FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

PROGRAM	**: I B.Tech., II-Sem., AI&DS-A**
ACADEMIC YEAR	**: 2023-24**
COURSE NAME & CODE	**: ENGINEERING PHYSICS**
L-T-P STRUCTURE	**: 3-0-0**
COURSE CREDITS	**3**
COURSE INSTRUCTOR	**: N. T. SARMA**
PRE-REQUISITE	**: Basic Knowledge of Physics**

Course Objectives:

To bridge the gap between the physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

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

CO 1	Analyze the intensity variation of light due to interference, diffraction and Polarization (Apply)
CO 2	Understand the basics of crystals and their structures (Understand)
CO 3	Summarize various types of polarization of dielectrics and classify the magnetic materials (Understand)
CO 4	Explain fundamentals of quantum mechanics and free electron theory of metals (Understand)
CO5	Identify the type of semiconductor using Hall Effect (Apply)

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

ENGINEERING PHYSICS												
COURSE DESIGNED BY	**FRESHMAN ENGINEERING DEPARTMENT**											
Course Outcomes PO's	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1. →	**3**	**3**	**2**	**1**	**1**	**1**	**1**					**1**
CO2.	**3**	**3**	**2**	**1**	**1**	**1**	**1**					**1**
CO3.	**3**	**3**	**2**	**1**	**1**	**1**						**1**
CO4.	**3**	**3**	**2**	**1**	**1**	**1**	**1**					**1**
CO5.	**3**	**3**	**2**	**1**	**1**	**1**	**1**					**1**
1 = Slight (Low) **2 = Moderate (Medium)** **3 = Substantial (High)**												

TEXT BOOKS

1. A Text book of "Engineering Physics" M.N. Avadhanulu, P.G. Kshirsagar, TVS Arun Murthy, S. Chand & Co., 11th Edition, 2019.
2. Engineering Physics – *D.K. Bhattacharya & Poonam Tandon, Oxford press (2015)*

REFERENCES

1. Engineering Physics - B.K.Pandey & S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press 2010.
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

WEB RESOURCES

1. http://www.loc.gov/rr/scitech/selected-internet/physics.html
2. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html
3. http://physicsdatabase.com/free-physics-books/
4. http://www.e-booksdirectory.com
5. http://www.thphys.physics.ox.ac.uk

TEACHING LEARNING METHODS			
TLM-1	Chalk and Talk	**TLM-4**	Demonstration (Lab/Field Visit)
TLM-2	PPT/AV illustrations	**TLM-5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM-3	Tutorial/Quiz/Assignment	**TLM-6**	Group Discussion/Project

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: INTERFERENCE, DIFFRACTION & POLARIZATION

Course Outcome :- CO 1; Text Book :- T1, R2

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Introduction to the Subject, Course Outcomes	1	13/02/2024		**TLM-2**		
2.	Principle of superposition, Interference of light	1	14/02/2024		**TLM-3**		
3.	Interference in thin films by reflection & applications	1	15/02/2024		**TLM-2**		
4.	Colors in thin films, Newton's rings	1	17/02/2024		**TLM-1**		
5.	Determination of wavelength and refractive index	1	20/02/2024		**TLM-4**		
6.	Problems & Assignment/Quiz	1	21/02/2024		**TLM-1**		

7.	Introduction, Fresnel and Fraunhoffer diffractions	1	22/02/2024		**TLM-3**		
8.	Fraunhoffer diffraction due to single slit	1	24/02/2024		**TLM-2**		
9.	Double slit & N slits (Qualitative)	1	27/02/2024		**TLM-4**		
10.	Diffraction Grating, Dispersive power & Resolving power of Grating-Qualitative	1	28/02/2024		**TLM-4**		
11.	Problems & Assignment/Quiz	1	29/02/2024		**TLM-3**		
12.	Introduction – Types of polarization	1	02/03/2024		**TLM-2**		
13.	Polarization by reflection, refraction & double refraction	1	05/03/2024		**TLM-2**		
14.	Nicol's prism	1	06/03/2024		**TLM-5**		
15.	Half wave and Quarter wave plates	1	07/03/2024		**TLM-2**		
16.	Problems & Assignment/Quiz	1	09/03/2024		**TLM-3**		
No. of classes required to complete UNIT-I: 16				No. of classes taken:			

UNIT-II: CRYSTALLOGRAPHY & X– RAY DIFFRACTION

Course Outcome :- CO 2; Text Book :- T1, R2

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Space lattice; Basis, Unit cell & Lattice parameters	1	12/03/2024		**TLM-3**		
2.	Bravais Lattices Crystal Systems (3D)	1	13/03/2024		**TLM-2**		
3.	Coordination number – Packing fraction of –SC, BCC	1	14/03/2024		**TLM-1**		
4.	Coordination number – Packing fraction of FCC	1	16/03/2024		**TLM-1**		
5.	Miller indices & Properties	1	19/03/2024		**TLM-2**		

6.	Separation between successive (hkl) planes	1	20/03/2024		**TLM-1**		
7.	Bragg's law; X–ray Diffractometer	1	21/03/2024		**TLM-2**		
8.	Crystal Structure determination by Laue's method	1	23/03/2024		**TLM-5**		
9.	Crystal Structure determination by Powder method	1	26/03/2024		**TLM-5**		
10.	Problems & Assignment/Quiz	1	27/03/2024		**TLM-3**		
11.	Revision	1	28/03/2024		**TLM-2**		
12.	Revision	1	30/03/2024		**TLM-2**		
13.	MID-1 Examinations	1	02/04/2024		**----**		
14.	MID-1 Examinations	1	03/04/2024		**----**		
15.	MID-1 Examinations	1	04/04/2024		**----**		
No. of classes required to complete UNIT-II: 12				No. of classes taken:			

UNIT-III : DIELECTRIC & MAGNETIC MATERIALS

Course Outcome :- CO 3; Text Book :- T1, R2

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Basic definitions, Relation between the electric vectors.	1	06/04/2024		**TLM-2**		
2.	Types of polarizations- Electronic polarization	1	06/04/2024		**TLM-1**		
3.	Types of polarizations - ionic & orientation polarizations (Qualitative)	1	10/04/2024		**TLM-1**		
4.	Lorentz internal field	1	13/04/2024		**TLM-2**		
5.	Claussius-Mosotti equation, Complex dielectric constant	1	16/04/2024		**TLM-1**		
6.	Frequency dependence & dielectric loss	1	18/04/2024		**TLM-5**		
7.	Problems & Assignment/Quiz	1	20/04/2024		**TLM-3**		

8.	Basic definitions, Relations & Atomic origin of magnetic Moment.	1	23/04/2024		**TLM-4**		
9.	Classification of magnetic materials- Dia, para, Ferro, anti-ferro & Ferri magnetic materials	1	24/04/2024		**TLM-2**		
10.	Domain concept for Ferromagnetism & Domain walls	1	25/04/2024		**TLM-2**		
11.	Hysteresis, soft and hard magnetic materials	1	27/04/2024		**TLM-5**		
12.	Problems & Assignment/Quiz	1	30/04/2024		**TLM-3**		
No. of classes required to complete UNIT-V: 12				No. of classes taken:			

UNIT-IV : QUANTUM MECHANICS & FREE ELECTRON THEORY

Course Outcome :- CO 4; Text Book :- T1, R2

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Dual nature of matter, De-Broglie's Hypothesis	1	01/05/2024		**TLM-2**		Extra hour
2.	Heisenberg's Uncertainty Principle, Significance & properties of wave function	1	02/05/2024		**TLM-2**		
3.	Schrodinger's time independent and dependent wave equations	1	04/05/2024		**TLM-1**		
4.	Particle in a one – dimensional infinite potential well	1	07/05/2024		**TLM-1**		
5.	Problems & Assignment/Quiz	1	08/05/2024		**TLM-3**		
6.	Classical free electron theory- merits and demerits	1	09/05/2024		**TLM-2**		
8.	Quantum free electron theory Electrical conductivity	1	11/05/2024		**TLM-2**		
10.	Fermi -Dirac distribution and temperature dependence	1	14/05/2024		**TLM-5**		
11.	Density of states, Fermi energy	1	15/05/2024		**TLM-1**		

