



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING  
(AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution

Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada

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DEPARTMENT OF AEROSPACE ENGINEERING

**COURSE HANDOUT**

**PART-A**

Name of Course Instructor	: Ms. M. ANURADHA	
Course Name & Code	: PC-I, 20FE01	
L-T-P Structure	: 2-0-0	Credits: 02
Program/Sem/Sec	: ASE- I SEM	
A.Y.	: 2022-23	
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	Write sentences and paragraphs using proper grammatical structures and word forms.	L1
CO2	Comprehend the given text by employing suitable strategies for skimming and Scanning and draw inferences	L2
CO3	Write summaries of reading texts using correct tense forms & Appropriate structures.	L1
CO4	Write Formal Letters; Memos & E-Mails	L3
CO5	Edit the sentences/short texts by identifying basic errors of grammar/ vocabulary/syntax	L2

**Unit-I**

**Exploration -** 'A Proposal to Girdle the Earth – Nellie Bly'; Reading: Skimming for main idea; Scanning for specific information; Grammar & Vocabulary: Content Words; Function Words; Word Forms: verbs, nouns, adjectives and adverbs; Nouns: Countable and Uncountable, Singular and Plural forms; Wh - Questions; Word Order in Sentences; Writing: Paragraph Analysis; Paragraph Writing; Punctuation and Capital Letters

**Unit-II**

**On Campus-** 'The District School as it Was by One Who Went to it – Warren Burton'; Reading: Identifying Sequence of Ideas; Grammar & Vocabulary: Cohesive Devices: Linkers/signposts/Transition signals, Synonyms, Meanings of Words/ Phrases in the context; Writing: Memo Drafting.

**Unit-III**

**Working Together-** 'The Future of Work'  
Reading: Making basic inferences; Strategies to use text clues for comprehension; Summarizing; Grammar & Vocabulary: Verbs: Tenses; Reporting Verbs for Academic Purpose; Writing: Rephrasing what is read; Avoiding redundancies and repetitions  
Abstract Writing/Summarizing.

**Unit-IV**

**'A.P.J. Abdul Kalam'**; Grammar & Vocabulary: Direct & Indirect Speech; articles and their Omission; Writing: E-Mail Drafting.

**Unit-V**

**'C.V.Raman'**; Grammar & Vocabulary: Subject-verb Agreement; Prepositions; Writing: Formal Letter Writing.

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

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

**TEXTBOOKS:**

- T1** Prabhavati. Y & etal , “English All Round –Communication Skills for Undergraduate Learners” ,Orient Black Swan, Hyderabad, 2019
- T2** “The Great Indian Scientists” published by Cengage Learning India Pvt. Ltd., Delhi, 2017

**REFERENCE BOOKS:**

- R1** Swan, M., “Practical English Usage”, Oxford University Press, 2016.
- R2** Kumar, Sand Latha, P, “Communication Skills”, Oxford University Press, 2018.
- R3** Rizvi Ashraf M, “Effective Technical Communication”, Tata Mc Graw Hill, New Delhi, 2008.
- R4** Baradwaj Kumkum, “Professional Communication”, I. K. International Publishing HousePvt.Lt.,NewDelhi,2008.
- R5** Wood, F. T., “Remedial English Grammar” , Macmillan, 2007.

**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	01	17-10-2022		TLM2	
2.	Proposal to Girdle The Earth by Nellie Bly	02	20-10-2022 21-10-2022		TLM2	
3.	Reading: Skimming for main idea ; Scanning for specific information	01	27-12-2022		TLM2	
4.	Content words and Function words	01	28-10-2022		TLM2	
5.	Word forms – verbs; Adjectives & adverbs	01	31-10-2022		TLM2	
6.	Nouns – countable & uncountable, singular and plural nouns Word order in sentences, “Wh” questions	01	3-10-2022		TLM2	
7.	Writing: Paragraph writing, Paragraph analysis	02	04-11-2022 07-11-2022		TLM2 TLM6	
<b>No. of classes required to complete UNIT-I: 09</b>				<b>No. of classes taken:</b>		

**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
8.	The District School As It Way by One Who Went to it - Warren Burton	03	10&11&14-11-2022		TLM2	
9.	Identifying sequence of ideas	01	17-11-2022		TLM2	
10.	Cohesive devices: linkers signposts/transition signals	01	18-11-2022		TLM2	

11.	Synonyms meanings of words / Phrases in the context	01	21-11-2022		TLM2	
12.	Essay Writing - Memo drafting	02	24&25 11-2022		TLM2 TLM6	
<b>No. of classes required to complete UNIT-II: 08</b>				<b>No. of classes taken:</b>		

**UNIT-III:**

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.	The Future of Work	02	28-11-2022 01-12-2022		TLM2 TLM6	
14.	Making basic inferences, Strategies to uses text clues for comprehension	01	02-12-2022		TLM2	
15.	Verbs :tenses, reporting verbs for academic purpose	02	05&08 -12-2022		TLM2	
16.	Summarizing rephrasing what is read	01	10-12-2022		TLM2	
17.	Avoiding redundancies and repetitions - Abstract Writing	01	19-12-2022		TLM2 TLM6	
<b>No. of classes required to complete UNIT-III: 07</b>				<b>No. of classes taken:</b>		

**UNIT-IV:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	APJ Abdul Kalam	03	22& 23&26-12-2022		TLM2 TLM2	
19.	APJ Abdul Kalam Textual Exercises	02	29&30-12-2022		TLM2	
20.	Direct-Indirect speech	02	02&06-01-2023		TLM2	
21.	Articles and their omission	02	07&09-01-2023		TLM2	
22.	E-mail drafting	02	12&13-01-2023		TLM2 TLM6	
<b>No. of classes required to complete UNIT-IV: 11</b>				<b>No. of classes taken:</b>		

