LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, (AUTONOMOUS)
Accredited by NAAC with 'A' Grade & NBA (Under Tier - I),
ISO 21001 : 2018, 50001 : 2018, 14001: 2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT
COURSE HANDOUT

PART-A

PROGRAM : II B. Tech., IV-Sem., MECH-A
ACADEMIC YEAR : 2023-24
COURSE NAME & CODE : PROBABILITY AND STATISTICS
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : M. Rami Reddy
COURSE COORDINATOR : M. Rami Reddy
PRE-REQUISITES : None

COURSE EDUCATIONAL OBJECTIVES (CEO): The objective of this course is to provide students with the foundations and applications of probabilistic and statistical methods mainly used in varied applications in engineering and science.

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

CO1	Understand various probabilistic situations using the laws of probability and Random variables.	**Understand - L2**
CO2	Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems.	**Apply - L3**
CO3	Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on sample data.	**Apply - L3**
CO4	Analyze the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis.	**Analyze - L4**
CO5	Construct the regression lines to predict the dependent variables and calculate the Correlation Coefficient for a bivariate statistical data.	**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	1	2	-	-	-	-	-	-	-	2	-	-	-
CO2	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-
CO3	3	2	2	2	-	-	-	-	-	-	-	2	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	2	-	-	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-

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

BOS APPROVED TEXT BOOKS:

T1 Jay L.Devore "Probability and Statistics for engineering and the sciences." , 8th edition, Cengage Learning india, 2012
T2 S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 11thEdition, Sultan Chand and sons, New Delhi,2014.

BOS APPROVED REFERENCE BOOKS:

R1 Miller & Freund's "Probability and Statistics for Engineers",8th edition. PHI, New Delhi,2011.
R2 B.V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Probability and Random Variables

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 class, course outcomes	1	02-01-24		TLM1	
2.	Basic concepts of probability	1	03-01-24		TLM1	
3.	problems on basic probability	1	04-01-24		TLM1	
4.	Axioms, Addition theorem	1	06-01-24		TLM1	
5.	Problems on Addition theorem	1	08-01-24		TLM1	
6.	Multiplication theorem, examples	1	09-01-24		TLM1&2	
7.	Independent events, theorems	1	10-01-24		TLM1	
8.	Results on independent events	1	11-01-24		TLM1	
9.	Practice Problems	1	18-01-24		TLM1	
10.	Baye's theorem,	1	20-01-24		TLM1&2	
11.	Problems on Baye's theorem	1	22-01-24		TLM1	
12.	Problems	1	23-01-24		TLM1	
13.	Random variables, Expectations	1	24-01-24		TLM1	
14.	Probability Mass function, examples	1	25-01-24		TLM1	
15.	Probability Density Function	1	27-01-24		TLM1	
16.	Practice Problems	1	29-01-24		TLM1&2	
No. of classes required to complete UNIT-I: 16				No. of classes taken:		

UNIT-II: Probability Distributions

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.	Binomial Distribution- mean & variance	1	30-01-24		TLM1&2	
2.	Problems on Binomial distribution	1	31-01-24		TLM1	
3.	Problems on Binomial distribution	1	01-02-24		TLM1	
4.	Fitting of binomial distribution	1	03-02-24		TLM1	
5.	Poisson distribution, mean and variance	1	05-02-24		TLM1	
6.	Problems on Poisson distribution	1	06-02-24		TLM1	
7.	Fitting of Poisson distribution	1	07-02-24		TLM1	
8.	Practice problems	1	08-02-24		TLM1	
9.	Normal distribution: mean &variance	1	12-02-24		TLM1&2	
10.	Problems on Normal Distribution	1	13-02-24		TLM1	
11.	Problems on Normal Distribution	1	14-02-24		TLM1	
12.	Applications of Normal Distribution	1	15-02-24		TLM1	
13.	Exponential distribution:, examples	1	17-02-24		TLM1	
14.	Practice problems	1	19-02-24		TLM1&2	
No. of classes required to complete UNIT-II: 14				No. of classes taken:		

UNIT-III: Sampling distribution and Estimation

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.	Sampling distribution ,definitions	1	20-02-24		TLM1&2	
2.	Sampling distribution of mean, variance	1	21-02-24		TLM1	
3.	Central limit theorem, Examples	1	22-02-24		TLM1	
4.	Problems on Central Limit Theorem	1	24-02-24		TLM1	
5.	**Mid-I examinations**		26-02-24 to 02-03-24			
6.	Problems on central limit theorem	1	04-03-24		TLM1	
7.	Practice problems	1	05-03-24		TLM1	
8.	Point and interval estimation	1	06-03-24		TLM1&2	
9.	Confidence Interval of mean (n>30)	1	07-03-24		TLM1	

10.	Problems	1	11-03-24		TLM1	
11.	Confidence Interval for proportion	1	12-03-24		TLM1	
12.	Practice Problems	1	13-03-24		TLM1	
13.	Confidence Interval for mean (n<30)	1	14-03-24		TLM1	
14.	problems	1	16-03-24		TLM1	
15.	Practice problems	1	18-03-24		TLM1&2	
No. of classes required to complete UNIT-III: 14				No. of classes taken:		

UNIT-IV: Tests of Hypothesis

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.	Testing of Hypothesis , definitions	1	19-03-24		TLM1&2	
2.	Z-test for single mean	1	20-03-24		TLM1	
3.	Z-test for difference of means	1	21-03-24		TLM1	
4.	Practice problems	1	23-03-24		TLM1&2	
5.	Z-test for single Proportion	1	26-03-24		TLM1	
6.	Z-test for difference of Proportions	1	27-03-24		TLM1	
7.	Practice problems	1	28-03-24		TLM1	
8.	t-test for single mean	1	30-03-24		TLM1	
9.	t-test for difference of means	1	01-04-24		TLM1	
10.	Paired t-test	1	02-04-24		TLM1	
11.	Practice problems	1	03-04-24		TLM1&2	
12.	F-test for variances	1	04-04-24		TLM1	
13.	χ^2-test for goodness of fit	1	06-04-24		TLM1	
14.	χ^2-test for independence of attributes	1	08-04-24		TLM1	
15.	Practice Problems	1	10-04-24		TLM1&2	
No. of classes required to complete UNIT-IV: 15				No. of classes taken:		

UNIT-V: Correlation and Regression

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.	Simple Bi-variate Correlation	1	15-04-24		TLM1&2	
2.	Problems on Pearson's Correlation	1	16-04-24		TLM1	
3.	Regression lines	1	18-04-24		TLM1	
4.	Problems on Regression lines	1	20-04-24		TLM1	
5.	Properties of Regression coefficients	1	22-04-24		TLM1&2	
6.	Problems on Regression coefficients	1	23-04-24		TLM1	
7.	Problems on rank Correlation	1	24-04-24		TLM1	
8.	Problems on repeated ranks	1	25-04-24		TLM1	
9.	Practice problems	1	27-04-24		TLM1	
No. of classes required to complete UNIT-V: 09				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R20 Regulations):

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

Program Educational Objectives (PEOs):

PEO1	To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.
PEO2	To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.
PEO3	To develop inquisitiveness towards good communication and lifelong learning.

Program Outcomes (POs):

PO1 - Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2 - Problem Analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3 - Design / Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4 - Conduct Investigations of Complex Problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5 - Modern Tool Usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6 - The Engineer and Society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7 - Environment and Sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8 - Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9 - Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10 - Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11 - Project Management and Finance	Demonstrate knowledge and understanding of the ring and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12 - Life-long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

PSO1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO2	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.
PSO3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructor	Course Coordinator	Module Coordinator	HOD
(M.Rami Reddy)	(M.Rami Reddy)	(Dr.A.Rami Reddy)	(Dr.A.Rami Reddy)

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: S.RAMI REDDY
Course Name & Code : APPLIED THERMODYNAMICS&20ME07
L-T-P Structure : 2-1-0 **Credits:** 3
Program/Sem/Sec : B.Tech/IV/A **A.Y.:** 2023-24
PREREQUISITE: Thermodynamics
COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course provides the analysis of vapour power cycle, principle of working, thermodynamic analysis, performance and applications of its components.

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

CO1	Describe the working of a vapour power cycles and identify the suitable fuels forpower plants
CO2	Identify the need of various boilers and draught systems for a thermal power plant.
CO3	Apply thermodynamic analysis to study the characteristics of steam nozzles andsteam condensers.
CO4	Evaluate the performance characteristics of an impulse and reaction turbines.
CO5	Comprehend the different compressors used in thermal systems.

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

TEXTBOOKS:

T1 Mahesh. M. Rathore, Thermal Engineering,1st Edition, 2012, TMH.

T2 R.K.Rajput, Thermal Engineering, 5th Edition, 2005, Laxmi publications.

REFERENCE BOOKS:

R1 T.D. Eastop and A. McConkey, Applied Thermodynamics, Pearson, 5th Edition, 2013.

R2 R. Yadav, Thermodynamics and Heat Engines, 5th Edition, Volume-II, 1999.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: VAPOUR POWER CYCLES

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, Carnot Vapour Power Cycle	1	02/01/2024		TLM1	
2.	Rankine Cycle	1	03/01/2024		TLM2	
3.	Problems on Rankine Cycle	1	04/01/2024		TLM1	
4.	Actual Vapour Power Cycle	1	06/01/2024		TLM1	
5.	Methods to improve efficiency of Rankine cycle	1	08/01/2024		TLM1	
6.	Reheating of steam, Regeneration	1	09/01/2024		TLM1	
7.	Problems on Reheating	1	10/01/2024		TLM1	
8.	Open and Closed Feed Water Heaters	1	11/01/2024		TLM1	
9.	Tutorial-I	1	12/01/2024		TLM3	
10.	Fuels used in power plant	1	18/01/2024		TLM1	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: BOILERS &DRAUGHT SYSTEMS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Introduction to boilers	1	20/01/2024		TLM1	
12.	Boiler systems Function and Classification	1	22/01/2024		TLM2	
13.	Fire tube boilers cornish	1	23/01/2024		TLM2	
14.	Lancashire, Cochran Boilers	1	24/01/2024		TLM2	
15.	Water Tube-Babcock and Wilcox boilers	1	25/01/2024		TLM2	
16.	High pressure boilers	1	27/01/2024		TLM2	
17.	Loeffler and Benson boilers	1	29/01/2024		TLM2	
18.	Boiler Mountings	1	30/01/2024		TLM1	
19.	Boiler Accessories	1	31/01/2024		TLM1	
20.	Draught system , Functions, Types	1	01/02/2024		TLM1	
21.	Natural Draft-Height of chimney for given draught and discharge	1	03/02/2024		TLM1	
22.	Tutorial-II	1	05/02/2024		TLM3	
23.	Condition for maximum discharge	1	06/02/2024		TLM1	
24.	Efficiency of chimney	1	07/02/2024		TLM1	
25.	artificial draught-induced and forced	1	08/02/2024		TLM1	
No. of classes required to complete UNIT-II: 16				**No. of classes taken:**		

UNIT-III: STEAM NOZZLES&STEAM CONDENSORS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Introduction, Types of nozzle	1	12/02/2024		TLM2	
27.	Flow through nozzles-thermodynamic Analysis	1	13/02/2024		TLM1	
28.	velocity of nozzle at exit	1	14/02/2024		TLM1	

29.	condition for maximum discharge	1	15/02/2024		TLM1	
30.	critical pressure ratio	1	17/02/2024		TLM1	
31.	Problems on steam nozzles	1	19/02/2024		TLM1	
32.	Problems on steam nozzles	1	20/02/2024		TLM1	
33.	Ideal and actual expansion in nozzle, velocity coefficient	1	21/02/2024		TLM1	
34.	Tutorial-III	1	22/02/2024		TLM3	
35.	Steam condensers, Introduction, Elements of a condenser plant	1	24/02/2024		TLM1	
36.	Types of Condensers-Jet condensers	1	04/03/2024		TLM1	
37.	Surface Condensers–working principle	1	05/03/2024		TLM1	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: STEAM TURBINES

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
38.	Steam turbine, Introduction,	1	06/03/2024		TLM2	
39.	Classification of steam turbines		07/03/2024		TLM2	
40.	Impulse turbine, Mechanical details, Working principle, Velocity diagram	1	11/03/2024		TLM1	
41.	Problems on impulse turbine		12/03/2024		TLM1	
42.	effect of friction–power developed, axial thrust, blade or diagram efficiency	1	13/03/2024		TLM1	
43.	Problems on impulse turbine		14/03/2024		TLM1	
44.	condition for maximum efficiency	1	16/03/2024		TLM1	
45.	De-Laval Turbine – its features	1	18/03/2024		TLM1	
46.	Method store ducerotor speed-velocitycompounding (Curtis Turbine)	1	19/03/2024		TLM1	
47.	Tutorial-IV	1	20/03/2024		TLM3	
48.	Pressure compounding (Rateau Turbine) and pressure and velocity compounding.	1	21/03/2024		TLM1	
49.	Reaction turbines, Introduction	1	23/03/2024		TLM1	
50.	Problems on reaction turbine		26/03/2024		TLM1	
51.	Problems on reaction turbine		27/03/2024		TLM1	
52.	Problems on reaction turbine		28/03/2024		TLM1	
53.	Parson‘s reaction turbine	1	30/03/2024		TLM1	
54.	performance analysis, degree of reaction	1	01/04/2024		TLM1	
55.	condition for maximum efficiency	1	02/04/2024		TLM1	
No. of classes required to complete UNIT-IV: 18				**No. of classes taken:**		

UNIT-V: RECIPROCATING AND ROTARY COMPRESSORS

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
56.	Compressors, Introduction, Classification	1	03/04/2024		TLM2	

57.	Reciprocating compressors, Principle of operation, Work required	1	04/04/2024		TLM1	
58.	Isothermal Efficiency, Volumetric efficiency and Effect of clearance volume	1	06/04/2024		TLM1	
59.	MultistageCompression.	1	08/04/2024		TLM1	
60.	Rotary compressors, Roots blower and Vane's sealed compressor	1	10/04/2024		TLM1	
61.	Tutorial-V	1	15/04/2024		TLM3	
62.	principle ofworking and applications	1	16/04/2024		TLM1	
63.	Centrifugal compressors	1	18/04/2024		TLM1	
64.	Axial flow compressors	1	20/04/2024		TLM1	
65.	Principle of operation and applications	1	22/04/2024		TLM1	
66.	Problems on Reciprocating compressors	1	23/04/2024		TLM1	
67.	Problems on Reciprocating compressors	1	24/04/2024		TLM1	
68.	Problems on Reciprocating compressors	1	25/04/2024		TLM1	
69.	Problems on Reciprocating compressors	1	27/04/2024		TLM1	
No. of classes required to complete UNIT-V: 14				**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	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	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 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	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	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	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	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	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	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	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 multidisciplinaryenvironments.
PO 12	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 principles of thermal sciences to design and develop various thermal systems.
PSO 2	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.
PSO 3	To apply the basic principles of mechanical engineering design or 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	**S.RAMI REDDY**	**Dr.P.VIJAYA KUMAR**	**Dr.P.VIJAYA KUMAR**	**Dr.M.B.S.SREDDY**
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 MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.K.Murahari, Associate Professor
Course Name & Code **:** Production Technology & 20ME08 **Regulation**: R20
L-T-P Structure **: 3-0-0** **Credits:** 03
Program/Sem/Sec : B.Tech IV Sem (A) **A.Y.:** 2023-2024

PREREQUISITE: Metallurgy and Material Science

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objective of this course is to understand the various manufacturing processes available for mechanical engineer and apply them in producing the components.