12.	Problems & Assignment/Quiz	1	16/05/2024		**TLM-3**		
No. of classes required to complete UNIT-III: 12				No. of classes taken:			

UNIT-V : SEMICONDUCTOR PHYSICS

Course Outcome :- CO 5; Text Book :- T2, R1

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
1.	Formation of energy bands, classification of crystalline solids	1	18/05/2024		**TLM-6**		
2.	Intrinsic semiconductors, Density of charge carriers	1	21/05/2024		**TLM-1**		
3.	Electrical conductivity, Fermi level	1	22/05/2024		**TLM-2**		
4.	Extrinsic semiconductors, Density of charge carriers	1	23/05/2024		**TLM-1**		
5.	Dependence of Fermi energy on carrier concentration & temperature	1	25/05/2024		**TLM-2**		
6.	Drift and Diffusion Currents, Einstein's equation	1	28/05/2024		**TLM-1**		
7.	Hall Effect & its applications	1	29/05/2024		**TLM-4**		
8.	Problems & Assignment/Quiz	1	30/05/2024		**TLM-3**		
9.	MID-2 Examinations	1	04/06/2024		**----**		
10.	MID-2 Examinations	1	05/06/2024		**----**		
11.	MID-2 Examinations	1	06/06/2024		**----**		
12.	MID-2 Examinations	1	08/06/2024		**----**		
No. of classes required to complete UNIT-IV: 08				No. of classes taken:			

PART-C

EVALUATION PROCESS (R-23 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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Instructor	Course Coordinator	Module Coordinator	HOD
N. T. SARMA	**Dr. S. YUSUF**	**Dr. S. YUSUF**	**Dr. A. RAMI REDDY**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, (AUTONOMOUS)
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ISO 21001 : 2018, 50001 : 2018, 14001: 2015 Certified Institution
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FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM : I B. Tech., II-Sem., AI&DS - A
ACADEMIC YEAR : 2023-24
COURSE NAME & CODE : Differential Equations & Vector Calculus
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Dr. K. Jhansi Rani
COURSE COORDINATOR : Dr.
PRE-REQUISITES : Basics of Vectors, Differentiation, Integration

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enlighten the learners in the concept of differential equations and multivariable calculus
- To furnish the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real-world applications.

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

CO1: Solve the differential equations related to various engineering fields – **L3**

CO2: Apply knowledge of partial differentiation in modeling and solving of Partial differential equations – **L3**

CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence – **L3**

CO4: Evaluate the work done against a field, circulation and flux using Vector Calculus – **L3**

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

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

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

BOS APPROVED TEXT BOOKS:

T1 Dr. B.S. Grewal, "Higher Engineering Mathematics", 44nd Edition, Khanna Publishers, New Delhi, 2017.

T2 Erwin Kreyszig, *"Advanced Engineering Mathematics"*, 10th Edition, John Wiley & sons, New Delhi, 2018.

BOS APPROVED REFERENCE BOOKS:

R1 George B. Thomas, Maurice D. Weir and Joel Hass, "*Thomas Calculus*", 14th Edition, Pearson Publishers, 2018.

R2 Dennis G. Zill and Warren S. Jones and Bartlett, "*Advanced Engineering Mathematics*",2018.

R3 Glyn James, "*Advanced Modern Engineering Mathematics*", 5th Edition, Pearson Publishers, 2018.

R4 R.K. Jain and S.R.K. Iyengar, "*Advanced Engineering Mathematics*", 5th Edition (9th reprint), Alpha Science International Ltd., 2021.

R5 B. V. Ramana, "*Higher Engineering Mathematics*", 3rd Edition McGraw Hill Education, 2017.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	12-02-2024		TLM2			
2.	Course Outcomes, Program Outcomes	1	13-02-2024		TLM2			

UNIT-I: Differential Equations of first order and first degree

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
3.	Introduction to UNIT I	1	14-02-2024		TLM1	CO1	T1,T2	
4.	Linear Differential equation	1	15-02-2024		TLM1	CO1	T1,T2	
5.	Bernoulli's DE	1	16-02-2024		TLM1	CO1	T1,T2	
6.	Exact DE	1	19-02-2024		TLM1	CO1	T1,T2	
7.	Exact DE	1	20-02-2024		TLM1	CO1	T1,T2	
8.	Non-exact DE Type I	1	21-02-2024		TLM1	CO1	T1,T2	
9.	Non-exact DE Type II	1	22-02-2024		TLM1	CO1	T1,T2	
10.	Non-exact DE Type III	1	23-02-2024		TLM1	CO1	T1,T2	
11.	Non-exact DE Type IV	1	26-02-2024		TLM1	CO1	T1,T2	
12.	Newton's Law of cooling	1	27-02-2024		TLM1	CO1	T1,T2	
13.	Newton's Law of cooling	1	28-02-2024		TLM1	CO1	T1,T2	
14.	Law of natural growth and decay	1	29-02-2024		TLM1	CO1	T1,T2	
15.	Law of natural growth and decay	1	01-03-2024		TLM1	CO1	T1,T2	
16.	Electrical circuits	1	04-03-2024		TLM1	CO1	T1,T2	
17.	TUTORIAL - I	1	05-03-2024		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		14			No. of classes taken:			

UNIT-II: Linear Differential equations of higher order (Constant Coefficients)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
18.	Introduction to UNIT II	1	06-03-2024		TLM1	CO1	T1,T2	
19.	Solving a homogeneous DE	1	07-03-2024		TLM1	CO1	T1,T2	
20.	Finding Particular Integral, P.I for e^{ax+b}	1	11-03-2024		TLM1	CO1	T1,T2	
21.	P.I for Cos bx, or sin bx	1	12-03-2024		TLM1	CO1	T1,T2	
22.	P.I for polynomial function	1	13-03-2024		TLM1	CO1	T1,T2	
23.	P.I for $e^{ax+b}v(x)$	1	14-03-2024		TLM1	CO1	T1,T2	
24.	P.I for $x^k v(x)$	1	15-03-2024		TLM1	CO1	T1,T2	

25.	Method of Variation of parameters	1	18-03-2024		TLM1	CO1	T1,T2	
26.	Method of Variation of parameters	1	19-03-2024		TLM1	CO1	T1,T2	
27.	Simultaneous linear equations	1	20-03-2024		TLM1	CO1	T1,T2	
28.	Simultaneous linear equations	1	21-03-2024		TLM1	CO1	T1,T2	
29.	L-C-R circuits	2	22-03-2024 26-03-2024		TLM1	CO1	T1,T2	
30.	Simple Harmonic motion	1	27-03-2024 28-03-2024		TLM1	CO1	T1,T2	
31.	TUTORIAL - II	1	30-03-2024		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-II		16			No. of classes taken:			

I MID EXAMINATIONS (01-04-2024 TO 06-04-2024)