**UNIT-V:**

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.	C.V.Raman	03	19&20&23 01-2023		TLM2	
24.	C.V.Raman	01	27-01-2023		TLM2	
25.	Subject – Verb agreement	03	28&30-01-2023 02-02-2023		TLM2	
26.	Prepositions	02	03&06 -02-2023		TLM2	
27.	Formal Letter Writing	02	09&11-02-2023		TLM2 TLM6	
<b>No. of classes required to complete UNIT-V: 11</b>				<b>No. of classes taken:</b>		

Teaching Learning Methods			
<b>TLM1</b>	Chalk and Talk	<b>TLM4</b>	Demonstration (Lab/Field Visit)
<b>TLM2</b>	PPT	<b>TLM5</b>	ICT (NPTEL/Swayam Prabha/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	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):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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
<b>PO 6</b>	<b>The engineer and society:</b> 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
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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
<b>PO 11</b>	<b>Project management and finance:</b> 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.
<b>PO 12</b>	<b>Life-long learning:</b> 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	M. Anuradha	Dr. B. Samrajya Lakshmi	Dr. B. Samrajya Lakshmi	Dr. A. Ramireddy
Signature				

**COURSE HANDOUT****Part-A**

<b>PROGRAM</b>	: I B. Tech., I-Sem., ASE
<b>ACADEMIC YEAR</b>	: 2022-23
<b>COURSE NAME &amp; CODE</b>	: Differential Equations
<b>L-T-P STRUCTURE</b>	: 5-0-0
<b>COURSE CREDITS</b>	: 4
<b>COURSE INSTRUCTOR</b>	: K. N. V. Lakshmi
<b>COURSE COORDINATOR</b>	: Dr. A. Rami Reddy
<b>PRE-REQUISITES</b>	: Differentiation, Integration

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The objective of this course is to introduce the first order and higher order differential equations, functions of several variables. The students will also learn solving of first order partial differential equations.

**COURSE OUTCOMES (COs)**

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

CO1: Apply first order and first degree differential equations to find orthogonal trajectories.

CO2: Distinguish between the structure and methodology of solving higher order differential equations with constant coefficients.

CO3: Apply various Numerical methods to solve initial value problem.

CO4: Generate the infinite series for continuous functions and investigate the functional dependence.

CO5: Solve partial differential equations using Lagrange's method.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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

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

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

**BOS APPROVED TEXT BOOKS:**

**T1** Dr. B.S. Grewal, "Higher Engineering Mathematics", 42<sup>nd</sup> Edition, Khanna Publishers, New Delhi, 2012.

**T2** Dr. B. V. Ramana, "Higher Engineering Mathematics", 1<sup>st</sup> Edition, TMH, New Delhi, 2010.

**BOS APPROVED REFERENCE BOOKS:**

**R1** M. D. Greenberg, "Advanced Engineering Mathematics", 2<sup>nd</sup> Edition, TMH Publications, New Delhi, 2011.

**R2** Erwin Kreyszig, "Advanced Engineering Mathematics", 8<sup>th</sup> Edition, John Wiley & sons, New Delhi, 2011.

**R3** W.E. Boyce and R. C. DiPrima, "Elementary Differential Equations", 7<sup>th</sup> Edition, John Wiley & sons, New Delhi, 2011.

**R4** S. S. Sastry, "Introductory Methods of Numerical Analysis" 5<sup>th</sup> Edition, PHI Learning Private Limited, New Delhi, 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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Bridge Course	8	17/10/2022 To 27/10/2022		TLM2			
2.	Introduction to the course, Course Outcomes	1	28/10/2022		TLM2			

**UNIT-I: Differential Equations of First Order and First Degree**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Introduction to UNIT I	1	29/10/2022		TLM2	CO1	T1,T2	
4.	Formation of Differential Equations	1	01/11/2022		TLM1	CO1	T1,T2	
5.	Exact DE	1	02/11/2022		TLM1	CO1	T1,T2	
6.	Non-exact DE Type I	1	03/11/2022		TLM1	CO1	T1,T2	
7.	Non-exact DE Type II	1	04/11/2022		TLM1	CO1	T1,T2	
8.	Non-exact DE Type III	1	05/11/2022		TLM1	CO1	T1,T2	
9.	Non-exact DE Type IV	1	08/11/2022		TLM1	CO1	T1,T2	
10.	Orthogonal Trajectories (Cartesian)	1	09/11/2022		TLM1	CO1	T1,T2	
11.	Orthogonal Trajectories (Cartesian)	1	10/11/2022		TLM1	CO1	T1,T2	
12.	Orthogonal Trajectories (polar)	1	11/11/2022		TLM1	CO1	T1,T2	
13.	Orthogonal Trajectories (polar)	1	12/11/2022		TLM1	CO1	T1,T2	
14.	Problems	1	15/11/2022		TLM1	CO1	T1,T2	
15.	<b>TUTORIAL 1</b>	1	16/11/2022		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		13			No. of classes taken:			

**UNIT-II: Higher Order Differential Equations**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
16.	Introduction to UNIT II	1	17/11/2022		TLM2	CO2	T1,T2	
17.	Solving a homogeneous DE	1	18/11/2022		TLM1	CO2	T1,T2	
18.	Finding Particular Integral, P.I for $e^{ax+b}$	1	19/11/2022		TLM1	CO2	T1,T2	
19.	P.I for Cos bx or sin bx	1	22/11/2022		TLM1	CO2	T1,T2	
20.	P.I for polynomial function	1	23/11/2022		TLM1	CO2	T1,T2	
21.	P.I for $e^{ax+b} v(x)$	1	24/11/2022		TLM1	CO2	T1,T2	
22.	P.I for $e^{ax+b} v(x)$	1	25/11/2022		TLM1	CO2	T1,T2	

