LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC with 'A' Grade, ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr Pawel Veliventi
Course Name & Code : Professional Communication-II (20FE02)
L-T-P Structure : 2-0-0   **Credits:** 2
Program/Sem/Sec : AI&DS/II/A   **A.Y.:** 2021-22
PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To improve English language proficiency of the students on various aspects like vocabulary, grammar, communication skills, listening skills, reading &writing skills

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

CO1	Produce a coherent paragraph interpreting a figure/graph/chart/table
CO2	Comprehend the given texts thoroughly by guessing the meanings of the words contextually
CO3	Use language appropriately for describing/comparing/contrasting/giving directions & suggestions
CO4	Write formal/informal dialogues with an understanding of verbal/non-verbal features of communication. Guess meanings of the words from the context
CO5	Write well structured essays, reports & resumé

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

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

TEXTBOOKS:

T1 Prabhavati.Y&etal, "English All Round–Communication Skills for Undergraduate Learners", Orient BlackSwan, Hyderabad, 2019

T2 "The Great Indian Scientists", Cengage Learning India Pvt. Ltd., Delhi, 2017

REFERENCE BOOKS:

R1 Swan,M., "Practical English Usage", Oxford University Press, 2016

R2 Kumar,S and Latha, P, "Communication Skills", Oxford University Press, 2018

R3 Rizvi Ashraf M.,"EffectiveTechnical Communication",TataMcGrawHill, NewDelhi, 2008

R4 Baradwaj Kumkum, "Professional Communication" ,I.K.International Publishing House Pvt. Lt.d, NewDelhi, 2008

R5 Wood,F.T., "Remedial English Grammar", Macmillan, 2007

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Fabric of Change

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.	H.G. Wells and the Uncertainties of Progress	1	5-5-22		TLM1	
2.	Studying the use of Graphic elements in texts	1	10-5-22		TLM1	
3.	Quantifying Expressions	1	12-5-22		TLM2	
4.	Adjectives and Adverbs	1	16-5-22		TLM2	
5.	Comparing and Contrasting	1	19-5-22		TLM3	
6.	Degrees of Comparison	1	24-5-22		TLM1	
7.	Information Transfer	1	26-5-22		TLM2	
No. of classes required to complete UNIT-I: 7				**No. of classes taken:**		

UNIT-II: Tools for Life

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
8.	Leaves from the Mental Portfolio of a Eurasian	1	31-5-22		TLM1	
9.	Global Comprehension & Detailed Comprehension	1	2-6-22		TLM1	
10.	Active & Passive Voice	1	7-6-22		TLM2	
11.	Idioms & Phrases	1	9-6-22		TLM1	
12.	Structured Essays using suitable claims and evidences	1	14-6-22		TLM2	
No. of classes required to complete UNIT-II: 5				**No. of classes taken:**		

UNIT-III: Homi Jahangir Bhabha

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Homi Jahangir Bhabha	1	16-6-22		TLM1	
14.	Words Often Confused	1	28-6-22		TLM1	
15.	Common Errors	1	30-6-22		TLM2	
16.	Incident & Investigation Reports	1	5-7-22		TLM2	
No. of classes required to complete UNIT-III: 4				**No. of classes taken:**		

UNIT-IV: Jagadish Chandra Bose

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Jagadish Chandra Bose	2	7-7-22 & 12-7-22		TLM1	
18.	Use of Antonyms	1	14-7-22		TLM1	
19.	Correction of Sentences	1	19-7-22		TLM3	
20.	Dialogue Writing	1	21-7-22		TLM1	
No. of classes required to complete UNIT-IV:5				**No. of classes taken:**		

UNIT-V: Prafulla Chandra Ray

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.	Prafulla Chandra Ray	2	26-7-22 & 28-7-22		TLM2	
22.	Analogy	1	2-8-22		TLM1	
23.	Sentence Completion	1	4-8-22		TLM2	
24.	Writing Résumé	1	11-8-22		TLM2	
No. of classes required to complete UNIT-V: 5				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & 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): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr Pawel Veliventi	Dr B Samrajya Lakshmi	Dr B Samrajya Lakshmi	Dr A Ramireddy
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT
PART-A

Name of Course Instructor :K. N. V. Lakshmi
Course Name & Code :Linear algebra & Transformation Techniques&20FE04
L-T-P Structure :2-1 -0 **Credits:3**
Program/Sem/Sec :I B.Tech/II sem/AIDS-A **A.Y.:**2021 - 22

PREREQUISITE:Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): In this course the students learn Matrix algebra. also students introduced to integral transformation which includes Laplace transformation and Z – Transformations.

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

CO1	Investigate the consistency of the system of equations and solve them.
CO2	Determine the Eigen vectors and inverse, powers of a matrix by using Cayley – Hamilton theorem.
CO3	Use the concepts of Laplace transforms to various forms of functions.
CO4	Solve Ordinary differential equations by using Laplace Transformations.
CO5	Apply Z- Transformations to solve difference equations.

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

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

TEXTBOOKS:
T1 Dr. B.S. Grewal, "Higher Engineering Mathematics", 42ndEdition, Khanna Publishers, New Delhi, 2012.
T2 Dr. B. V. Ramana, "Higher Engineering Mathematics", 1stEdition, TMH, New Delhi, 2010.

REFERENCE BOOKS:
R1 M. D. Greenberg, "Advanced Engineering Mathematics", 2nd Edition, TMH Publications, New Delhi, 2011.

R2 Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & sons, New Delhi, 2011.

R3 W.E. Boyce and R. C. Diprima, " Elementary Differential Equations" , 7th Edition, John Wiley & sons, New Delhi,2011.

R4   S. S. Sastry, " Introductory Methods of Numerical Analysis" 5th Edition, PHI Learning Private Limited, New Delhi, 2012.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Linear System of Equations

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to the course, Course Outcomes	1	02/05/22		TLM1	
2.	Introduction to UNIT I	1	04/05/22		TLM2	
3.	Echelon form of a matrix	1	06/05/22		TLM1	
4.	Echelon form of a matrix	1	09/05/22		TLM1	
5.	Normal form of a matrix	1	10/05/22		TLM1	
6.	Normal form of a matrix	1	11/05/22		TLM1	
7.	PAQ form	1	13/05/22		TLM1	
8.	Solution of Homogeneous linear system of equations	1	16/05/22		TLM1	
9.	**Tutorial 1**	1	17/05/22		TLM3	
10.	Solution of Non homogeneous Linear system of equations	1	18/05/22		TLM1	
11.	Solution of Non homogeneous Linear system of equations	1	20/05/22		TLM1	
12.	Solution of Non homogeneous Linear system of equations	1	23/05/22		TLM1	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Eigen values and Eigen Vectors

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to UNIT II	1	24/05/22		TLM2	
14.	Eigen values of a matrix	1	25/05/22		TLM1	
15.	Eigen values and Eigen vectors of a matrix	1	27/05/22		TLM1	
16.	Eigen values and Eigen vectors of a matrix	1	30/05/22		TLM1	
17.	Properties	1	31/05/22		TLM1	
18.	Properties	1	01/06/22			
19.	Cayley – Hamilton Theorem	1	03/06/22		TLM1	
20.	**TUTORIAL 2**	1	06/06/22		TLM3	
21.	Inverse and powers of a matrix by using Caley – Hamilton Theorem	1	07/06/22		TLM1	
22.	Inverse and powers of a matrix by using Caley – Hamilton Theorem	1	08/06/22		TLM1	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Laplace Transformation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Introduction to Unit-III	1	10/06/22		TLM2	
24.	Standard forms of Laplace	1	13/06/22		TLM1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	Transformations					
25.	Linear Property, Shifting Theorem	1	14/06/22		TLM1	
26.	Change of scale property, Multiplication by t	1	15/06/22		TLM1	
27.	Multiplication by t	1	17/06/22		TLM1	
28.	Division by t	1	27/06/22		TLM3	
29.	**TUTORIAL 3**	1	28/06/22		TLM 1	
30.	Transformation derivatives and Integrals	1	29/06/22		TLM1	
31.	Transformation integrals	1	01/07/22		TLM1	
32.	Unit step function and Dirac's delta function	1	04/07/22		TLM1	

No. of classes required to complete UNIT-III: 10 | **No. of classes taken:**

UNIT-IV: Inverse Laplace Transformations

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Introduction to UNIT IV	1	05/07/22		TLM1	
34.	Linear property	1	06/07/22		TLM1	
35.	Shifting properties	1	08/07/22		TLM1	
36.	Inverse Laplace transformation by using partial fractions	1	11/07/22		TLM1	
37.	Inverse Laplace transformation by using partial fractions	1	12/07/22		TLM1	
38.	Inverse Laplace Transformation by using Convolution theorem	1	13/07/22		TLM1	
39.	Inverse Laplace Transformation by using Convolution theorem	1	15/07/22		TLM3	
40.	**TUTORIAL 4**	1	18/07/22		TLM1	
41.	Solving of Ordinary differential equation by Laplace transform method	1	19/07/22		TLM1	
42.	Solving of Ordinary differential equation by Laplace transform method	1	20/07/22		TLM3	

No. of classes required to complete UNIT-IV: 10 | **No. of classes taken:**

UNIT-V: Z- Transformations

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Introduction to UNIT V	1	22/07/22		TLM1	
44.	Standard forms of Z-Transformation	1	25/07/22		TLM1	
45.	Damping rule	1	26/07/22		TLM1	
46.	Shifting Rule	1	27/07/22		TLM1	
47.	Initial and final value theorems	1	29/07/22		TLM1	
48.	Inverse Z – Transformations	1	01/08/22		TLM1	
49.	Inverse Z – Transfroms by using partial fractions	1	02/08/22		TLM1	
50.	Inverse Z – Transformation by using convolution theorem	1	03/08/22		TLM1	
51.	Solving Difference equations by using Z – Transformations	1	05/08/22		TLM1	
52.	Solving Difference equations by using Z - Transformations	1	8/08/22		TLM1	

53.	**TUTORIAL 5**	1	10/08/22		TLM3	
54.	Content beyond the syllabus	1	12/08/22		TLM5	
No. of classes required to complete UNIT-V:12				**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	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- DescriptiveExamination (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): 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 theinformation 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 orleader 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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	K. N. V. Lakshmi	Dr. K. Jhansi Rani	Dr. A. Rami Reddy	Dr. A. Rami Reddy
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

Part-A

PROGRAM	:	**B.Tech., II-Sem., AI & DS**
ACADEMIC YEAR	:	**2021-22**
COURSE NAME & CODE	:	**APPLIED PHYSICS LAB & 20FE54**
L-T-P STRUCTURE	:	**0 – 0 – 3**
COURSE CREDITS	:	**1.5**
COURSE INSTRUCTOR	:	**N. T. SARMA / Dr. P.V.N.Kishore**
COURSE COORDINATOR	:	**N. T. SARMA**

Pre-requisites :   Nil

Course Educational Objective: This course enables the students to acquire theoretical ideas, analytical techniques, and graphical analysis, by completing a host of experiments with the procedures and observational skills for appropriate use of simple and complex apparatus.

Course Outcomes: At the end of the course, the student will be able to:
CO 1:   Analyse the wave characteristics of light.
CO 2:   Estimate the magnetic field using Stewart's and Gee's apparatus.
CO 3:   Verify the characteristics of semiconductor diodes.
CO 4:   Determine the acceptance angle and numerical aperture of optical fibre.
CO 5:   Improve report writing skills and individual teamwork with ethical values.

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

Applied Physics Lab												
COURSE DESIGNED BY	FRESHMAN ENGINEERING DEPARTMENT											
Course Outcomes	**Programme Outcomes**											
PO's →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1.	3	3	1	1								1
CO2.	3	3	1	1								1
CO3.	3	3	1	1								1
CO4.	3	3	1	1								1
CO5.								2	2	2		

BOS APPROVED TEXT BOOKS:
1. Lab Manual Prepared by the LBRCE.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): CSE – B

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	02/05/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
2.	Experiment 1	3	09/05/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
3.	Experiment 2	3	16/05/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
4.	Experiment 3	3	23/05/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
5.	Experiment 4	3	30/05/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
6.	Experiment 5	3	06/06/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
7.	Demonstration	3	13/06/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
8.	Experiment 6	3	27/06/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
9.	Experiment 7	3	04/07/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
10.	Experiment 8	3	11/07/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
11.	Experiment 9	3	18/07/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
12.	Experiment 10	3	25/07/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
13.	**Internal Exam**	3	01/08/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
14.	**Internal Exam**	3	08/08/2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
No. of classes required to complete lab					No. of classes taken:			

EVALUATION PROCESS:

Evaluation Task	Expt. no's	Marks
Day to Day work = **A**	1,2,3,4,5,6,7,8,9,10	A = 05
Internal test = **B**	1,2,3,4,5,6,7,8,9,10	B = 05
Evaluation of viva voce = **C**	1,2,3,4,5,6,7,8,9,10	C = 05
Cumulative Internal Examination : A + B + C = 15	1,2,3,4,5,6,7,8,9,10	**15**
Semester End Examinations = D	1,2,3,4,5,6,7,8,9,10	**D = 35**
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8,9,10	**50**

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. P. V. N. Kishore   N. T. SARMA   Dr. S. YUSUB   Dr. A. RAMIREDDY

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

PROGRAM   **: B.Tech**, II-Sem

ACADEMIC YEAR   **:** 2021-22

COURSE NAME & CODE **:** Discrete Mathematical Structures – 20CS04

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

COURSE CREDITS   **:** 3

COURSE INSTRUCTOR   **:** V.CHANDRA KUMAR

COURSE COORDINATOR **:** V.CHANDRA KUMAR

PRE-REQUISITE: Basic Mathematical Knowledge.