UNIT-III: Partial Differential Equations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
32.	Introduction to Unit III	1	08-04-2024		TLM1	CO2	T1,T2	
33.	Formation of PDE by elimination of arbitrary constants	1	10-04-2024		TLM1	CO2	T1,T2	
34.	Formation of PDE by elimination of arbitrary functions	1	12-04-2024		TLM1	CO2	T1,T2	
35.	Formation of PDE by elimination of arbitrary functions	1	15-04-2024		TLM1	CO2	T1,T2	
36.	Solving of PDE	1	16-04-2024		TLM1	CO2	T1,T2	
37.	Lagrange's Method	1	18-04-2024		TLM1	CO2	T1,T2	
38.	Lagrange's Method	1	19-04-2024		TLM1	CO2	T1,T2	
39.	Homogeneous Linear PDE with constant coefficients	1	22-04-2024		TLM1	CO2	T1,T2	
40.	TUTORIAL - III	1	23-04-2024		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-III		09			No. of classes taken:			

UNIT-IV: Vector Differentiation

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
41.	Introduction to UNIT IV	1	24-04-2024		TLM1	CO3	T1,T2	
42.	Vector Differentiation	1	25-04-2024		TLM1	CO3	T1,T2	
43.	Gradient	1	26-04-2024		TLM1	CO3	T1,T2	
44.	Directional Derivative	1	29-04-2024		TLM1	CO3	T1,T2	

45.	Directional Derivative	1	30-04-2024		TLM1	CO3	T1,T2	
46.	Divergence	1	01-05-2024		TLM1	CO3	T1,T2	
47.	Curl	1	02-05-2024		TLM1	CO3	T1,T2	
48.	Problems	1	03-05-2024		TLM1	CO3	T1,T2	
49.	Solenoidal fields, Irrotational fields, potential surfaces	1	06-05-2024		TLM1	CO3	T1,T2	
50.	Solenoidal fields, Irrotational fields, potential surfaces	1	07-05-2024		TLM1	CO3	T1,T2	
51.	Laplacian, second order operators	1	08-05-2024		TLM1	CO3	T1,T2	
52.	Vector Identities	1	09-05-2024		TLM1	CO3	T1,T2	
53.	Vector Identities	1	10-05-2024		TLM1	CO3	T1,T2	
54.	TUTORIAL IV	1	13-05-2024		TLM3	CO3	T1,T2	
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V: Vector Integration

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
57.	Introduction to Unit-V	1	14-05-2024		TLM1	CO4	T1,T2	
58.	Line Integral	1	15-05-2024		TLM1	CO4	T1,T2	
59.	Circulation	1	16-05-2024		TLM1	CO4	T1,T2	
60.	Work done	1	17-05-2024		TLM1	CO4	T1,T2	
61.	Surface Integral	1	20-05-2024		TLM1	CO4	T1,T2	
62.	Surface Integral	1	21-05-2024		TLM1	CO4	T1,T2	
63.	Flux	1	22-05-2024		TLM1	CO4	T1,T2	
64.	Green's Theorem	1	23-05-2024		TLM1	CO4	T1,T2	
65.	Green's Theorem	1	24-05-2024		TLM1	CO4	T1,T2	
66.	Stoke's Thoerem	1	27-05-2024		TLM1	CO4	T1,T2	
67.	Divergence Theorem	1	28-05-2024		TLM1	CO4	T1,T2	
68.	TUTORIAL - V	1	29-05-2024		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-V		12			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
69.	Non-homogeneous Linear PDE with constant coefficients	1	31-05-2024		TLM2	CO2	T1,T2	
No. of classes		1			No. of classes taken:			
II MID EXAMINATIONS (03-06-2024 TO 08-06-2024)								

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/SwayamPrabha/MOOCS)

TLM3	Tutorial	**TLM6**	Group Discussion/Project

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

Dr. K. Jhansi Rani	Dr. K. R. Kavitha	**Dr. A. RAMI REDDY**	**Dr. A. RAMI REDDY**
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF ECE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs.B.Rajeswari **Date**: 09-02-2024
Course Name & Code **:** Basic Electrical & Electronics Engineering – 23EE01
L-T-P Structure **: 3-0-0** **Credits:** 3
Program/Sem./Sec. : B.Tech/II/AIDS-A **A.Y.:** 2023-24
Regulations: R23

PREREQUISITE: Physics

Course Objectives (COs)

Basic Electrical Engineering:
To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.
Basic Electronics Engineering
To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

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

PART-A: BASIC ELECTRICAL ENGINEERING	
CO1	Extract electrical variables of AC & DC circuits using fundamental laws. **(Understand)**
CO2	Understand the operation of electrical machines and measuring instruments. **(Understand)**
CO3	Classify various energy resources, safety measures and interpret electricity bill generation in electrical systems. **(Understand)**
PART-B: BASIC ELECTRONICS ENGINEERING	
CO4	Interpret the characteristics of various semiconductor devices **(Knowledge)**
CO5	Infer the operation of rectifiers, amplifiers. **(Understand)**
CO6	Contrast various logic gates, sequential and combinational logic circuits. **(Understand)**

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3									1	3	2		2
CO2	2	2												2		3
CO3	2	2				3					2	2	2			
CO4	3	2										1	2		3	2
CO5	3	2										1	2		3	2
CO6	2	2	2										2		2	1
1 - Low **2 –**Medium **3 -** High																

TEXTBOOKS:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

4. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
5. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

REFERENCE BOOKS:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.
5. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
6. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
7. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

PART A: BASIC ELECTRICAL ENGINEERING

UNIT-I: DC & AC Circuits

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and Course Outcomes	1	08-04-2024		TLM1	
2.	**DC Circuits:** Electrical circuit elements (R, L and C)	1	12-04-2024		TLM1	
3.	Ohm's Law and its limitations, KCL & KVL	1	13-04-2024		TLM1	
4.	Series, Parallel, series-parallel circuits	1	15-04-2024		TLM1	
5.	Series, Parallel, series-parallel circuits	1	16-04-2024		TLM1	
6.	Superposition theorem	1	18-04-2024		TLM1	
7.	**AC Circuits:** A.C. Fundamentals:	1	19-04-2024		TLM1	
8.	Equation of AC Voltage and current, waveform	1	20-04-2024		TLM1	
9.	Time period, frequency, amplitude, phase, phase difference, average value, RMS value	1	22-04-2024		TLM1	
10.	Time period, frequency, amplitude, phase, phase difference, average value, RMS value	1	23-04-2024		TLM1	
11.	Time period, frequency, amplitude, phase, phase difference, average value, RMS value	1	25-04-2024		TLM1	
12.	Form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits	1	26-04-2024		TLM1	
13.	Concept of Impedance, Active power, reactive power and apparent power	1	27-04-2024		TLM2	
14.	Concept of power factor (Simple Numerical problems).	1	29-04-2024		TLM1	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Machines and Measuring Instruments

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	**Machines:** Construction, principle and operation of DC Motor	1	30-04-2024		TLM1	
16.	Construction, principle and operation of DC Generator	1	02-05-2024		TLM2	
17.	Construction, principle and operation of Single-Phase Transformer	1	03-05-2024		TLM2	
18.	Construction, principle and operation of Three Phase Induction Motor	1	04-05-2024		TLM2	
19.	Construction, principle and operation of Alternator	1	06-05-2024		TLM1	
20.	Applications of electrical machines	1	07-05-2024		TLM1	
21.	**Measuring Instruments:** Construction and working principle of Permanent Magnet Moving Coil (PMMC)	2	09-05-2024 10-05-2024		TLM2	
22.	Moving Iron (MI) Instruments	1	11-05-2024		TLM2	
23.	Wheatstone Bridge	1	13-05-2024		TLM1	
No. of classes required to complete UNIT-II: 09				**No. of classes taken:**		