23.	P.I for $x^*v(x)$	1	26/11/2022		TLM1	CO2	T1,T2	
24.	P.I for $x^*v(x)$	1	29/11/2022		TLM1	CO2	T1,T2	
25.	Method of Variation of parameters	1	30/11/2022		TLM1	CO2	T1,T2	
26.	Method of Variation of parameters	1	01/12/2022		TLM1	CO2	T1,T2	
27.	<b>TUTORIAL 2</b>	1	02/12/2022		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

### UNIT-III: Numerical solution of Ordinary Differential Equations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
28.	Introduction to Unit-III	1	03/12/2022		TLM2	CO3	T1,T2	
29.	Numerical Methods	1	06/12/2022		TLM1	CO3	T1,T2	
30.	Solution by Taylor's series	1	07/12/2022		TLM1	CO3	T1,T2	
31.	Solution by Taylor's series	1	08/12/2022		TLM1	CO3	T1,T2	
32.	Picard's Method	1	9/12/2022		TLM1	CO3	T1,T2	
33.	Picard's Method	1	10/12/2022		TLM1	CO3	T1,T2	
<b>I MID EXAMINATIONS (12-12-2022 TO 17-12-2022)</b>								
34.	Euler's Method	1	20/12/2022		TLM1	CO3	T1,T2	
35.	Modified Euler's Method	1	21/12/2022		TLM1	CO3	T1,T2	
36.	Modified Euler's Method	1	22/12/2022		TLM1	CO3	T1,T2	
37.	Runge- Kutta Method	1	23/12/2022		TLM1	CO3	T1,T2	
38.	Runge- Kutta Method	1	24/12/2022		TLM1	CO3	T1,T2	
39.	<b>TUTORIAL 3</b>	1	27/12/2022		TLM3	CO3	T1,T2	
No. of classes required to complete UNIT-III		12			No. of classes taken:			

### UNIT-IV: Functions of Several Variables

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
40.	Introduction to UNIT IV	1	28/12/2022		TLM2	CO4	T1,T2	
41.	Generalized Mean Value Theorem, Taylor's series	1	29/12/2022		TLM1	CO4	T1,T2	
42.	Maclaurin's series	1	30/12/2022		TLM1	CO4	T1,T2	
43.	Functions of several variables	1	31/12/2022		TLM1	CO4	T1,T2	
44.	Jacobians( Cartesian coordinates)	1	03/01/2023		TLM1	CO4	T1,T2	

45.	Jacobians (polar, coordinates)	1	04/01/2023		TLM1	CO4	T1,T2	
46.	Jacobians (cylindrical, spherical coordinates)	1	05/01/2023		TLM1	CO4	T1,T2	
47.	Functional dependence	1	06/01/2023		TLM1	CO4	T1,T2	
48.	Maxima and Minima	1	07/01/2023		TLM1	CO4	T1,T2	
49.	Maxima and Minima of functions of two variables	1	10/01/2023		TLM1	CO4	T1,T2	
50.	Maxima and Minima of functions of two variables	1	11/01/2023		TLM1	CO4	T1,T2	
51.	<b>TUTORIAL 4</b>	1	12/01/2023		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

#### UNIT-V: Partial Differential Equations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
52.	Introduction to UNIT V	1	13/01/2023		TLM2	CO5	T1,T2	
53.	Partial Differential equations	1	19/01/2023		TLM1	CO5	T1,T2	
54.	Formation of PDE by elimination of arbitrary constants	1	20/01/2023		TLM1	CO5	T1,T2	
55.	Formation of PDE by elimination of arbitrary functions	1	21/01/2023		TLM1	CO5	T1,T2	
56.	Formation of PDE by elimination of arbitrary functions	1	24/01/2023		TLM1	CO5	T1,T2	
57.	Formation of PDE by elimination of arbitrary functions	1	25/01/2023		TLM1	CO5	T1,T2	
58.	Solving of PDE	1	27/01/2023		TLM1	CO5	T1,T2	
59.	Solving of PDE	1	28/01/2023		TLM1	CO5	T1,T2	
60.	Lagrange's Method	1	31/01/2023		TLM1	CO5	T1,T2	
61.	Lagrange's Method	1	01/02/2023		TLM1	CO5	T1,T2	
62.	Lagrange's Method	1	02/02/2023		TLM1	CO5	T1,T2	
63.	Lagrange's Method	1	03/02/2023		TLM1	CO5	T1,T2	
64.	<b>TUTORIAL 5</b>	1	04/02/2023		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		13			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
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65.	Lagrange's Method Other models	1	07/02/2023		TLM1	CO4	T1,T2	
66.	Solving of PDE other methods	1	08/02/2023		TLM5	CO5	T1,T2	
67.	Solving of PDE other methods	1	09/02/2023		TLM3	CO1	T1,T2	
68.	Revision	1	10/02/2023		TLM3	CO2	T1,T2	
No. of classes		4			No. of classes taken:			
<b>II MID EXAMINATIONS (13-02-2023 TO 18-02-2023)</b>								

Teaching Learning Methods			
<b>TLM1</b>	Chalk and Talk	<b>TLM4</b>	Demonstration (Lab/Field Visit)
<b>TLM2</b>	PPT	<b>TLM5</b>	ICT (NPTEL/Swayam Prabha/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	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- 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):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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
<b>PO 6</b>	<b>The engineer and society:</b> 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
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

<b>PO 9</b>	<b>Individual and teamwork:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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.
<b>PO 12</b>	<b>Life-long learning:</b> 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.