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

CO1	Classify various manufacturing processes and illustrate the casting processes. **(Understanding- L2)**
CO2	Recall the various welding techniques and explain gas welding and arc welding. **(Understanding- L2)**
CO3	Illustrate resistance welding, special welding, soldering and brazing processes. **(Understanding- L2)**
CO4	Understand the nature of plastic deformation and identify the types of metal forming processes. **(Remembering – L1)**
CO5	Distinguish various types of metal forming processes. **(Understanding- 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	2	3	1									3	1
CO2	3	1	1	3	2								2	3	2
CO3	3	2	2	3	3								2	3	1
CO4	3	3	3	3	2									3	2
CO5	3	1	2	3	1									3	2
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS:

T1 P.N. Rao, Manufacturing Technology – Vol I & II, TMH, 5th Edition, 2018.

T2 Richard W Heine, Philip Rosenthal & Karl R.Loper, Principles of metal casting, TMHEdition, 2017.

REFERENCE BOOKS:

R1	S. Kalpakjain, S.R.Schmid, Manufacturing Engineering and Technology, Pearson Edu., 7th Edition, 2014.
R2	R.K. Jain , Production Technology /Khanna Publishers, 19th Edition, 2020.
R3	Lindberg, Process and Materials of Manufacturing, PE, 4th Edition, 2015.
R4	Sarma P C, Production Technology, S Chand & Company Ltd, 8th Edition, 2014.
R5	B.S.Raghuvamsi, Workshop Technology, Dhanapatirai and co. 12th Edition, 2013.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - B

UNIT-I: Introduction to manufacturing, Casting

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.	CEO's and COs of Production Technology Introduction to manufacturing technology, Definitions.	1	03/01/2024		**TLM1/TLM2**	
2.	Importance of manufacturing	1	05/01/2024		**TLM1/TLM2**	
3.	Classification of Manufacturing.	1	06/01/2024		**TLM1/TLM2**	
4.	**Casting:** Casting Introduction,	1	08/01/2024		**TLM1/TLM2**	
5.	Steps involved in making of casting	1	10/01/2024		**TLM1/TLM2**	
6.	Advantages, Limitations andapplications of casting.	1	12/01/2024		**TLM1/TLM2**	
7.	Materialsused for patterns, Cores and Core prints, Chaplets, Moulding sand and its Properties.	1	19/01/2024		**TLM1/TLM2**	
8.	Pattern and its types	1	20/01/2024		**TLM1/TLM2**	
9.	Pattern allowances and construction.	1	22/01/2024		**TLM1/TLM2**	
10.	Principal of gating.	1	24/01/2024		**TLM1/TLM2**	
11.	Gating ratio and design ofgating system.	1	26/01/2024		**TLM1/TLM2**	
12.	Riser, types,	1	27/01/2024		**TLM1/TLM2**	
13.	Function anddesign.	1	29/01/2024		**TLM1/TLM2**	
14.	Centrifugal casting,	1	31/01/2024		**TLM1/TLM2**	
15.	Die casting,	1	02/02/2024		**TLM1/TLM2**	
16.	Investment casting, clean casting	1	03/02/2024		**TLM1/TLM2**	
17.	Defects and remedies	1	05/02/2024		**TLM1/TLM2**	
No. of classes required to complete UNIT-I: 17				**No. of classes taken:**		

UNIT-II: Welding, Electric Arc Welding

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.	Introduction, Classification of welding process,	1	07/02/2024		**TLM1/TLM2**	
19.	Gas welding-Oxy-acetylene welding Equipment.	1	09/02/2024		**TLM1/TLM2**	

	Oxy-acetylene process and applications					
	, Hydrogen welding,					
20.	Gas cutting process, Gas cutting applications	1	10/02/2024		**TLM1/TLM2**	
21.	Electric arc welding, electrodes,polarities.	1	12/02/2024		**TLM1/TLM2**	
22.	Consumable and non-Consumable,	1	14/02/2024		**TLM1/TLM2**	
23.	Inert Gas Welding Types, MIG welding	1	16/02/2024		**TLM1/TLM2**	
	Sub-merged arc welding (SAW)		17/02/2024			
	Carbon arc welding,		19/02/2024			
	Inert Gas Welding (TIG)process and applications.		21/02/2024			
No. of classes required to complete UNIT-II: 06				**No. of classes taken:**		

UNIT-III: Resistance welding, Soldering and Brazing

S. No.	**Topics to be covered**	**No. of Classes Required**	231/02/2024	**Actual Date of Completion**	**Teaching Learning Methods**	**HOD Sign Weekly**
24.	Principle and types of resistance welding and Applications.	1	24/02/2024		**TLM1/TLM2**	
25.	resistance welding and Applications.	1	24/03/2023		**TLM1/TLM2**	
26.	Thermit welding.	1	04/03/2024		**TLM1/TLM2**	
27.	Friction welding.	1	06/03/2024		**TLM1/TLM2**	
28.	Explosive welding,	1	08/03/2024		**TLM1/TLM2**	
29.	inductionwelding.	1	09/03/2024		**TLM1/TLM2**	
30.	Soldering and brazing,	1	11/03/2024		**TLM1/TLM2**	
31.	Applications of soldering andbrazing processes	1	13/03/2024		**TLM1/TLM2**	
32.	Welding defects, causes andremedies	1	15/03/2024		**TLM1/TLM2**	
31.	non-destructive Examination of eldments.		16/03/2024		**TLM1/TLM2**	
No. of classes required to complete UNIT-III: 06				**No. of classes taken:**		

UNIT-IV: Metal Forming processes

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.	Nature of plastic deformation, Hot working and cold working processes	1	18/03/2024		**TLM1/TLM2**	
33.	Hot working and cold working processes	1	20/03/2024		**TLM1/TLM2**	
34.	Rolling fundamentals, Theory of rolling, Types of rollingmills	1	22/03/2024		**TLM1/TLM2**	
35.	Types of rollingmills	1	23/03/2024		**TLM1/TLM2**	
36.	Theory of Drawing, Wire drawing and tube rawing	1	25/03/2024		**TLM1/TLM2**	
37.	Coining, spinning	1	27/03/2024		**TLM1/TLM2**	
38.	Principle of forging, types offorging	1	29/03/2024		**TLM1/TLM2**	
39.	Smith and drop forging, machine forging, Forging defects	1	30/03/2024		**TLM1/TLM2**	
40.	Causes and remedies, Applications of forming andforging processes	1	01/04/2024		**TLM1/TLM2**	
No. of classes required to complete UNIT-IV: 07				**No. of classes taken:**		

UNIT-V: Extrusion of Metals, Sheet Metal Operations.

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Basic Extrusion process andits characteristics,	1	03/04/2024		**TLM1/TLM2**	
42.	Hot extrusion and its types	1	05/04/2024		**TLM1/TLM2**	
43.	Cold extrusion and its process	1	06/04/2024		**TLM1/TLM2**	
44.	Forward extrusion	1	08/04/2024		TLM1/TLM2	
45.	Backward extrusion	1	10/04/2024		**TLM1/TLM2**	
46.	Impact extrusion,	1	12/04/2024		**TLM1/TLM2**	
47.	Hydrostatic extrusion	1	13/04/2024		**TLM1/TLM2**	
48.	Introduction of sheet metal	1	15/04/2024		**TLM1/TLM2**	
49.	sheet metal operation,	1	17/04/2024		**TLM1/TLM2**	
50.	Stamping,Forming	1	19/04/2024		**TLM1/TLM2**	
51.	Blanking and piercing and forming	1	20/04/2024		**TLM1/TLM2**	
52.	Bending and Stretching Forming	1	22/04/2024		**TLM1/TLM2**	
53.	Embossing and Coining	1	24/04/2024		**TLM1/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
1.	Out of the syllabus – Case studies 1	1	26/04/2024		**TLM1/TLM2**	
2.	Out of the syllabus- Case studies 2	1	27/04/2024		**TLM5/ TLM6**	

Contents beyond the Syllabus

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- 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 EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.
PEO 2	To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.
PEO 3	To develop inquisitiveness towards good communication and lifelong learning.

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 analyses 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 principles of thermal sciences to design and develop various thermal systems.
PSO 2	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.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr.Murahari Kolli	Dr.Murahari Kolli	Dr. M.B.S.SReddy	Dr. M.B.S.SReddy
Signature				

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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. P.V. Chandrasekhar Rao
Course Name & Code : Theory of Machines (20ME06)
L-T-P Structure : 3-1-0 Credits : 3
Program/Sem/Sec : B.Tech., ME., IV-Sem., Sections-A A.Y : 2023-24

PRE-REQUISITE: Engineering Mechanics, Mechanics of Solids

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this course is to identify the basic components, layout and kinematics of mechanisms & familiarize the standard mechanisms used for speed and stability control under the effects of vibrations.

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

CO 1	Comprehend the layout and working of various mechanisms.
CO 2	Analyze the velocity and accelerations of various kinematic links in a mechanism.
CO 3	Understand the gear kinematics and turning moment diagrams of engines
CO 4	Analyze the speed regulations in various types of governors.
CO 5	Comprehend the balancing of the rotating parts and understand the basic concepts of vibrations for mechanical systems.

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	1	-	-	-	-	-	-	-	-	2	-	-	3
CO2	3	2	-	-	-	-	-	-	-	-	-	2	-	-	3
CO3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	3
CO4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	3
CO5	3	2	1	-	-	-	-	-	-	-	-	2	-	-	3

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 Rattan S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi,2011.
T2 Shigley J.E. and Uicker J.J., "Theory of Machines and Mechanisms", 2ndEdition, McGraw-Hill, Inc.,1995.

REFERENCE BOOKS:

R1 Thomas Bevan, "Theory of Machines", 3rd edition, 3rd impress, CBS Publishers and Distributors, 2013.
R2 Rao J.S and Dukkipati R.V, "Mechanism and Machine Theory", 2ndEdition, New Age International, New Delhi, 2007.
R3 Sadhu Singh "Theory of Machines", 3rd edition, Pearson Education, 1997.
R4 Ballaney.P.L"Theory of Machines", 20th edition, Khanna Publishers,1996.
R5 A. Ghosh and A.K.Mallik, "Theory of Mechanisms and Machines", EW Press, 1988.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: MECHANISMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Introduction to Theory of Machines CEO & COs	1	02-01-2024		TLM1	CO1	
2.	**MECHANISMS:** Mechanism & Machine, Differences between Mechanism & Machine	1	03-01-2024		TLM1	CO1	
3.	Elements-classification Joints -classification Difference between Chain, Mechanism and Inversion,	1	04-01-2024		TLM1/TLM4	CO1	
4.	Pair, Types of kinematic Pairs	1	08-01-2024		TLM1/TLM4	CO1	
5.	Pair, Types of kinematic Pairs/Minor	1	08-01-2024		TLM1/TLM4	CO1	
6.	Types of constrained motions	1	09-01-2024		TLM1	CO1	
7.	Grashof Law	1	10-01-2024		TLM1	CO1	
8.	inversion of mechanism, inversions of quadric cycle chain (4-bar chain)	1	11-01-2024		TLM1/TLM4	CO1	
9.	Inversions of single slider crank chain	1	18-01-2024		TLM1/TLM4	CO1	
10.	Inversions of single slider crank chain	1	22-01-2024		TLM1/TLM4	CO1	
11.	Grashof Law/Minor	1	22-01-2024		TLM1/TLM4	CO1	
12.	Inversions of double slider crank chain	1	23-01-2024		TLM1	CO1	
13.	Degree of freedom-Gruebler's criterion	1	24-01-2024		TLM1	CO1	
14.	Problems Gruebler's criterion, Limitations of Gruebler's criterion	1	25-01-2024		TLM1	CO1	
15.	Tutorial-1	1	29-01-2024		TLM3	CO1	
16.	Tutorial-1/Monor	1	29-01-2024		TLM3	CO1	
17.	Unit-I Revision	1	30-01-2024		TLM1	CO1	
No. of classes required to complete UNIT-I: 17					No. of classes taken:		

UNIT-II: VELOCITY AND ACCELERATION ANALYSIS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Introduction to Velocity & Acceleration Analysis Absolute and relative motions	1	31-01-2024		TLM1	CO2	
2.	Instantaneous centre - Kennedy's theorem	1	01-02-2024		TLM1	CO2	
3.	Determination of angular velocity of points and links for simple mechanisms	1	05-02-2024		TLM1	CO2	
4.	Tutorial-2/Minor	1	05-02-2024		TLM3	CO2	
5.	Relative velocity –Velocity Polygon, Velocity diagrams for simple mechanisms	1	06-02-2024		TLM1	CO2	
6.	Acceleration Polygon- acceleration diagrams for simple mechanisms	1	07-02-2024		TLM1	CO2	
7.	Problems on velocity & acceleration diagrams	1	08-02-2024		TLM1	CO2	
8.	Coriolis acceleration & problem, Klein's construction	1	12-02-2024		TLM1	CO2	

9.	Tutorial-3/Minor	1	12-02-2024		TLM3	CO2	
10.	Unit-II Revision	1	13-02-2024		TLM1	CO2	
No. of classes required to complete UNIT-II: 10					No. of classes taken:		

UNIT-III: GEARS &TURNING MOMENT DIAGRAMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	GEARS: Terminology - law of gearing- Profile for gears	1	14-02-2024		TLM1/TLM2	CO3	
2.	Involute gearing- Velocity of sliding	1	15-02-2024		TLM1/ TLM2	CO3	
3.	Path of Contact, Arc of Contact & Contact Ratio	1	19-02-2024		TLM1/TLM2	CO3	
4.	Path of Contact, Arc of Contact & Contact Ratio/Minor	1	19-02-2024		TLM1/TLM2	CO3	
5.	Interference and Undercutting	1	20-02-2024		TLM1/ TLM2	CO3	
6.	Tutorial-4 Assignment-1	1	21-02-2024		TLM3	CO3	
7.	Mid-I Revision	1	22-02-2024		TLM1	CO3	
8.	Introduction about Turning moment	1	04-03-2024		TLM1	CO3	
9.	Introduction about Turning moment/Minor	1	04-03-2024		TLM1	CO3	
10.	Angular velocity and acceleration of piston, connecting rod	1	05-03-2024		TLM1	CO3	
11.	Engine force analysis-piston and crank effort & Inertia torque of connecting rod	1	06-03-2024		TLM1	CO3	
12.	Introduction to turning moment diagrams-single and multi-cylinder engines	1	07-03-2024		TLM1	CO3	
13.	Problems on single cylinder engines & multi cylinder engines	1	11-03-2024		TLM1	CO3	
14.	Tutorial-5/Minor	1	11-03-2024		TLM3	CO3	
15.	Fluctuation of energy- Problems	1	12-03-2024		TLM1	CO3	
16.	Unit-III Revision	1	13-03-2024		TLM1	CO3	
No. of classes required to complete UNIT-III: 16					No. of classes taken:		

UNIT-IV :GOVERNORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Governor - introduction, Watt governor working & Derivation for speed of governor	1	14-03-2024		TLM1/TLM4	CO4	
2.	Porter governor working & derivation	1	18-03-2024		TLM1/TLM4	CO4	
3.	Porter governor Problems/Minor	1	18-03-2024		TLM1/TLM4	CO4	
4.	Tutorial-6	1	19-03-2024		TLM3	CO4	
5.	Proell governor working & derivation	1	20-03-2024		TLM1/TLM4	CO4	

6.	Hartnell governor working, derivation & Problems	1	21-03-2024		TLM1/TLM4	CO4	
7.	Sensitiveness, Isochronism, and hunting	1	26-03-2024		TLM1	CO4	
8.	Tutorial-7	1	27-03-2024		TLM3	CO4	
9.	Unit-IV Revision	1	28-03-2024		TLM1	CO4	
10.	Unit-IV Revision	1	01-04-2024		TLM1	CO4	
11.	Unit-IV Revision	1	01-04-2024		TLM1	CO4	
No. of classes required to complete UNIT-IV: 11					No. of classes taken:		