COURSE OBJECTIVE: In this Course student will learn about- The objective of the course is to perform the operations associated with relations and functions. Relate practical examples to the functions and relations and interpret the associated operations and terminology used in the context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior of software or to solve problems such as puzzles.

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

CO1	Construct mathematical arguments using logical connectives & quantifiers and verify them.**(Understand – L2)**
CO2	Demonstrate the basic terminology of functions, relations, lattices, and their operations.**(Understand – L2)**
CO3	Apply the properties of graphs to solve the graph theory problems in Computer science.**(Apply – L3)**
CO4	Illustrate the basic principles/techniques to solve different algebraic structures & combinatorial problems.**(Apply – L3)**
CO5	Solve linear recurrence relations by recognizing homogeneity using constant coefficients characteristic roots and Generating functions. **(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	3													
CO2	3	3	1	2											
CO3	3	3	1	2											
CO4	3	3	2	1											
CO5	3	3	1												
1 - Low					**2 –**Medium					**3 –** High					

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 Tremblay, Manohar, Discrete Mathematical Structures with Applications to ComputerScience, TMH Publications[units- 1,2,3,4,5]

BOS APPROVED REFERENCE BOOKS:

R1 Chandrasekaran,Umaparvathi,DiscreteMathematics,PHI, 2010[1,2,3,4,5]

R2 Ralph. P.Grimaldi, Ramana, Discrete and Combinational Mathematics,Pearson,5th edition. [1,2,3,4,5]

R3 https://nptel.ac.in/courses/106/106/106106183/[1,2,3,4,5] .

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)
UNIT-I

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.	Statements and Notations , Connectives	1	03-05-2022		2,4	CO1	T1,R1	
2.	Truth Tables, Tautologies	1	05-05-2022		2,4	CO1	T1,R1	
3.	Equivalence of Formulas	1	06-05-2022		2,4	CO1	T1,R1	
4.	Implications	1	07-05-2022		2,4	CO1	T1,R1	
5.	Tautological Implications		10-05-2022		2,4	CO1	T1,R1	
6.	Normal Forms Disjunctive Normal Form	1	12-05-2022		2,4	CO1	T1,R1	
7.	PCNF, PDNF	1	13-05-2022		2,4	CO1	T1,R1	
8.	Theory of Inference for Statement Calculus	1	14-05-2022		2,4	CO1	T1,R1	
9.	Consistency of Premises	1	17-05-2022		2,4	CO1	T1,R1	
10	Indirect Method of Proof, Predicate Logic	1	19-05-2022		2,4	CO1	T1,R1	
11	Statement Functions	1	20-05-2022		2,4	CO1	T1,R1	
12	Variables and Quantifiers.	1	21-05-2022		2,4	CO1	T1,R1	
13	**Tutorial- I**	1	24-05-2022		3			
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
14.	Introduction to Sets, representation of Sets.	1	26-05-2022		2,4	CO2	T1,R1	
15.	Operation on Sets	1	27-05-2022		2,4	CO2	T1,R1	
16.	Properties of Binary Relations	1	28-06-2022		2,4	CO2	T1,R1	
17.	Relation Matrix	1	31-06-2022		2,4	CO2	T1,R1	
18.	Operations on Relations, Transitive Closure	1	02-06-2022		2,4	CO2	T1,R1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Equivalence Relation	1	03-06-2022		2,4	CO2	T1,R1	
20.	Compatibility and Partial Ordering Relations	1	04-06-2022		2,4	CO2	T1,R1	
21.	Hasse Diagrams	1	07-06-2022		2,4	CO2	T1,R1	
22.	Lattices: LUB, GLB.	1	09-06-2022		2,4	CO2	T1,R1	
23	**Functions**: Bijective Functions	1	10-06-2022		2,4	CO2	T1,R1	
24	Composition of Functions	1	11-06-2022		2,4	CO2	T1,R1	
25	Inverse Functions, **Tutorial-II**	1	14-06-2022		3			
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
26.	**Graph Theory I :** Basic Concepts of Graphs	1	16-06-2022		2,4	CO3	T1,R2	
27.	Matrix Representation of Graphs: Adjacency Matrices	1	17-06-2022		2,4	CO3	T1,R2	
28.	Incidence Matrices, Isomorphic Graphs	1	18-06-2022		2,4	CO3	T1,R2	
29.	Eulerian and Hamiltonian Graphs.	1	18-06-2022		2,4	CO3	T1,R2	
30.	**Graph Theory II:** Planar Graphs, Euler's Formula	1	28-06-2022		2,4	CO3	T1,R2	
31.	Graph Coloring, Chromatic Number	1	30-06-2022		2,4	CO3	T1,R2	
32.	Graph Traversals: BFS, DFS	1	02-06-2022		2,4	CO3	T1,R2	
33.	Trees**:** Spanning Trees: Properties	1	03-07-2022		2,4	CO3	T1,R2	
34	Algorithms for Minimum cost Spanning Trees	1	04-07-2022		2,4	CO3	T1,R2	
35.	**Tutorial-III**	1	07-07-2022		3			
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
36.	**Algebraic Structures & Combinatorics** Algebraic Systems with one Binary Operation	1	09-07-2022		1,4,5	CO4	T1,R2	
37.	Properties of Binary operations	1	10-07-2022		1,4,5	CO4	T1,R2	
38.	Semi groups and Monoids: Homomorphism of Semi groups and Monoids	1	11-07-2022		1,4,5	CO4	T1,R2	
39.	Group, Abelian group	1	14-07-2022		1,4,5	CO4	T1,R2	
40.	Sub Groups	1	16-07-2022		1,4,5	CO4	T1,R2	
41.	Lagrange's Theorem	1	17-07-2022					
42.	**Combinatorics:** Basic of Counting,	1	18-07-2022					

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
43.	Permutations, Combinations,	1	21-07-2022					
44.	Combinations with repetition Pigeonhole Principle	1	23-07-2022		1,4,3	CO4	T1,R2	
45.	Pigeonhole Principle and its Applications	1	24-07-2022					
46.	Principle of inclusion-exclusion.	1	25-07-2022					
47.	**Tutorial-IV**	1	28-07-2022					
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT-V

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
48.	**Recurrence Relation**	1	29-07-2022		1,4,5	CO5	T1,R2	
49.	Generating Function of Sequences	1	30-07-2022		1,4,5	CO5	T1,R2	
50.	Calculating Coefficient of Generating Functions	1	02-08-2022		1,4,5	CO5	T1,R2	
51.	Recurrence Relations	1	04-08-2022		1,4,5	CO5	T1,R2	
52.	Solving linear or homogeneous recurrence Relations by substitution	1	05-08-2022		1,4,5	CO5	T1,R2	
53.	generating functions	1	06-08-2022		1,4,3	CO5	T1,R2	
54.	Characteristic Roots, **Tutorial-V**	1	09-08-2022					
No. of classes required to complete UNIT-V		7			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
55.			09-08-2022					
56.			09-08-2022					

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	02-05-2022	18-06-2021	7W
I Mid Examinations	20-06-2022	25-06-2022	1W
II Phase of Instructions	27-06-2022	13-08-2021	7W
II Mid Examinations	15-08-2022	20-08-2022	1W
Preparation and Practicals	22-08-2022	27-08-2022	1W
Semester End Examinations	29-08-2022	10-09-2022	2W

<div align="center">**PART-C**</div>

EVALUATION PROCESS (R20 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): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

<div align="center">**PART-D**</div>

PROGRAMME OUTCOMES (POs):

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

PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. V.Chandra Kumar	Mr. V.Chandra Kumar	**Dr. O. Rama Devi**	**Dr. O. Rama Devi**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: P.GANDHI PRAKASH
Course Name & Code : DATA STRUCTURES & 20CS03
L-T-P Structure : 3-0-0   **Credits:** 3
Program/Sem/Sec : B.Tech/II/A   **A.Y.:** 2021-22

PREREQUISITE: C Programming Language

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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	Write the algorithms for various operations on list using arrays and linked list and analyze the time complexity of its operations.(**Understand - L2**)
CO2	Apply linear data structures like stack and queue in problem solving.(**Apply - L3**)
CO3	Demonstrate various sorting techniques and compare their computational complexities in terms of space and time.(**Understand - L2**)
CO4	Write the algorithms for various operations on binary trees, binary search trees and AVL trees.(**Understand - L2**)
CO5	Demonstrate graph traversal techniques and hashing techniques.(**Understand - L2**)

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

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

TEXTBOOKS:

T1	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd edition [1,2,3 units].
T2	ReemaThareja, Data Structures using c, Oxford Publications [3,4,5].

REFERENCE BOOKS:

R1	Langson, Augenstein &Tenenbaum, 'Data Structures using C and C++', 2nd Ed, PHI.
R2	RobertL.Kruse, Leung and Tando, 'Data Structures and Program Design in C', 2ndedition, PHI.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Data Structures	1	02-05-2022		TLM1	
2.	Classification of Data Structures	1	04-05-2022		TLM1	
3.	Introduction to Algorithm	1	06-05-2022		TLM1	
4.	Algorithm Analysis	1	09-05-2022		TLM1	
5.	Asymptotic Notations	1	10-05-2022		TLM1	
6.	List using Arrays	1	11-05-2022		TLM1	
7.	List using Linked List	1	13-05-2022		TLM1	
8.	Single Linked List	1	16-05-2022		TLM1	
9.	Double Linked List	1	17-05-2022		TLM1	
10.	Circular Linked List	1	18-05-2022		TLM1	
11.	Assignment-1	1	20-05-2022		TLM1	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II:

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.	Stacks adt	1	23-05-2022		TLM1	
13.	Stacks using arrays	1	24-05-2022		TLM1	
14.	Stacks using linked list	1	25-05-2022		TLM1	
15.	Infix to postfix conversion	1	27-05-2022		TLM1	
16.	Postfix evalution	1	30-05-2022		TLM1	
17.	Checking balanced paranthesis	1	31-05-2022		TLM1	
18.	Queue	1	01-06-2022		TLM1	
19.	Queue using array	1	03-06-2022		TLM1	
20.	Queue using linked list	1	06-06-2022		TLM1	
21.	Circular queue	2	07-06-2022		TLM1	
22.	Deque	1	08-06-2022		TLM1	
23.	Assignment-2	1	10-06-2022		TLM1	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: SORTING TECHNIQUES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Sorting	1	13-06-2022		TLM1	
25.	Bubble sort	1	14-06-2022		TLM1	
26.	Insertion Sort	1	15-06-2022		TLM1	
27.	Selection Sort	1	17-06-2022		TLM1	
28.	Merge Sort	1	27-06-2022		TLM1	
29.	Quick Sort	1	28-06-2022		TLM1	
30.	Heap Sort	1	29-06-2022		TLM1	
31.	Assignment-3	1	01-07-2022		TLM1	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: TREES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Introduction	1	04-07-2022		TLM1	
33.	Tree Traversals	1	05-07-2022		TLM1	
34.	Tree Traversals	1	06-07-2022		TLM1	
35.	Binary Trees	1	08-07-2022		TLM1	
36.	Binary Search Trees	1	11-07-2022		TLM1	
37.	Binary Search Trees	1	12-07-2022		TLM1	
38.	AVL Trees	1	13-07-2022		TLM1	
39.	Operations	1	15-07-2022		TLM1	
40.	Assignment-4	1	18-07-2022		TLM1	
No. of classes required to complete UNIT-IV: 09				**No. of classes taken:**		

UNIT-V: GRAPHS & 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
41.	Introduction of graphs	1	19-07-2022		TLM1	
42.	Graphs, fundamentals	1	20-07-2022		TLM1	
43.	Representation of graphs	1	22-07-2022		TLM1	
44.	BFS	1	25-07-2022		TLM1	
45.	DFS	2	26-07-2022		TLM1	
46.	Hashing Introduction	1	27-07-2022		TLM1	
47.	Hash Table, Hash Function	1	29-07-2022		TLM1	
48.	Separate Chaining	1	01-08-2022		TLM1	
49.	Linear Probing	1	02-08-2022		TLM1	
50.	Quadratic Probing	1	03-08-2022		TLM1	
51.	Double Hashing	1	05-08-2022		TLM1	
52.	Rehashing / Assignment-5	1	08-08-2022		TLM1	
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	HOD Sign Weekly
55	Introduction to Advanced Data Structures	1	10-08-2022		TLM1	
56	Advanced Lists	1	12-08-2022		TLM1	

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

PART-C

EVALUATION PROCESS (R17 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): 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	P. Gandhi Prakash	P. Gandhi Prakash	Dr. O. Rama Devi	Dr. O. Rama Devi
Signature				

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hodads@lbrce.ac.in , ads@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT
PART-A

Name of Course Instructor : **DR.K.DEEPIKA**
Course Name & Code   : CONSTITUTION OF INDIA (20MC01)

L-T-P Structure   : 2-0-0   Credits : 0
Program/Sem/Sec   : B.Tech., AI & DS., II-Sem., A   A.Y: 2021-22

PRE-REQUISITE: Understand the Indian Constitution

COURSE EDUCATIONAL OBJECTIVES (CEOs):

● To enable the student to understand the importance of constitution

● To understand the structure of Executive ,Legislature and Judiciary.