<b>K. N. V. Lakshmi</b>	<b>Dr. A. RAMI REDDY</b>	<b>Dr. A. RAMI REDDY</b>	<b>Dr. A. RAMI REDDY</b>
Course Instructor	Course Coordinator	Module Coordinator	HOD



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada

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

Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF FRESHMAN ENGINEERING

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor** : Dr. Lakshmi V R Babu Syamala

**Course Name & Code** : Applied Chemistry & 20FE05

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

**Program/Sem/Sec** : B.Tech/I-sem/ASE

**Credits: 03**

**A.Y. : 2022-23**

**PREREQUISITE:** Nil

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** It enables the students to understand the fundamental concepts of chemistry and to provide them with the knowledge of industrial problems and finding the solutions. It helps to strengthen the basic concepts of water, fuel technologies, electrochemistry, corrosion and advanced materials used in technologies.

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

CO1	Identify the troubles due to hardness of water and its maintenance in industrial applications. (Understand-L2)
CO2	Identify issues related to conventional fuels, biofuels and photo-voltaic cells in energy production. (Understand-L2)
CO3	Apply Nernst Equation for calculating electrode cell potentials and compare batteries for different applications. (Apply-L3)
CO4	Apply principles of corrosion for design and effective maintenance of various equipments. (Apply-L3)
CO5	Analyse the suitability of engineering materials like polymers, lubricants, nano materials and composites in technological applications. (Understand-L2)

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

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
COs												
CO1	3	2	1	2		2	1					2
CO2	3	2	2	1		2	2					2
CO3	3	2	2	1		2	1					2
CO4	3	3	2	1		2	1					2
CO5	3	2	2	1		1	1					2
<b>1 = Slight (Low)                      2 = Moderate (Medium)                      3 = Substantial (High)</b>												

**BOS APPROVED TEXT BOOKS:****TEXT BOOKS**

1. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 3<sup>rd</sup> Edition, 2003.
2. Jain, Jain, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, New Delhi, 16<sup>th</sup> Edition, 2015.

**REFERENCES**

1. Shikha Agarwal, "A text book of Engineering Chemistry", Cambridge University Press, New Delhi, 1<sup>st</sup> Edition, 2015.
2. S.S. Dara, S.S. Umare, "A Text book of Engineering Chemistry", S. Chand Publications, New Delhi, 12<sup>th</sup> Edition, 2010.
3. Y. Bharathi Kumari, Jyotsna Cherukuri, "A Text book of Engineering Chemistry", VGS Publications, Vijayawada, 1<sup>st</sup> Edition, 2009.

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I: Water Technology**

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 Applied Chemistry, Sources of water & quality	1	17-10-2022		TLM1	
2.	Hardness & types of hardness, Units of hardness & interrelation	1	18-10-2022		TLM1	
3.	Problems on hardness-1	1	19-10-2022		TLM1	
4.	Problems on hardness-2	1	22-10-2022		TLM1	
5.	Scale and sludges, Caustic embrittlement	1	25-10-2022		TLM1	
6.	priming and foaming, Bolier corrosion	1	26-10-2022		TLM1	
7.	W.H.O standards of potable water, Ion exchange process	1	29-10-2022		TLM1	
8.	Reverse osmosis and electro-dialysis	1	31-10-2022		TLM2	
9.	Treatment of industrial waste water	1	1-11-2022		TLM1	
10.	Revision	1	2-11-2022		TLM1	
11.	Assignment & Quiz		5-11-2022		TLM	
No. of classes required to complete UNIT-I: 11				No. of classes taken:		

**UNIT-II: Fuel Technology**

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.	Characteristics of good fuel, comparative study of solid, liquid & gaseous fuels	1	7-11-2022		TLM1	
2.	GCV, LCV and coal origin	1	9-11-2022		TLM1	
3.	Proximate Analysis &	1	14-11-2022		TLM1	

	significance				
4.	Petroleum-origin, types of crude oil and refining of petroleum	1	15-11-2022		TLM2
5.	Cracking - moving bed catalytic cracking, synthetic petrol –Fischer Tropsch’s process	1	16-11-2022		TLM2
6.	Natural gas composition and C.N.G - advantages	1	19-11-2022		TLM1
7.	Characteristics of bio fuels, sources of bio mass & advantages - Production of biodiesel from rape seed oil	1	21-11-2022		TLM1
8.	Photovoltaic cell design working, advantages and disadvantages	1	22-11-2022		TLM2
9.	Revision	1	23-11-2022		TLM1
10.	Assignment and Quiz	1	26-11-2022		
No. of classes required to complete UNIT-II: 10				No. of classes taken:	

### UNIT-III: Electrochemistry and batteries

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 electrochemistry	1	28-11-2022		TLM1	
2.	Types of electrodes, Calomel Electrode	1	29-11-2022		TLM2	
3.	Glass Electrode	1	3-12-2022		TLM2	
4.	Calculation of EMF of Cell	1	5-12-2022		TLM1	
5.	Applications of Electro chemical Series, Applications of Nernst Equation-1	1	6-12-2022		TLM1	
6.	Applications of Nernst Equation-2	1	7-12-2022		TLM1	
7.	Lead-acid Battery	1	19-12-2022		TLM2	
8.	Lithium ion Battery	1	20-12-2022		TLM2	
9.	H <sub>2</sub> - O <sub>2</sub> Fuel Cell, Mg-Cu reserve battery	1	21-12-2022		TLM2	
10.	Revision, Assignment & Quiz	1	24-12-2022		TLM1	
No. of classes required to complete UNIT-III: 10				No. of classes taken:		

### UNIT-IV: IV Science of corrosion

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.	Types of dry corrosion-oxidative corrosion, Pilling Bed worth rule	1	26-12-2022		TLM1	
2.	corrosion by other gases and liquid metal corrosion	1	27-12-2022		TLM1	
3.	Wet corrosion, mechanism	1	28-12-2022		TLM1	
4.	Concentration Cell Corrosion	1	31-12-2022		TLM2	