UNIT-V :BALANCING & BASICS OF VIBRATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Introduction to Balancing - Balancing of rotating masses in single plane	1	02-04-2024		TLM1/ TLM2	CO5	
2.	Balancing of several masses rotating in different planes	1	03-04-2024		TLM1/TLM2	CO5	
3.	Analytical and graphical methods	1	04-04-2024		TLM1/ TLM2	CO5	
4.	Introduction Types of Vibrations (Longitudinal, Transverse & Torsional)	1	08-04-2024		TLM1/ TLM2	CO5	
5.	Types of vibrations/Minor	1	08-04-2024		TLM1/ TLM2	CO5	
6.	Undamped free longitudinal vibrations of spring mass system	1	10-04-2024		TLM1	CO5	
7.	Problems	1	15-04-2024		TLM1	CO5	
8.	Problems/Minors	1	15-04-2024		TLM1	CO5	
9.	Critical Damping, Under Damping & Over damping (Definitions only). Under-damped free vibrations of spring mass system Logarithmic decrement	1	16-04-2024		TLM1/ TLM2	CO5	
10.	Problems on Under-damped free vibrations of spring mass system	1	18-04-2024		TLM1	CO5	
11.	Tutorial-10	1	22-04-2024		TLM3	CO5	
12.	Assignmen-2/Minor	1	22-04-2024		TLM3	CO5	
13.	Unit-V Revision	1	23-04-2024		TLM1	CO5	
14.	Revision	1	24-04-2024		TLM1	CO5	
No. of classes required to complete UNIT-V: 14					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	HOD Sign Weekly
1.	Gyroscope & Whirling Speed of Shaft (Used for lab also)	01	25-04-2024		TLM1/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

EVALUATION PROCESS (R20 Regulations):

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	01/01/2024	24/02/2024	8
I Mid Examinations	26/02/2024	02/03/2024	1
II Phase of Instructions	04/03/2024	27/04/2024	8
II Mid Examinations	29/04/2024	04/05/2024	1
Preparation and Practicals	06/05/2024	11/05/2024	1
Semester End Examinations	13/05/2023	25/05/2023	2

PART-D

PROGRAMME OUTCOMES (POs):

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

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO 2	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.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructor	Course Coordinator	Module Coordinator	HOD
(Dr. P. V Chandrasekhar Rao)	(Mr.K.V.Viswanadh)	(Mr. B. Sudheer Kumar)	(Dr.M.B.S.Sreekara Reddy)

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. P. RAVINDRA KUMAR
Course Name & Code : Universal Human Values 2: Understanding Harmony (20HS01)
L-T-P Structure : 3-0-0 **Credits** : 3
Program/Sem/Sec : B.Tech IV Semester – MECH Section-A **A.Y.** : 2023-24

PREREQUISITE: Nil

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

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

CO1	**Apply the value inputs in life and profession (Applying level – L3)**
CO2	**Distinguish between values and skills, happiness and accumulation of physical facilities, the self, and the Body (Understanding level – L2)**
CO3	**Understand the role of a human being in ensuring harmony in society. (Understanding level – L2)**
CO4	**Understand the role of a human being in ensuring harmony in the nature and existence. (Understanding level – L2)**
CO5	**Distinguish between ethical and unethical practices (Applying level – L3)**

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

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

TEXTBOOKS:

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

REFERENCE BOOKS:

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Need, Basic Guidelines, content, and Process for value Education

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	02-1-2024		TLM1,2	
2.	'Natural Acceptance' and Experiential Validation	1	03-1-2024		TLM1,2	
3.	Process for self-exploration	1	04-1-2024		TLM1,2	
4.	Continuous Happiness and Prosperity	1	06-1-2024		TLM1,2	
5.	A look at basic human aspirations: Right understanding	1	09-1-2024		TLM1,2	
6.	Active learning activity	1	10-1-2024		TLM6	
7.	Right understanding, Relationship and Physical Facility	1	18-1-2024		TLM1,2	
8.	Understanding Happiness, and Prosperity	1	20-1-2024		TLM1,2	
9.	Formative Assessment	1	23-1-2024		TLM3	
No. of classes required to complete UNIT-I: 9				**No. of classes taken 9**		

UNIT-II: Understanding Harmony in the Human Being-Harmony in myself

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Introduction, COs, POs and articulation matrix	1	24-1-2024		TLM1,2	
11.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	25-1-2024		TLM1,2	
12.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	27-1-2024		TLM1,2	
13.	Active learning activity	1	30-1-2024		TLM6	
14.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	31-1-2024		TLM1,2	
15.	Understanding the harmony of I with the Body: Sanyam and Health	1	01-2-2024		TLM1,2	
16.	Active learning activity	1	03-2-2024		TLM1,2	
17.	Correct appraisal of Physical needs	1	06-2-2024		TLM1,2	
18.	Formative Assessment	1	07-2-2024		TLM3	
No. of classes required to complete UNIT-II: 9				**No. of classes taken:**		

UNIT-III: Understanding Harmony in the Family and society-Harmony in Human- Human Relationship

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.	Understanding values in human-human relationship: meaning of justice	1	08-2-2024		TLM1,2	
20.	Program for fulfillment to ensure	1	13-2-2024		TLM1,2	

	mutual happiness and Trust					
21.	Program for fulfillment to ensure mutual happiness and Respect as the foundational values of relationship	1	14-2-2024		TLM1,2	
22.	Understanding Harmony in the society: Resolution	1	15-2-2024		TLM1,2	
23.	Active learning activity	1	17-2-2024		TLM6	
24.	Understanding the harmony in the society: Resolution, Prosperity	1	20-2-2024		TLM1,2	
25.	Understanding the harmony in the society: fearlessness, and co-existence as comprehensive Human Goals	1	21-2-2024		TLM1,2	
26.	Unit end questions format, Question modelling	1	22-2-2024		TLM1	
27.	Multiple choice questions	1	24-2-2024		TLM1,2	
28.	I-Mid examinations	1	26-2-2024 to 02-3-2024			
29.	Prosperity, fearlessness, and co-existence as comprehensive human goals	2	05-3-2024		TLM1,2	
30.	Visualizing a universal harmonious order in the society-undivided society	1	06-3-2024		TLM1,2	
31.	Universal order-from family to world family	1	07-3-2024		TLM1,2	
32.	Gratitude as a universal value in relationships	1	12-3-2024		TLM1,2	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

UNIT-IV: Understanding Harmony in the Nature and Existence- Whole existence as Coexistence.

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, COs, POs and articulation matrix	1	13-3-2024		TLM1,2	
34.	Understanding Harmony in the Nature	1	14-3-2024		TLM1,2	
35.	Interconnectedness and mutual fulfillment among four orders of nature	2	16-3-2024 19-3-2024		TLM1,2	
36.	Recyclability and self-regulation in nature	1	20-3-2024		TLM1,2	
37.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	21-3-2024		TLM1,2	
38.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	23-3-2024		TLM1,2	
39.	Holistic perception of harmony at all levels of existence	1	26-3-2024		TLM1,2	
40.	Active learning activity	1	27-3-2024		TLM6	
41.	Formative Assessment	1	28-3-2024		TLM3	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Implications of the above Holistic understanding of Harmony on professional ethics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Introduction, COs, POs and articulation matrix	1	30-3-2024		TLM1,2	
43.	Natural acceptance of human values	1	02-4-2024		TLM1,2	
44.	Definitiveness of ethical human conduct	1	03-4-2024		TLM1,2	
45.	Basis for humanistic education	1	04-4-2024		TLM1,2	
46.	Humanistic constitution and humanistic universal order	1	06-4-2024		TLM1,2	
47.	Competence in professional ethics	1	10-4-2024		TLM1,2	
48.	Strategy for transition from the present state to universal human order	1	13-4-2024		TLM1,2	
49.	Active learning activity	1	16-4-2024		TLM6	
50.	Formative Assessment	1	18-4-2024		TLM3	
51.	Revision	2	20-4-2024 23-4-2024		TLM1,2	
52.	**Content beyond the syllabus** Vision for Holistic Technologies, Production Systems and Management Models	2	24-4-2024 25-4-2024		TLM2,5	
No. of classes required to complete UNIT-V: 9				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & 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+A	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
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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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO 2	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.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Title	Course Instructor	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. P. RAVINDRA KUMAR**	**Dr. B. SRINIVASA RAO**	**Dr. M.B.S.S. REDDY**
Signature			

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Dr.KM/Mr.ADK

Course Name & Code	**:** Production Technology Lab & 20ME57	**Regulation:** R20
L-T-P Structure	**:** 0-0-3	**Credits:** 1.5
Program/Sem/Sec	: B. Tech/ IV-Sem/ A-Section	**A.Y.:**2023-2024

PREREQUISITE: Engineering Workshop, Engineering Graphics

COURSE EDUCATIONAL OBJECTIVES *(CEOs) and* COURSE OUTCOMES *(COs)*:

COURSE EDUCATIONAL OBJECTIVE (S):
The objective of the course is to provide hands-on experience in primary production processes to design, fabricate, testing and evaluation of mechanical components of different materials using casting, welding, press working and moulding techniques.

COURSE OUTCOMES: After completion of the course students are able to:

CO1: Choose a suitable primary production process to design an industrial component. **(Understanding-L2)**

CO2: Select a suitable production process for fabrication of designed component. **(Applying-L3)**

CO3: Choose a suitable mechanical press working operation to get the required shape of component. **(Remembering-L1)**

CO4: Manufacture a plastic component using various plastic processing techniques. **(Applying-L3)**

Mapping of COs with POs and PSOs:

COURSE ARTICULATION MATRIX (Correlation between COs and POs and PSOs):

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) & PSOs – Production Technology Lab (20ME57)															
		POs												PSOs	
		1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	PSO 3
COs	CO1	3	2	3	3	1	1	2	2	3	1	1	2	-	2	3
	CO2	2	1	3	3	1	1	2	1	2	1	1	2	-	2	2
	CO3	2	1	3	3	1	1	2	2	2	1	1	2	-	2	1
	CO4	1	1	2	3	1	1	1	1	2	1	1	2	-	2	1
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)															

Lab in charge – I **Lab – in charge – II** **Head of the Department**

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DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

2. Problem analysis: Identify, formulate, review research literature, and 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.

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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.

Programme Specific Outcomes (PSOs):

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

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Dr.KM/Mr.ADK

Course Name & Code	**:** Production Technology Lab & 20ME57	**Regulation:** R20
L-T-P Structure	**:** 0-0-3	**Credits:** 1.5
Program/Sem/Sec	: B. Tech/ IV-Sem/ A-Section	**A.Y.:**2023-2024

PREREQUISITE: Engineering Workshop, Engineering Graphics

LIST OF EXPERIMENTS

At least 10 Experiments should be conducted

I. METAL CASTING

1. Pattern Design and making - for one casting drawing - 1 Exercise
2. Sand properties testing - Exercise -for strengths and Permeability - 1 Exercise
3. MouldingMaking, Melting and Casting - 1 Exercise

II WELDING

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Resistance Welding - 2 Exercises
3. Special Welding Techniques - 1 Exercise
4. Brazing and Soldering - 2 Exercises

III MECHANICAL PRESS WORKING

1. Study of simple, compound and progressive press tools (Blanking & Piercing operation) - 1 Exercise
2. Hydraulic Press- operations - 1 Exercise

IV PROCESSING OF PLASTICS

1. Injection Moulding - 1 Exercise
2. Blow Moulding - 1 Exercise

Ref: Production Technology Lab Manual

Lab in charge – I **Lab – in charge – II** **Head of the Department**

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Dr.KM/Mr.ADK
Course Name & Code : Production Technology Lab & 20ME57 **Regulation:** R20
L-T-P Structure : 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B. Tech/ IV-Sem/ A-Section **A.Y.:** 2023-2024

PREREQUISITE: Engineering Workshop, Engineering Graphics

Batches (Section – B)

S.No	Batches	Regd.No's	Total No. of Students
1	B. Tech – A/S	22761A0301 – 22761A0302, 22761A0304-22761A0305, 22761A0307 , 22761A0310-22761A0320, 22761A0330, 23765A0301-23765A0338	55
2	Batch B1	22761A0301 – 22761A0302, 22761A0304-22761A0305, 22761A0307 , 22761A0310-22761A0320, 22761A0330, 23765A0301-23765A0311	28
3	Batch B2	23765A0312-23765A0338	27

Sub Batches of B1:

S. No	Batch	Registered No's	Total
1	B11	22761A0301–302 , 22761A0304-305, 22761A0307, 22761A0310	06
2	B12	22761A0311 – 22761A0316	06
3	B13	22761A0317 – 22761A0320, 22761A0330, 23765A0301	06
4	B14	23765A0302-23765A0306	05
5	B15	23765A0307-23765A0311	05
Total (B1)			28

Sub Batches of B2:

S. No	Batch	Registered No's	Total
1	B21	23765A0312-23765A017	06
2	B22	23765A0318-23765A023	06
3	B23	23765A0324-23765A028	05
4	B24	23765A0329-23765A033	05
5	B25	23765A0334-23765A038	05
Total (B2)			27

Lab in charge – I **Lab – in charge – II** **Head of the Department**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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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 MECHANICAL ENGINEERING

Name of Course Instructor: Dr.KM/Mr.ADK

Course Name & Code	**:** Production Technology Lab & 20ME57	**Regulation:** R20
L-T-P Structure	**:** 0-0-3	**Credits:** 1.5
Program/Sem/Sec	: B. Tech/ IV-Sem/ A-Section	**A.Y.:**2023-2024

PREREQUISITE: Engineering Workshop, Engineering Graphics

Notification of Cycles (Section –A)

Cycle – I: METAL CASTING, WELDING, MECHANICAL PRESS WORKING AND PROCESSING OF PLASTICS:

MOLD MAKING & CASTING: To prepare a pattern for given object for lost form casting; To prepare a Green sand mould from the prepared pattern; To melt and pour Aluminium metal into the mould. **(D Ex – 1)**

1. To study and observe the welding and brazing techniques through demonstration and practice (ARC, MAG, TIG, SPOT, Brazing etc.) **(D Ex – 2)**
2. Demonstration of Hydraulic Press **(D Ex – 3)**
3. Demonstration of Injection Moulding and Blow Moulding **(D Ex – 4)**

Cycle – II: METAL CASTING, WELDING, MECHANICAL PRESS WORKING AND PROCESSING OF PLASTICS:

1. To prepare a sand Moulding using the given single piece pattern, preparation of a core for the sand casting **(C1)**
2. Determine the permeability number, Compressive Strength, Tensile Strength and Shear Strength of the given Moulding sand. **(C2)**
3. Moulding, Melting and Casting **(C3)**
4. To prepare a lap joint on Mild Steel Strip using ARC Welding technique anddetermine the tensile strength of the specimen **(AW1)**
5. To prepare a butt joint on Mild Steel Strip using ARC Welding technique anddetermine the tensile strength of the specimen **(AW2)**
6. To perform the spot welding operation on a given MS and GI thin metallic sheets to make parallel patterns and to determine the tensile strength of the specimen **(SW1)**
7. To perform the spot welding operation on a given MS and GI thin metallic sheets to make a zig -zag patterns and to determine the tensile strength of the specimen **(SW2)**
8. To prepare a butt joint and a lap joint on MildSteel Strip using TIG Welding technique anddetermine the tensile strength of the specimen **(TW1)**
9. To join two given sheets by using Brazing process **(BZ1)**
10. To cut a given plate by using gas cutting equipment **(GW1)**
11. To perform Blanking operation with the help ofdie using Hydraulic Press **(H1)**
12. To perform Piercing operation with the help ofdie using Hydraulic Press **(H2)**
13. To performDeep Drawing operation with the help ofdie using Hydraulic Press **(H3)**
14. To perform Extrusionoperation with the help ofdie using Hydraulic Press **(H4)**
15. To performBending operation with the help ofdie using Hydraulic Press **(H5)**
16. To inject the thermo plastic material into the mould for obtaining the desired article using Injection Moulding Machine. **(PM1)**
17. To inject the thermo plastic material into the mould for obtaining the desired article using Blow Moulding Machine. **(PM2)**