UNIT-III: Energy Resources, Electricity Bill & Safety Measures

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	**Energy Resources**: Conventional and non-conventional energy resources	1	14-05-2024		TLM1	
25.	Layout and operation of various Power Generation systems: Hydel power generation	1	16-05-2024		TLM1	
26.	Layout and operation of nuclear power generation	1	17-05-2024		TLM1	
27.	Layout and operation of nuclear power generation	1	18-05-2024		TLM1	
28.	Layout and operation of Solar power generation	1	20-05-2024		TLM1	
29.	**Electricity bill:** Power rating of household appliances including air conditioners PCs, Laptops, Printers, etc.	1	21-05-2024		TLM1	
30.	Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, Calculation of electricity bill for domestic consumers	1	23-05-2024		TLM1	
31.	**Equipment Safety Measures:** Working principle of Fuse and	1	24-05-2024		TLM1	

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	Miniature Circuit Breaker (MCB), merits and demerits.					
32.	**Personal Safety Measures**: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.	2	25-05-2024 27-05-2024		TLM1	
33.	Revision of Unit-I, II & III	1	28-05-2024		TLM2	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

I Mid Examinations: 01-04-2024 to 06-04-2024

PART B: BASIC ELECTRONICS ENGINEERING

UNIT-I: Semiconductor Devices

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Introduction to Course and Course Outcomes	1	12-02-2024		TLM1	
35.	Evolution of electronics, Vacuum tubes to nano electronics	1	13-02-2024		TLM1	
36.	Characteristics of PN Junction Diode	1	15-02-2024		TLM1	
37.	Zener Effect — Zener Diode and its Characteristics	1	16-02-2024		TLM1	
38.	Bipolar Junction Transistor	1	17-02-2024		TLM1	
39.	Bipolar Junction Transistor	1	19-02-2024		TLM1	
40.	CB Configurations and Characteristics	1	20-02-2024		TLM2	
41.	CE Configurations and Characteristics.	1	22-02-2024		TLM2	
42.	CC Configurations and Characteristics.	1	23-02-2024		TLM2	
43.	Elementary Treatment of Small Signal CE Amplifier.	1	24-02-2024		TLM1	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Basic Electronic Circuits and Instrumentation

SI.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	**Rectifiers and power supplies**: Block diagram description of a DC power supply	1	29-02-2024		TLM1	
45.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	01-02-2024		TLM1	
46.	Working of full wave bridge rectifier, capacitor filter (no analysis)	1	02-03-2024		TLM1	
47.	**Amplifiers**: Block diagram of Public Address system	1	04-03-2024		TLM1	
48.	Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.	1	05-03-2024		TLM2	
49.	Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency	1	07-03-2024		TLM1	

Sl.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	response.					
50.	**Electronic Instrumentation:** Block diagram of an electronic instrumentation system.	1	09-03-2024		TLM2	
51.	Electronic Instrumentation: Block diagram of an electronic instrumentation system.	1	11-03-2024		TLM1	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Digital Electronics

Sl.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
52.	Overview of Number Systems	1	12-03-2024		TLM1	
53.	Logic gates including Universal Gates	1	14-03-2024		TLM2	
54.	BCD codes	1	15-03-2024		TLM1	
55.	Excess-3 code, gray code	1	16-03-2024		TLM2	
56.	Hamming code	1	18-03-2024		TLM1	
57.	Boolean Algebra	1	19-03-2024		TLM1	
58.	Basic Theorems and properties of Boolean Algebra	1	21-03-2024		TLM1	
59.	Truth Tables and Functionality of Logic Gates NOT, OR, AND, NOR, NAND, XOR and XNOR	1	22-03-2024		TLM1	
60.	Simple combinational circuits	1	23-03-2024		TLM2	
61.	Half and Full Adders	1	26-03-2024		TLM1	
62.	Introduction to sequential circuits, Flip flops	1	28-03-2024		TLM2	
63.	Registers and counters	1	30-03-2024		TLM2	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

II Mid Examinations: 03-06-2024 to 08-06-2024

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 & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), 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):	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions	12-02-2024	06-04-2024	8W
I Mid Examinations	01-04-2024	06-04-2024	1W
II Phase of Instructions	08-04-2024	01-06-2024	8W
II Mid Examinations	03-06-2024	08-06-2024	1W
Preparation and Practicals	10-06-2024	15-06-2024	1W
Semester End Examinations	17-06-2024	29-06-2024	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 modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO a	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO b	Design and analyze electrical machines, modern drive and lighting systems
PSO c	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO d	Design controllers for electrical and electronic systems to improve their performance.

Date: 07-02-2024

Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Mrs. B. Rajeswari	Dr. P. Rakesh Kumar	Dr. G. Srinivasulu	Dr. Y. Amar Babu

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT
PART-A

Name of Course Instructor(s): Dr. L. Prabhu, Mr. Rami Reddy, Mr. Uma Maheswar Reddy

Course Name & Code	: Engineering Graphics – 23ME01	**Regulations**	: R23
L-T-P Structure	: 2-0-2	**Credits**	: 03
Program/Sem/Sec	: B.Tech/II SEM AI & DS - A Section	**A.Y.**	: 2023-24
PREREQUISITE	: Engineering Physics, Mathematics		

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
- To impart knowledge on the projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
- To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

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

CO1	Understand the principles of engineering drawing, including engineering curves, scales, Orthographic and isometric projections. (**Understanding Level –L2**)
CO2	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. (**Applying Level –L3**)
CO3	Understand and draw projection of solids in various positions in first quadrant. (**Apply –L3**)
CO4	Able to draw the development of surfaces of simple objects. (**Applying Level –L3**)
CO5	Prepare isometric and orthographic sections of simple solids. (**Applying Level –L3**)

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

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

TEXTBOOKS:

T1 N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar publishers,2012

REFERENCE BOOKS:

R1 Narayana K L, Kannaiah P, Textbook on Engineering Drawing, 2nd Edition, SciTechpublishers.
R2 R.K.Dhawan, Engineering Drawing, S.Chand Company LTD.
R3 Venugopal, Engineering Drawing and Graphics, New Age publishers
R4 Dhananjay A. Jolhe, Engineering Drawing, Tata McGraw Hill Publishers
R5 N.S.Parthasarathy, Vela Murali, Engineering Drawing, Oxford Higher Education

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

UNIT - I: INTRODUCTION, GEOMETRICAL CONSTRUCTIONS, SCALES, CONICS, CYCLOIDS, INVOLUTES, ORTHOGRAPHIC PROJECTIONS OF POINTS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
01	Introduction to Engineering Graphics: COs, CEOs, POs and PEOs **UNIT I: INTRODUCTION:** Introduction to Engineering Drawing, Principles of Engineering Graphics,and their Significance	2	14-02-2024		TLM 1, 2	**CO 1**	**T1, R1 to R5**	
02	Drawing Instruments and their use-Conventions in Drawing, Lines, Lettering, and Dimensioning – BIS Conventions, Practice	2	14-02-2024		TLM 1, 2, 3	**CO 1**	**T1, R1 to R5**	
03	**Geometrical Constructions** and Constructing regular polygons by general methods, **Scales**: Plain scales, diagonal scales, and vernier scales	2	15-02-2024 21-02-2024		TLM 1, 2	**CO 1**	**T1, R1 to R5**	
04	Engineering **Curves**: Conic Sections, Construction of Ellipse, Parabola, and Hyperbola by general method only	3	21-02-2024		TLM 1, 2, 3	**CO 1**	**T1, R1 to R5**	
05	Construction of Cycloids, Involutes, Normal and tangent to Curves, Practice	2	23-02-2024 28-02-2024		TLM 1, 2	**CO 1**	**T1, R1 to R5**	
06	**Orthographic Projections**: Reference plane, importance of reference lines or Plane, Practice	3	28-02-2024		TLM 1, 2, 3	**CO 1**	**T1, R1 to R5**	
07	Projections of a point situated in any one of the four quadrants, Practice	2	01-03-2024 06-03-2024		TLM 1, 2, 3	**CO 1**	**T1, R1 to R5**	
No. of classes required to complete UNIT - I: 16 (Lecture:09 Practice: 07)			**No. of classes taken (including Practice):**					