5.	Passivity and Galvanic series	1	2-1-2023		TLM1
6.	Nature of metal that influences rate of corrosion	1	3-1-2023		TLM1
7.	Nature of environment	1	4-1-2023		TLM1
8.	Cathodic Protection	2	7 and 9-1-2023		TLM2
9.	electro plating and metal cladding	1	10-1-2023		TLM2
10.	Revision, Assignment & Quiz	1	11-1-2023		TLM1
No. of classes required to complete UNIT-IV: 11				No. of classes taken:	

#### UNIT-V: Chemistry of Engineering 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.	Differences between thermoplasts and thermosets, Types of polymerization with examples	1	16-1-2023		TLM1	
2.	Preparation properties and engineering applications of PVC, Teflon, BUNA-S and Polyurethane.	2	17 and 18-1-2023		TLM2	
3.	Preparation properties and engineering applications of BUNA-S and Polyurethane	1	21-1-2023		TLM2	
4.	Characteristics of a good lubricant and properties of lubricants; Application of properties of lubricants	1	23-1-2023		TLM1	
5.	Nano Materials Introduction, definition, extraordinary changes observed at nano size of materials and reasons	1	24-1-2023		TLM2	
6.	Types of nano-materials, Gas-Phase synthesis & Applications	2	28 and 30-1-2023		TLM2	
7.	Composites, advantageous characteristics of composites, Constituents	1	31-1-2023		TLM1	
8.	Fibre reinforced composites (GFRP, CFRP), Reasons for failure of composites	2	1 and 4-2-2023		TLM1	
9.	Revision, Assignment , Quiz	1	6-2-2023		TLM1	
10.	Semester revision	2	7 and 8-2-2023			
No. of classes required to complete UNIT-V: 12				No. of classes taken:		

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

### **PART-C**

#### **EVALUATION PROCESS (R20 Regulation):**

<b>Evaluation Task</b>	<b>Marks</b>
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
<b>Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))</b>	<b>M=30</b>
<b>Cumulative Internal Examination (CIE): M</b>	<b>30</b>
<b>Semester End Examination (SEE)</b>	<b>70</b>
<b>Total Marks = CIE + SEE</b>	<b>100</b>

## PART-D

### PROGRAMME OUTCOMES (POs):

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<b>Title</b>	<b>Course Instructor</b>	<b>Course Coordinator</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	Dr. Lakshmi V R Babu Syamala	Dr. V. Parvathi	Dr. V. Parvathi	Dr. A. Rami Reddy
<b>Signature</b>				





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## DEPARTMENT OF AEROSPACE ENGINEERING

### COURSE HANDOUT

**Name of Course Instructor:** S. Indrasena Reddy

**Course Name & Code** : Engineering Graphics & 20ME01

**L-T-P Structure** :2-0-4

**Credits:** 4

**Program/Sem/Sec** : B.Tech/I Sem

**A.Y.:** 2022-23

**PRE-REQUISITES:** - Mathematics, Physics

#### **COURSE EDUCATIONAL OBJECTIVE:**

The main objective of the course is to recognize the BI Standards of Engineering Drawing and develop an ability to get familiarized with orthographic projections and isometric views

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

**CO 1:** Represent the geometrical objects considering BIS standards.

**CO2:** Comprehend the basics of orthographic projections and deduce orthographic projections of a point and a line at different orientations.

**CO3:** Visualize geometrical planes of different positions in real life environment

**CO4:** Imagine orthographic views of various solid objects at different orientations

**CO5:** Recognize the significance of isometric drawing to relate 2D environment with 3D environment.

#### **Course Articulation Matrix:**

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

#### **TEXT BOOK:**

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

#### **REFERENCES:**

1. Narayana K L, Kannaiah P, Textbook on Engineering Drawing, 2nd Edition, SciTech publishers.
2. R.K.Dhawan, Engineering Drawing, S.Chand Company LTD.
3. Venugopal, Engineering Drawing and Graphics, New Age publishers
4. Dhananjay A. Jolhe, Engineering Drawing, Tata McGraw Hill Publishers
5. N.S.Parthasarathy, Vela Murali, Engineering Drawing, Oxford Higher Education

**COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I : Introduction To Engineering Drawing**

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 Engineering Drawing, Dimensioning – Lettering	3	17-10-22		TLM 1	
2.	Geometrical Constructions	4	20-10-22		TLM 1	
3.	Engineering Curves: Conic Sections- Ellipse, General method	4	27-10-22		TLM 1	
4.	Ellipse Special methods	3	31-10-22		TLM 1	
5.	Parabola General method and other	4	03-11-22		TLM 1	
6.	Hyperbola and rectangular hyperbola	3	07-11-22		TLM 1	
7.	Cycloids and Involutives	4	10-11-22		TLM 1	
No. of classes required to complete UNIT-I		25		No. of classes taken:		

**UNIT-II : Orthographic Projections**

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.	Introduction to Orthographic Projections	3	14-11-22		TLM 1	
9.	Projections of Points	4	17-11-22		TLM 1	
10.	Projections of straight lines	3	21-11-22		TLM 1	
11.	Projections of straight lines inclined to one plane	4	24-11-22		TLM 1	
12.	Projections of straight lines inclined to both the planes	3	28-11-22		TLM 1	
13.	True lengths and traces	4	01-12-22		TLM 1	
No. of classes required to complete UNIT-II		21		No. of classes taken:		

**UNIT-III : Projection of planes**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Introduction to Projection of Planes	3	05-12-22		TLM 1	
15.	Planes parallel to one planes	4	08-12-22		TLM 1	
16.	Perpendicular to both the planes	3	19-12-22		TLM 1	
17.	Inclined to one reference plane and perpendicular to other	4	22-12-22		TLM 1	
18.	Planes Inclined to both the planes	3	26-12-22		TLM 1	
No. of classes required to complete UNIT-III		17		No. of classes taken:		