Lab in charge – I **Lab – in charge – II** **Head of the Department**

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Dr.KM/Mr.ADK
Course Name & Code : Production Technology Lab & 20ME57 **Regulation:** R20
L-T-P Structure : 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B. Tech/ IV-Sem/ A-Section **A.Y.:** 2023-2024

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – A)

Batch B1: 22761A0301 – 22761A0302, 22761A0304-22761A0305, 22761A0307, 22761A0310-22761A0320, 22761A0330, 23765A0301-23765A0311

Date	Experiment (Batch)				
	Exp - 1	**Exp – 2**	**Exp – 3**	**Exp – 4**	**Exp – 5**
08-01-2024	Demo				
22-01-2024	B11	B12	B13	B14	B15
29-01-2024	B12	B13	B14	B15	B11
05-02-2024	B13	B14	B15	B11	B12
12-02-2024	B14	B15	B11	B12	B13
19-02-2024	B15	B11	B12	B13	B14
26-02-2024 To 01-03-2024	***I Mid Examinations***				
	Exp - 6	**Exp – 7**	**Exp– 8**	**Exp – 9**	**Exp – 10**
04-03-2024	B11	B12	B13	B14	B15
11-03-2024	B12	B13	B14	B15	B11
18-03-2024	B13	B14	B15	B11	B12
01-04-2024	B14	B15	B11	B12	B13
08-04-2024	B15	B11	B12	B13	B14
14-04-2024	***REPETITION***				
22-04-2024	**Internal Examinations and Viva Voice**				
29-04-2024 TO 04-05-2024	***II Mid Examinations***				
06-05-2024 TO 11-05-2024	**Preparation and Practical's**				
13-05-2024 TO 025-05-2024	**Semester End Examinations**				

Lab in charge – I **Lab – in charge – II** **Head of the Department**

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Dr.KM/Mr.ADK
Course Name & Code : Production Technology Lab & 20ME57 **Regulation:** R20
L-T-P Structure : 0-0-3 **Credits:** 1.5
Program/Sem/Sec : B. Tech/ IV-Sem/ A-Section **A.Y.:** 2023-2024

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – A)

Batch B2:21761A0331, 22765A0301 – 22765A0329,

Date	Experiment (Batch)				
	Exp- 1	**Exp– 2**	**Exp – 3**	**Exp – 4**	**Exp – 5**
05-01-2024	Demo				
12-01-2024	B21	B22	B23	B24	B25
19-01-2024	B22	B23	B24	B25	B21
02-02-2024	B23	B24	B25	B21	B22
09-02-2024	B24	B25	B21	B22	B23
16-02-2024	B25	B21	B22	B23	B24
23-02-2024	***REPETITION/ Cycle change***				
26-02-2024 To 01-03-2024	***I Mid Examinations***				
	Exp - 6	**Exp – 7**	**Exp – 8**	**Exp – 9**	**Exp – 10**
23-02-2024	B21	B22	B23	B24	B25
15-03-2024	B22	B23	B24	B25	B21
22-03-2024	B23	B24	B25	B21	B22
12-04-2024	B24	B25	B21	B22	B23
19-04-2024	B25	B21	B22	B23	B24
26-05-2023	**Internal Mid Examinations and Viva Voice**				
29-04-2024 TO 04-05-2024	***II Mid Examinations***				
06-05-2024 TO 11-05-2024	**Preparation and Practical's**				
13-05-2024 TO 025-05-2024	**Semester End Examinations**				

Lab in charge – I **Lab – in charge – II** **Head of the Department**

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DEPARTMENT OF MECHANICAL ENGINEERING

CYCLE –I

1. Pattern Design and making - for one casting drawing
2. Demonstration of TIG-welding and Special welding
3. ARC Welding: - Lap joint
4. ARC Welding: - butt joint
5. Spot Welding: -chain Joint /Spot Welding: -Zig-Zag Joint
6. Brazing and soldering

CYCLE-II

1. Sand properties testing - Exercise -for Permeability
2. Sand properties testing- Exercise- for strengths
3. Mould preparation
4. Injection Molding
5. Blanking & piercing operation and study of simple, compound and progressive press tool
6. Bending and other operations using Hydraulic press

Lab in charge – I **Lab – in charge – II** **Head of the Department**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech. IV-Sem., ME A/S

ACADEMIC YEAR : 2023-2024

COURSE NAME & CODE : Theory of Machines Lab, 20ME58

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : Dr.B. Sudheer Kumar/Mr.S.Srinivasa Reddy(jr)

COURSE COORDINATOR : Mr.K.V. Viswanadh

PRE-REQUISITE: Engineering Mechanics, Theory of Machines

COURSE OBJECTIVE:

The main objective of this course is to demonstrate the concepts of theory of machines.

COURSE OUTCOMES (CO)

CO 1	Apply the dynamics of cams, gyroscopes for any practical problems. **(Applying-L3)**	
CO 2	Evaluate the speed regulations in governors. **(Applying-L3)**	
CO 3	Execute the static and dynamic balancing for rotating parts of a machine. **(Applying-L3)**	
CO 4	Analyze the vibration parameters of oscillating bodies. **(Analyzing-L4)**	

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

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

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

REFERENCE:

R1	Lab Manual

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

Batch: A1 (22761A0301-320 & 330 - 23765A0301-311)

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	Demonstration	3	08-01-2024		TLM8	-	
2.	Experiment-1	3	22-01-2024		TLM8	R1	
3.	Experiment-2	3	29-01-2024		TLM8	R1	
4.	Experiment-3	3	05-02-2024		TLM8	R1	
5.	Experiment-4	3	12-02-2024		TLM8	R1	
6.	Experiment-5	3	19-02-2024		TLM8	R1	
7.	**I MID EXAMINATION (26-02-2024 TO 02-03-2024)**						
8.	Experiment-6	3	04-03-2024		TLM8	R1	
9.	Experiment-7	3	11-03-2024		TLM8	R1	
10.	Experiment-8	3	18-03-2024		TLM8	R1	
11.	Experiment-9	3	01-04-2024		TLM8	R1	
12.	Experiment-10	3	08-04-2024		TLM8	R1	
13.	Repetition	3	15-04-2024		TLM8	R1	
14.	Lab Internal	3	22-04-2024		-	-	

Additional Experiments:

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
15.	Gyroscope	3	15-04-2024		TLM8	-	

Batch: A2 (23761A0312-23765A0338)

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	Demonstration	3	05-01-2024		TLM8	-	
2.	Experiment-1	3	12-01-2024		TLM8	R1	
3.	Experiment-2	3	19-01-2024		TLM8	R1	
4.	Experiment-3	3	02-02-2024		TLM8	R1	
5.	Experiment-4	3	09-02-2024		TLM8	R1	
6.	Experiment-5	3	16-02-2024		TLM8	R1	

7.	Experiment-6	3	23-02-2024		TLM8	R1	
8.	**I MID EXAMINATION (26-02-2024 TO 02-03-2024)**						
9.	Experiment-7	3	15-03-2024		TLM8	R1	
10.	Experiment-8	3	22-03-2024		TLM8	R1	
11.	Experiment-9	3	12-04-2024		TLM8	R1	
12.	Experiment-10	3	19-04-2024		TLM8	R1	
13.	Lab Internal	3	26-04-2024			-	

Additional Experiments:

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
14.	Gyroscope	3	19-04-2024		TLM8	-	

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	01/01/2024	24/02/2024	8
I Mid Examinations	26/02/2024	02/03/2024	1
II Phase of Instructions	04/03/2024	27/04/2024	8
II Mid Examinations	29/04/2024	04/05/2024	1
Preparation and Practicals	06/05/2024	11/05/2024	1
Semester End Examinations	13/05/2024	25/05/2024	2
Internship	27/06/2023	06/07/2023	6

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Day to Day Evaluation: A	1,2,3,4	A=05
Record: B	1,2,3,4	B=05
Internal Test: C	1,2,3,4	C=05
Cumulative Internal Examination : CIE=A+B+C	**1,2,3,4**	**CIE=15**
Semester End Examinations: SEE	**1,2,3,4**	**SEE=35**
Total Marks: CIE+SEE	**1,2,3,4**	**50**

Details of Batches:A

Batch No.	Reg. No. of Students	Number of Students

Batch No.	Reg. No. of Students	Number of Students

A1A	22761A0301-310	05
A1B	22761A0310-315	06
A1C	22761A0316-330	06
A1D	23765A0301-306	06
A1E	23765A0307-311	05

A2A	23765A0312-317	06
A2B	23765A0318-323	06
A2C	23765A0324-328	05
A2D	23765A0329-333	05
A2E	23765A0334-338	05

Batch No:	Exp. 01	Exp. 02	Exp. 03	Exp. 04	Exp. 05	Exp. 06	Exp. 07	Exp. 08	Exp. 09	Exp. 10
A1A	TOM1	TOM2	TOM3	TOM4	TOM5	TOM6	TOM7	TOM8	TOM9	TOM10
A1B	TOM2	TOM3	TOM4	TOM5	TOM1	TOM7	TOM8	TOM9	TOM10	TOM6
A1C	TOM3	TOM4	TOM5	TOM1	TOM2	TOM8	TOM9	TOM10	TOM6	TOM7
A1D	TOM4	TOM5	TOM1	TOM2	TOM3	TOM9	TOM10	TOM6	TOM7	TOM8
A1E	TOM5	TOM1	TOM2	TOM3	TOM4	TOM10	TOM6	TOM7	TOM8	TOM9
A2A	TOM1	TOM2	TOM3	TOM4	TOM5	TOM6	TOM7	TOM8	TOM9	TOM10
A2B	TOM2	TOM3	TOM4	TOM5	TOM1	TOM7	TOM8	TOM9	TOM10	TOM6
A2C	TOM3	TOM4	TOM5	TOM1	TOM2	TOM8	TOM9	TOM10	TOM6	TOM7
A2D	TOM4	TOM5	TOM1	TOM2	TOM3	TOM9	TOM10	TOM6	TOM7	TOM8
A2E	TOM5	TOM1	TOM2	TOM3	TOM4	TOM10	TOM6	TOM7	TOM8	TOM9

LIST OF EXPERIMENTS:

Exp.No.	Name of the Experiment	Related CO
TOM1	Study the cam jump phenomenon of various cams and followers.	CO1
TOM2	Whirling Speed of Rotating Shaft	CO2
TOM3	Determination of centrifugal forces and draw the characteristics curve of Watt and Porter governor.	CO2
TOM4	Determination of centrifugal forces and draw the characteristics curve of Proell governor.	CO2
TOM5	Determination of centrifugal forces and draw the characteristics curve of Hartnell governor.	CO2
TOM6	Determination of damped and undamped forced vibrations of beams.	CO4
TOM7	Determination of natural frequency of torsional vibrations of a single rotor system.	CO4
TOM8	Determination of natural frequency of the spring-mass damped and undamped systems.	CO4
TOM9	Balance the given rotor system dynamically with the aid of the force polygon and the couple polygon.	CO3
TOM10	Verification of Dunkerley's formula for transverse vibrations of beams with different end conditions.	CO4

NOTIFICATION OF CYCLE

Cycle	Exp.No.	Name of the Experiment	Related CO
Cycle-1	TOM1	Cam Jump Analysis	CO1
	TOM2	Whirling Speed of Rotating Shaft	CO2
	TOM3	Watt and Porter Governor	CO2
	TOM4	Proell Governor	CO2
	TOM5	Hartnell Governor	CO2
Cycle-2	TOM6	Damped and Undamped forced vibrations of beams	CO4
	TOM7	Natural Frequency of torsional vibrations of a single rotor system	CO4
	TOM8	Natural Frequency of the spring-mass damped and undamped systems	CO4
	TOM9	Dynamic Balancing of Rotating Machine	CO3
	TOM10	Dunkerley's formula for transverse vibrations of beams with different end conditions.	CO4

PROGRAMME EDUCATIONAL OBJECTIVES:

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

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

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

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Dr.B.Sudheer Kumar Mr.S.Srinivasa Reddy(jr)	**Mr.K.V.Viswanadh**	**Dr.B.Sudheer Kumar**	**Dr.M.B.S. Sreekara Reddy**
Course Instructor(s)	**Course Coordinator**	**Module Coordinator**	**HOD**

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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., IV-Sem., ME-A/S
ACADEMIC YEAR : 2023-24
COURSE NAME & CODE : Computer Aided Machine Drawing Lab - 20ME59
L-T-P STRUCTURE : 0-0-2
COURSE CREDITS 1
COURSE INSTRUCTOR : Dr.B.Sudheer Kumar/ Mr.K.Venkateswara Reddy/ Mr. Uma Maheswara Reddy
COURSE COORDINATOR: Dr.B.Sudheer Kumar
PRE-REQUISITE : Computer Aided Engineering Graphics

COURSE OBJECTIVE:
The main objectives of the course are to familiarize the basic conventions and various machine elements used in design and to understand the assembly drawings for engine parts, machine parts, valves etc

COURSE OUTCOMES (CO):
After completion of the course students are able to:
CO1: Develop and/or comprehend basic conventions needed for machine Drawing.
CO2: Apply the conventions of machine elements while designing standardized parts.
CO3: Design the drawings of engine components and their assemblies.
CO4: Design the drawings of mechanical components and their assemblies.

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO				1					3		2	1			3
CO				1					3		2	1			3
CO				1					3		2	1			3
CO				1					3		2	1			3

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

MATERIAL:
M1 Lab Manual

BOS APPROVED TEXT BOOKS:
T1 K.L.Narayana, P.Kannaiah& K. Venkata Reddy, Machine Drawing, 4th Edition New Age Publishers. 2004
T2 P.S Gill, Machine Drawing, 18th Edition Eastern Publisher, 2013.