● To Understand Philosophy of fundamental rights and duties.

● To Understand the autonomous nature of constitution bodies like Supreme Court and High Court Controller and Auditor General of India and Election Commision of India

● To Understand the Central and State relation, financial and administrative.

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

CO 1	Understand history and philosophy of constitution with reference to preamble, Fundamental Rights and Duties.
CO 2	Understand the concept of Unitary and Federal Government along with the role of President, Prime Minister and Judicial System.
CO 3	Understand the structure of the state government, Secretariat, Governor and Chief Minister and their functions.
CO 4	Learn local administration viz. Panchayat, Block, Municipality and Corporation.
CO 5	Learn about Election Commision and the process and about SC,ST,OBC and women.

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	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	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).

TEXT BOOKS:

T1   Dr.B.R Ambedkar ,The Constitution of India ,General Press First edition 2020., New Delhi

T2   Dr.B.R Ambedkar ,The Constitution of India, Government of India

REFERENCE BOOKS:

R1   Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd., New Delhi.

R2   Subash Kashyap, Indian Constitution, National Book Trust.

R3   J.A. Siwach, Dynamics of Indian Government and Politics.

R4   D.C. Gupta, Indian Government and Politics.

R5   H.M.Sreevai. Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication).

R6   J.C. Johari, Indian Government and Politics Hans.

R7   J.Raj, Indian Government and Politics.

R8   M.V. Pylee, Indian Constitution, Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd., New Delhi.

R9Noorani, A.G. (South Asia Human Rights Documentation Centre), Challenges to Civil Right). Challenges to Civil Rights Guarantees in India, Oxford University Press 2012.

E RESOURCES
 1. nptel.ac.in/courses/109104074/8.
 2. nptel.ac.in/courses/109104045.
 3. nptel.ac.in/courses/101104065.
 4. www.hss.iitb.ac.in/en/lecture-details.
 5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indianconstitution.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section C

UNIT-I : Introduction to Indian Constitution

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 and Co-Po and Syllabus	1	04-05-2022		TLM2	CO1	T1 / T2	
2.	Constitution meaning and the term	1	06-05-2022		TLM2	CO1	T1 / T2	
3.	Sources and History of Indian Constitution	1	11-05-2022		TLM2	CO1	T1 / T2	
4.	Features-Citizenship, Preamble	1	13-05-2022		TLM2	CO1	T1 / T2	
5.	Fundamental Rights and Duties	1	18-05-2022		TLM2	CO1	T1 / T2	
6.	Directive Principles of State Policy	1	20-05-2022		TLM2	CO1	T1 / T2	
7.	Assignment -I	1	25-05-2022		TLM7	CO1	T1 / T2	
No. of classes required to complete UNIT-I		**7**			**No. of classes taken:**			

UNIT-II: Union Government and its Administration Structure of the Indian Union

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
8	Union Government structure in India	1	27-05-2022		TLM2	CO2	T1 / T2	
9	Federalism Centre	1	01-06-2022		TLM2	CO2	T1 / T2	
10	State Relationships to the Union	1	03-06-2022		TLM2	CO2	T1 / T2	
11	President Role, Power and Position	1	08-06-2022		TLM2	CO2	T1 / T2	
12	Prime Minister (PM) and Council of Ministers ,cabinet and Central Secretariat Powers and duties	1	10-06-2022		TLM2	CO2	T1 / T2	
13	Lok Sabha,Rajya Sabha, Supreme Court and High Court Powers and Functions.	1	15-06-2022		TLM2	CO2	T1 / T2	
14	Assignment II	1	17-06-2022		TLM7	CO2	T1 / T2	
I MID EXAMINATIONS 20-06-2022 to 25-06-2022								
		7			**No. of classes taken:**			

UNIT-III: State Government and its administration Governor

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
15	State Government and its Administration Governor and Role	1	22-06-2022		TLM2 / TLM4	CO3	T1 / T2	
16	Role of Chief Ministers and Council of Ministers	1	24-06-2022		TLM2 / TLM4	CO3	T1 / T2	
17	State Secretariat Functions	1	29-07-2022		TLM2 / TLM4	CO3	T1 / T2	
18	Organisation ,Structure and Functions of State Governments	1	01-07-2022		TLM2 / TLM4	CO3	T1 / T2	
19	Assignment –III	1	06-07-2022		TLM2 / TLM4	CO3	T1 / T2	
No. of classes required to complete UNIT-III		05			No. of classes taken:			

UNIT-IV: A Local Administration

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
20	A Local Administration	1	08-07-2022		TLM2 / TLM4	CO4	T1 / T2	
21	Role and importance of local administration	1	13-07-2022		TLM2 / TLM4	CO4	T1 / T2	
22	Municipalities –Mayor and Role of Elected Representative	1	15-07-2022		TLM2 / TLM4	CO4	T1 / T2	
23	Functions of Panchayati Raj Institution,Zilla Panchayats ,Elected Official and their roles	1	20-07-2022		TLM2 / TLM4	CO4	T1 / T2	
24	Village level-Role of Elected and Appointed officials./Assignment-IV	1	22-07-2022		TLM2/ TLM 7	CO4	T1 / T2	
No. of classes required to complete UNIT-IV		05			No. of classes taken:			

UNIT-V: Election Commission

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
25	Election Commission :Role of Chief Election Commissioner and Election Commisionerate	1	27-07-2022		TLM2 / TLM4	CO5	T1 / T2	
26	State Election Commission	1	29-07-2022		TLM2 / TLM4	CO5	T1 / T2	
27	Functions and Commissions for the Welfare of SC/ST/OBC and Women.	1	03-08-2022		TLM2 / TLM4	CO5	T1 / T2	
No. of classes required to complete UNIT-V		**03**			**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
29.	Consumer Rights	1	05.08.2022 & 10-08-2022		TLM2/ TLM5		T2/R3	
	Industrial policies							

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
TLM 7	Assignment /Quiz		

PART-C

EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I , Unit-II , Unit-III)	A1=5
Assignment-II (Unit-III , Unit-IV , Unit-V)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Quiz Examination (Units-III, IV & V)	Q2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=15
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
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PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
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	**Programming Paradigms:**The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 2	**Data Engineering:**To inculcate an ability to analyze, design and implement database applications.
PSO 3	**Software Engineering:**The ability to apply Software Engineering practices and strategies in software project development using open source programming environment for the success of organization.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.K.Deepika	K.Ravi Kiran Yasaswi	Dr.D.Veeraiah	Dr.O.Ramadevi

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.Pawel Veliventi
Course Name & Code :PCS LAB, 20FE51
L-T-P Structure : 0-0-2   Credits:01
Program/Sem/Sec : AI&DS/II SEM/A
A.Y. :2021-22

PREREQUISITE:NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): To improve the proficiency of students in English with an emphasis on better communication in formal and informal situations; Develop speaking skills required for expressing their knowledge and abilities and to face interviews with confidence.

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

CO1	Introduce one-self and others using appropriate language and details.	L2
CO2	Comprehend short talks and speak clearly on a specific topic using	L2
CO3	Report effectively after participating in informal discussions ethically.	L1
CO4	Interpret data aptly, ethically & make oral presentations without	L3

Syllabus:ProfessionalCommunicationLab(PCS)shallhavetwoparts:

- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems,LAN facility and English language software for self-study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorderetc.

Exercise– I

CALL Lab: Understand-Sentence structure.

ICSLab:Practice-Listening:Identifyingthetopic,thecontextandspecificinformation, Speaking: Introducing oneself and others.

Exercise–II

CALL Lab: Understand-Framing questions.

ICSLab:Practice-Listening: Answering a series of questions about main idea and supporting ideas after listening to audio text.

Speaking:Discussing in pairs/small groups on specific topics; Delivering short structured talks using suitable cohesive devices (JAM)

Exercise–III

CALL Lab:Understand- Comprehension practice–Strategies for Effective Communication

ICS Lab: Practice - Listening: Listening for global comprehension and Summarizing
Speaking:Discussing specific topics in pairs/small groups, reporting what is discussed

Exercise–IV

CALLLab:Understand-Features of Good Conversation–Strategies for Effective Communication.

ICS Lab: Practice -Listening: making predictions while listening to conversations/transactional dialogues with/without video

Speaking: Role – plays – formal & informal – asking for and giving information/directions/instructions/suggestions

Exercise– V

CALL Lab:Understand-Features of Good Presentation, Methodology of Group Discussion

ICS Lab:Practice –Introduction to Group Discussions.

Listening: Answering questions, identifying keyterms and understanding concepts.

Speaking: Formal Oral & Poster presentations on topics from academic contexts without the use of PPT.

LabManual:

1. Prabhavati.Y & etal,"English All Round–Communication Skills for Undergraduate Learners", Orient BlackSwan, Hyderabad, 2019.

SuggestedSoftware:

1. Digital Mentor: Globarena, Hyderabad,2005
2. SkyPronunciationSuite:YoungIndia Films, Chennai,2009
3. MasteringEnglishinVocabulary,Grammar,Spelling,Composition ,Dorling Kindersley,USA,2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA,2001
5. Oxford Talking Dictionary, The Learning Company, USA, 2002
6. Learning to Speak English- 4CDs. The Learning Company, USA, 2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi, 2008.

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					3	3				
CO2					3					3	3				
CO3					3					3	3				

CO4				3				3	3			

1 - Low	**2 –Medium**	**3 - High**

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to syllabus	02	4-05-2022		TLM4	
2.	Self Introduction & Introducing others	02	11-05-2022		TLM4	
3.	Self Introduction & Introducing others	02	18-05-2022		TLM4	
4.	JAM- I(Short and Structured Talks)	02	25-05-2022		TLM4	
5.	JAM-II(Short and Structured Talks)	02	1-06-2022		TLM4	
6.	Role Play-I(Formal and Informal)	02	8-06-2022		TLM4	
7.	Role Play-II (Formal and Informal)	02	15-06-2022		TLM4	
8.	Role Play-II (Formal and Informal)	02	29-06-2022		TLM4	
9.	Group Discussion-I (Reporting the discussion)	02	06-07-2022		TLM4, TLM6	
10.	Group Discussion-II	02	13-07-2022		TLM4, TLM6	
11.	Oral & Poster Presentation	02	20-07-2022		TLM2, TLM4	
12.	Oral & Poster Presentation	02	27-07-2022		TLM2, TLM4	
13.	Oral & Poster Presentation	02	3-8-2022		TLM2, TLM4	
14.	Lab Internal Exam	02	10-8-2022			
No. of classes required to complete Syllabus: 26				**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		Marks
Day to Day work (Observation)	A11 - 10	A1 = 05
Record Writing	A12 - 10	
Viva – Voce during Lab Sessions		A2 = 05
Internal Lab Examination		A3 = 05
Cumulative Internal Examination (CIE) : A1+A2+A3+A4		**15**

Semester End Examinations (SEE)	35
Total Marks: CIE + SEE	50

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.
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PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr.Pawel Veliventi	Dr. B. Samrajya Lakshmi	Dr. B. Samrajya Lakshmi	Dr. A. Ramireddy
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

PROGRAM	: B.Tech., II-Sem., AI & DS
ACADEMIC YEAR	: 2021-22
COURSE NAME & CODE	: APPLIED PHYSICS & 20FE07
L-T-P STRUCTURE	: 4-0-0
COURSE CREDITS	3
COURSE INSTRUCTOR	: N. T. SARMA
PRE-REQUISITE	: Basic Knowledge of Physics

COURSE EDUCATIONAL OBJECTIVES (CEOs): It enables the students to understand the fundamental concepts of optics, quantum mechanics, free electron theory of metals, semiconductors, dielectrics, and their applications.

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

CO 1	**Define** the nature of Interference and Diffraction.
CO 2	**Apply** the Lasers and Optical Fibers in different fields.
CO 3	**Estimate** the electrical conductivity of metals.
CO 4	**Analyze** the properties of Semiconducting materials.
CO5	**Classify** the different types of Magnetic and Dielectric materials.

