.Srinivasa Rao**	**Dr. D. Ratna Kishore**

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DEPARTMENT OF COMPUTER SCIENCE AND 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.:** 2026-27

PREREQUISITE: DATA STRUCTURES LAB

COURSE EDUCATIONAL OBJECTIVES:
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)

Reference Books:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh, 2ndEdition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2ndEdition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill

Online Learning Resources:
1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

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.	06	27-07-2026 03-08-2026		
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	10-08-2026		
3.	Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.	03	17-08-2026		
4.	Implement BFT for given graph, when graph is represented by a) Adjacency Matrix b) Adjacency Lists	03	24-08-2026		
5.	Implement DFT for given graph, when graph is represented by a) Adjacency Matrix b) Adjacency Lists	03	31-08-2026		
6.	Write a program for finding the bi-connected components in a given graph.	03	21-09-2026		
7.	Write a program to find maximum and minimum element in array using Divide and conquer.	03	13-07-2026		
8.	Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).	03	20-07-2026		
9.	Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.	03	28-09-2026		
10.	Implement Job Sequencing with deadlines using Greedy strategy.	03	05-10-2026		
11.	Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.	03	12-10-2026		
12.	Implement N-Queens Problem Using Backtracking.	03	26-10-2026		
13.	Implement Travelling Sales Person problem using Branch and Bound approach.	03	02-11-2026		
14.	Internal Exam	03	09-11-2026		

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.
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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.

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**M. Rajesh Reddy**	**Dr. D. Srinivasa Rao**	**Dr. G. Rajendra**	**Dr. D. Ratna Kishore**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT ----PART-A

Name of Course Instructor: **Mr. Ch.Sambasivarao**

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 Sem-B** **A.Y.: 2026-27**

PRE-REQUISITE: Computer Programming Lab

COURSE EDUCATIONAL OBJECTIVE (CEO): The aim of this course is 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, JDBC connectivity
- Construct Threads, Event Handling, implement packages, Java FX GUI

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

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	-	-	-	-	-
CO5	3	2	2	-	2	-	-	-	-	-	-	2	-	-	2
1 –Low **2** –Medium **3**– High															

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

Experiments covering the Topics:

- Object Oriented Programming fundamentals- datatypes, control structures
- Classes, methods, objects, Inheritance, polymorphism
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, Java FX GUI

INDEX					
Week	**Expected Date of execution**	**Index**	**PROGRAM**	**Completion date**	**Sign**
1	**14-07-2026**	**Data Types and Operators**			
		1.1	**Write a JAVA program to display default value of all primitive data type of JAVA**		
		1.2	**Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.**		
		1.3	**Automated Smart Greenhouse Monitoring System**		
		1.4	**Smart Warehouse Inventory and Employee Performance System**		
		1.5	**Smart Building Access Control System**		
		1.6	**Smart Logistics Company – Package ID Generation and Container Allocation**		
		1.7	**Smart Parking Lot Management System**		
2	**21-07-2026**	**Control Structures – conditional controls -- if, switch**			
		2.1	**Online Banking – Minimum Balance Verification System.**		
		2.2	**University Scholarship Eligibility System**		
		2.3	**Smart Electricity Billing System**		
		2.4	**Smart Movie Theater Ticketing System**		
		2.5	**Smart Hospital Appointment & Billing System.**		
3	**28-07-2026**	**Control Structures – loop controls – while, do—while,for**			
		3.1	**ATM Cash Withdrawal System**		
		3.2	**Restaurant Food Ordering System**		
		3.3	**Employee Payroll Processing System**		
		3.4	**Smart Highway Toll Plaza Management System.**		

		3.5	**LED Display Board Pattern Generator**		
4	**04-08-2026**	**Class, Method, Object, Constructor, Overloading**			
		4.1	**Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method. -- Smart Library Management System**		
		4.2	**Write a JAVA program implements method overloading. -- Smart Courier Service Charge Calculator**		
		4.3	**Write a JAVA program to implement constructor. -- Online Hotel Room Reservation System**		
		4.4	**Write a JAVA program to implement constructor overloading. -- Online Food Delivery Order System**		
		4.5	**Smart University Student Registration System**		
5	**11-08-2026**	**String Handling Functions**			
		5.1	**Employee Email Verification System**		
		5.2	**Online Shopping Coupon Verification System**		
		5.3	**Student Result Analysis System**		
		5.4	**Online Movie Ticket Booking System**		
		5.5	**Smart Hospital Patient Record System**		
6	**18-08-2026**	**Arrays**			
		6.1	**Write a JAVA program to search for an element in a given list of elements using binary search mechanism.**		
		6.2	**Write a JAVA program to sort for an element in a given list of elements using bubble sort.**		
		6.3	**Write a JAVA program using String Buffer to delete, remove character.**		
		6.4	**Student Attendance Monitoring System**		
		6.5	**College Student Marks Management System.**		
7	**01-09-2026**	**Inheritance and polymorphism**			
		7.1	**Write a JAVA program to implement Single Inheritance -- Hospital Management System**		
		7.2	**Write a JAVA program to implement multilevel Inheritance -- Online Shopping Order Tracking System**		