BOS APPROVED REFERENCE BOOKS:
R1 N.Sidheshwar, Machine Drawing, 4th Edition, Tata McGraw Hill, 2001
R2 Dhawan, Machine Drawing, revised edition, S.Chand Publications, 2002
R3 K. C. JOHN, Machine Drawing 6th Edition, Stronck publishers, 2007
R4 N.D.Bhatt, V.M.Panchal Machine Drawing Charotar Publishing House, 2005

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.	CO-PO Discussion	03	02/01/24		TLM8	--	M1	
2.	Demonstration To Machine Drawing	03	09/01/24		TLM8	CO1	M1	
3.	Demonstration To Catia-V5	03	23/01/24		TLM8	CO1	M1	
4.	Conventional Representations of Various Materials	03	30/01/24		TLM8	CO1	M1	
5.	Conventional Representations of Various Machine Parts	03	06/02/24		TLM8	CO1	M1	
6.	Sectional Views, Thread Profiles	03	13/02/24		TLM8	CO1	M1	
7.	Bolt With Nut And Washer	03	20/02/24		TLM8	CO2	M1	
MID-I EXAMINATIONS:(26-02-24 TO 02-03-24)								
8.	Flanged Coupling	03	05/03/24		TLM8	CO2	M1	
9.	Rivetted Joints	03	12/03/24		TLM8	CO2	M1	
10.	Stuffing Box Assembly	03	19/03/24		TLM8	CO2	M1	
11.	Piston Assembly	03	26/03/24		TLM8	CO3	M1	
12.	Plummer Block Assembly	03	02/04/24		TLM8	CO3	M1	
13.	Universal Joint Assembly	03	16/04/24		TLM8	CO3	M1	
14.	Screw Jack Assembly	03	23/04/24		TLM8	CO4	M1	
No. of classes required to complete.		**42**			**No. of classes taken:**			

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	01/01/2024	24/02/2024	8
I Mid Examinations	26/02/2024	02/03/2024	1
II Phase of Instructions	04/03/2024	27/04/2024	8
II Mid Examinations	29/04/2024	04/05/2024	1
Preparation and Practicals	06/05/2024	11/05/2024	1
Semester End Examinations	13/05/2024	25/05/2024	2
Internship	27/06/2023	06/07/2023	6

EVALUATION PROCESS:

Evaluation Task	Cos	Marks
Day to Day Evaluation: A	1,2,3,4	A=5
Internal Lab Exams: B	1,2,3,4	B=5
Viva Marks: C	1,2,3,4	C=5
Cumulative Internal Examination : CIE=A+B+C+D	**1,2,3,4**	**CIE=15**
Semester End Examinations: SEE	**1,2,3,4**	**SEE=35**
Total Marks: CIE+SEE	**1,2,3,4**	**50**

List of Experiments:

Expt. No.	Type of Drawings	Name of the Experiment
1.	Conventional Drawing	Conventional representations of various materials
2.		Conventional representations of various machine parts
3.		Sectional Views
4.	Drawing of Machine elements for simple parts	Thread Profiles
5.		Bolt with Nut and Washer
6.		Flanged Coupling
7.		Riveted Joint
8.	Assembly Drawing	Stuffing box
9.		Piston Assembly
10.		Plummer block
11.		Universal Joint
12.		Screw Jack

PROGRAMME EDUCATIONAL OBJECTIVES:

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

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

PEO3: To develop inquisitiveness towards good communication and lifelonglearning.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	**Course Coordinator**	**Module Coordinator**	**HoD**
Dr.B.Sudheer Kumar	Dr.B.Sudheer Kumar	Dr.B.Sudheer Kumar	Dr.M.B.S. Sreekar Reddy

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs. Kamala Priya Bysani(T792), A Nageswara Rao(T649), P Mounika(T872)

Course Name & Code : Structural and Modal Analysis using ANSYS **Regulation** : R20

L-T-P Structure : **1-0-2** **Credits:** 02

Program/Sem/Sec : B.Tech – IV Semester – A Section **A.Y.:** 2023-24

Continuous Internal Assessment : --

PREREQUISITE: Strength of Materials

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objective of this course is to improve the modelling and analysis skills of students in ANSYS Workbench and enable them to solve problems related to structures and machine members.

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

CO1	Understand the basics and fundamentals related to Finite Element Method.**(Understanding - L2)**
CO2	Apply the konwledge of ANSYS to solve the engineering problems. **(Applying - L3)**
CO3	Perform the static structural analysis in 1D, 2D and 3D using ANSYS workbench.**(Applying - L3)**
CO4	Analyze the mode shapes of structures and machine elements.**(Analyzing - L4)**

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

SOFTWARE PACKAGES: ANSYS

Web REFERENCES:

1.https://www.slideshare.net/nageshsurner/introduction-to-ansys-workbench-80635115

2.https://www.youtube.com/watch?v=C8WvCQpzT2A

3.https://www.youtube.com/watch?v=FwKkjAr9Kbk
4.https://www.youtube.com/watch?v=6QaFX1CG-ZE

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-B

COURSE DELIVERY PLAN (LESSON PLAN): (Section – A)

Schedule of Experiments: Thursday (from 09.00 AM – 12.30 PM)

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
01	Introduction to Finite Element Method	4	04-01-2024		TLM4	
Cycle-I						
02	Basics of ANSYS interface and its utilities	4	**11-01-2024**		TLM4	
03	Structural analysis of Stepped Bar and Tappered Bar	4	**25-01-2024**		TLM4	
04	Static Analysis of a Planar Truss	4	**01-02-2024**		TLM4	
05	Static Analysis of a Cantilever Beam	4	**08-02-2024**		TLM4	
06	Static Analysis of a Simply supported Beam with point load.	4	**15-02-2024**		TLM4	
07	Static Analysis of a Simply supported Beam with Uniformly Distributed load.	4	**22-02-2024**		TLM4	
I Mid Exams: 26-02-2024 to 02-03-2024						
Cycle-II						
08	Static Analysis of a Simply supported Beam with Uniformly Varying load.	4	**07-03-2024**		TLM4	
09	Static Analysis of a Fixed Beam subjected to Axial Load.	4	**14-03-2024**		TLM4	
10	Stress Analysis of Flat plates and simple shells.	4	**21-03-2024**		TLM4	
11	Stress Analysis of Axi-symmetric Components.	4	**21-03-2024**		TLM4	
12	Vibration Analysis of Spring-Mass	4	**28-03-2024**		TLM4	

	Systems.					
13	Mode-Frequency Analysis of Beam sand Machine Elements.	4	**04-04-2024**		TLM4	
14	Practise	4	**11-04-2024**			
15	Viva – Voce	4	**18-04-2024**			
16	Internal Exam	4	**25-04-2024**			
II Mid Exams:29-04-2024 to 04-05-2024						
No. of classes required to complete: 15				**No. of classes taken:**		

PART-B

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	**Marks**
Semester End Examination:	50
Total Marks:	**50**

Academic calendar

Commencement of VI Semester Classwork	**01-01-2024**		
Description	**From**	**To**	**Weeks**
I Phase of Instructions	01-01-2024	24-02-2024	8 W
I Mid Examinations	26-02-2024	02-03-2024	1 W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II Mid Examinations	29-04-2024	04-05-2024	1 W
Preparation and Practicals	06-05-2024	11-05-2024	1 W
Semester End Examinations	13-05-2024	25-05-2024	2 W
Internship	27-05-2024	06-07-2024	6 W
Commencement of VII Semester Classwork	**08 – 07 - 2024**		

Lab Occupancy Time Table (B.Tech IV Sem:Section – A/ S)

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

Faculty – In Charges:

S.No	**Class**	**Section**	**Lab Assistant**	**Faculty – In Charge**
1	**B.Tech – IV**	**A**	**Mr. P Guna Sundar Reddy**	**Mrs. B. Kamala Priya (T792)**

	Semester			**A Nageswara Rao(T649)** **P Mounika(T872)**

PART-C

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.
PEO 2	To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.
PEO 3	To develop inquisitiveness towards good communication and lifelong learning.

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 principles of thermal sciences to design and develop various thermal systems.
PSO 2	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.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Signature				
Name of the Faculty	**Mrs. B. Kamala Priya/ A Nageswara Rao/P Mounika**	**K V Viswanath**	**Jonnala Subba Reddy**	**Dr.M.B.S.Sreekara Reddy**
Designation	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**HOD**

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FRESHMAN ENGINEERING DEPARTMENT
COURSE HANDOUT
PART-A

PROGRAM : II B. Tech., IV-Sem., MECH-B
ACADEMIC YEAR : 2023-24
COURSE NAME & CODE : PROBABILITY AND STATISTICS
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : M. Rami Reddy
COURSE COORDINATOR : M. Rami Reddy
PRE-REQUISITES : None

COURSE EDUCATIONAL OBJECTIVES (CEO): The objective of this course is to provide students with the foundations and applications of probabilistic and statistical methods mainly used in varied applications in engineering and science.

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

CO1	Understand various probabilistic situations using the laws of probability and Random variables.	**Understand - L2**
CO2	Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems.	**Apply - L3**
CO3	Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on sample data.	**Apply - L3**
CO4	Analyze the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis.	**Analyze - L4**
CO5	Construct the regression lines to predict the dependent variables and calculate the Correlation Coefficient for a bivariate statistical data.	**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	1	2	-	-	-	-	-	-	-	2	-	-	-
CO2	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-
CO3	3	2	2	2	-	-	-	-	-	-	-	2	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	2	-	-	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-

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

BOS APPROVED TEXT BOOKS:

T1 Jay L.Devore "Probability and Statistics for engineering and the sciences." , 8th edition, Cengage Learning india, 2012
T2 S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 11thEdition, Sultan Chand and sons, New Delhi,2014.

BOS APPROVED REFERENCE BOOKS:

R1 Miller & Freund's "Probability and Statistics for Engineers",8th edition. PHI, New Delhi,2011.
R2 B.V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.

PART-B
COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Probability and Random Variables

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 class, course outcomes	1	02-01-24		TLM1	
2.	Basic concepts of probability	1	03-01-24		TLM1	
3.	problems on basic probability	1	04-01-24		TLM1	
4.	Axioms, Addition theorem	1	05-01-24		TLM1	
5.	Problems on Addition theorem	1	06-01-24		TLM1	
6.	Multiplication theorem, examples	1	09-01-24		TLM1&2	
7.	Independent events, theorems	1	10-01-24		TLM1	
8.	Results on independent events	1	11-01-24		TLM1	
9.	Practice Problems	1	12-01-24		TLM1	
10.	Baye's theorem,	1	18-01-24		TLM1&2	
11.	Problems on Baye's theorem	1	19-01-24		TLM1	
12.	Problems	1	20-01-24		TLM1	
13.	Random variables, Expectations	1	23-01-24		TLM1	
14.	Probability Mass function, examples	1	24-01-24		TLM1	
15.	Problems	1	25-01-24		TLM1	
16.	Probability Density Function	1	27-01-24		TLM1	
17.	Practice Problems	1	30-01-24		TLM1&2	
No. of classes required to complete UNIT-I: 17				No. of classes taken:		

UNIT-II: Probability Distributions

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.	Binomial Distribution- mean & variance	1	31-01-24		TLM1&2	
2.	Problems on Binomial distribution	1	01-02-24		TLM1	
3.	Problems on Binomial distribution	1	02-02-24		TLM1	
4.	Fitting of binomial distribution	1	03-02-24		TLM1	
5.	Poisson distribution, mean and variance	1	06-02-24		TLM1	
6.	Problems on Poisson distribution	1	07-02-24		TLM1	
7.	Fitting of Poisson distribution	1	08-02-24		TLM1	
8.	Practice problems	1	09-02-24		TLM1	
9.	Normal distribution: mean &variance	1	13-02-24		TLM1&2	
10.	Problems on Normal Distribution	1	14-02-24		TLM1	
11.	Problems on Normal Distribution	1	15-02-24		TLM1	
12.	Applications of Normal Distribution	1	16-02-24		TLM1	
13.	Exponential distribution:, examples	1	17-02-24		TLM1	
14.	Practice problems	1	20-02-24		TLM1&2	
No. of classes required to complete UNIT-II: 14				No. of classes taken:		

UNIT-III: Sampling distribution and Estimation

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.	Sampling distribution ,definitions	1	21-02-24		TLM1&2	
2.	Sampling distribution of mean, variance	1	22-02-24		TLM1	
3.	Central limit theorem, Examples	1	23-02-24		TLM1	
4.	Problems on Central Limit Theorem	1	24-02-24		TLM1	
5.	**Mid-I examinations**		27-02-24 to 02-03-24			
6.	Problems on central limit theorem	1	05-03-24		TLM1	
7.	Practice problems	1	06-03-24		TLM1	
8.	Point and interval estimation	1	07-03-24		TLM1&2	
9.	Confidence Interval of mean (n>30)	1	12-03-24		TLM1	
10.	Problems	1	13-03-24		TLM1	
11.	Confidence Interval for proportion	1	14-03-24		TLM1	

12.	Practice Problems	1	15-03-24		TLM1	
13.	Confidence Interval for mean (n<30)	1	16-03-24		TLM1	
14.	problems	1	19-03-24		TLM1	
15.	Practice problems	1	20-03-24		TLM1&2	
No. of classes required to complete UNIT-III: 14				No. of classes taken:		

UNIT-IV: Tests of Hypothesis

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.	Testing of Hypothesis , definitions	1	21-03-24		TLM1&2	
2.	Z-test for single mean	1	22-03-24		TLM1	
3.	Z-test for difference of means	1	23-03-24		TLM1	
4.	Practice problems	1	26-03-24		TLM1&2	
5.	Z-test for single Proportion	1	27-03-24		TLM1	
6.	Z-test for difference of Proportions	1	28-03-24		TLM1	
7.	Practice problems	1	30-03-24		TLM1	
8.	t-test for single mean	1	02-04-24		TLM1	
9.	t-test for difference of means	1	03-04-24		TLM1	
10.	Paired t-test	1	04-04-24		TLM1	
11.	Practice problems	1	05-04-24		TLM1&2	
12.	F-test for variances	1	06-04-24		TLM1	
13.	χ^2-test for goodness of fit	1	10-04-24		TLM1	
14.	χ^2-test for independence of attributes	1	12-04-24		TLM1	
15.	Practice Problems	1	15-04-24		TLM1&2	
No. of classes required to complete UNIT-IV: 15				No. of classes taken:		

UNIT-V: Correlation and Regression

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.	Simple Bi-variate Correlation	1	16-04-24		TLM1&2	
2.	Problems on Pearson's Correlation	1	18-04-24		TLM1	
3.	Regression lines	1	19-04-24		TLM1	
4.	Problems on Regression lines	1	20-04-24		TLM1	
5.	Properties of Regression coefficients	1	23-04-24		TLM1&2	
6.	Problems on Regression coefficients	1	24-04-24		TLM1	
7.	Problems on rank Correlation	1	25-04-24		TLM1	
8.	Problems on repeated ranks	1	26-04-24		TLM1	
9.	Practice problems	1	27-04-24		TLM1	
No. of classes required to complete UNIT-V: 09				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R20 Regulations):

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

Program Educational Objectives (PEOs):

PEO1	To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.
PEO2	To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.
PEO3	To develop inquisitiveness towards good communication and lifelong learning.

Program Outcomes (POs):

PO1 - Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2 - Problem Analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3 - Design / Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4 - Conduct Investigations of Complex Problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5 - Modern Tool Usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6 - The Engineer and Society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7 - Environment and Sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8 - Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9 - Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10 - Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11 - Project Management and Finance	Demonstrate knowledge and understanding of the ring and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12 - Life-long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

PSO1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO2	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.
PSO3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructor	Course Coordinator	Module Coordinator	HOD
(M.Rami Reddy)	(M.Rami Reddy)	(Dr.A.Rami Reddy)	(Dr.A.Rami Reddy)

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L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.V.DHANA RAJU
Course Name & Code : Applied Thermodynamics – 20ME07
L-T-P Structure : 2-1-0 Credits : 3
Program/Sem/Sec : B.Tech., MECH., IV-Sem., Section- B A.Y : 2023-24

PRE-REQUISITE: Thermodynamics

COURSE EDUCATIONAL OBJECTIVES (CEOs): This Course provides a simple understanding of the steam power systems. The course contains the analysis of vapour power cycle i.e. Rankine cycle, steam generators and their accessories, Performance of Boilers and combustion of fuel, high pressure boilers, flow through steam nozzles, different type of steam turbines for power generation, and compressors.

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

CO 1	**Describe** the components and functioning of a Rankine cycle and compressors
CO 2	**Apply** thermodynamic analysis to study the behavior of steam nozzles
CO 3	**Analyze** the need of various boiler draught systems for a vapor power cycle.
CO 4	**Evaluate** the performance of impulse, reaction turbines and reciprocating compressors.
CO 5	**Estimate** the parametric performance of Rankine cycle with reheat and regeneration concepts.