UNIT-II: PROJECTIONS OF STRAIGHT LINES AND PLANES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
08	**Projections of straight lines:** Projections of straight lines parallel to both reference planes, perpendicular to one reference plane, and parallel to other reference planes	3	06-03-2024		TLM 1, 2, 3	**CO 2**	**T1, R1 to R5**	
09	Projections of lines inclined to one reference plane and parallel to the other reference plane, Practice	3	13-03-2024		TLM 1, 2, 3	**CO 2**	**T1, R1 to R5**	
10	Projections of Straight Line Inclined to both the reference planes, Practice	2	13-03-2024 15-03-2024		TLM 1, 2, 3	**CO 2**	**T1, R1 to R5**	
11	**Projections of Planes:** Projections of Regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane, Practice	3	20-03-2024		TLM 1, 2, 3	**CO 2**	**T1, R1 to R5**	
12	Projections of planes inclined to both the reference planes, Practice	2	20-03-2024		TLM 1, 2	**CO 2**	**T1, R1 to R5**	
13	Practice	2	20-03-2024		TLM 1, 2	**CO 2**	**T1, R1 to R5**	
14	Revision	1	22-03-2024		TLM 1, 2	**CO 2**	**T1, R1 to R5**	
15	Revision Practice	4	27-03-2024		TLM 1, 2	**CO 2**	**T1, R1 to R5**	
-	**I Mid Examinations: From 01-04-2024 to 06-04-2024 (Covered CO 1 & CO 2)**							
No. of classes required to complete UNIT - II: 15 (Lecture:08 Practice: 07)			**No. of classes taken (including Practice):**					

UNIT-III: PROJECTIONS OF SOLIDS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
14	Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to HP, Practice	4	10-04-2024		TLM 1, 2, 3	**CO 3**	**T1, R1 to R5**	
15	Projections of solids in simple positions: Axis perpendicular to vertical plane and Axis parallel to both the reference planes	2	12-04-2024 19-04-2024		TLM 1, 2	**CO 3**	**T1, R1 to R5**	
16	Projection of Solids with axis inclined to one reference plane and parallel to another plane, Practice	4	24-04-2024		TLM 1, 2, 3	**CO 3**	**T1, R1 to R5**	
17	Numericals	1	26-04-2024		TLM 1, 2	**CO 3**	**T1, R1 to R5**	
18	Practice	4	01-05-2024		TLM 1, 2, 3	**CO 3**	**T1, R1 to R5**	
No. of classes required to complete UNIT - III: 14 (Lecture:06 Practice: 08)			**No. of classes taken (including Practice):**					

UNIT-IV: SECTIONS OF SOLIDS & DEVELOPMENT OF SURFACES:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
19	Introduction to Sections of Solids and Development of Surfaces: Perpendicular and inclined section planes	2	03-05-2024 08-05-2024		TLM 1, 2	**CO 4**	**T1, R1 to R5**	
20	Sectional views and True shape of section, Practice	3	08-05-2024		TLM 1, 2, 3	**CO 4**	**T1, R1 to R5**	
21	Sections of solids in simple position only, Numericals	2	10-05-2024 15-05-2024		TLM 1, 2	**CO 4**	**T1, R1 to R5**	
22	**Development of Surfaces:** Introduction to Methods of Development of Surfaces, Parallel Line Development (Plane Surfaces), Practice	3	15-05-2024		TLM 1, 2, 3	**CO 4**	**T1, R1 to R5**	
23	Radial Line Development, Numericals	2	17-05-2024 22-05-2024		TLM 1, 2, 3	**CO 4**	**T1, R1 to R5**	
24	Practice	3	22-05-2024		TLM 1, 2, 3	**CO 4**	**T1, R1 to R5**	
No. of classes required to complete UNIT - IV: 15 (Lecture:06 Practice: 09)			**No. of classes taken (including Practice):**					

UNIT-V: CONVERSION VIEWS & COMPUTER GRAPHICS:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
25	Introduction to Isometric Views, Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views	1	24-05-2024		TLM 1, 2	**CO 5**	**T1, R1 to R5**	
26	Practice	3	29-05-2024		TLM 1, 2, 3	**CO 5**	**T1, R1 to R5**	
27	**Computer Graphics**: Creating 2D&3D drawings of objects, including PCB and Transformations using Auto CAD	1	31-05-2024		TLM 1, 2	**CO 5**	**T1, R1 to R5**	
No. of classes required to complete UNIT - V: 5 (Lecture:02 Practice: 03)			**No. of classes taken (including Practice):**					
II Mid Examinations: From 01-04-2024 to 06-04-2024 (Covered CO 3, CO 4 & CO 5)								

Teaching Learning Methods:

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

PART-C

EVALUATION PROCESS for EG Course (R23 Regulation):

Evaluation Task	Marks
I - Descriptive Examination (Units - I, II)	M1=15
II- Descriptive Examination (UNITs - III, IV & V)	M2=15
Day – to – Day Evaluation (UNITs - I, II, III, IV & V)	DDE=15
Mid Marks for 80% of Max (M1, M2) + 20% of Min (M1, M2)	M=15
Cumulative Internal Examination (CIE): M+ DDE	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDER - B.Tech - II Semester (R23):

Commencement of Class work		**12-02-2024**	
Description	**From**	**To**	**Weeks**
I Phase of Instructions	12-02-2024	06-04-2024	8 Weeks
I Mid Examinations	01-04-2024	06-04-2024	1 Week
II Phase of Instructions	08-04-2024	01-06-2024	8 Weeks
II Mid Examinations	03-06-2024	08-06-2024	1 Week
Preparation and Practicals	10-06-2024	15-06-2024	1 Week
Semester End Examinations	17-06-2024	29-06-2024	1 Week
Commencement of Next (III) Semester Class Work		**01-07-2024**	

Class Time Table - B.Tech – II Sem: AI &DS Section – B (R23)

↓Day/Date→	09.00 – 09.50	09.50 - 10.40	10.50 - 11.40	11.40 - 12.30	12.30 - 13.30	13.30 - 14.20	14.20 - 15.10	15.10 - 16.00
Monday					**LUNCH BREAK**			
Tuesday			**EG**					
Wednesday								
Thursday								
Friday						**EG**		
Saturday								

Day – to – Day work / Submission of Sheets

S.No	Unit No	Course Outcome	Sheet No. and Content
1	**I**	**CO 1**	1. Geometrical Constructions, Engineering Curves: Ellipse, Parabola, Hyperbola 2. Construction of Cycloids, involutes 3. Projections of Points
2	**II**	**CO 2**	4. Projections of straight lines 5. Projections of Planes
3	**III**	**CO 3**	6. Projections of Solids
4	**IV**	**CO 4**	7. Sections of Solids 8. Development of Surfaces
5	**V**	**CO 5**	9. Isometric views of simple solids, conversion of Isometric views to Orthographic Projections 10. Conversion of Orthographic Projections to Isometric Views

PART-D

Program Educational Objectives (PEOs):

PEO1: To develop intelligent systems with a cutting-edge combination of machine learning, analytics, and visualization technologies.

PEO2: To adapt the new technologies and develop the solutions to real world problems with ethical practices thereby contributing to the society.

PEO3: To continue education for fulfilling their long-term goals and achieve satisfaction as successful professionals in industry, academia and research.

Program Outcomes (POs):

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

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

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

PO4 - Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 - Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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

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

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

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

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

PO11 - Project Management and Finance: Demonstrate knowledge and understanding of the ring and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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.

Program Specific Outcomes (PSOs):

PSO1: To apply fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.