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

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

BOS APPROVED TEXT BOOKS:

    T1 : V. Rajendran, "*Engineering Physics*", TMH, New Delhi, 6th Edition, 2014.

    T2 : M.N. Avadhanulu, P.G. Kshirsagar, "Engineering *Physics*", S. Chand & Co., 2nd Edition, 2014.

BOS APPROVED REFERENCE BOOKS:

    R1 : M.N. Avadhanulu, TVS Arun Murthy, "Applied *Physics*", S. Chand & Co., 2nd Edition, 2007.

    R2 : P.K. Palani Samy, "*Applied Physics*", Sci. Publ. Chennai, 4th Edition, 2016.

    R3 : P. Sreenivasa Rao, K Muralidhar, "*Applied Physics*", Him. Publi. Mumbai,1st Edition, 2016.

    R4 : Hitendra K Mallik , AK Singh " *Engineering Physics*", TMH, New Delhi, 1st Edition, 2009.

WEB REFERENCES AND E-TEXT BOOKS

1. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html
2. http://physicsdatabase.com/free-physics-books/
3. http://www.e-booksdirectory.com
4. 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

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	02/05/2022		**TLM-2**		
2.	Superposition of waves, Coherence, Conditions for Interference	1	04/05/2022		**TLM-3**		
3.	Interference in thin films	1	06/05/2022		**TLM-4**		
4.	Expression for maxima & minima	1	09/05/2022		**TLM-1**		
5.	Newton's rings	1	10/05/2022		**TLM-4**		
6.	Radii of bright &	1	11/05/2022		**TLM-1**		

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
	dark rings						
7.	Michelson's interferometer	1	13/05/2022		**TLM-2**		
8.	Problems & Assignment	1	16/05/2022		**TLM-1**		
9.	Introduction – Diffraction,Types of diffraction	1	17/05/2022		**TLM-3**		
10.	Single slit diffraction	1	18/05/2022		**TLM-1**		
11.	Expression for maximum & minimum Intensities	1	20/05/2022		**TLM-1**		
12.	Diffraction grating Wavelength, Circular aperture,	1	23/05/2022		**TLM-4**		
13.	Resolving power RP of Grating	1	24/05/2022		**TLM-1**		
14.	Problems & Assignment/Quiz	1	25/05/2022		**TLM-3**		
No. of classes required to complete UNIT-I: 14				No. of classes taken:			

UNIT-II: LASERS & OPTICAL FIBERS

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.	Principle of laser, Absorption, Spontaneous and Stimulated emission	1	27/05/2022		**TLM-2**		
2.	Einstein Coefficients	1	30/05/2022		**TLM-1**		
3.	Nd-YAG Laser, He-Ne gas Laser	1	31/05/2022		**TLM-2**		
4.	Applications of LASERS	1	01/06/2022		**TLM-5**		
5.	Optical Fiber principle, Structure ofoptical fiber, Types of optical fibers	1	03/06/2022		**TLM-2**		
6.	Numerical aperture and Acceptance angle	1	06/06/2022		**TLM-1**		
7.	Applications and Advantages of Optical Fibers	1	07/06/2022		**TLM-5**		

| 8. | Problems & Assignment/Quiz | 1 | 08/06/2022 | | **TLM-1** | | |

| No. of classes required to complete UNIT-II: 08 | No. of classes taken: | |

UNIT-III: PRICIPLES OF QUANTUM MECHANICS & FREE ELECTRON THEORY

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.	Introduction quantum mechanics, De Broglie hypothesis	1	10/06/2022		**TLM-5**		
2.	Davisson and Germer Experiment, Physical significance of wave function	1	13/06/2022		**TLM-2**		
3.	Schrodinger time dependent & independent wave equations	1	14/06/2022		**TLM-1**		
4.	Particle in a box	1	15/06/2022		**TLM-1**		
5.	Problems & Assignment/Quiz	1	17/06/2022		**TLM-1**		
6.	MID-1 Exam Preparation	1	20/06/2022		---		
7.	MID-1 Exam Preparation	1	21/06/2022		---		
8.	MID-1 Exam Preparation	1	22/06/2022		---		
9.	MID-1 Exam Preparation	1	24/06/2022		---		
10.	Classical free electron theory-postulates, Success & Failures	1	27/06/2022		**TLM-2**		
11.	Expression for electrical conductivity And drift velocity	1	28/06/2022		**TLM-1**		
12.	Fermi-Dirac distribution function-Temperature dependence	1	29/06/2022		**TLM-2**		
13.	Classification of Solids on the basis of Band theory	1	01/07/2022		**TLM-6**		
14.	Problems & Assignment/Quiz	1	04/07/2022		**TLM-1**		

| No. of classes required to complete UNIT-III: 14 | No. of classes taken: | |

UNIT-IV : SEMICONDUCTOR PHYSICS

Course Outcome :- CO 4; 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.	Introduction - Classification of semiconductors	1	05/07/2022		TLM-6		
2.	Conductivity of Intrinsic and Extrinsic semiconductors	1	06/07/2022		TLM-1		
3.	Drift and Diffusion Current, Einstein relation	1	08/07/2022		TLM-2		
4.	Hall Effect and Hall Coefficient	1	11/07/2022		TLM-5		
5.	Direct band gap and indirect band gap semiconductors	1	12/07/2022		TLM-2		
6.	Solar Cell, Applications	1	13/07/2022		TLM-4		
7.	Problems & Assignment/Quiz	1	15/07/2022		TLM-3		
No. of classes required to complete UNIT-IV: 07			No. of classes taken:				

UNIT-V : MAGNETIC & DIELECTRIC MATERIALS

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.	Introduction, Magnetic parameters	1	18/07/2022		TLM-3		
2.	Classification of magnetic materials – Dia, para & Ferro	1	19/07/2022		TLM-6		
3.	Hysteresis loop, soft and hard magnetic materials	1	20/07/2022		TLM-2		
4.	Applications of magnetic materials	1	22/07/2022		TLM-2		
5.	Problems & Assignment/Quiz		25/07/2022				
6.	Basic Definitions, Electronic polarization	1	26/07/2022		TLM-1		
7.	Ionic & Orientation polarization	1	27/07/2022		TLM-1		

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign	Remarks
8.	Local field, Expression for Internal field	1	29/07/2022		**TLM-1**		
9.	Clausius - Mosotti equation	1	01/08/2022		**TLM2**		
10.	Applications of dielectric materials	1	02/08/2022				
11.	Problems & Assignment/Quiz	1	12/08/2022		**TLM-3**		
No. of classes required to complete UNIT-V: 11							

Revision Classes / Beyond the Syllabus (Additional Topic)

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.	Renewable and Non Renewable Energy Sources	1	03/08/2022		**TLM-2**		
2.	Revision of Unit-1	1	05/08/2022		**TLM-2**		
3.	Revision of Unit-2	1	09/08/2022		**TLM-2**		
4.	Revision of Unit-3	1	10/08/2022		**TLM-2**		
5.	MID-2 Exam Preparation	1	16/08/2022		**---**		
6.	MID-2 Exam Preparation	1	17/08/2022		**---**		
No. of classes required for Revision: 06				No. of classes taken:			

PART-C

EVALUATION PROCESS (R-20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & III (A))	A-1 = 5
I-Mid Examination (Units-I, II & III (A))	M-1 = 15
I-Quiz Examination (Units-I, II & III (A))	Q-1 = 10
Assignment-III (Units-III (B), IV & V)	A-2 = 5
II-Mid Examination (Units-III (B), IV & V)	M-2 = 15
II-Quiz Examination (Units-III (B), IV & V)	Q-2 = 10
Assignment Marks = Best of A1 & A2	A = 5
Mid Marks = 80% of Max (M-1, M-2) + 20% of Min (M-1, M-2)	M = 15
Quiz Marks = 80% of Max (Q-1, Q-2) + 20% of Min (Q-1, Q-2)	Q = 10
Cumulative Internal Examination (CIE) : A+M+Q	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	**100**

PART-D

PROGRAMME OUTCOMES (POs):

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

Course Instructor   Course Coordinator   Module Coordinator   HOD

N. T. SARMA   **N. T. SARMA**   **DR. S. YUSUB**   **DR. A. RAMI REDDY**

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: P. Gandhi Prakash
Course Name & Code : DATA STRUCTURES LAB & 20CS53
L-T-P Structure : 0-0-3   **Credits:** 1.5
Program/Sem/Sec : B.Tech/II/B   **A.Y.:** 2021-22

PREREQUISITE: Programming Language

COURSE 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: Implement Linear Data Structures using array and Linked list. (**Apply - L3**)
CO2: Implement Various Sorting Techniques. (**Apply - L3**)
CO3: : Implement Non-Linear Data Structure such as Trees &Graphs. (**Apply - L3**)

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

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

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

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

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.	Discussion of CO'S and CEO's	3	05-05-2022		
2.	List using Arrays, Linked List Programs	3	12-05-2022		
3.	Stack Using Arrays, Linked List	3	19-05-2022		
4.	Queue Using arrays, Linked List	3	26-05-2022		
5.	Infix to Postfix Infix to Prefix	3	02-06-2022		
6.	Evolution of Postfix Balanced Parenthesis	3	09-06-2022		
7.	Circular Queue Double Ended Queue	3	16-06-2022		
8.	Bubble sort Selection sort Insertion sort	3	30-06-2022		
9.	Merge sort Quick sort	3	07-07-2022		
10.	Heap sort Binary Tree	3	14-07-2022		
11.	Binary Search Tree	3	21-07-2022		
12.	BFS	3	28-07-2022		
13.	DFS	3	04-08-2022		
14.	Internal Exam	3	11-08-2022		

PART-C

EVALUATION PROCESS (R20 Regulations):

According to Academic Regulations of R20 Distribution and Weightage of Marks For Laboratory Courses is as follows

(a) **Continuous Internal Evaluation (CIE):** The Continuous Internal Evaluation (CIE) is based on the following parameters:

Parameter	Marks
Day to Day work	05
Record	05
Internal Test	05
Total	15

(b) Semester End Examinations (SEE): The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3 hours duration and evaluated for 35 marks.

The performance of the student shall be evaluated as per the parameters indicated below:

Parameter	Marks
Procedure/Algorithm	05
Experimentation/Program execution	10
Observations/Calculations/Validation	10
Result/Inference	05
Viva voce	05
Total	35

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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. P. Gandhi Prakash	Mr. P. Gandhi Prakash	Dr. O. Rama Devi	Dr. O. Rama Devi

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor : P.Mohana Ganaga Raju/ J. Eeshwar Ram
Course Name & Code : COMPUTER AIDED ENGINEERING DRAWING LAB –20ME53
L-T-P Structure : 0-0-3 Credits : 1.5
Program/Sem/Sec : B.Tech., AI&DS., II-Sem., Sec-A **A.Y : 2021-22**

PRE-REQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main
objectivesofthiscoursearetofamiliarizevariouscommandsusedinAuto-CADand
tovisualizetheIsometric andOrthographic views ofany object

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

CO 1	Understand the Auto-CAD basics and apply to solve problems used in industries where the speed and accuracy can be achieved (**Understand – L2**)
CO 2	Understand the principles of Orthographic projections of points, lines, planes and solids (**Understand – L2**)
CO 3	Draw the isometric views of lines, planes and simple solids (**Understand – L2**)
CO 4	ConvertOrthographictoisometric&viceversa. (**Understand – L2**)

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

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

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).
TEXT BOOKS:
 T1 D.M. Kulkarni, A.P Rastogi, and A.K. Sarkar, "Engineering Graphics with AutoCAD", PHI Learning Private Limited, New Delhi, 2009.