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

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

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 Mahesh. M. Rathore, Thermal Engineering, 1st Edition, 2012, TMH.

T2 R. K. Rajput, Thermal Engineering, 5th Edition, 2005, Laxmi publications.

BOS APPROVED REFERENCE BOOKS:

R1 T.D. Eastop and A. McConkey, Applied Thermodynamics, Pearson, 5th Edition, 2013.

R2 R. Yadav, Thermodynamics and Heat Engines,5th Edition,Voleme-II,1999.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Vapour Power cycles

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.	Introduction to Applied Thermodynamics	1	02-01-2024		TLM2	
19.	Course outcomes of ATD, Introduction to the vapour power cycles	1	03-01-2024		TLM2	
20.	Formation of steam and its properties, Carnot vapour power cycle	1	04-01-2024		TLM1	
21.	Rankine cycle efficiency using P-V, T-S and h-s diagrams	1	06-01-2024		TLM1	
22.	Comparison of Rankine and Carnot vapour power cycles	1	08-01-2024		TLM1	
23.	Tutorial-1	1	09-01-2024		TLM3	
24.	Numerical problems	1	10-01-2024		TLM1	
25.	Reheating cycle	1	11-01-2024		TLM3	
26.	Regeneration cycle,	1	18-01-2024		TLM1	
27.	Open and closed feed water heaters	1	20-01-2024		TLM1	
28.	Fuels and combustion	1	22-01-2024		TLM1	
29.	Chemical reaction equations for solid and gaseous fuels	1	23-01-2024		TLM1	
No. of classes required to complete UNIT-I: 12				No. of classes taken:		

UNIT-II: Steam Boilers and Draught system

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Boilers - Boiler systems classification	1	24-01-2024		TLM2	
16.	fire tube boilers- Cornish ,	1	25-01-2024		TLM2	

17.	Lancashire, Cochran boilers	1	27-01-2024		TLM2	
18.	Water tube –Babcock and Wilcox boiler	1	29-01-2024		TLM2	
19.	High pressure boilers	1	30-01-2024		TLM2	
20.	Boiler accessories	1	31-01-2024		TLM2	
21.	Boiler mountings,	1	01-02-2024		TLM3	
22.	Tutorial -2	1	03-02-2024			
23.	Draught system-functions and types	1	05-02-2024		TLM1	
24.	Condition for maximum discharge,	1	06-02-2024		TLM1	
25.	Efficiency of chimney, induced draft and forced draft	1	07-02-2024		TLM1	
26.	Numerical Problems	1	08-02-2024		TLM1	
27.	Tutorial -3	1	12-02-2024		TLM3	
No. of classes required to complete UNIT-II: 13				No. of classes taken:		

UNIT-III: Steam Nozzles and Condensers

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Introduction to nozzles, Flow through nozzles-thermodynamic analysis	1	13-02-2024		TLM2	
17.	Velocity of nozzle at exit, Condition for maximum discharge	1	14-02-2024		TLM1	
18.	Ideal and actual expansion, Supersaturated flow in nozzles	1	15-02-2024		TLM1	
19.	Tutorial -4	1	17-02-2024		TLM3	
20.	Degree of super cooling and super saturation-Wilson line,	1	19-02-2024		TLM1	

21.	Numerical Problems	1	20-02-2024		TLM1	
22.	Steam condensers- introduction, Types of condensers, Elements of condenser,	1	21-02-2024		TLM2	
23.	jet condensers, surface condensers, Air leakage through condensers	1	04-03-2024		TLM2	
24.	Performance parameters of condensers,	1	05-03-2024		TLM3	
25.	Tutorial -5	1	06-03-2024		TLM3	
No. of classes required to complete UNIT-III: 10				No. of classes taken:		

UNIT-IV : Steam Turbines

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Introduction to steam turbines, Classification of steam turbines	1	07-03-2024		TLM2	
17.	Impulse turbine working principle,	1	11-03-2024		TLM2	
18.	Velocity diagrams of impulse turbine	1	12-03-2024		TLM2	
19.	Numerical problems	1	13-03-2024		TLM1	
20.	Tutorial -6	1	14-03-2024		TLM3	
21.	Blade, stage efficiencies	1	18-03-2024		TLM1	
22.	De-Laval turbine and its features	1	19-03-2024		TLM1	
23.	Compounding of turbines	1	20-03-2024		TLM1	
24.	Velocity, pressure and combined compounding of steam turbines	1	21-03-2024		TLM1	
25.	Combined velocity triangle for a velocity compounded impulse turbine	1	23-03-2024		TLM1	
26.	Reaction turbine - Introduction ,Degree of reaction(Parsons),	1	26-03-2024		TLM1	

	Parsons reaction turbine					
27.	Numerical Problems	1	27-03-2024		TLM1	
No. of classes required to complete UNIT-IV: 12				No. of classes taken:		

UNIT-V : Compressors

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Compressors-Reciprocating compressors-principle of operation	1	28-03-2024		TLM2	
11.	Work required, free air delivery	1	02-04-2024		TLM2	
12.	Isothermal, volumetric efficiency, Condition for minimum work	1	03-04-2024		TLM2	
13.	Effect of clearance volume, Multistage compression	1	04-04-2024		TLM2	
14.	Numerical Problems	1	06-04-2024		TLM1	
15.	Tutorial -7	1	08-04-2024		TLM3	
16.	Roots blower, Vanes compressor, Efficiency considerations	1	11-04-2024		TLM2	
17.	Centrifugal compressors, Degree of reaction ,	1	15-04-2024		TLM2	
18.	Energy transfer, velocity diagram	1	16-04-2024		TLM2	
19.	Axial flow compressors and degree of reaction,	1	18-04-2024		TLM2	
20.	Comparison of various compressors	1	20-04-2024		TLM2	
21.	Revision	1	22-04-2024		TLM2	
22.	content beyond syllabus	1	23-04-2024		TLM2	

23.	content beyond syllabus	1	24-04-2024		TLM1	
24.	content beyond syllabus	1	25-04-2024		TLM1	
No. of classes required to complete UNIT-V: 15				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 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	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)	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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 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
Dr.V.Dhana Raju	Dr. P.Vijay Kumar	Dr. P.Vijay Kumar	Dr. M.B.S. Sreekar Reddy

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. Seelam Pichi Reddy, Professor
Course Name & Code **:** Production Technology & 20ME08 **Regulation**: R20
L-T-P Structure **: 3-0-0** **Credits:** 03
Program/Sem/Sec : B.Tech IV Sem (A) **A.Y.:** 2023-2024

PREREQUISITE: Metallurgy and Material Science

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objective of this course is to understand the various manufacturing processes available for mechanical engineer and apply them in producing the components.

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

CO1	Classify various manufacturing processes and illustrate the casting processes. **(Understanding- L2)**
CO2	Recall the various welding techniques and explain gas welding and arc welding. **(Understanding- L2)**
CO3	Illustrate resistance welding, special welding, soldering and brazing processes. **(Understanding- L2)**
CO4	Understand the nature of plastic deformation and identify the types of metal forming processes. **(Remembering – L1)**
CO5	Distinguish various types of metal forming processes. **(Understanding- 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	2	3	1									3	1
CO2	3	1	1	3	2								2	3	2
CO3	3	2	2	3	3								2	3	1
CO4	3	3	3	3	2									3	2
CO5	3	1	2	3	1									3	2
1 - Low			**2 –**Medium							**3 -** High					

TEXTBOOKS:

T1 P.N. Rao, Manufacturing Technology – Vol I & II, TMH, 5th Edition, 2018.

T2 Richard W Heine, Philp Rosenthal & Karl R.Loper, Principles of metal casting, TMH Edition, 2017.

REFERENCE BOOKS:

R1	S. Kalpakjain, S.R.Schmid, Manufacturing Engineering and Technology, Pearson Edu., 7th Edition, 2014.
R2	R.K. Jain , Production Technology /Khanna Publishers, 19th Edition, 2020.
R3	Lindberg, Process and Materials of Manufacturing, PE, 4th Edition, 2015.
R4	Sarma P C, Production Technology, S Chand & Company Ltd, 8th Edition, 2014.
R5	B.S.Raghuvamsi, Workshop Technology, Dhanapatirai and co. 12th Edition, 2013.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - A

UNIT-I: Introduction to manufacturing, Casting

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.	CEO's and COs of Production Technology Introduction to manufacturing technology, definitions.	1	2-01-2024		**TLM1/TLM2**	
2.	Importance of manufacturing, Classification of Manufacturing.	1	3-01-2024		**TLM1/TLM2**	
3.	**Casting:** Casting Introduction, Steps involved in making of casting.	1	6-01-2024		**TLM1/TLM2**	
4.	Advantages, Limitations and applications of casting.	1	8-01-2024		**TLM1/TLM2**	
5.	Pattern and its types, Materials used for patterns, Cores and Core prints,	1	9-01-2024		**TLM1/TLM2**	
6.	Chaplets, Moulding sand and its properties.	1	10-01-2024		**TLM1/TLM2**	
7.	Pattern allowances and construction.	1	20-01-2024		**TLM1/TLM2**	
8.	Principal of gating.	1	22-01-2024		**TLM1/TLM2**	
9.	Gating ratio and design of gating system.	1	23-01-2024		**TLM1/TLM2**	
10.	Riser, types, function and design.	1	24-01-2024		**TLM1/TLM2**	
11.	Centrifugal casting, Die casting,	1	27-01-2024		**TLM1/TLM2**	
12.	Investment casting, and cleaning of casting Defects and remedies.	1	29-01-2024		**TLM1/TLM2**	
13.	Non-Destructive Testing in Welding	1	30-01-2024		**TLM1/TLM2**	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II: Welding, Electric Arc Welding

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, Classification of welding process, Gas welding-	1	31-01-2024		**TLM1/TLM2**	
15.	Oxy-acetylene welding equipment.	1	03-02-2024		**TLM1/TLM2**	
16.	Oxy-acetylene process and applications, Hydrogen welding	1	05-02-2024		**TLM1/TLM2**	
17.	Gas cutting process, Gas cutting applications.	1	06-02-2024		**TLM1/TLM2**	
18.	Electric arc welding, electrodes, polarities.	1	07-02-2024		**TLM1/TLM2**	
19.	Consumable and non-consumable, MIG welding.	1	12-02-2024		**TLM1/TLM2**	
20.	Sub-merged arc welding (SAW), Inert gas welding,	1	13-02-2024		**TLM1/TLM2**	
21.	Carbon arc welding,	1	14-02-2024		**TLM1/TLM2**	
22.	Tungsten Inert Gas Welding (TIG) process and	1	17-02-2024		**TLM1/TLM2**	

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

UNIT-III: Resistance welding, Soldering and Brazing

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.	Principle of resistance welding and applications.	1	19-02-2024		**TLM1/TLM2**	
24.	Types of resistance welding	1	20-02-2024		**TLM1/TLM2**	
25.	Thermit welding.	1	21-02-2024		**TLM1/TLM2**	
26.	Friction welding.	1	24-02-2024		**TLM1/TLM2**	
27.	Explosive welding, induction welding.	1	04-03-2024		**TLM1/TLM2**	
28.	Soldering and brazing, Applications of	1	05-03-2024		**TLM1/TLM2**	
29.	Soldering and brazing processes	1	06-03-2024		**TLM1/TLM2**	
30.	Welding defects, causes and remedies.	1	11-03-2024		**TLM1/TLM2**	
31.	Non-destructive examination of weldments	1	12-03-2024		**TLM1/TLM2**	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Metal Forming processes

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.	Nature of plastic deformation,	1	13-03-2024		**TLM1/TLM2**	
33.	Hot working and cold working processes	1	16-03-2024		**TLM1/TLM2**	
34.	Rolling fundamentals, Theory of rolling	1	18-03-2024		**TLM1/TLM2**	
35.	Types of rolling mills	1	19-03-2024		**TLM1/TLM2**	
36.	Theory of Drawing	1	20-03-2024		**TLM1/TLM2**	
37.	Wire drawing	1	23-03-2024		**TLM1/TLM2**	
38.	Tube drawing	1	25-03-2024		**TLM1/TLM2**	
39.	Coining, spinning	1	26-03-2024		**TLM1/TLM2**	
40.	Principle of forging, types of forging	1	27-03-2024		**TLM1/TLM2**	
41.	Smith and drop forging, machine forging, Forging defects	1	30-03-2024		**TLM1/TLM2**	
42.	Causes and remedies, Applications of forming and forging processes	1	01-04-2024		**TLM1/TLM2**	
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: Extrusion of Metals, Sheet Metal Operations.

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.	Basic Extrusion process and its characteristics	1	02-04-2024		**TLM1/TLM2**	
44.	Hot extrusion and its types, Cold extrusion and its process	1	03-04-2024		**TLM1/TLM2**	
45.	Forward, extrusion and backward extrusion	1	06-04-2024		**TLM1/TLM2**	
46.	Impact extrusion, Hydrostatic extrusion	1	08-04-2024		**TLM1/TLM2**	
47.	Introduction of sheet metal operation	1	10-04-2024		**TLM1/TLM2**	
48.	Stamping, Forming	1	15-04-2024		**TLM1/TLM2**	
49.	Blanking and piercing and forming	1	16-04-2024		**TLM1/TLM2**	
50.	Bending	1	20-04-2024		**TLM1/TLM2**	
51.	Stretching Forming	1	22-04-2024		**TLM1/TLM2**	
52.	Embossing and Coining	1	23-04-2024		**TLM1/TLM2**	
53.	Revision	1	24-04-2024		**TLM1/TLM2**	
54.	Revision	1	27-04-2024		**TLM1/TLM2**	
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- 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 EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To build a professional career and pursue higher studies with sound knowledge in Mathematics, Science and Mechanical Engineering.
PEO 2	To inculcate strong ethical values and leadership qualities for graduates to become successful in multidisciplinary activities.
PEO 3	To develop inquisitiveness towards good communication and lifelong learning.

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 analyse 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 principles of thermal sciences to design and develop various thermal systems.
PSO 2	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.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr.S.Pichi Reddy**	**Dr.K.Murahari**	**Mr.J.Subba Reddy**	**Dr.M.B.S.Sreekar Reddy**
Signature				

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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. K.V.Viswanadh
Course Name & Code : Theory of Machines (20ME06)
L-T-P Structure : 3-1-0 Credits : 3
Program/Sem/Sec : B.Tech., ME., IV-Sem., Sections-B A.Y : 2023-24

PRE-REQUISITE: Engineering Mechanics, Mechanics of Solids

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this course is to identify the basic components, layout and kinematics of mechanisms & familiarize the standard mechanisms used for speed and stability control under the effects of vibrations.

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

CO 1	Comprehend the layout and working of various mechanisms.
CO 2	Analyze the velocity and accelerations of various kinematic links in a mechanism.
CO 3	Understand the gear kinematics and turning moment diagrams of engines
CO 4	Analyze the speed regulations in various types of governors.
CO 5	Comprehend the balancing of the rotating parts and understand the basic concepts of vibrations for mechanical systems.

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	1	-	-	-	-	-	-	-	-	2	-	-	3
CO2	3	2	-	-	-	-	-	-	-	-	-	2	-	-	3
CO3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	3
CO4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	3
CO5	3	2	1	-	-	-	-	-	-	-	-	2	-	-	3

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 Rattan S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi,2011.
T2 Shigley J.E. and Uicker J.J., "Theory of Machines and Mechanisms", 2ndEdition, McGraw-Hill, Inc.,1995.