		7.3	Write a JAVA program for abstract class to find areas of different shape		
		7.4	Digital Payment System		
		7.5	Smart Ride Booking System		
8	15-09-2026	Interfaces, Packages			
		8.1	Write a JAVA program to implement Interface. What kind of Inheritance can be achieved? -- Smart Home Appliance Control System		
		8.2	Write a JAVA program give example for “super” keyword. -- Employee Payroll Management System		
		8.3	Write a JAVA program that implements Runtime polymorphism -- Online Food Delivery System		
		8.4	University Library Management System		
		8.5	Online Shopping Cart System		
9	22-09-2026	Random, date/time class, Lang , util packages, Enumeration			
		9.1	Lucky Draw Winner Selection System		
		9.2	Hospital Appointment Scheduling System		
		9.3	Employee Information Processing System		
		9.4	Online Food Delivery Order Tracking System.		
		9.5	Smart Banking Transaction System		
10	29-09-2026	Exception Handling			
		10.1	Write a JAVA program that describes exception handling mechanism		
		10.2	Write a JAVA program Illustrating Multiple catch clauses		
		10.3	Write a JAVA program for creation of Java Built-in Exceptions		
		10.4	Write a JAVA program for creation of User Defined Exception		
		10.5	Write a JAVA program that import and use the user defined packages		
11	06-10-2026	Files			
		11.1	Student Assignment Submission System		
		11.2	Student Result File Analyzer		
		11.3	Hospital Medical Report Backup System		
		11.4	College Feedback Report Generator		
		11.5	Bank Customer Record Management System.		

12	**13-10-2026**	**Multi threading**			
		12.1	Write a JAVA program that creates threads by extending Thread class.First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds,(Repeat the same by implementing Runnable)		
		12.2	Write a program illustrating is Alive and join ()		
		12.3	Write a Program illustrating Daemon Threads.		
		12.4	Write a JAVA program Producer Consumer Problem		
13	**27-10-2026**	**Java Fx**			
		13.1	Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)		
		13.2	Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI		
14	**03-11-2026**	**Colletion frame work**			
		14.1	Implement the programs using List Interface and its implemented classes.		
		14.2	Implement the programs using Set Interface and its implemented classes.		
		14.3	Implement the programs using Map Interface and its implemented classes.		
15	**10-11-2026**	**Lab Internal Exam**			

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.
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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**
Signature				
Name of the Faculty	**Mr. Ch.Sambasivarao**	**Dr. Y. Vijaya Bhaskara Reddy**	**Dr.B.Srinivasa rao**	**Dr.D. Ratna kishore**

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. G. RAJENDRA
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.:** 2026-27

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	1	-	2	-	2	-	-	-	-	-	-	2	-	-	3
CO2	1	-	2	-	2	-	-	-	-	-	-	2	-	-	3
CO3	1	-	2	-	2	-	-	-	-	-	-	2	-	-	3
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.	Introduction to Web and its applications & basic tags in HTML programming	3	16-07-2026		
2.	Lists, Links and Images	3	23-07-2026		
3.	HTML Tables, Forms and Frames	3	30-07-2026		
4.	HTML Tables, Forms and Frames	3	06-08-2026		
5.	HTML 5 and Cascading Style Sheets, Types of CSS	3	13-08-2026		
6.	Selector forms	3	20-08-2026		
7.	CSS with Color, Background, Font, Text and CSS Box Model	3	27-08-2026		
8.	Introduction to Java script and how to embedded JS in html	3	03-09-2026		
9.	Applying JavaScript - internal and external, I/O, Type Conversion	3	10-09-2026		
10.	JavaScript Conditional Statements and Loops,	3	17-09-2026		
11.	JavaScripts; Pre-defined and User-defined Objects	3	24-09-2026		
12.	JavaScript Functions and Events	3	01-10-2026		
13.	Additional Lab Experiments	3	08-10-2026		
14.	Revision	3	15-10-2026		
15.	Review of Project	3	29-10-2026		
16.	Internal Exam	3	05-11-2026		

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.

Academic Calendar:

Description	From	To	Weeks
Commencement of Class Work	**13-07-2026**		
I Phase of Instructions	**13-07-2026**	05-09-2026	8W
I Mid Examinations	**07-09-2026**	**09-09-2026**	**3 Days**
II Phase of Instructions	10-09-2026	17-10-2026	5 ½ W
Dussehra Holidays	19-10-2026	24-10-2026	1 W
II Phase of Instructions Contd..	26-10-2026	11-11-2026	2 ½ W
II Mid Examinations	**12-11-2026**	**14-11-2026**	**3 Days**
Preparation and Practical's	16-11-2026	21-11-2026	1W
Semester End Examinations	**23-11-2026**	**05-12-2026**	**2W**

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