REFERENCE BOOKS:

 R1 N. D. Bhatt, "Engineering Drawing", 51st Revised and Enlarged Edition, Charotar Publishers, 2012.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and Cos	3	06-05-2022		**TLM4**	
2.	Basic Auto Cad Commands Drawing commands, Edit commands, Array commands	3	13-05-2022		**TLM4**	
3.	Basic Auto Cad Commands Hatching commands &line commands, commands, Dimensioning & text commands.	3	20-05-2022		**TLM4**	
4.	Modify Commands Move, Extend, Trim & Copy	3	27-05-2022		**TLM4**	
5.	Projection of Points, Lines And Planes: Projection of points (I, II, III & IV quadrants) Projection of lines parallel to both reference planes	3	03-06-2022		**TLM4**	
6.	Projection of Points, Lines And Planes: Projection of lines parallel to one reference plane & inclined to other reference plane. Projection of planes: single stage projections.	3	10-06-2022		**TLM4**	
7.	Orthographic Projections: Conversion of plane figures to orthographic views Conversion of circular figures to orthographic views.	3	17-06-2022		**TLM4**	
8.	Orthographic Projections: Conversion of combination of plane figures and circular figures to orthographic views.	3	01-07-2022		**TLM4**	
9.	IsometricProjections: Conversion of plane	3	08-07-2022		**TLM4**	

	figures to isometricviews. Conversion of circular figures to isometricviews.					
10.	IsometricProjections: Conversion of plane figures to isometricviews. Conversion of circular figures to isometricviews.	3	15-07-2022		**TLM4**	
11.	IsometricProjections: Conversion of plane figures to isometricviews. Conversion of circular figures to isometricviews.	3	22-07-2022		**TLM4**	
12.	IsometricProjections: Conversion of plane figures to isometricviews. Conversion of circular figures to isometricviews.	3	29-07-2022		**TLM4**	
13.	IsometricProjections: Conversion of plane figures to isometricviews. Conversion of circular figures to isometricviews.	3	05-07-2022		**TLM4**	
14.	Revision	3	12-07-2022		**TLM4**	

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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PO 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
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PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
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   HOD

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT
PART-A

Name of Course Instructor: Dr Pawel Veliventi
Course Name & Code   : Professional Communication-II (20FE02)
L-T-P Structure   : 2-0-0   **Credits:** 2
Program/Sem/Sec   : AI&DS/II/A   **A.Y.:** 2021-22
PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To improve English language proficiency of the students on various aspects like vocabulary, grammar, communication skills, listening skills, reading &writing skills

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

CO1	Produce a coherent paragraph interpreting a figure/graph/chart/table
CO2	Comprehend the given texts thoroughly by guessing the meanings of the words contextually
CO3	Use language appropriately for describing/comparing/contrasting/giving directions & suggestions
CO4	Write formal/informal dialogues with an understanding of verbal/non-verbal features of communication. Guess meanings of the words from the context
CO5	Write well structured essays, reports & resumé

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

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

TEXTBOOKS:

T1 Prabhavati.Y&etal, "English All Round–Communication Skills for Undergraduate Learners", Orient BlackSwan, Hyderabad, 2019
T2 "The Great Indian Scientists", Cengage Learning India Pvt. Ltd., Delhi, 2017

REFERENCE BOOKS:

R1 Swan,M., "Practical English Usage", Oxford University Press, 2016
R2 Kumar,S and Latha, P, "Communication Skills", Oxford University Press, 2018
R3 Rizvi Ashraf M.,"EffectiveTechnical Communication",TataMcGrawHill, NewDelhi, 2008
R4 Baradwaj Kumkum, "Professional Communication" ,I.K.International Publishing House Pvt. Lt.d, NewDelhi, 2008
R5 Wood,F.T., "Remedial English Grammar", Macmillan, 2007

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Fabric of Change

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.	H.G. Wells and the Uncertainties of Progress	1	5-5-22		TLM1	
2.	Studying the use of Graphic elements in texts	1	10-5-22		TLM1	
3.	Quantifying Expressions	1	12-5-22		TLM2	
4.	Adjectives and Adverbs	1	16-5-22		TLM2	
5.	Comparing and Contrasting	1	19-5-22		TLM3	
6.	Degrees of Comparison	1	24-5-22		TLM1	
7.	Information Transfer	1	26-5-22		TLM2	
No. of classes required to complete UNIT-I: 7				**No. of classes taken:**		

UNIT-II: Tools for Life

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
8.	Leaves from the Mental Portfolio of a Eurasian	1	31-5-22		TLM1	
9.	Global Comprehension & Detailed Comprehension	1	2-6-22		TLM1	
10.	Active & Passive Voice	1	7-6-22		TLM2	
11.	Idioms & Phrases	1	9-6-22		TLM1	
12.	Structured Essays using suitable claims and evidences	1	14-6-22		TLM2	
No. of classes required to complete UNIT-II: 5				**No. of classes taken:**		

UNIT-III: Homi Jahangir Bhabha

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Homi Jahangir Bhabha	1	16-6-22		TLM1	
14.	Words Often Confused	1	28-6-22		TLM1	
15.	Common Errors	1	30-6-22		TLM2	
16.	Incident & Investigation Reports	1	5-7-22		TLM2	
No. of classes required to complete UNIT-III: 4				**No. of classes taken:**		

UNIT-IV: Jagadish Chandra Bose

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Jagadish Chandra Bose	2	7-7-22 & 12-7-22		TLM1	
18.	Use of Antonyms	1	14-7-22		TLM1	
19.	Correction of Sentences	1	19-7-22		TLM3	
20.	Dialogue Writing	1	21-7-22		TLM1	
No. of classes required to complete UNIT-IV:5				**No. of classes taken:**		

UNIT-V: Prafulla Chandra Ray

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.	Prafulla Chandra Ray	2	26-7-22 & 28-7-22		TLM2	
22.	Analogy	1	2-8-22		TLM1	
23.	Sentence Completion	1	4-8-22		TLM2	
24.	Writing Résumé	1	11-8-22		TLM2	
No. of classes required to complete UNIT-V: 5				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & 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): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr Pawel Veliventi**	**Dr B Samrajya Lakshmi**	**Dr B Samrajya Lakshmi**	**Dr A Ramireddy**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT
PART-A

PROGRAM/SEM/SEC   : I B. Tech., II-Sem., AIDS-B
ACADEMIC YEAR   : 2021-22
COURSE NAME & CODE   : Linear algebra & Transformation Techniques&20FE04
L-T-P STRUCTURE   : 3-1-0
COURSE CREDITS   : 3
COURSE INSTRUCTOR   : Dr. A.Rami Reddy
COURSE COORDINATOR   : Dr. K. Jhansi Rani
PRE-REQUISITES   : Matrices, Differentiation, Integration

COURSE EDUCATIONAL OBJECTIVES (CEOs): In this course the students learn Matrix algebra and introduced with transformation techniques such as Laplace transformation and Z – Transformations.

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

CO1	Investigate the consistency of the system of equations and solve them. (Apply L3)
CO2	Determine the Eigen vectors and inverse, powers of a matrix by using Cayley – Hamilton theorem. (Apply L3)
CO3	Use the concepts of Laplace transforms to various forms of functions.(Understand L2)
CO4	Solve Ordinary differential equations by using Laplace Transformations. (Apply L3)
CO5	Apply Z- Transformations to solve difference equations. (Apply L3)

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

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

TEXTBOOKS:

T1 Dr. B.S. Grewal, "Higher Engineering Mathematics", 42ndEdition, Khanna Publishers, New Delhi, 2012.
T2 Dr. B. V. Ramana, "Higher Engineering Mathematics", 1stEdition, TMH, New Delhi, 2010.

REFERENCE BOOKS:

R1 M. D. Greenberg, "Advanced Engineering Mathematics", 2nd Edition, TMH Publications, New Delhi, 2011.

R2 Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & sons, New Delhi, 2011.

R3 W.E. Boyce and R. C. Diprima, " Elementary Differential Equations" , 7th Edition, John Wiley & sons, New Delhi,2011.

<div align="center">**PART-B**</div>

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to the course, Course Outcomes	1	02/05/22		TLM1	

<div align="center">**UNIT-I: Linear System of Equations**</div>

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
2.	Introduction to the course, Course Outcomes	1	05/05/22		TLM1	
3.	Introduction to UNIT I	1	06/05/22		TLM1	
4.	Echelon form of a matrix	1	09/05/22		TLM1	
5.	Normal form of a matrix	1	10/05/22		TLM1	
6.	Normal form of a matrix	1	12/05/22		TLM1	
7.	PAQ form	1	13/05/22		TLM1	
8.	Solution of Homogeneous linear system of equations	1	16/05/22		TLM1	
9.	Solution of Non homogeneous Linear system of equations	1	17/05/22		TLM1	
10.	Solution of Non homogeneous Linear system of equations	1	19/05/22		TLM1	
11.	**Tutorial 1**	1	20/05/22		TLM3	
12.	Solution of homogeneous Linear system of equations	1	23/05/22		TLM1	

No. of classes required to complete UNIT-I: 11   **No. of classes taken:**

<div align="center">**UNIT-II: Eigen values and Eigen Vectors**</div>

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to UNIT II	1	24/05/22		TLM1	
14.	Eigen values of a matrix	1	26/05/22		TLM1	
15.	Eigen values and Eigen vectors of a matrix.	1	27/05/22		TLM1	
16.	Eigen values and Eigen vectors of a matrix.	1	30/05/22		TLM1	
17.	Properties (PPT)	1	31/05/22		TLM2	
18.	Properties(PPT)		02/06/22			
19.	Cayley – Hamilton Theorem.	1	03/06/22		TLM2	
20.	Inverse and powers of a matrix by using Cayley – Hamilton Theorem.	1	06/06/22		TLM1	
21.	Inverse and powers of a matrix by using Cayley – Hamilton Theorem.	1	07/06/22		TLM1	
22.	**Tutorial 2**	1	09/06/22		TLM3	

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

<div align="center">**UNIT-III: Laplace Transforms**</div>

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Introduction to Unit-III	1	10/06/22		TLM2	
24.	Standard forms of Laplace Transforms.	1	13/06/22		TLM1	
25.	Linear Property, Shifting Theorem.	1	14/06/22		TLM1	
26.	Change of scale property, Multiplication by t.	1	16/06/22		TLM1	
27.	Multiplication by t.	1	17/06/22		TLM1	

<div align="center">**II MID EXAMINATIONS (20-06-2022 TO 25-06-2022)**</div>

28.	Division by t	1	27/06/22		TLM1	
29.	Transforms of derivatives	1	28/06/22		TLM 1	
30.	Transforms integrals.	1	30/06/22		TLM1	
31.	**Tutorial 3**	1	01/07/22		TLM3	
32.	Unit step function and Dirac's delta function.	1	04/07/22		TLM1	
33.	Application of Laplace Transforms(PPT)	1	05/07/22		TLM2	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: Inverse Laplace Transforms

S. No.	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 UNIT IV.	1	07/07/22		TLM1	
35.	Linear property.	1	08/07/22		TLM1	
36.	Shifting properties.	1	11/07/22		TLM1	
37.	Inverse Laplace transform by using partial fractions.	1	12/07/22		TLM1	
38.	Inverse Laplace transform by using partial fractions.	1	14/07/22		TLM1	
39.	Inverse Laplace Transform by using Convolution theorem.	1	15/07/22		TLM1	
40.	Inverse Laplace Transform by using Convolution theorem.	1	18/07/22		TLM1	
41.	Solving of Ordinary differential equation by Laplace transform method.(PPT)	1	19/07/22		TLM2	
42.	Solving of Ordinary differential equation by Laplace transform method. (PPT)	1	21/07/22		TLM2	
43.	**Tutorial 4**	1	22/07/22		TLM3	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Z- Transformations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Introduction to UNIT V.	1	25/07/22		TLM1	
45.	Standard forms of Z- Transform.	1	26/07/22		TLM1	
46.	Damping rule	1	28/07/22		TLM1	
47.	Shifting Rule	1	29/07/22		TLM1	
48.	Initial and final value theorems	1	01/08/22		TLM1	
49.	Inverse Z – Transfroms by using partial fractions.	1	02/08/22		TLM1	
50.	Inverse Z – Transformation by using convolution theorem.	1	04/08/22		TLM1	
51.	Solving of Difference equations by using Z – Transforms. (PPT)	1	05/08/22		TLM2	
52.	Solving of Difference equations by using Z – Transforms. (PPT)	1	08/08/22		TLM2	
53.	**Tutorial 5**	1	11/08/22		TLM3	
No. of classes required to complete UNIT-V:10				**No. of classes taken:**		

Contents beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
54.	Solving of PDE other methods	1	12/08/22		TLM5	

II MID EXAMINATIONS (15-08-2022 TO 20-08-2022)

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

TLM3	Tutorial		TLM6	Group Discussion/Project

<div align="center">

PART-C

</div>

EVALUATION PROCESS (R17 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): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

<div align="center">

PART-D

</div>

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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. A.Rami Reddy	**Dr. K. Jhansi Rani**	**Dr. A. Rami Reddy**	**Dr. A. Rami Reddy**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor   :Mrs.N.Aruna
Course Name & Code   : Applied Physics, 20FE07
L-T-P Structure   : 2-1-0   Credits : 4
Program/Sem/Sec   : B.Tech.,AI&DS, II-Sem., Section- B   A.Y   : 2021-22

COURSE EDUCATIONAL OBJECTIVES (CEOs): It enables the students to understand the fundamental concepts of Optics , quantum mechanics, free electron theory of metals, semi conductors,dielectrics and their applications.

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

CO 1	Define the nature of Interference and Diffraction.
CO 2	Apply the lasers and optical fibers in different fields.
CO 3	Estimate the electrical conductivity in metals.
CO 4	Analyze the properties of semiconducting materials
CO5	Classify the different types of magnetic and dielectric materials.

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

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

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

BOS APPROVED TEXT BOOKS:
T1   : V. Rajendran, "*Engineering Physics*", TMH, New Delhi, 6th Edition, 2014.

T2   : M.N. Avadhanulu, TVS Arun Murthy, "Applied *Physics*", S. Chand & Co., 2nd
             Edition, 2014.