**UNIT-IV: projection of solids**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Introduction to Projections of Solids	4	29-12-22		TLM 1	
20.	Axis inclined to one plane	3	02-01-23		TLM 1	
21.	Axis inclined to one of the reference planes and parallel to the other	4	05-01-23		TLM 1	
22.	Axis inclined to both H.P and V.P,	3	09-01-23		TLM 1	
23.	Axis inclined to both H.P and V.P,	4	19-01-23		TLM 1	
No. of classes required to complete UNIT-IV		18		No. of classes taken:		

**UNIT-V: Isometric Views**

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.	Introduction to Isometric View of prism	3	23-01-23		TLM 1	
25.	Isometric view of pyramid, cylinder & cone	3	30-01-23		TLM 1	
26.	Isometric to orthographic	4	02-02-23		TLM 1	
27.	Transformation of Projections:	3	06-02-23		TLM 1	
28.	Conversion of Orthographic Projections to Isometric Views	4	09-02-23		TLM 1	
No. of classes required to complete UNIT-V		17		No. of classes taken:		

**Teaching Learning Methods**

<b>TLM1</b>	Chalk and Talk	<b>TLM4</b>	Demonstration (Lab/Field Visit)
<b>TLM2</b>	PPT	<b>TLM5</b>	ICT (NPTEL/Swayam Prabha/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Group Discussion/Project

**EVALUATION PROCESS:**

Evaluation Task	COs	Marks
Sheet Marks	1,2,3,4,5	A=15
I-Mid Examination	1,2,3	B1=15
II-Mid Examination	3,4,5	B2=15
Evaluation of Mid Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4,5	B=15
<b>Cumulative Internal Examination : A+B</b>	<b>1,2,3,4,5</b>	<b>30</b>
<b>Semester End Examinations</b>	<b>1,2,3,4,5</b>	<b>C=70</b>
<b>Total Marks: A+B+C</b>	<b>1,2,3,4,5</b>	<b>100</b>

## PART-D

### PROGRAMME OUTCOMES (POs):

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

<b>PSO 1</b>	To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design
<b>PSO 2</b>	To prepare the students to work effectively in Aerospace and Allied Engineering organizations

Mr.S.Indrasena Reddy	Mr.S.Indrasena Reddy	Dr.P.Lovaraju
Course Instructor	Module Coordinator	HOD



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## DEPARTMENT OF AEROSPACE ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor: Mr. K.V.Viswanadh

Course Name & Code : Engineering Mechanics & 20ME02

L-T-P Structure : 2-1-0

Credits: 3

Program/Sem : B. Tech / I-Sem

A.Y.: 2022-23

PREREQUISITE: Engineering Physics, Mathematics

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The main objective of this course is to develop the ability to predict the behavior of rigid solid bodies under the action of external forces in real world scenario.

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

CO1	Apply free body diagram concepts to analyze rigid bodies in static conditions. ( <b>Apply-L3</b> ).
CO2	Apply the equilibrium Equations of rigid bodies associated with frictional forces. ( <b>Apply-L3</b> ).
CO3	Identify the location of centroid / centre of gravity and evaluate the moment of inertia of plane sections/solids ( <b>Apply-L3</b> ).
CO4	Understand the behavior of moving bodies in rectilinear motion using kinematic equations or motion curves. ( <b>Understand-L2</b> ).
CO5	Examine the behavior of moving bodies using dynamic equilibrium conditions. ( <b>Apply-L3</b> )

**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	1												3
CO2	3	3	2	1											3
CO3	3	2		2											3
CO4	2	3		2											3
CO5	3	3		1											3
	1 - Low			2 -Medium				3 - High							

**TEXTBOOKS:**

T1 S. S. Bhavikatti, Engineering Mechanics, 4th edition, New Age International (P) Ltd, 2012.

T2 N. H. Dubey, Engineering Mechanics, McGraw Hill, 2013

**REFERENCE BOOKS:**

R1 Ferdinand. L. Singer, Engineering Mechanics, 3<sup>rd</sup> edition, Harper – Collins, 1994

R2 B.Bhattacharya, Engineering Mechanics, 1<sup>st</sup> edition, Oxford University Press, 2008

R3 A.K.Tayal, Engineering Mechanics, 14<sup>th</sup> edition, 2<sup>nd</sup> reprint, Umesh Publications, 2012

R4 R.K.Bansal, Engineering Mechanics, 3<sup>rd</sup> edition, Laxmi Publications, 2016

R5 R.K.Rajput, A Text book of Applied Mechanics, Laxmi Publications, 2011.

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: SYSTEM OF FORCES AND EQUILIBRIUM OF SYSTEM OF FORCES

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 Engineering Mechanics	1	17-10-2022		TLM2	
2.	Course Outcomes, CEOs, POs, PEOs	1	18-10-2022		TLM2	
3.	Basic terminology in Mechanics, laws of Mechanics	1	19-10-2022		TLM,2	
4.	Force, Characteristics of Forces, Force Systems	1	21-10-2022		TLM 1,2	
5.	Resolution and Composition of forces, Parallelogram, Triangle and Polygon Law of Forces	1	22-10-2022		TLM1,2	
6.	Resultant of Coplanar Concurrent Force System-Problems	1	25-10-2022		TLM1,2	
7.	Moment of a Force, Couple – Varignon’s Theorem	1	26-10-2022		TLM2	
8.	<b>Tutorial-1</b>	1	28-10-2022		TLM3	
9.	Resultant of Coplanar Non-Concurrent Force System-Problems	1	29-10-2022		TLM1,2	
10.	<b>EQUILIBRIUM OF SYSTEM OF FORCES:</b> Equilibrium equations of concurrent and non concurrent force system, Free Body Diagrams, Lami’s Theorem	1	31-10-2022		TLM1,2	
11.	Equilibrium of a rigid body subjected to coplanar concurrent forces	1	01-11-2022		TLM2	
12.	Equilibrium of a rigid body subjected to non-concurrent forces- Problems.	1	02-11-2022		TLM2	
13.	<b>Tutorial-2</b>	1	04-11-2022		TLM3	
14.	Problems related to Connected Bodies, Roller problems	1	05-11-2022		TLM1,2	
15.	Roller problems, Assignment -1/ Quiz-1	1	07-11-2022		TLM2,3	
16.	Unit-I Revision	1	08-11-2022		TLM1, 2	
<b>No. of classes required to complete UNIT-I: 16</b>			<b>No. of classes taken:</b>			