REFERENCE BOOKS:

R1 Thomas Bevan, "Theory of Machines", 3rd edition, 3rd impress, CBS Publishers and Distributors, 2013.
R2 Rao J.S and Dukkipati R.V, "Mechanism and Machine Theory", 2ndEdition, New Age International, New Delhi, 2007.
R3 Sadhu Singh "Theory of Machines", 3rd edition, Pearson Education, 1997.
R4 Ballaney.P.L"Theory of Machines", 20th edition, Khanna Publishers,1996.
R5 A. Ghosh and A.K.Mallik, "Theory of Mechanisms and Machines", EW Press, 1988.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: MECHANISMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
30.	Introduction to Theory of Machines CEO & COs	1	02-01-2024		TLM1	CO1	
31.	**MECHANISMS:** Mechanism & Machine, Differences between Mechanism & Machine	1	03-01-2024		TLM1	CO1	
32.	Elements-classification Joints -classification Difference between Chain, Mechanism and Inversion,	1	04-01-2024		TLM1/TLM4	CO1	
33.	Pair, Types of kinematic Pairs	1	08-01-2024		TLM1/TLM4	CO1	
34.	Pair, Types of kinematic Pairs/Minor	1	08-01-2024		TLM1/TLM4	CO1	
35.	Types of constrained motions	1	09-01-2024		TLM1	CO1	
36.	Grashof Law	1	10-01-2024		TLM1	CO1	
37.	inversion of mechanism, inversions of quadric cycle chain (4-bar chain)	1	11-01-2024		TLM1/TLM4	CO1	
38.	Inversions of single slider crank chain	1	18-01-2024		TLM1/TLM4	CO1	
39.	Inversions of single slider crank chain	1	22-01-2024		TLM1/TLM4	CO1	
40.	Grashof Law/Minor	1	22-01-2024		TLM1/TLM4	CO1	
41.	Inversions of double slider crank chain	1	23-01-2024		TLM1	CO1	
42.	Degree of freedom-Gruebler's criterion	1	24-01-2024		TLM1	CO1	
43.	Problems Gruebler's criterion, Limitations of Gruebler's criterion	1	25-01-2024		TLM1	CO1	
44.	Tutorial-1	1	29-01-2024		TLM3	CO1	
45.	Tutorial-1/Monor	1	29-01-2024		TLM3	CO1	
46.	Unit-I Revision	1	30-01-2024		TLM1	CO1	
No. of classes required to complete UNIT-I: 17					No. of classes taken:		

UNIT-II: VELOCITY AND ACCELERATION ANALYSIS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
28.	Introduction to Velocity & Acceleration Analysis Absolute and relative motions	1	31-01-2024		TLM1	CO2	
29.	Instantaneous centre - Kennedy's theorem	1	01-02-2024		TLM1	CO2	
30.	Determination of angular velocity of points and links for simple mechanisms	1	05-02-2024		TLM1	CO2	
31.	Tutorial-2/Minor	1	05-02-2024		TLM3	CO2	
32.	Relative velocity –Velocity Polygon, Velocity diagrams for simple mechanisms	1	06-02-2024		TLM1	CO2	
33.	Acceleration Polygon- acceleration diagrams for simple mechanisms	1	07-02-2024		TLM1	CO2	
34.	Problems on velocity & acceleration diagrams	1	08-02-2024		TLM1	CO2	
35.	Coriolis acceleration & problem, Klein's construction	1	12-02-2024		TLM1	CO2	
36.	Tutorial-3/Minor	1	12-02-2024		TLM3	CO2	

37.	Unit-II Revision	1	13-02-2024		TLM1	CO2	
No. of classes required to complete UNIT-II: 10					No. of classes taken:		

UNIT-III: GEARS &TURNING MOMENT DIAGRAMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
26.	GEARS: Terminology - law of gearing- Profile for gears	1	14-02-2024		TLM1/TLM2	CO3	
27.	Involute gearing- Velocity of sliding	1	15-02-2024		TLM1/ TLM2	CO3	
28.	Path of Contact, Arc of Contact & Contact Ratio	1	19-02-2024		TLM1/TLM2	CO3	
29.	Path of Contact, Arc of Contact & Contact Ratio/Minor	1	19-02-2024		TLM1/TLM2	CO3	
30.	Interference and Undercutting	1	20-02-2024		TLM1/ TLM2	CO3	
31.	Tutorial-4 Assignment-1	1	21-02-2024		TLM3	CO3	
32.	Mid-I Revision	1	22-02-2024		TLM1	CO3	
33.	Introduction about Turning moment	1	04-03-2024		TLM1	CO3	
34.	Introduction about Turning moment/Minor	1	04-03-2024		TLM1	CO3	
35.	Angular velocity and acceleration of piston, connecting rod	1	05-03-2024		TLM1	CO3	
36.	Engine force analysis-piston and crank effort & Inertia torque of connecting rod	1	06-03-2024		TLM1	CO3	
37.	Introduction to turning moment diagrams-single and multi-cylinder engines	1	07-03-2024		TLM1	CO3	
38.	Problems on single cylinder engines & multi cylinder engines	1	11-03-2024		TLM1	CO3	
39.	Tutorial-5/Minor	1	11-03-2024		TLM3	CO3	
40.	Fluctuation of energy- Problems	1	12-03-2024		TLM1	CO3	
41.	Unit-III Revision	1	13-03-2024		TLM1	CO3	
No. of classes required to complete UNIT-III: 16					No. of classes taken:		

UNIT-IV :GOVERNORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
28.	Governor - introduction, Watt governor working & Derivation for speed of governor	1	14-03-2024		TLM1/TLM4	CO4	
29.	Porter governor working & derivation	1	18-03-2024		TLM1/TLM4	CO4	
30.	Porter governor Problems/Minor	1	18-03-2024		TLM1/TLM4	CO4	
31.	Tutorial-6	1	19-03-2024		TLM3	CO4	
32.	Proell governor working & derivation	1	20-03-2024		TLM1/TLM4	CO4	
33.	Hartnell governor working, derivation & Problems	1	21-03-2024		TLM1/TLM4	CO4	

34.	Sensitiveness, Isochronism, and hunting	1	26-03-2024		TLM1	CO4	
35.	Tutorial-7	1	27-03-2024		TLM3	CO4	
36.	Unit-IV Revision	1	28-03-2024		TLM1	CO4	
37.	Unit-IV Revision	1	01-04-2024		TLM1	CO4	
38.	Unit-IV Revision	1	01-04-2024		TLM1	CO4	
No. of classes required to complete UNIT-IV: 11					No. of classes taken:		

UNIT-V :BALANCING & BASICS OF VIBRATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
25.	Introduction to Balancing - Balancing of rotating masses in single plane	1	02-04-2024		TLM1/ TLM2	CO5	
26.	Balancing of several masses rotating in different planes	1	03-04-2024		TLM1/TLM2	CO5	
27.	Analytical and graphical methods	1	04-04-2024		TLM1/ TLM2	CO5	
28.	Introduction Types of Vibrations (Longitudinal, Transverse & Torsional)	1	08-04-2024		TLM1/ TLM2	CO5	
29.	Types of vibrations/Minor	1	08-04-2024		TLM1/ TLM2	CO5	
30.	Undamped free longitudinal vibrations of spring mass system	1	10-04-2024		TLM1	CO5	
31.	Problems	1	15-04-2024		TLM1	CO5	
32.	Problems/Minors	1	15-04-2024		TLM1	CO5	
33.	Critical Damping, Under Damping & Over damping (Definitions only). Under-damped free vibrations of spring mass system Logarithmic decrement	1	16-04-2024		TLM1/ TLM2	CO5	
34.	Problems on Under-damped free vibrations of spring mass system	1	18-04-2024		TLM1	CO5	
35.	Tutorial-10	1	22-04-2024		TLM3	CO5	
36.	Assignmen-2/Minor	1	22-04-2024		TLM3	CO5	
37.	Unit-V Revision	1	23-04-2024		TLM1	CO5	
38.	Revision	1	24-04-2024		TLM1	CO5	
No. of classes required to complete UNIT-V: 14					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	HOD Sign Weekly
1.	Gyroscope & Whirling Speed of Shaft (Used for lab also)	01	25-04-2024		TLM1/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

EVALUATION PROCESS (R20 Regulations):

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

ACADEMIC CALENDAR:

Description	**From**	**To**	**Weeks**
I Phase of Instructions-1	01/01/2024	24/02/2024	8
I Mid Examinations	26/02/2024	02/03/2024	1
II Phase of Instructions	04/03/2024	27/04/2024	8
II Mid Examinations	29/04/2024	04/05/2024	1
Preparation and Practicals	06/05/2024	11/05/2024	1
Semester End Examinations	13/05/2023	25/05/2023	2

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess

	societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO 2	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.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Course Instructor	Course Coordinator	Module Coordinator	HOD
(Mr. K.V.Viswanadh)	(Mr.K.V.Viswanadh)	(Mr. B. Sudheer Kumar)	(Dr.M.B.S.Sreekara Reddy)

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.K.Venkateswara Reddy
Course Name & Code : Universal Human Values 2: Understanding Harmony (20HS01)
L-T-P Structure : 3-0-0 **Credits** : 3
Program/Sem/Sec : B.Tech IV Semester – MECH Section-B **A.Y.** : 2023-24

PREREQUISITE: Nil

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

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

CO1	**Apply the value inputs in life and profession (Applying level – L3)**
CO2	**Distinguish between values and skills, happiness and accumulation of physical facilities, the self, and the Body (Understanding level – L2)**
CO3	**Understand the role of a human being in ensuring harmony in society. (Understanding level – L2)**
CO4	**Understand the role of a human being in ensuring harmony in the nature and existence. (Understanding level – L2)**
CO5	**Distinguish between ethical and unethical practices (Applying level – L3)**

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

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

TEXTBOOKS:

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

REFERENCE BOOKS:

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Need, Basic Guidelines, content, and Process for value Education

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	03-01-2024		TLM1,2	
2.	'Natural Acceptance' and Experiential Validation	1	04-01-2024		TLM1,2	
3.	Process for self-exploration	1	06-01-2024		TLM1,2	
4.	Continuous Happiness and Prosperity	1	08-01-2024		TLM1,2	
5.	A look at basic human aspirations: Right understanding	1	10-01-2024		TLM1,2	
6.	Active learning activity	1	11-01-2024		TLM6	
7.	Right understanding, Relationship and Physical Facility	1	18-01-2024		TLM1,2	
8.	Understanding Happiness, and Prosperity	1	20-01-2024		TLM1,2	
9.	Formative Assessment	1	22-01-2024		TLM3	
No. of classes required to complete UNIT-I: 9				**No. of classes taken:**		

UNIT-II: Understanding Harmony in the Human Being-Harmony in myself

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Introduction, COs, POs and articulation matrix	1	24-01-2024		TLM1,2	
11.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	25-01-2024		TLM1,2	
12.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	27-01-2024		TLM1,2	
13.	Active learning activity	1	29-01-2024		TLM6	
14.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	31-01-2024		TLM1,2	
15.	Understanding the harmony of I with the Body: Sanyam and Health	1	01-02-2024		TLM1,2	
16.	Active learning activity	1	03-02-2024		TLM1,2	
17.	Correct appraisal of Physical needs	1	05-02-2024		TLM1,2	
18.	Formative Assessment	1	07-02-2024		TLM3	
No. of classes required to complete UNIT-II: 9				**No. of classes taken:**		

UNIT-III: Understanding Harmony in the Family and society-Harmony in Human- Human Relationship

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.	Understanding values in human-human relationship: meaning of justice	1	08-02-2024		TLM1,2	
20.	Program for fulfillment to ensure mutual happiness and Trust	1	10-02-2024		TLM1,2	
21.	Program for fulfillment to ensure mutual happiness and Respect as the foundational values of relationship	1	12-02-2024		TLM1,2	
22.	Understanding Harmony in the society: Resolution	1	14-02-2024		TLM1,2	
23.	Active learning activity	1	15-02-2024		TLM6	
24.	Understanding the harmony in the society: Resolution, Prosperity	1	17-02-2024		TLM1,2	
25.	Understanding the harmony in the society: fearlessness, and co-existence as comprehensive Human Goals	1	19-02-2024		TLM1,2	
26.	Unit end questions format, Question modelling	1	21-02-2024		TLM1	
27.	Multiple choice questions	1	22-02-2024		TLM1,2	
28.	Formative Assessment	1	24-02-2024		TLM6	
29.	I-Mid examinations					
30.	Prosperity, fearlessness, and co-existence as comprehensive human goals	2	04-03-2024 06-03-2024		TLM1,2	
31.	Visualizing a universal harmonious order in the society-undivided society	1	07-03-2024		TLM1,2	
32.	Universal order-from family to world family	1	09-03-2024		TLM1,2	
33.	Gratitude as a universal value in relationships	1	11-03-2024		TLM1,2	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

UNIT-IV: Understanding Harmony in the Nature and Existence- Whole existence as Coexistence.

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, COs, POs and articulation matrix	1	13-03-2024		TLM1,2	
35.	Understanding Harmony in the Nature	1	14-03-2024		TLM1,2	
36.	Interconnectedness and mutual fulfillment among four orders of nature	2	16-03-2024 18-03-2024		TLM1,2	
37.	Recyclability and self-regulation in nature	1	20-03-2024		TLM1,2	
38.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	21-03-2024		TLM1,2	
39.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	23-03-2024		TLM1,2	
40.	Holistic perception of harmony at all levels of existence	1	27-03-2024		TLM1,2	

41.	Active learning activity	1	28-03-2024		TLM6	
42.	Formative Assessment	1	30-03-2024		TLM3	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Implications of the above Holistic understanding of Harmony on professional ethics

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, COs, POs and articulation matrix	1	01-04-2024		TLM1,2	
44.	Natural acceptance of human values	2	03-04-2024 04-04-2024		TLM1,2	
45.	Definitiveness of ethical human conduct	1	06-04-2024		TLM1,2	
46.	Basis for humanistic education	1	08-04-2024		TLM1,2	
47.	Humanistic constitution and humanistic universal order	1	10-04-2024		TLM1,2	
48.	Competence in professional ethics	2	13-04-2024 15-04-2024		TLM1,2	
49.	Strategy for transition from the present state to universal human order	1	18-04-2024		TLM1,2	
50.	Active learning activity	1	20-04-2024		TLM6	
51.	Formative Assessment	1	22-04-2024		TLM3	
52.	Revision	3	24-04-2024 25-04-2024 27-04-2024		TLM1,2	
No. of classes required to complete UNIT-V: 14				**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+A	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	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the principles of thermal sciences to design and develop various thermal systems.
PSO 2	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.
PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr.K.Venkateswara Reddy	Dr.P.Ravindra Kumar	Dr. B. SRINIVASA RAO	Dr. M.B.S.Sreekara Reddy
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech. IV-Sem., ME **SEC - B**

ACADEMIC YEAR : 2023-2024

COURSE NAME & CODE : **PRODUCTION TECHNOLOGY Lab, 20ME57**

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : Mr.S.Srinivasa Reddy,Dr. Murahari, Dr. s.pichi reddy

COURSE OBJECTIVE :

The main objective of this course is to demonstrate the concepts of Production Technology**.**

COURSE EDUCATIONAL OBJECTIVE (S):

The objectives of the course are to provide hands-on laboratory experience in the area of production, provide basic knowledge about casting and tools used in casting; get familiarized with welding equipment and various welding processes; acquire practical knowledge in mechanical press working and get equip with moulding processes.

COURSE OUTCOMES: After completion of the course students are able to:

CO1: Design and develop a product using various metal casting methods.
CO2: Fabricate machine components with suitable welding technique.
CO3: Choose a suitable mechanical press working process to obtain the required shape of metal.
CO4: Manufacture a plastic component using various plastic processing techniques.