BOS APPROVED REFERENCE BOOKS:
R1   : M.N. Avadhanulu, TVS Arun Murthy, "Applied *Physics*", S. Chand & Co., 2nd

R2   P.K. Palani Samy, "*Applied Physics*", Sci. Publ. Chennai, 4th Edition, 2016.

R3   P. Sreenivasa Rao, K Muralidhar, "*Applied Physics*", Him. Publi. Mumbai,1st
        Edition, 2016.
R4 Hitendra K Mallik , AK Singh " *Engineering Physics*", TMH, New Delhi, 1stEdition, 2009. Edition, 2007

<center>**PART-B**</center>

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Interference and Diffraction

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	1	02-05-2022		TLM1	
2.	Introduction to Unit-I	1	05-05-2022		TLM1	
3.	Superposition of waves, Coherence, Conditions for Interference	1	07-05-2022		TLM1,2	
4.	Interference from thin films	1	09-05-2022		TLM1,2	
5.	Newton's rings	1	10-05-2022		TLM2	
6.	Michelson's interferometer	1	12-05-2022		TLM1,2	
7.	Diffraction-Introduction	1	14-05-2022		TLM2	
8.	Single slit diffraction	1	16-05-2022		TLM2	
9.	Single slit diffraction	1	17-05-2022		TLM1,2	
10.	Circular aperture	1	19-05-2022		TLM2	
11.	Diffraction –N parallel slits and grating-Characteristics	1	21-05-2022		TLM1.2	
12.	Resolving power of Grating	1	23-05-2022		TLM1	
13.	Problems/ Assignment	1	24-05-2022		TLM3	
No. of classes required to complete UNIT-I: 13				No. of classes taken:13		

UNIT-II: Lasers and Optical fibers

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to UNIT- II				TLM1	
2.	Characteristics of Lasers, Principle of laser	1	26-05-2022		TLM2	
3.	Population inversion, Meta stable state,	1	28-05-2022		TLM1,2	
4.	Einstein's coefficients	1	30-05-2022		TLM2	
5.	Laser Components ,Nd-YAG Laser	1	31-05-2022		TLM2	
6.	He-Ne gas laser,	1	02-06-2022		TLM2	
7.	Principle and Structure of optical fibre	1	04-06-2022		TLM2	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
8.	Acceptance angle &Numerical Aperture	1	06-06-2022		TLM1,2	
9.	Step index and Graded index fibers, Applications	1	07-06-2022		TLM2	
10.	Problems/ Assignment	1	09-06-2022		TLM3	
No. of classes required to complete UNIT-II: 10				No. of classes taken:10		

UNIT-III: Principles of Quantum Mechanics and Classical Free Electron theory of Mmetals

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-Unit III	1	11-06-2022		TLM1	
2.	De Broglie hypothesis,Properties of matter waves		11-06-2022		TLM 1	
3.	Davisson and Germer Experiment	1	13-06-2022		TLM2	
4.	Schrodinger wave equation- Time independent	1	14-06-2022		TLM1	
5.	Physical significance of wave function, Particle in a box	1	16-06-2022		TLM1	
6.	Problems	1	18-06-2022		TLM 1	
7.	Classical free electron theory- postulates	1	27-06-2022		TLM1	
8.	drift velocity, Expression for electrical conductivity	1	28-06-2022		TLM1	
9.	Advantageous and drawbacks	1	30-06-2022		TLM1	
10.	Fermi –Dirac statistics	1	02-07-2022		TLM1	
11.	Classification of solids -band theory	1	04-07-2022		TLM2	
12.	Problems/ Assignment	1	05-07-2022		TLM3	
No. of classes required to complete UNIT-III: 12				No. of classes taken :		

UNIT-IV : Semiconductor Physics

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to UNIT-IV Carrier concentration - Intrinsic semiconductor	1	07-07-2022		TLM1	
2.	Carrier concentration - Intrinsic semiconductor	1	09-07-2022		TLM1	
3.	Carrier concentration -	1	11-07-2022		TLM1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	Extrinsic semiconductor					
4.	Carrier concentration - Extrinsic semiconductor	1	12-07-2022		TLM1	
5.	Energy band gap of a Semiconductor	1	14-07-2022		TLM1.2	
6.	Drift and diffusion current	1	16-07-2022		TLM1,2	
7.	Einstein relations	1	18-07-2022		TLM1,2	
8.	Hall effect	1	19-07-2022		TLM1,2	
9.	Direct band gap and indirect band gap semiconductors	1	21-07-2022		TLM1,2	
10.	Solar cell, Applications	1	23-07-2022		TLM2	
11.	Problems/ Assignment	1	25-07-2022		TLM3	
No. of classes required to complete UNIT-IV: 11				No. of classes taken:		

UNIT-V :Magnetic and Dielectric materials

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to UNIT-V Magnetic parameters	1	26-07-2022		TLM1	
2.	Classification of magnetic materials	1	28-07-2022		TLM2	
3.	Hysteresis loop,Soft &Hard magnetic materials	1	30-07-2022		TLM2	
4.	Types of polarization- Electronic polarization	1	01-08-2022		TLM1,2	
5.	Ionic and Orientation Polarization	1	02-08-2022		TLM2	
6.	Local field	1	04-08-2022		TLM1	
7.	Classius mosotti equation	1	06-08-2022		TLM1	
8.	Applications	1	08-08-2022		TLM2	
9.	Problems/Assignment	1	11-08-2022		TLM3	
10.	Revision	1	13-08-2022		TLM2	
No. of classes required to complete UNIT-V: 10				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

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
N.Aruna	**N.T.Sarma**	**Dr. S.Yusub**	**Dr. A. Rami Reddy**

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT
PART-A

PROGRAM	: **B.Tech**, II-Sem
ACADEMIC YEAR	: 2021-22
COURSE NAME & CODE	: Discrete Mathematical Structures – 20CS04
L-T-P STRUCTURE	: 3-0-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: B. RAJENDRA PRASAD
COURSE COORDINATOR	: B. RAJENDRA PRASAD

PRE-REQUISITE: Basic Mathematical Knowledge.

COURSE OBJECTIVE: In this Course student will learn about- The objective of the course is to perform the operations associated with relations and functions. Relate practical examples to the functions and relations and interpret the associated operations and terminology used in the context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior of software or to solve problems such as puzzles.

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

CO1	Construct mathematical arguments using logical connectives & quantifiers and verify them.**(Understand – L2)**
CO2	Demonstrate the basic terminology of functions, relations, lattices, and their operations.**(Understand – L2)**
CO3	Apply the properties of graphs to solve the graph theory problems in Computer science.**(Apply – L3)**
CO4	Illustrate the basic principles/techniques to solve different algebraic structures & combinatorial problems.**(Apply – L3)**
CO5	Solve linear recurrence relations by recognizing homogeneity using constant coefficients characteristic roots and Generating functions. **(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	3													
CO2	3	3	1	2											
CO3	3	3	1	2											
CO4	3	3	2	1											
CO5	3	3	1												
	1 - Low					**2 –**Medium					**3 –** High				

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 Tremblay, Manohar, Discrete Mathematical Structures with Applications to ComputerScience, TMH Publications[units- 1,2,3,4,5]

BOS APPROVED REFERENCE BOOKS:

R1 Chandrasekaran,Umaparvathi,DiscreteMathematics,PHI, 2010[1,2,3,4,5]

R2 Ralph. P.Grimaldi, Ramana, Discrete and Combinational Mathematics,Pearson,5th edition. [1,2,3,4,5]

R3 https://nptel.ac.in/courses/106/106/106106183/[1,2,3,4,5] .

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)
UNIT-I

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.	Statements and Notations , Connectives	1	02-05-2022		2,4	CO1	T1,R1	
2.	Truth Tables, Tautologies	1	04-05-2022		2,4	CO1	T1,R1	
3.	Equivalence of Formulas	1	05-05-2022		2,4	CO1	T1,R1	
4.	Implications	1	07-05-2022		2,4	CO1	T1,R1	
5.	Tautological Implications		09-05-2022		2,4	CO1	T1,R1	
6.	Normal Forms Disjunctive Normal Form	1	12-05-2022		2,4	CO1	T1,R1	
7.	PCNF, PDNF	1	16-05-2022		2,4	CO1	T1,R1	
8.	Theory of Inference for Statement Calculus	1	18-05-2022		2,4	CO1	T1,R1	
9.	Consistency of Premises	1	19-05-2022		2,4	CO1	T1,R1	
10	Indirect Method of Proof, Predicate Logic	1	21-05-2022		2,4	CO1	T1,R1	
11	Statement Functions	1	23-05-2022		2,4	CO1	T1,R1	
12	Variables and Quantifiers.	1	25-05-2022		2,4	CO1	T1,R1	
13	**Tutorial- I**	1	26-05-2022		3			
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
14.	Introduction to Sets, representation of Sets.	1	28-05-2022		2,4	CO2	T1,R1	
15.	Operation on Sets	1	30-05-2022		2,4	CO2	T1,R1	
16.	Properties of Binary Relations	1	01-06-2022		2,4	CO2	T1,R1	
17.	Relation Matrix	1	02-06-2022		2,4	CO2	T1,R1	
18.	Operations on Relations,	1	04-06-2022		2,4	CO2	T1,R1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
	Transitive Closure							
19.	Equivalence Relation	1	06-06-2022		2,4	CO2	T1,R1	
20.	Compatibility and Partial Ordering Relations	1	08-06-2022		2,4	CO2	T1,R1	
21.	Hasse Diagrams	1	09-06-2022		2,4	CO2	T1,R1	
22.	Lattices: LUB, GLB.	1	09-06-2022		2,4	CO2	T1,R1	
23	**Functions**: Bijective Functions	1	13-06-2022		2,4	CO2	T1,R1	
24	Composition of Functions	1	13-06-2022		2,4	CO2	T1,R1	
25	Inverse Functions, **Tutorial-II**	1	13-06-2022		3			
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
26.	**Graph Theory I :**Basic Concepts of Graphs	1	15-06-2022		2,4	CO3	T1,R2	
27.	Matrix Representation of Graphs: Adjacency Matrices	1	16-06-2022		2,4	CO3	T1,R2	
28.	Incidence Matrices, Isomorphic Graphs	1	18-06-2022		2,4	CO3	T1,R2	
29.	Eulerian and Hamiltonian Graphs.	1	18-06-2022		2,4	CO3	T1,R2	
30.	**Graph Theory II:** Planar Graphs, Euler's Formula	1	27-06-2022		2,4	CO3	T1,R2	
31.	Graph Coloring, Chromatic Number	1	29-06-2022		2,4	CO3	T1,R2	
32.	Graph Traversals: BFS, DFS	1	30-06-2022		2,4	CO3	T1,R2	
33.	**Trees:** Spanning Trees: Properties	1	02-07-2022		2,4	CO3	T1,R2	
34	Algorithms for Minimum cost Spanning Trees	1	04-07-2022		2,4	CO3	T1,R2	
35.	**Tutorial-III**	1	06-07-2022		3			
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
36.	**Algebraic Structures & Combinatorics** Algebraic Systems with one Binary Operation	1	07-07-2022		1,4,5	CO4	T1,R2	
37.	Properties of Binary operations	1	11-07-2022		1,4,5	CO4	T1,R2	
38.	Semi groups and Monoids: Homomorphism of Semi groups and Monoids	1	13-07-2022		1,4,5	CO4	T1,R2	
39.	Group, Abelian group	1	14-07-2022		1,4,5	CO4	T1,R2	
40.	Sub Groups	1	16-07-2022		1,4,5	CO4	T1,R2	
41.	Lagrange's Theorem	1	18-07-2022					

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
42.	**Combinatorics:** Basic of Counting,	1	20-07-2022					
43.	Permutations, Combinations,	1	21-07-2022					
44.	Combinations with repetition Pigeonhole Principle	1	23-07-2022		1,4,3	CO4	T1,R2	
45.	Pigeonhole Principle and its Applications	1	25-07-2022					
46.	Principle of inclusion-exclusion.	1	27-07-2022					
47.	**Tutorial-IV**	1	28-07-2022					
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT-V

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
48.	**Recurrence Relation**	1	30-07-2022		1,4,5	CO5	T1,R2	
49.	Generating Function of Sequences	1	01-08-2022		1,4,5	CO5	T1,R2	
50.	Calculating Coefficient of Generating Functions	1	03-08-2022		1,4,5	CO5	T1,R2	
51.	Recurrence Relations	1	04-08-2022		1,4,5	CO5	T1,R2	
52.	Solving linear or homogeneous recurrence Relations by substitution	1	06-08-2022		1,4,5	CO5	T1,R2	
53.	generating functions	1	08-08-2022		1,4,3	CO5	T1,R2	
54.	Characteristic Roots, **Tutorial-V**	1	10-08-2022					
No. of classes required to complete UNIT-V		7			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
55.			10-08-2022					
56.			10-08-2022					

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	02-05-2022	18-06-2021	7W
I Mid Examinations	20-06-2022	25-06-2022	1W
II Phase of Instructions	27-06-2022	13-08-2021	7W
II Mid Examinations	15-08-2022	20-08-2022	1W
Preparation and Practicals	22-08-2022	27-08-2022	1W
Semester End Examinations	29-08-2022	10-09-2022	2W

PART-C

EVALUATION PROCESS (R20 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): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

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.