PSO2: To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.

PSO3: To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values.

Signature				
Name of the Faculty	Dr. L. Prabhu	Mr. J. Subba Reddy	Mr. J. Subba Reddy	Dr. P. Lovaraju
Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade,
ISO 21001:2018, 50001:2018, 14001:2015 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada.
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. S. Siva Ramakrishna
Course Name & Code : DATA STRUCTURES & 23CS02
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech./AI&DS/II/B **A.Y.:** 2023-24

PREREQUISITE: Programming for Problem Solving Using C-20CS01

COURSE EDUCATIONAL OBJECTIVES(CEO):

The objective of the course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

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

CO1	Understand the role of linear and nonlinear data structures in organizing and accessing data **(Understand-L2)**
CO2	Implement abstract data type (ADT) and data structures for given application. **(Apply-L3)**
CO3	Design algorithms based on techniques like linked list, stack, queue, trees etc. **(Apply-L3)**
CO4	Apply the appropriate linear and nonlinear data structure techniques for solving a problem. **(Apply-L3)**
CO5	Design hash-based solutions for specific problems. **(Apply-L3)**

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

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

TEXTBOOKS:

T1 Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.

T2 Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan AndersonFreed, Silicon Press, 2008

REFERENCE BOOKS:

R1 Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders

R2 C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft

R3 Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum

R4 Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein

R5 Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Linear Data Structures

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 Discussion of CO's	1	14-02-2024		TLM1	
2.	Definition and Importance of Linear Data Structures	1	15-02-2024		TLM1	
3.	Abstract Data Types and Implementation	1	16-02-2024		TLM1	
4.	Overview of time and space complexity	2	17-02-2024		TLM1	
5.	Analysis of Liner Data structures	1	21-02-2024		TLM1	
6.	Revise Arrays	1	22-02-2024		TLM1	
7.	Searching Techniques: Linear Search	1	23-02-2024		TLM1	
8.	Binary Search & Analysis	2	24-02-2024		TLM1	
9.	Bubble Sort & Analysis	1	28-02-2024		TLM1	
10.	Insertion Sort & Analysis	1	29-02-2024		TLM1	
11.	Selection Sort & Analysis	2	01-03-2024 02-03-2024		TLM1	
No. of classes required to complete UNIT-I: 15				**No. of classes taken:**		

UNIT-II: Linked Lists

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	List Implementation using Arrays and Array Disadvantages	1	06-03-2024		TLM1	
13.	Linked List Representation	1	07-03-2024		TLM1	
14.	Sing Linked List : Operations	3	13-03-2024 14-03-2024 15-03-2024		TLM1	
15.	Double Linked List : Operations	2	16-03-2024		TLM1	
16.	Circular Single Linked List	1	20-03-2024		TLM1	
17.	Circular Double Linked List	2	21-03-2024 22-03-2024		TLM1	
18.	Comparing Arrays and Linked List	2	23-03-2024		TLM1	
19.	Applications of Linked Lists: Polynomial Representation	2	27-03-2024 28-03-2024		TLM1	
20.	Polynomial Addition	1	30-03-2024		TLM1	
No. of classes required to complete UNIT-II: 13				**No. of classes taken:**		

UNIT-III: Stacks:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
21.	Introduction to Stacks : Properties	1	10-04-2024		TLM1	
22.	Operations of Stacks	1	12-04-2024		TLM1	
23.	Implementation of stacks using arrays	1	18-04-2024		TLM1	
24.	Stacks using Linked List	1	19-04-2024		TLM1	
25.	Expressions: Expression evaluation	2	20-04-2024 20-04-2024		TLM1	

26.	Infix to Postfix Conversion	2	19-04-2024 20-04-2024		TLM1	
27.	Checking Balanced Parenthesis	2	25-04-2024 25-04-2024		TLM1	
28.	Reversing a List	1	26-04-2024		TLM1	
29.	Backtracking	1	27-04-2024		TLM1	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Queues

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Introduction to queues: properties and operations,	1	27-04-2024		TLM1	
31.	Implementing queues using arrays	1	01-05-2024		TLM1	
32.	Implementing queues using Linked List	1	02-05-2024		TLM1	
33.	Applications of Queue : Scheduling	1	03-05-2024		TLM1	
34.	Breadth First Search	1	04-05-2024		TLM1	
35.	Circular Queue	2	04-05-2024 08-05-2024		TLM1	
36.	Double ended queue	2	09-05-2024 10-05-2024		TLM1	
37.	Applications of Deque	1	11-05-2024		TLM1	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: TREES & HASHING TECHNQIUES

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.	Introduction to Trees,	1	11-05-2024		TLM1	
39.	Representation of Trees	1	15-05-2024		TLM1	
40.	Tree Traversals	1	16-05-2024		TLM1	
41.	Binary Search Trees-Operations	3	17-05-2024 18-05-2024		TLM1	
42.	Hashing Introduction	1	22-05-2024		TLM1	
43.	Hash Functions	1	23-05-2024		TLM1	
44.	Collison Resolution Techniques: Separate Chaining	1	24-05-2024		TLM1	
45.	Open Addressing: Linear Probing	1	25-05-2024		TLM1	
46.	Quadratic Probing, Double Hashing	2	25-05-2024 29-05-2024		TLM1	
47.	Rehashing	1	30-05-2024		TLM1	
48.	Applications of Hashing	1	31-05-2024		TLM1	
49.	Revision		01-06-2024		TLM1	
No. of classes required to complete UNIT-V: 13				**No. of classes taken:**		

Content Beyond Syllabus

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

		Required	Completion	Completion	Learning Methods	Outcome COs	followed	Weekly
1.	Evaluation of Prefix Expression	1	18-04-2024					
2.	Towers of Hanoi	1	25-04-2024					
3.	Extendable Hashing	1	31-05-2024					
No. of classes		3			No. of classes taken:			
II MID EXAMINATIONS (03-06-2024 TO 08-06-2024)								

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	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr. S. Siva Ramakrishna**	**Dr. S. Nagarjuna Reddy**	**Dr. Y.V.B Reddy**	**Dr. O. Rama Devi**
Signature				

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

Part-A

PROGRAM	**:**	**B.Tech., I-Sem., AI&DS-A**
ACADEMIC YEAR	**:**	**2023-24**
COURSE NAME & CODE	**:**	**ENGINEERING PHYSICS LAB**
L-T-P STRUCTURE	**:**	**0 – 0 – 2**
COURSE CREDITS	**:**	**1**
COURSE INSTRUCTOR	**:**	**N. T. SARMA / Dr. N. Aruna**
COURSE COORDINATOR	**:**	

Pre-requisites : Nil

Course Objective: To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes:
CO1: Analyze the wave properties of light using optical instruments (Apply-L3).
CO2: Estimate the elastic modulii of various materials and acceleration due to gravity (Apply-L3).
CO3: Demonstrate the vibrations in stretched strings (Understand-L2).
CO4: Evaluate dielectric constant and magnetic field of circular coil carrying current (Apply-L3).
CO5: Examine the characteristics of semiconductor devices (Apply-L3).

Course articulation matrix (Correlation between CO's and PO's):

Engineering Physics Lab												
COURSE DESIGNED BY	**FRESHMAN ENGINEERING DEPARTMENT**											
Course Outcomes PO's →	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1.	**3**	**3**	**2**	**1**				**1**	**1**			**1**
CO2.	**3**	**3**	**2**	**1**				**1**	**1**			**1**
CO3.	**3**	**3**	**2**	**1**				**1**	**1**			**1**
CO4.	**3**	**3**	**2**	**1**				**1**	**1**			**1**
CO5.	**3**	**3**	**2**	**1**				**1**	**1**			**1**
1 = slight (Low)	**2 = Moderate (Medium)**							**3 = Substantial (High)**				

List of Experiments

1. Determination of radius of curvature of a given Plano - Convex lens by Newton's rings.
2. Determination of wavelengths of diffraction spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Determination of dielectric constant using charging and discharging method.
4. Determination of wavelength of a laser light using diffraction grating.
5. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
6. Determination of temperature coefficients of a thermistor.
7. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
8. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
9. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
10. Sonometer- Verification of laws of a stretched string.