#### UNIT-II: FRICTION

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.	<b>FRICTION</b> : Introduction to Friction, advantages, disadvantages	1	09-11-2022		TLM1, 2	
18.	Types of Friction, limiting friction, Laws of Friction	1	11-11-2022		TLM1,2	
19.	Co-efficient of Friction, Angle of Friction – Angle of Repose	1	12-11-2022		TLM1,2	
20.	Blocks resting on horizontal plane	1	14-11-2022		TLM1,2	
21.	Problems on Blocks resting on horizontal plane	1	15-11-2022		TLM1	
22.	One Block resting on another block, Blocks resting on Inclined plane	1	16-11-2022		TLM1,2	

23.	Problems--Blocks resting on Inclined plane	1	18-11-2022		TLM2
24.	Problems--Blocks resting on Inclined plane	1	19-11-2022		TLM2
25.	<b>Tutorial-3</b>	1	21-11-2022		TLM3
26.	Problems--Blocks resting on Inclined plane Assignment -II/ Quiz-I1	1	22-11-2022		TLM2,3
27.	Unit-II Revision	1	23-11-2022		TLM1, 2
<b>No. of classes required to complete UNIT-II: 11</b>				<b>No. of classes taken:</b>	

### UNIT-III: CENTROID AND AREA MOMENT OF INERTIA; CENTRE OF GRAVITY AND MASS MOMENT OF INERTIA

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
28.	<b>CENTROID:</b> Introduction, Concept, Applications, axis of symmetry	1	25-11-2022		TLM2	
29.	Centroid of simple figures from basic principles	1	26-11-2022		TLM1,2	
30.	Centroid of simple composite sections	1	28-11-2022		TLM2	
31.	<b>AREA MOMENT OF INERTIA:</b> Moment of inertia, Theorems of Moment of Inertia	1	29-11-2022		TLM2	
32.	Determination of Moment of Inertia of Rectangle, Circle, Hollow Circle	1	30-11-2022		TLM2	
33.	Determination of Moment of Inertia of Semi Circle, Triangle from basic principles	1	02-12-2022		TLM2	
34.	Problems on moment of inertia	1	03-12-2022		TLM1	
35.	<b>Tutorial – 4</b> - Area Moment of Inertia-problems	1	05-12-2022		TLM3	
36.	Problems on Area moment of inertia	1	06-12-2022		TLM1	
37.	Unit-III Revision (Centroid & Area Moment of Inertia)	1	07-12-2022		TLM1	
38.	Unit-I, II, III Revision	1	09-12-2022		TLM1	
39.	Unit-I, II, III Revision	1	10-12-2022		TLM1	
40.	<b>CENTRE OF GRAVITY:</b> Centre of gravity of solid cylinder	1	19-12-2022		TLM2	
41.	Centre of gravity of right circular cone, hemi sphere	1	20-12-2022		TLM1,2	
42.	Centre of gravity of composite bodies	1	21-12-2022		TLM1,2	
43.	<b>MASS MOMENT OF INERTIA:</b> Introduction, Radius of gyration	1	23-12-2022		TLM2	
44.	Determination of Mass Moment of Inertia of Uniform Rod, Rectangular Plate, Circular Plate-problems	1	24-12-2022		TLM1,2	
45.	<b>Tutorial-5 &amp; Assignment -III/ Quiz-III</b>	1	26-12-2022		TLM3	
46.	Determination of Mass Moment of Inertia of Solid Sphere, Solid Cylinder--problems	1	27-12-2022		TLM1	
47.	Unit-III Revision	1	28-12-2022		TLM1	
<b>No. of classes required to complete UNIT-III: 20</b>				<b>No. of classes taken:</b>		

### UNIT-IV: KINEMATICS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
48.	Introduction to Kinematics, general principles in dynamics, types of motion, rectilinear motion	1	30-12-2022		TLM1,2	
49.	Motion Curves	1	31-12-2022		TLM1,2	
50.	Motion with Uniform Velocity - Problems	1	02-01-2023		TLM1,2	
51.	Motion with Uniform Acceleration derivations- problems	1	03-01-2023		TLM1,2	
52.	<b>Tutorial-6</b>	1	04-01-2023		TLM3	
53.	Motion with Uniform Acceleration-Problems	1	06-01-2023		TLM2	
54.	Motion with varying acceleration - Problems	1	07-01-2023		TLM2	
55.	Angular motion, relationship between linear and angular motions-- problems	1	16-01-2023		TLM1,2	
56.	<b>Tutorial-7 &amp; Assignment -III/ Quiz-III</b>	1	17-01-2023		TLM3	
57.	Uniformly accelerated rotation-problems	1	18-01-2023		TLM1,2	
58.	Unit-IV Revision	1	20-01-2023		TLM1	
<b>No. of classes required to complete UNIT-IV: 11</b>				<b>No. of classes taken:</b>		