The first row continues from the previous page: "and write effective reports and design documentation, make effective presentations, and give and receive clear instructions."

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. B. Rajendraprasad	Mr. B. Rajendraprasad	Dr. O. Rama Devi	Dr. O. Rama Devi
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: S. Siva Ramakrishna
Course Name & Code : DATA STRUCTURES & 20CS03
L-T-P Structure : 3-0-0   **Credits:** 3
Program/Sem/Sec : B.Tech/II/B   **A.Y.:** 2021-22

PREREQUISITE: C Programming Language

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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	Write the algorithms for various operations on list using arrays and linked list and analyze the time complexity of its operations.(**Understand - L2**)
CO2	Apply linear data structures like stack and queue in problem solving.(**Apply - L3**)
CO3	Demonstrate various sorting techniques and compare their computational complexities in terms of space and time.(**Understand - L2**)
CO4	Write the algorithms for various operations on binary trees, binary search trees and AVL trees.(**Understand - L2**)
CO5	Demonstrate graph traversal techniques and hashing techniques.(**Understand - L2**)

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

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

TEXTBOOKS:

T1	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd edition [1,2,3 units].
T2	ReemaThareja, Data Structures using c, Oxford Publications [3,4,5].

REFERENCE BOOKS:

R1	Langson, Augenstein &Tenenbaum, 'Data Structures using C and C++', 2nd Ed, PHI.
R2	RobertL.Kruse, Leung and Tando, 'Data Structures and Program Design in C', 2ndedition, PHI.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Data Structures	1	02-05-2022		TLM1	
2.	Classification of Data Structures	1	04-05-2022		TLM1	
3.	Introduction to Algorithm	1	07-05-2022		TLM1	
4.	Algorithm Analysis	1	09-05-2022		TLM1	
5.	Asymptotic Notations	1	10-05-2022		TLM1	
6.	List using Arrays	1	11-05-2022		TLM1	
7.	List using Linked List	1	16-05-2022		TLM1	
8.	Single Linked List	1	17-05-2022		TLM1	
9.	Double Linked List	1	18-05-2022		TLM1	
10.	Circular Linked List	1	21-05-2022		TLM1	
11.	Assignment-1	1	23-05-2022			

No. of classes required to complete UNIT-I: 14   **No. of classes taken:**

UNIT-II:

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.	Stacks adt	1	24-05-2022		TLM1	
13.	Stacks using arrays	1	25-05-2022		TLM1	
14.	Stacks using linked list	1	28-05-2022		TLM1	
15.	Infix to postfix conversion	2	30-05-2022		TLM1	
16.	Postfix evalution	1	31-05-2022		TLM1	
17.	Checking balanced paranthesis	1	01-06-2022		TLM1	
18.	Queue	1	04-06-2022		TLM1	
19.	Queue using array	1	06-06-2022		TLM1	
20.	Queue using linked list	1	07-06-2022		TLM1	
21.	Circular queue	2	08-06-2022		TLM1	
22.	Deque / Assignment-2	1	13-06-2022		TLM1	

No. of classes required to complete UNIT-II: 13   **No. of classes taken:**

UNIT-III: SORTING TECHNIQUES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Bubble sort	1	14-06-2022		TLM1	
24.	Insertion Sort	1	15-06-2022		TLM1	
25.	Selection Sort	1	18-06-2022		TLM1	
26.	Merge Sort	1	27-06-2022		TLM1	
27.	Merge Sort	1	28-06-2022		TLM1	
28.	Quick Sort	1	29-06-2022		TLM1	
29.	Heap Sort	1	02-07-2022		TLM1	
30.	Assignment-3	1	04-07-2022		TLM1	

No. of classes required to complete UNIT-III: 09   **No. of classes taken:**

UNIT-IV: TREES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Introduction	1	05-07-2022		TLM1	
32.	Tree Traversals	1	06-07-2022		TLM1	
33.	Tree Traversals	1	11-07-2022			
34.	Binary Trees	1	12-07-2022		TLM1	
35.	Binary Search Trees	1	13-07-2022		TLM1	
36.	Binary Search Trees	1	16-07-2022			
37.	AVL Trees	1	18-07-2022		TLM1	
38.	Operations / Assignment-4	1	19-07-2022		TLM1	
No. of classes required to complete UNIT-IV: 09				**No. of classes taken:**		

UNIT-V: GRAPHS & 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
39.	Graphs, fundamentals	1	20-07-2022		TLM1	
40.	Representation of graphs	1	23-07-2022		TLM1	
41.	BFS	1	25-07-2022		TLM1	
42.	DFS	2	26-07-2022		TLM1	
43.	Hashing Introduction	1	27-07-2022		TLM1	
44.	Hash Table, Hash Function	1	30-07-2022		TLM1	
45.	Separate Chaining	1	01-08-2022		TLM1	
46.	Linear Probing	1	02-08-2022		TLM1	
47.	Quadratic Probing	1	03-08-2022		TLM1	
48.	Double Hashing	1	06-08-2022		TLM1	
49.	Rehashing / Assignment-5	1	08-08-2022		TLM1	
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	HOD Sign Weekly
50	Introduction to Advanced Data Structures	1	10-08-2022		TLM1	
51	Advanced Lists	1	13-08-2022		TLM1	

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

PART-C

EVALUATION PROCESS (R17 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): 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	Mr. S. Siva Ramakrishna	Dr. O. Rama Devi	Dr. O. Rama Devi
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor   : **DR.K.DEEPIKA**
Course Name & Code   : CONSTITUTION OF INDIA (20MC01)

L-T-P Structure   : 2-0-0   Credits : 0
Program/Sem/Sec   : B.Tech., AI & DS., II-Sem., B   A.Y: 2021-22

PRE-REQUISITE: Understand the Indian Constitution

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- To enable the student to understand the importance of constitution

- To understand the structure of Executive ,Legislature and Judiciary.

- To Understand Philosophy of fundamental rights and duties.

- To Understand the autonomous nature of constitution bodies like Supreme Court and High Court Controller and Auditor General of India and Election Commision of India

- To Understand the Central and State relation, financial and administrative.

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

CO 1	Understand history and philosophy of constitution with reference to preamble, Fundamental Rights and Duties.
CO 2	Understand the concept of Unitary and Federal Government along with the role of President, Prime Minister and Judicial System.
CO 3	Understand the structure of the state government, Secretariat, Governor and Chief Minister and their functions.
CO 4	Learn local administration viz. Panchayat, Block, Municipality and Corporation.
CO 5	Learn about Election Commision and the process and about SC,ST,OBC and women.

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	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	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).

TEXT BOOKS:

T1   Dr.B.R Ambedkar ,The Constitution of India ,General Press First edition 2020., New Delhi

T2   Dr.B.R Ambedkar ,The Constitution of India, Government of India

REFERENCE BOOKS:

R1   Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd., New Delhi.

R2   Subash Kashyap, Indian Constitution, National Book Trust.

R3   J.A. Siwach, Dynamics of Indian Government and Politics.

R4   D.C. Gupta, Indian Government and Politics.

R5   H.M.Sreevai. Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication).

R6   J.C. Johari, Indian Government and Politics Hans.

R7   J.Raj, Indian Government and Politics.

R8   M.V. Pylee, Indian Constitution, Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd., New Delhi.

R9Noorani, A.G. (South Asia Human Rights Documentation Centre), Challenges to Civil Right). Challenges to Civil Rights Guarantees in India, Oxford University Press 2012.

E RESOURCES
 1. nptel.ac.in/courses/109104074/8.
 2. nptel.ac.in/courses/109104045.
 3. nptel.ac.in/courses/101104065.
 4. www.hss.iitb.ac.in/en/lecture-details.
 5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indianconstitution.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section C

UNIT-I : Introduction to Indian Constitution

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 and Co-Po and Syllabus	1	06-05-2022		TLM2	CO1	T1 / T2	
2.	Constitution meaning and the term	1	07-05-2022		TLM2	CO1	T1 / T2	
3.	Sources and History of Indian Constitution	1	13-05-2022		TLM2	CO1	T1 / T2	
4.	Features-Citizenship, Preamble	1	14-05-2022		TLM2	CO1	T1 / T2	
5.	Fundamental Rights and Duties	1	20-05-2022		TLM2	CO1	T1 / T2	
6.	Directive Principles of State Policy	1	21-05-2022		TLM2	CO1	T1 / T2	
7.	Assignment -I	1	27-05-2022		TLM7	CO1	T1 / T2	
No. of classes required to complete UNIT-I		**7**			**No. of classes taken:**			

UNIT-II: Union Government and its Administration Structure of the Indian Union

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
8	Union Government structure in India	1	28-05-2022		TLM2	CO2	T1 / T2	
9	Federalism Centre	1	03-06-2022		TLM2	CO2	T1 / T2	
10	State Relationships to the Union	1	04-06-2022		TLM2	CO2	T1 / T2	
11	President Role, Power and Position	1	10-06-2022		TLM2	CO2	T1 / T2	
12	Prime Minister (PM) and Council of Ministers ,cabinet and Central Secretariat Powers and duties	1	11-06-2022		TLM2	CO2	T1 / T2	
13	Lok Sabha,Rajya Sabha, Supreme Court and High Court Powers and Functions.	1	17-06-2022		TLM2	CO2	T1 / T2	
14	Assignment II	1	18-06-2022		TLM7	CO2	T1 / T2	
I MID EXAMINATIONS 20-06-2022 to 25-06-2022								
		7			**No. of classes taken:**			

UNIT-III: State Government and its administration Governor

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
15	State Government and its Administration Governor and Role	1	24-06-2022		TLM2 / TLM4	CO3	T1 / T2	
16	Role of Chief Ministers and Council of Ministers	1	25-06-2022		TLM2 / TLM4	CO3	T1 / T2	
17	State Secretariat Functions	1	01-07-2022		TLM2 / TLM4	CO3	T1 / T2	
18	Organisation ,Structure and Functions of State Governments	1	02-07-2022		TLM2 / TLM4	CO3	T1 / T2	
19	Assignment –III	1	08-07-2022		TLM2 / TLM4	CO3	T1 / T2	
No. of classes required to complete UNIT-III		**05**			**No. of classes taken:**			

UNIT-IV: A Local Administration

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
20	A Local Administration	1	09-07-2022		TLM2 / TLM4	CO4	T1 / T2	
21	Role and importance of local administration	1	15-07-2022		TLM2 / TLM4	CO4	T1 / T2	
22	Municipalities –Mayor and Role of Elected Representative	1	16-07-2022		TLM2 / TLM4	CO4	T1 / T2	
23	Functions of Panchayati Raj Institution,Zilla Panchayats ,Elected Official and their roles	1	22-07-2022		TLM2 / TLM4	CO4	T1 / T2	
24	Village level-Role of Elected and Appointed officials./Assignment-IV	1	23-07-2022		TLM2/ TLM 7	CO4	T1 / T2	
No. of classes required to complete UNIT-IV		**05**			**No. of classes taken:**			

UNIT-V: Election Commission

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
25	Election Commission :Role of Chief Election Commissioner and Election Commisionerate	1	29-07-2022		TLM2 / TLM4	CO5	T1 / T2	
26	State Election Commission	1	30-07-2022		TLM2 / TLM4	CO5	T1 / T2	
27	Functions and Commissions for the Welfare of SC/ST/OBC and Women.	1	05-08-2022		TLM2 / TLM4	CO5	T1 / T2	
No. of classes required to complete UNIT-V		**03**			**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
29.	Consumer Rights	1	06.08.2022 & 12-08-2022		TLM2/ TLM5		T2/R3	
	Industrial policies							

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
TLM 7	Assignment /Quiz		

PART-C

EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I , Unit-II , Unit-III)	A1=5
Assignment-II (Unit-III , Unit-IV , Unit-V)	A2=5
I-Mid Examination (Units-I & II)	M1=15
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=15
II-Quiz Examination (Units-III, IV & V)	Q2=10
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=15
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+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.
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PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
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	**Programming Paradigms:**The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 2	**Data Engineering:**To inculcate an ability to analyze, design and implement database applications.
PSO 3	**Software Engineering:**The ability to apply Software Engineering practices and strategies in software project development using open source programming environment for the success of organization.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.K.Deepika	K.Ravi Kiran Yasaswi	Dr.D.Veeraiah	Dr.O.Ramadevi

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Ms. Anuradha M
Course Name & Code : PCS LAB, 20FE51
L-T-P Structure : 0-0-2   **Credits:** 01
Program/Sem/Sec : AI & DS (Sec B) –II SEM
A.Y. : 2020-21

PREREQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): To improve the proficiency of students in English with an emphasis on better communication in formal and informal situations; Develop speaking skills required for expressing their knowledge and abilities and to face interviews with confidence.