References:

- A Textbook of Practical Physics – S. Balasubramanian, M.N. Srinivasan, S. Chand publishers,2017.

BOS APPROVED TEXT BOOKS:

1. Lab Manual Prepared by the LBRCE.

EVALUATION PROCESS:

Evaluation Task	**Marks**
Day-to-Day Work	A1 = **10**
Record & Observation	B1 = **5**
Internal Exam	C1 = **15**
Cumulative Internal Examination (CIE): (A1+B1+C1)	**30**
Semester End Examination (SEE)	**70**
Total Marks = CIE + SEE	**100**

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): CIVIL

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign
1.	Introduction & Demonstration	3	15/02/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
2.	Experiment 1	3	22/02/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
3.	Experiment 2	3	29/02/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
4.	Experiment 3	3	07/03/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
5.	Experiment 4	3	14/03/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
6.	Experiment 5	3	21/03/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
7.	Experiment 6	3	28/03/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
8.	**MID-1 Exam**	3	04/04/2024		**---**	**---**	**---**	
9.	Experiment 6	3	18/04/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
10.	Experiment 7	3	25/04/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
11.	Experiment 8	3	02/05/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
12.	Experiment 8	3	09/05/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
13.	Experiment 9	3	16/05/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
14.	Experiment 10	3	23/05/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	T1	
15.	**Internal Exam**	3	30/05/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	**---**	
16.	**Internal Exam**	3	30/05/2024		**TLM-4**	CO1, CO2, CO3, CO4 & CO5	**---**	
17.	**MID-2 Exam**	3	05/06/2024		**---**	**---**	**---**	
No. of classes required to complete lab		14			No. of classes taken:			

PROGRAM OUTCOMES: Engineering Graduates will be able to:

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

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

Course Instructor	Course Coordinator	Module Coordinator	H.O.D
N. T. SARMA	**Dr. S. YUSUF**	**Dr. S. YUSUF**	**Dr. A. RAMIREDDY**

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 Permanently Affiliated to JNTUK, Kakinada

L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.

Phone: 08659-222933, **Fax**: 08659-222931

DEPARTMENT OF ECE

LAB HANDOUT

PART-A

Date: 07-02-2024

Name of Course Instructor : Mrs. B. Rajeswari, Mr. M. Siva Sankara Rao, Mr. P. James Vijay, Mr. Ch. Siva Rama Krishna

Course Name & Code : Electrical & Electronics Engineering Workshop (E & EE WS)

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

Program/Sem/Sec : B.Tech., AIDS., II-Sem., Section- A **A.Y.** : 2023-24

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

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

CO1	Compute voltage, current and power in an electrical circuit. (**Apply**)
CO2	Compute medium resistance using Wheat stone bridge. (**Apply**)
CO3	Discover critical field resistance and critical speed of DC shunt generators. (**Apply**)
CO4	Estimate reactive power and power factor in electrical loads. (**Understand**)
CO5	Plot the characteristics of semiconductor devices. (**Apply**)
CO6	Demonstrate the working of various logic gates using ICs. (**Understand**)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2						2	3	2		1				
CO2	2	2		2				2	2	2						
CO3	2	2	2	2				2	2	2				2		
CO4	2	2		3				2	3	2		1	2			
CO5	3	2			2			2	2	2	1	1	2	2	3	2
CO6	3	3		2	2			2	3	3		1			3	
1 - Low **2 –**Medium **3 -** High																

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered. (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to BEEE Lab (Function Generators, CRO, RPS, Breadboard etc), Course Objectives and Outcomes.	3	13-02-2024		TLM4	
2.	Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.	3	20-02-2024		TLM4	
3.	Plot V – I characteristics of Zener Diode and its application as voltage Regulator.	3	27-02-2024		TLM4	
4.	Implementation of half wave and full wave rectifiers	3	05-03-2024		TLM4	
5.	Plot Input & Output characteristics of BJT in CE and CB configurations	3	19-03-2024		TLM4	
6.	Frequency response of CE amplifier.	3	26-03-2024		TLM4	
7.	Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs	3	02-04-2024		TLM4	
8.	Internal Lab Examination (**Electronics**)	3	16-04-2024		TLM4	
9.	Verification of KCL and KVL, Verification of Superposition Theorem	3	23-04-2024		TLM4	
10.	Measurement of Resistance using Wheat stone bridge	3	30-04-2024		TLM4	
11.	Magnetization Characteristics of DC Shunt Generator	3	07-05-2024		TLM4	
12.	Measurement of Power and Power factor using Single-phase wattmeter	3	14-05-2024		TLM4	
13.	Calculation of Electrical Energy for Domestic Premises	3	21-05-2024		TLM4	
14.	Internal Lab Examination (**Electricals**)	3	28-05-2024		TLM4	
No. of classes required: 42				**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 (R20 Regulation):

Evaluation Task	Expt. no's	Marks
Day to Day work	1,2,3,4,5,6,7,8…	A1 =10

Record and observation	1,2,3,4,5,6,7,8…	B1 = 5
Internal Exam	1,2,3,4,5,6,7,8…	**C1=15**
Cumulative Internal Examination (CIE):(A1+B1+C1)	1,2,3,4,5,6,7,8…	**30**
Semester End Examination (SEE)	1,2,3,4,5,6,7,8…	**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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO a	Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power
PSO b	Design and analyze electrical machines, modern drive and lighting systems
PSO c	Specify, design, implement and test analog and embedded signal processing electronic systems
PSO d	Design controllers for electrical and electronic systems to improve their performance.

Date: 07-02-2024

Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Mrs. B. Rajeswari	Mr. Ch. Mallikarjuna Rao	Dr. G. Srinivasulu	Dr. Y. Amar Babu

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L.B. Reddy Nagar, Mylavaram, NTR District, Andhra Pradesh - 521230
DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PROGRAM : B.Tech. II-Sem, A SECTION AI&DS

ACADEMIC YEAR : 2023-24

COURSE NAME & CODE : Engineering Workshop, 20ME51

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

COURSE CREDITS : 1.5

COURSE INSTRUCTOR : Mr. Mallikarjuna Rao Dandu, Sr. Assistant Professor,
Mr. S. Srinivasa Reddy, Sr. Assistant Professor

COURSE COORDINATOR : Seelam Srinivasa Reddy, Assoc. Professor

PRE-REQUISITE: Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability

COURSE OBJECTIVE:

The objective of this course is to get familiarized with various trades used in Engineering Workshop and learn the safety pre-cautions to be followed in the workshops, while working with the different tools.

COURSE OUTCOMES (CO)

CO1	Design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint.
CO2	Fabricate and model various basic prototypes in the trade of fitting such as Straight fit, V-fit.
CO3	Produce various basic prototypes in the trade of Tin smithy such as Rectangular tray, and open Cylinder.
CO4	Perform various basic House Wiring techniques.