#### UNIT-V: KINETICS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
59.	Introduction to Kinetics, Newton's second law of motion-inertia force	1	21-01-2023		TLM1,2	
60.	D'Alembert's principle – Problems, Bodies in rectilinear translation	1	23-01-2023		TLM1,2	
61.	<b>Tutorial-8</b>	1	24-01-2023		TLM3	
62.	Bodies in rectilinear translation - Problems	1	25-01-2023		TLM1,2	
63.	Bodies in rectilinear translation - Problems	1	27-01-2023		TLM2	
64.	Kinetics of rigid bodies Rotating about Fixed Axis, Derivations	1	28-01-2023		TLM1,2	
65.	Simple problems on Bodies Rotating about Fixed Axis.	1	30-01-2023		TLM1,3	
66.	<b>Tutorial-9</b>	1	31-01-2023		TLM3	
67.	Problems – fixed rotation of bodies		01-02-2023		TLM1,2	
68.	Fixed rotation of bodies, Assignment -V/ Quiz-V	1	03-02-2023		TLM2,3	
69.	Curvilinear and general plane motion(Beyond Syllabus)	1	04-02-2023		TLM2,3	
70.	Unit-V Revision	1	06-02-2023		TLM1	
71.	Unit-III, IV, V Revision	1	07-02-2023		TLM1	
72.	Unit-III, IV, V Revision	1	08-02-2023		TLM1	
<b>No. of classes required to complete UNIT-V: 14</b>				<b>No. of classes taken:</b>		



**SYLLABUS BEYOND SYLLABUS**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Calculation of Support reactions	1	10-02-2023		TLM1,2	
2.	Force Analysis of Trusses	1	11-02-2023		TLM1,2	
<b>No. of classes required to complete : 02</b>				<b>No. of classes taken:</b>		

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

**PART-C****EVALUATION PROCESS (R17 Regulation):**

<b>Evaluation Task</b>	<b>Marks</b>
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
<b>Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))</b>	<b>M=30</b>
<b>Cumulative Internal Examination (CIE): M</b>	<b>30</b>
<b>Semester End Examination (SEE)</b>	<b>70</b>
<b>Total Marks = CIE + SEE</b>	<b>100</b>

## PART-D

### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering Problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, Natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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.
<b>PO 6</b>	<b>The engineer and society:</b> 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.
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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.
<b>PO 12</b>	<b>Life-long learning:</b> 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):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.K.V.Viswanadh	Mr. Ch. Siva Sankara Babu	Mr. B. Sudheer Kumar	Dr. P. Lova Raju
Signature				



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution

Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada

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

Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF FRESHMAN ENGINEERING

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor** : Dr. Lakshmi V R Babu Syamala  
**Course Name & Code** : Applied Chemistry Lab & 20FE52  
**L-T-P Structure** : 0-0-3 **Credits:** 1.5  
**Program/Sem/Sec** : B.Tech/I-sem/ASE **A.Y. :** 2022-23

**Pre requisites:** Nil

**Course Educational Objective:** This course enables the students to analyze water samples and perform different types of volumetric titrations. It provides them with an overview of preparation of polymers and properties of fuels.

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

**CO1:** Assess quality of water based on the given procedures (Understand-L2)

**CO2:** Distinguish different types of titrations in volumetric analysis after performing experiments listed in the syllabus (Understand-L2)

**CO3:** Acquire practical knowledge related to preparation of polymers (Understand-L2)

**CO4:** Exhibit skills in performing experiments based on theoretical fundamentals. (Apply-L3)

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

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

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		1		2	2					
CO2	2	1										
CO3	2		1									
CO4	3	2	1									
1 = Slight (Low)			2 = Moderate (Medium)				3 = Substantial (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 Lab Manual**

## Part-B

### COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S. No.	Experiment	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Introduction to Applied chemistry lab; Determination of pH of the given sample solution/soil using pH meter	3	21-10-2022		TLM2	CO4	
2.	Introduction and Glassware explanation; Preparation of Bakelite	3	28-10-2022		TLM2	CO4	
3.	Determination of amount of Na <sub>2</sub> CO <sub>3</sub> using standard HCl solution	3	04-11-2022		TLM4	CO2,CO4	
4.	Estimation of Mohr's salt using standard KMnO <sub>4</sub>	3	11-11-2022		TLM4	CO3,CO4	
5.	Estimation of Mohr's salt using standard K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	3	18-11-2022		TLM4	CO4	
6.	Determination of total Hardness of water using EDTA method	3	25-11-2022		TLM4	CO3,CO4	
7.	Determination of permanent hardness of using EDTA method	3	02-12-2022		TLM4	CO1,CO4	
8.	Determination of alkalinity of water sample	3	09-12-2022		TLM4	CO1,CO4	
9.	Preparation of nylon fibres	3	23-12-2022		TLM4	CO1,CO4	
10.	Nephelometry	3	30-12-2022		TLM4	CO2,CO4	
11.	Review/Revision of expt.	3	06-01-2023		TLM4	CO2,CO4	
12.	Review/Revision of expt.	3	20-01-2023		TLM4	CO3,CO4	
13.	Additional Expt.	3	27-01-2023		TLM4	CO4	
14.	Internal Lab Exam	3	03-02-2023		TLM4	CO2,CO4	
Total							

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:

According to academic regulations of R20, distribution and weightage of marks for laboratory courses are followed as given below.

#### (a) Continuous Internal Evaluation (CIE):

- ✓ The continuous internal evaluation for laboratory course is based on the following parameters:

Parameter		Marks
Day – to – Day Work	Observation	05 Marks
	Record	05 Marks
Internal Test		05 Marks
<b>Total</b>		<b>15 Marks</b>

### PROGRAMME OUTCOMES (POs):

#### Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamental, 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 modeling 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.

<b>Title</b>	<b>Course Instructor</b>	<b>Course Coordinator</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	Dr. Lakshmi V R Babu Syamala	Dr. V. Parvathi	Dr. V. Parvathi	Dr. A. Rami Reddy
<b>Signature</b>				