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

CO1	Introduce one-self and others using appropriate language and details.	L2
CO2	Comprehend short talks and speak clearly on a specific topic using	L2
CO3	Report effectively after participating in informal discussions ethically.	L1
CO4	Interpret data aptly, ethically & make oral presentations without	L3

Syllabus: Professional Communication Lab (PCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems, LAN facility and English language software for self-study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorder etc.

Exercise– I

CALL Lab: Understand- Sentence structure.

ICS Lab: Practice -Listening: Identifying the topic, the context and specific information, Speaking: Introducing oneself and others.

Exercise–II

CALL Lab: Understand- Framing questions.

ICS Lab: Practice- Listening: Answering a series of questionsaboutmainideaandsupportingideasafterlisteningtoaudiotext.

Speaking: Discussing in pairs/small groups on specific topics; Delivering short structured talks using suitable cohesive devices (JAM)

Exercise–III

CALL Lab: Understand- Comprehension practice–Strategies for Effective Communication

ICS Lab: Practice - Listening: Listening for global comprehension and Summarizing Speaking: Discussing specific topics in pairs/small groups, reporting what is discussed

Exercise–IV

CALL Lab: Understand- Features of Good Conversation–Strategies for Effective Communication.

ICS Lab: Practice -Listening: making predictions while listening to conversations/transactional dialogues with/without video Speaking: Role – plays – formal & informal – asking for and giving information/directions/instructions/suggestions

Exercise– V

CALL Lab: Understand- Features of Good Presentation, Methodology of Group Discussion

ICS Lab: Practice –Introduction to Group Discussions.

Listening: Answering questions, identifying key terms and understanding concepts.

Speaking: Formal Oral & Poster presentations on topics from academic contexts without the use of PPT.

Lab Manual:

1. Prabhavati .Y & etal, "English All Round–Communication Skills for Undergraduate Learners" , Orient Black Swan, Hyderabad, 2019.

Suggested Software:

1. Digital Mentor: Globarena, Hyderabad,2005
2. Sky Pronunciation Suite: Young India Films, Chennai,2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley, USA, 2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, The Learning Company, USA, 2002
6. Learning to Speak English- 4CDs. The Learning Company, USA, 2002
7. Cambridge Advanced Learners English Dictionary (CD).Cambridge University Press, New Delhi, 2008.

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					3	3				
CO2					3					3	3				
CO3					3					3	3				
CO4					3					3	3				
1 - Low						**2 –Medium**						**3 - High**			

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to syllabus	02	05-05-2021		TLM4	
2.	Self Introduction & Introducing others	02	12-05-2021		TLM4	
3.	Self Introduction & Introducing others	02	19-05-2021		TLM4	
4.	JAM- I(Short and Structured Talks)	02	26-05-2021		TLM4	
5.	JAM-II(Short and Structured Talks)	02	25-05-2021		TLM4	
6.	Role Play-I(Formal and Informal)	02	02-06-2021		TLM4	
7.	Role Play-II (Formal and Informal)	02	09-06-2021		TLM4	
8.	Group Discussion-I (Reporting the discussion)	02	16-06-2021		TLM4, TLM6	
9.	Group Discussion-I (Reporting the discussion)	02	30-06-2021		TLM4, TLM6	
10.	Group Discussion-II	02	07-06-2021		TLM4, TLM6	
11.	Oral & Poster Presentation	02	14-07-2021		TLM2, TLM4	
12.	Oral & Poster Presentation	02	21-07-2021		TLM2, TLM4	
13.	Oral & Poster Presentation	02	28-07-2021		TLM2, TLM4	
14.	Oral & Poster Presentation	02	04-08-2021		TLM2, TLM4	
15.	Lab Internal Exam	02	11-08-2021			
No. of classes required to complete Syllabus: 30				**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	Marks
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering.
PSO 2	Possesses ability to plan, examine and analyse the various laboratory tests required for the professional demands.
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	M.Anuradha	Dr. B. Samrajya Lakshmi	Dr. B. Samrajya Lakshmi	Dr. A. Ramireddy
Signature				

![LBRCE Logo]

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

Part-A

PROGRAM	:	B.Tech., II-Sem.,AI&DS -B
ACADEMIC YEAR	:	2021-22
COURSE NAME & CODE	:	APPLIED PHYSICS LAB -20 FE54
L-T-P STRUCTURE	:	0-0 -3
COURSE CREDITS	:	1.5
COURSE INSTRUCTOR	:	**Mrs. N.Aruna**
COURSE COORDINATOR	:	**Mr. N.T.Sarma**

Pre-requisites : NIL

Course Educational Objective : This course enables the students to acquire theoretical ideas, Analytical techniques and graphical analysis by completing a host of experiments with the procedures and observational skills for appropriate use of simple and complex apparatus.

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

Co1.	Analyze the wave characteristics of Light (Understand-L2)
Co2.	Estimate the magnetic field using Stewart's and Gee's apparatus (Understand-L2)
Co3.	Verify the characteristics of Semiconductor Diodes (Apply-L3)
Co4.	Determine the acceptance angle and numerical aperture of optical fibre (Apply-L3)
Co 5.	Improve report writing skills, Individual and team work with Ethical values (Understand-L2)

COURSE ARTICULATION MATRIX (Correlation between Cos & POs, PSOs

Applied Physics Lab												
COURSE DESIGNED BY	FRESHMAN ENGINEERING DEPARTMENT											
Course Outcomes	Programme Outcomes											
PO's →	1	2	3	4	5	6	7	8	9	10	11	12
CO1.	3	3	1	1	-	-	-	-	-	-	-	1
CO2.	3	3	2	1	1	1	1	-	-	-	-	1
CO3.	3	3	1	1	-	-	-	-	-	-	-	1
CO4.	3	3	1	1	-	-	-	-	-	-	-	1
CO5.	-	-	-	-	-	-	-	2	2	2	-	-
CATEGORY	BASIC SCIENCES											

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

BOS APPROVED TEXT BOOKS:

1. Lab Manual Prepared by the LBRCE

COURSE DELIVERY PLAN (LESSON PLAN): Section- B

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.	CEO'S &CO'S	2	06-05-2022		**TLM4**	1,2,3,4	T1	
2.	Introduction	2	13-05-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
3.	Demonstration	2	20-05-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
4.	Experiment 1	2	27-05-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
5.	Experiment 2	2	03-06-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
6.	Experiment 3	2	10-06-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
7.	Experiment 4	2	17-06-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
8.	Experiment 5	2	24-06-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
9.	Demonstration	2	01-07-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
10.	Experiment 6	2	08-07-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
11.	Experiment 7	2	15-07-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
12.	Experiment 8	2	22-07-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
13.	Experiment 9	2	29-07-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
14.	Experiment 10	2	05-08-2022		**TLM4**	CO1, CO2, CO3, CO4	T1	
15.	**Internal Exam**		12-08-2022					
No. of classes required to complete lab		45				No. of classes taken:		

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Graduates of Information Technology programme will be:

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

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

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

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

PROGRAM OUTCOMES:

Engineering Graduates will be able to:

(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). **Ethic**s: 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.

PROGRAM SPECIFIC OUTCOMES (PSOs):

Graduate of the ECE will have the ability to

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

(2) Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time

applications in the field of VLSI and Embedded Systems using relevant tools

(3) Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

N.Aruna/P V Sirisha	N.T.Sarma	Dr S.Yusub	Dr A. Ramireddy
Course Instructor	Course Coordinator	Module Coordinator	HOD

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: S. Siva Ramakrishna
Course Name & Code : DATA STRUCTURES LAB & 20CS53
L-T-P Structure : 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B.Tech/II/B **A.Y.:** 2021-22

PREREQUISITE: Programming Language

COURSE 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: Implement Linear Data Structures using array and Linked list. (**Apply - L3**)
CO2: Implement Various Sorting Techniques. (**Apply - L3**)
CO3: : Implement Non-Linear Data Structure such as Trees &Graphs. (**Apply - L3**)
CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Discussion of CO'S and CEO's	3	10-05-2021		
2.	List using Arrays, Linked List Programs	3	17-05-2021		
3.	Stack Using Arrays, Linked List	3	24-05-2021		
4.	Queue Using arrays, Linked List	3	31-05-2021		
5.	Infix to Postfix Infix to Prefix	3	07-06-2021		
6.	Evolution of Postfix Balanced Parenthesis	3	14-06-2021		
7.	Circular Queue Double Ended Queue	3	28-06-2021		
8.	Bubble sort Selection sort Insertion sort	3	05-07-2021		
9.	Merge sort Quick sort	3	12-07-2021		
10.	Heap sort Binary Tree	3	19-07-2021		
11.	Binary Search Tree	3	26-07-2021		
12.	BFS,DFS	3	02-08-2021		

PART-C

EVALUATION PROCESS (R20 Regulations):

According to Academic Regulations of R20 Distribution and Weightage of Marks For Laboratory Courses is as follows

(a) Continuous Internal Evaluation (CIE): The Continuous Internal Evaluation (CIE) is based on the following parameters:

Parameter	Marks
Day to Day work	05
Record	05
Internal Test	05
Total	15

(b) Semester End Examinations (SEE: The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3 hours duration and evaluated for 35 marks.   The performance of the student shall be evaluated as per the parameters indicated below:

Parameter	Marks
Procedure/Algorithm	05
Experimentation/Program execution	10
Observations/Calculations/Validation	10
Result/Inference	05
Viva voce	05
Total	35

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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. S. Siva Ramakrishna	Mr. S. Siva Ramakrishna	Dr. O. Rama Devi	Dr. O. Rama Devi

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT
PART-A

Name of Course Instructor : K. Harish Kumar/ B. Rama Krishna
Course Name & Code   : COMPUTER AIDED ENGINEERING DRAWING LAB –20ME53
L-T-P Structure   : 0-0-3   Credits : 1.5
Program/Sem/Sec   : B.Tech., AI&DS., II-Sem., Sec-B   **A.Y   : 2021-22**

PRE-REQUISITE: NIL

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objectives of this course are to familiarize various commands used in Auto-CAD and to visualize the Isometric and Orthographic views of any object

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

CO 1	Understand the Auto-CAD basics and apply to solve problems used in industries where the speed and accuracy can be achieved (**Understand – L2**)
CO 2	Understand the principles of Orthographic projections of points, lines, planes and solids (**Understand – L2**)
CO 3	Draw the isometric views of lines, planes and simple solids (**Understand – L2**)
CO 4	Convert Orthographic to isometric & vice versa. (**Understand – L2**)

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

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

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

TEXT BOOKS:

T1   D.M. Kulkarni, A.P Rastogi, and A.K. Sarkar, "Engineering Graphics with AutoCAD", PHI Learning Private Limited, New Delhi, 2009.

REFERENCE BOOKS:

R1   N. D. Bhatt, "Engineering Drawing", 51st Revised and Enlarged Edition, Charotar Publishers, 2012.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and Cos	3	04-05-2022		**TLM4**	
2.	Basic Auto Cad Commands Drawing commands, Edit commands, Array commands	3	11-05-2022		**TLM4**	
3.	Basic Auto Cad Commands Hatching commands &line commands, commands, Dimensioning & text commands.	3	18-05-2022		**TLM4**	
4.	Modify Commands Move, Extend, Trim & Copy	3	25-05-2022		**TLM4**	
5.	Projection of Points, Lines And Planes: Projection of points (I, II, III & IV quadrants) Projection of lines parallel to both reference planes	3	01-06-2022		**TLM4**	
6.	Projection of Points, Lines And Planes: Projection of lines parallel to one reference plane & inclined to other reference plane. Projection of planes: single stage projections.	3	08-06-2022		**TLM4**	
7.	Orthographic Projections: Conversion of plane figures to orthographic views Conversion of circular figures to orthographic views.	3	15-06-2022		**TLM4**	
8.	Orthographic Projections: Conversion of combination of plane figures and circular figures to orthographic views.	3	29-07-2022		**TLM4**	
9.	Isometric Projections: Conversion of plane figures to isometric	3	06-07-2022		**TLM4**	

	views. Conversion of circular figures to isometric views.					
10.	<u>Isometric Projections:</u> Conversion of plane figures to isometric views. Conversion of circular figures to isometric views.	3	13-07-2022		**TLM4**	
11.	<u>Isometric Projections:</u> Conversion of plane figures to isometric views. Conversion of circular figures to isometric views.	3	20-07-2022		**TLM4**	
12.	<u>Isometric Projections:</u> Conversion of plane figures to isometric views. Conversion of circular figures to isometric views.	3	27-07-2022		**TLM4**	
13.	<u>Isometric Projections:</u> Conversion of plane figures to isometric views. Conversion of circular figures to isometric views.	3	03-07-2022		**TLM4**	
14.	<u>Revision</u>	3	10-07-2022		**TLM4**	

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

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
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Instructor   HOD