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

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

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

REFERENCE:

R1	Lab Manual

COURSE DELIVERY PLAN (LESSON PLAN): Section-B (BATCH-B1)

S. No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	Induction	3	13-02-2024		TLM8	-	
2.	Demonstration	3	20-02-2024		TLM8	R1	
3.	Experiment-1	3	27-02-2024		TLM8	R1	
4.	Experiment-2	3	05-03-2024		TLM8	R1	
5.	Experiment-3	3	19-03-2024		TLM8	R1	
6.	Experiment-4	3	26-03-2024		TLM8	R1	
I-Mid Examinations (01-04-2024 to 06-04-2024)							
7.	Experiment-5	3	02-04-2024		TLM8	R1	
8.	Experiment-6	3	16-04-2024		TLM8	R1	
9.	Experiment-7	3	23-06-2024		TLM8	R1	
10.	Experiment-8	3	30-05-2024		TLM8	R1	
11.	Repetition lab	3	07-05-2024 14-05-2024 21-05-2024		TLM8	--	
12.	Lab Internal	3	28-05-2024		TLM6	--	

COURSE DELIVERY PLAN (LESSON PLAN): Section-B (BATCH-B2)

S. No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	Induction	3	13-02-2024		TLM8	-	
2.	Demonstration	3	20-02-2024		TLM8	R1	
3.	Experiment-1	3	27-02-2024		TLM8	R1	
4.	Experiment-2	3	05-03-2024		TLM8	R1	
5.	Experiment-3	3	19-03-2024		TLM8	R1	
6.	Experiment-4	3	26-03-2024		TLM8	R1	
I-Mid Examinations (01-04-2024 to 06-04-2024)							
7.	Experiment-5	3	02-04-2024		TLM8	R1	
8.	Experiment-6	3	16-04-2024		TLM8	R1	
9.	Experiment-7	3	23-06-2024		TLM8	R1	
10.	Experiment-8	3	30-05-2024		TLM8	R1	
11.	Repetition lab	3	07-05-2024 14-05-2024 21-05-2024		TLM8	--	
12.	Lab Internal	3	28-05-2024		TLM6	--	

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	12-02-2024	06-04-2024	8W
I Mid Examinations	01-04-2024	06-04-2024	1W
II Phase of Instructions	08-04-2024	01-06-2024	8W
II Mid Examinations	03-06-2024	08-06-2024	1W
Preparation and Practical's	10-06-2024	15-06-2024	1W
Semester End Examinations	17-06-2024	29-06-2024	2W

Part-C

EVALUATION PROCESS:

Parameter	Marks
Day–to–Day Work	A1=10 Marks
Record And Observation	B1= 05 Marks
Internal Test	C1 = 15 Marks
Cumulative Internal Examination (CIE = A1 + B1 + C1)	A1+B1+C1=30Marks
Semester End Examinations (SEE)	D1 = 70 Marks
Total Marks : A1+B1+C1+D1	100 Marks

Details of Batches: A-SEC

Batch No.	Reg. No. of Students	Number of Students	Batch No.	Reg. No. of Students	Number of Students
B11	23761A05466-5474	9	B21	23761A054A0-54A7	8
B12	23761A05475-5483	8	B22	23761A054A8-54B5	8
B13	23761A05484-5491	8	B23	23761A054B6-54C3	8
B14	23761A05492-5499	8	B24	23761A054C4-54D1	8

Batch No:	Exp. 01	Exp. 02	Exp. 03	Exp. 04	Exp. 05	Exp. 06	Exp. 07	Exp. 08	Exp. 09
B11	F1	F2	P1	P2	C1	C2	E1	E2	T1
B12	F2	F1	P2	P1	C2	C1	E2	E1	T1
B13	P1	P2	C1	C2	E1	E2	F1	F2	T1
B14	P2	P1	C2	C1	E2	E1	F2	F1	T1
B21	C1	C2	E1	E2	F1	F2	P1	P2	T1
B22	C2	C1	E2	E1	F2	F1	P2	P1	T1
B23	E1	E2	F1	F2	P1	P2	C1	C2	T1
B24	E2	E1	F2	F1	P2	P1	C2	C1	T1

LIST OF EXPERIMENTS:

Exp. No.	Name of the Experiment	Related CO
1.	Carpentry-1(C1)-Corner Bridle Joint	CO1
2.	Carpentry-2(C2)-Dove Tail Joint	CO1
3.	Fitting-1(F1)-L-**J**oint	CO2
4.	Fitting-2(F2)-V-**J**oint	CO2
5.	Plumbing-1(P1)-Pipe Threading practice	CO3
6.	Plumbing-2(P2)-Pipe Layout	CO3
7.	House Wiring-1(E1)–Series and Parallel connection	CO4
8.	HouseWiring-2(E2)–Fluorescent Lamp and Calling Bell Circuit	CO4
9.	Tinsmity-1(T1)- Rectangular Tray	CO2
10.	Demonstration- Welding and Foundry	CO2

NOTIFICATION OF CYCLE:

cycle	Exp. No.	Name of the Experiment	Related CO
Cycle 1	1.	Carpentry-1(C1)-Corner Bridle Joint	CO1
	2.	Carpentry-2(C2)-Dove tail Joint	CO1
	3.	Fitting-1(F1)-T-**J**oint	CO2
	4.	Fitting-2(F2)-V-**J**oint	CO2
	5.	Plumbing-1(P1)-Pipe Threading practice	CO3
Cycle 2	6.	Plumbing-2(P2)-PipeLayout	CO3
	7.	House Wiring-1(E1)–Series and Parallel Connection	CO4
	8.	House Wiring-2(E2)–Fluorescent Lamp and Calling bell Circuit	CO4
	9.	Tinsmity-1(T1)- Rectangular Tray	CO2
	10.	Demonstration- Welding and Foundry	CO2

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO1: To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.

PEO2: To inculcate strong ethical values and leadership qualities for graduates to become successful in multi-disciplinary activities.

PEO3: To develop inquisitiveness towards good communication and lifelong learning.

PROGRAM OUT COMES (POs)

Engineering Graduates will be able to :

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

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 multi disciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. To apply the principles of thermal sciences to design and develop various thermal systems.
2. To apply the principles of manufacturing technology, scientific management towards Improvement of quality and optimization of engineering systems in the design, analysis and manufacture ability of products.
3. To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructors	**Course Coordinator**	**Module Coordinator**	**HOD**
Mr. Mallikarjuna Rao Dandu Mr. S. Srinivasa Reddy	**Mr. S. Srinivasa Reddy**	**Mr. J. Subba Reddy**	**Dr. M. B. S Sreekara Reddy**

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. S. Siva Ramakrishna
Course Name & Code : DATA STRUCTURES LAB & 23CS52
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech/AI&DS/II/A **A.Y.:** 2023-24

PREREQUISITE: PPSC

COURSE EDUCATIONAL OBJECTIVE:
The objective of this course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

COURSE OUTCOMES (CO):
CO1: Apply Linear Data Structures for organizing the data efficiently **(Apply-L3)**
CO2: Apply Non- Linear Data Structures for organizing the data efficiently **(Apply-L3)**
CO3: Develop and implement hashing techniques for solving problems (**Apply - L3**)
CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

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

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

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

PART-B:

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Array Manipulations	3	19-02-2024		
2.	Searching and Sorting Techniques	3	26-02-2024		
3.	Single Linked List	3	04-03-2024		
4.	Double Linked List	3	11-03-2024		
5.	Circular Linked List	3	18-03-2024		
6.	Polynomial Representation & Polynomial Addition	3	08-04-2024		
7.	Linked List Applications	3	15-04-2024		
8.	Stack Implementation	3	22-04-2024		
9.	Stack Applications	3	29-04-2024		
10.	Queue Implementation & Circular Queue	3	06-05-2024		
11.	Double Ended Queue	3	13-05-2024		
12.	Trees, Hashing	3	20-05-2024		
13.	Internal Exam	3	27-05-2024		

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	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr. S. Siva Ramakrishna	Dr. S.Nagarjuna Reddy	Dr. Y.V.B Reddy	**Dr. O. Rama Devi**
Signature				