Mapping of COs with POs and PSOs:

COURSE ARTICULATION MATRIX (Correlation between COs and POs and PSOs):

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) & PSOs – Production Technology Lab (17ME65)																
		POs												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	PSO 3
COs	CO1	3	2	3	3	1	1	2	2	3	1	1	2	-	2	3
	CO2	2	1	3	3	1	1	2	1	2	1	1	2	-	2	2
	CO3	2	1	3	3	1	1	2	2	2	1	1	2	-	2	1
	CO4	1	1	2	3	1	1	1	1	2	1	1	2	-	2	1
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)																

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

Batch: B1 (22761A0321-340 & 23765A0339-349)

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	Demonstration	3	06-01-2024		TLM8	-	
2	Experiment-1	3	20-01-2024		TLM8	R1	
3	Experiment-2	3	27-01-2024		TLM8	R1	
4	Experiment-3	3	03-02-2024		TLM8	R1	
5	Experiment-4	3	10-02-2024		TLM8	R1	
6	Experiment-5	3	17-02-2024		TLM8	R1	
7	Experiment-6	3	24-02-2024		TLM8	R1	
8	Experiment-7	3	16-03-2024		TLM8	R1	
9	Experiment-8	3	23-03-2024		TLM8	R1	
10	Experiment-9	3	30-03-2024		TLM8	R1	
11	Experiment-10	3	06-04-2024		TLM8	R1	
12	Lab Internal	3	20-04-2024		-	-	

Additional Experiments:

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
13	Gyroscope	3	27-04-2024		TLM8	-	

Batch:B2 (23765A0350-23765A0377)

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	**Demonstration**	3	04-01-2024		TLM8	-	
2.	**Demonstration**	3	11-01-2024		TLM8	-	
3.	**Experiment-1**	3	18-01-2024		TLM8	R1	
4.	Experiment-2	3	25-01-2024		TLM8	R1	
5.	Experiment-3	3	01-02-2024		TLM8	R1	
6.	Experiment-4	3	08-02-2024		TLM8	R1	
7.	Experiment-5	3	15-02-2024		TLM8	R1	
8.	Demonstration	3	22-02-2024		TLM8	-	
9.	Experiment-6	3	07-03-2024		TLM8	R1	
10.	Experiment-7	3	14-03-2024		TLM8	R1	
11.	Experiment-8		21-03-2024		TLM8	R1	

12.	Experiment-9	3	28-03-2024		TLM8	R1	
13.	Experiment-10		04-04-2024		TLM8	R1	
14.	Lab Internal	3	11-04-2024		-	-	

Additional Experiments:

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
15.	reputation	3	18-04-2024		TLM8	-	

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	02/01/2024	24/02/2024	8
I Mid Examinations	26/02/2024	02/03/2024	1
II Phase of Instructions	04/03/2024	27/04/2024	8
II Mid Examinations	29/04/2024	04/05/2024	1
Preparation and Practicals	06/05/2024	11/05/2024	1
Semester End Examinations	13/05/2024	25/05/2024	2

EVALUATION PROCESS:

Evaluation Task	Cos	Marks
Day to Day Evaluation: A	1,2,3,4	A=5
Record: B	1,2,3,4	B=5
Internal Lab Exams: C	1,2,3,4	C=5
Cumulative Internal Examination : CIE=A+B+C	**1,2,3,4**	**CIE=15**
Semester End Examinations: SEE	**1,2,3,4**	**SEE=35**
Total Marks: CIE+SEE	**1,2,3,4**	**50**

Details of Batches:

Batch No.	Reg. No. of Students	Number of Students
B1A	22761A0321-325	5
B1B	22761A0326-332	5
B1C	22761A0333-339	6
B1D	23765A0339-343	5
B1E	23765A0344-349	6

Batch No.	Reg. No. of Students	Number of Students
B2A	23765A0350-354	5
B2B	23765A0355-359	5
B2C	23765A0360-365	6
B2D	23765A0366-371	6
B2E	23765A0372-377	6

LIST OF EXPERIMENTS

At least 12 Experiments should be conducted

I. METAL CASTING

1. Pattern Design and making - for one casting drawing - 1 Exercise
2. Sand properties testing - Exercise -for strengths and Permeability - 1 Exercise
3. Moulding, Melting and Casting - 1 Exercise

II WELDING

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 2 Exercises
3. TIG Welding - 1 Exercise

III MECHANICAL PRESS WORKING

1. Blanking & Piercing operation and study of simple, compound and progressive press tool - 1 Exercise
2. Hydraulic Press: Deep drawing and extrusion operation - 1 Exercise
3. Bending and other operations - 1 Exercise

IV PROCESSING OF PLASTICS

1. Injection Moulding - 1 Exercise
2. Blow Moulding - 1 Exercise

Ref: Production Technology Manual

PROGRAMME EDUCATIONAL OBJECTIVES:

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

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

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

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Mr.s.srinivasa redy	**Dr.s.pichi reddy**	**Dr.k.murahari**	**Dr.M.B.S.Sreekar Reddy**
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech. IV-Sem., ME

ACADEMIC YEAR : 2021-2022

COURSE NAME & CODE : **Theory of Machines Lab, 20ME58**

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : Mr.K.V.Viswanadh/Mr. V Sankara Rao

COURSE COORDINATOR : **Mr.K.V. Viswanadh**

PRE-REQUISITE: Engineering Mechanics, Theory of Machines

COURSE OBJECTIVE:

The main objective of this course is to demonstrate the concepts of theory of machines.

COURSE OUTCOMES (CO)

CO 1	Apply the dynamics of cams, gyroscopes for any practical problems. **(Applying-L3)**
CO 2	Evaluate the speed regulations in governors. **(Applying-L3)**
CO 3	Execute the static and dynamic balancing for rotating parts of a machine. **(Applying-L3)**
CO 4	Analyze the vibration parameters of oscillating bodies. **(Analyzing-L4)**

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

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

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

REFERENCE:

R1	Lab Manual

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

Batch: B1 (22761A0321-340 & 23765A0339-349)

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1	Demonstration	3	06-01-2024		TLM8	-	
2	Experiment-1	3	20-01-2024		TLM8	R1	
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4	Experiment-3	3	03-02-2024		TLM8	R1	
5	Experiment-4	3	10-02-2024		TLM8	R1	
6	Experiment-5	3	17-02-2024		TLM8	R1	
7	Experiment-6	3	24-02-2024		TLM8	R1	
8	Experiment-7	3	16-03-2024		TLM8	R1	
9	Experiment-8	3	23-03-2024		TLM8	R1	
10	Experiment-9	3	30-03-2024		TLM8	R1	
11	Experiment-10	3	06-04-2024		TLM8	R1	
12	Lab Internal	3	20-04-2024		-	-	

Additional Experiments:

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
13	Gyroscope	3	27-04-2024		TLM8	-	

Batch:B2 (23765A0350-23765A0377)

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1	**Demonstration**	3	04-01-2024		TLM8	-	
2	**Demonstration**	3	11-01-2024		TLM8	-	
3	**Experiment-1**	3	18-01-2024		TLM8	R1	
4	Experiment-2	3	25-01-2024		TLM8	R1	
5	Experiment-3	3	01-02-2024		TLM8	R1	
6	Experiment-4	3	08-02-2024		TLM8	R1	
7	Experiment-5	3	15-02-2024		TLM8	R1	
8	Demonstration	3	22-02-2024		TLM8	-	
9	Experiment-6	3	07-03-2024		TLM8	R1	
10	Experiment-7	3	14-03-2024		TLM8	R1	
11	Experiment-8		21-03-2024		TLM8	R1	

12	Experiment-9	3	28-03-2024		TLM8	R1	
13	Experiment-10		04-04-2024		TLM8	R1	
14	Lab Internal	3	11-04-2024		-	-	

Additional Experiments:

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
15	Gyroscope	3	18-04-2024		TLM8	-	

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:

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II Mid Examinations	29/04/2024	04/05/2024	1
Preparation and Practicals	06/05/2024	11/05/2024	1
Semester End Examinations	13/05/2024	25/05/2024	2

EVALUATION PROCESS:

Evaluation Task	Cos	Marks
Day to Day Evaluation: A	1,2,3,4	A=5
Record: B	1,2,3,4	B=5
Internal Lab Exams: C	1,2,3,4	C=5
Cumulative Internal Examination : CIE=A+B+C	**1,2,3,4**	**CIE=15**
Semester End Examinations: SEE	**1,2,3,4**	**SEE=35**
Total Marks: CIE+SEE	**1,2,3,4**	**50**

Details of Batches:

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B1C	22761A0333-339	6
B1D	23765A0339-343	5
B1E	23765A0344-349	6

Batch No.	Reg. No. of Students	Number of Students
B2A	23765A0350-354	5
B2B	23765A0355-359	5
B2C	23765A0360-365	6
B2D	23765A0366-371	6
B2E	23765A0372-377	6

Batch No:	Exp. 01	Exp. 02	Exp. 03	Exp. 04	Exp. 05	Exp. 06	Exp. 07	Exp. 08	Exp. 09	Exp. 10
B1A	TOM1	TOM2	TOM3	TOM4	TOM5	TOM6	TOM7	TOM8	TOM9	TOM10
B1B	TOM2	TOM3	TOM4	TOM5	TOM1	TOM7	TOM8	TOM9	TOM10	TOM6
B1C	TOM3	TOM4	TOM5	TOM1	TOM2	TOM8	TOM9	TOM10	TOM6	TOM7
B1D	TOM4	TOM5	TOM1	TOM2	TOM3	TOM9	TOM10	TOM6	TOM7	TOM8
B1E	TOM5	TOM1	TOM2	TOM3	TOM4	TOM10	TOM6	TOM7	TOM8	TOM9
B2A	TOM1	TOM2	TOM3	TOM4	TOM5	TOM6	TOM7	TOM8	TOM9	TOM10
B2B	TOM2	TOM3	TOM4	TOM5	TOM1	TOM7	TOM8	TOM9	TOM10	TOM6
B2C	TOM3	TOM4	TOM5	TOM1	TOM2	TOM8	TOM9	TOM10	TOM6	TOM7
B2D	TOM4	TOM5	TOM1	TOM2	TOM3	TOM9	TOM10	TOM6	TOM7	TOM8
B2E	TOM5	TOM1	TOM2	TOM3	TOM4	TOM10	TOM6	TOM7	TOM8	TOM9

LIST OF EXPERIMENTS:

Exp.No.	Name of the Experiment	Related CO
TOM1	Study the cam jump phenomenon of various cams and followers.	CO1
TOM2	Whirling Speed of Rotating Shaft	CO2
TOM3	Determination of centrifugal forces and draw the characteristics curve of Watt and Porter governor.	CO2
TOM4	Determination of centrifugal forces and draw the characteristics curve of Proell governor.	CO2
TOM5	Determination of centrifugal forces and draw the characteristics curve of Hartnell governor.	CO2
TOM6	Determination of damped and undamped forced vibrations of beams.	CO4
TOM7	Determination of natural frequency of torsional vibrations of a single rotor system.	CO4
TOM8	Determination of natural frequency of the spring-mass damped and undamped systems.	CO4
TOM9	Balance the given rotor system dynamically with the aid of the force polygon and the couple polygon.	CO3
TOM10	Verification of Dunkerley's formula for transverse vibrations of beams with different end conditions.	CO4

NOTIFICATION OF CYCLE

Cycle	Exp.No.	Name of the Experiment	Related CO
Cycle-1	TOM1	Cam Jump Analysis	CO1
	TOM2	Whirling Speed of Rotating Shaft	CO2
	TOM3	Watt and Porter Governor	CO2
	TOM4	Proell Governor	CO2

	TOM5	Hartnell Governor	CO2
Cycle-2	TOM6	Damped and Undamped forced vibrations of beams	CO4
	TOM7	Natural Frequency of torsional vibrations of a single rotor system	CO4
	TOM8	Natural Frequency of the spring-mass damped and undamped systems	CO4
	TOM9	Dynamic Balancing of Rotating Machine	CO3
	TOM10	Dunkerley's formula for transverse vibrations of beams with different end conditions.	CO4

PROGRAMME EDUCATIONAL OBJECTIVES:

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

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

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

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyse 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.
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12. **Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Mr.K.V.Viswanadh **Mr.V. SANKARA RAO**	**Mr.K.V.Viswanadh**	**Mr.B.Sudheer Kumar**	**Dr.S.Pichi Reddy**
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.V.Sankararao/Mr.K.Sai Babu/Mr.D.Mallikharuna Rao
Course Name & Code : Computer Aided Machine Drawing Lab - 20ME59
L-T-P Structure : 1-0-2
Program/Sem/Sec : B.Tech., ME., IV-Sem., B/S Credits : 2
PRE-REQUISITE : Engineering Graphics, Engg. Drawing using Auto CAD A.Y: 2023-24

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objectives of the course are to familiarize the basic conventions and various machine elements used in design and to understand the assembly drawings for engine parts, machine parts, valves etc.

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

CO1	Comprehend basic conventions needed for machine drawing. **(Understanding-L2)**
CO2	Construct the machine elements with suitable proportions used in mechanical systems. **(Applying-L3)**
CO3	Execute the assembly drawings of engine parts. **(Analyzing-L4)**
CO4	Execute the assembly drawings of machine parts. **(Analyzing-L4)**

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

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

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

MATERIAL: Lab Manual

TEXT BOOK

1. K.L.Narayana, P.Kannaiah & K. Venkata Reddy, Machine Drawing, 4th Edition New Age Publishers. 2004.
2. P.S Gill, Machine Drawing, 18th Edition Eastern Publisher, 2013.

REFERENCES

1. N.Sidheshwar, Machine Drawing, 4th Edition, Tata McGraw Hill, 2001.
2. Dhawan, Machine Drawing, revised edition, S.Chand Publications, 2002.
3. K. C. JOHN, Machine Drawing 6th Edition, Stronck publishers, 2007.
4. N.D.Bhatt, V.M.Panchal Machine Drawing Charotar Publishing House, 2005.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Programs to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs and ribs.	03	02-01-2024		TLM2	CO 1,2,3,4	
2.	Types of sections – selection of section planes and drawing of sections and auxiliary sectional views, Parts not usually sectioned.	03	09-01-2024		TLM4	CO 1,2,3,4	
3.	Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centres, curved and tapered features.	03	23-01-2024		TLM4	CO1	
4.	Title boxes, their size, location and details - common abbreviations & their liberal usage	03	30-01-2024		TLM4	CO1	
5.	Types of Drawings	03	06-02-2024		TLM4	CO1	
6.	Popular forms of screw threads, bolts, nuts, stud bolts, tap bolts and set screws.	03	13-02-2024		TLM4	CO2	
7.	Keys, cotter joints and knuckle joint.	03	20-02-2024		TLM4	CO2	
8.	Riveted joints for plates	03	05-03-2024		TLM4	CO2	
9.	Shaft coupling, spigot and socket pipe joint.	03	12-03-2024		TLM4	CO3	
10.	Journal, pivot and collar and foot step bearings	03	19-03-2024		TLM4	CO3	
11.	Engine parts – Stuffing box, Cross head, Eccentric, Connecting rod, Piston assembly.	03	26-03-2024		TLM4	CO4	

12.	Other machine parts - Screws jack, Bench Vice, Pipe vice, Plummer block, Tailstock.	03	02-04-2024		TLM4	CO4	
13.	Repetition	03	16-04-2024		TLM4	-	
14.	Internal Exam	03	23-04-2024		-	-	

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

ACADEMIC CALENDAR:

Description	**From**	**To**	**Weeks**
I Phase of Instructions	02/01/2024	24/02/2024	8
I Mid Examinations	26/02/2024	02/03/2024	1
II Phase of Instructions	04/03/2024	27/04/2024	8
II Mid Examinations	29/04/2024	04/05/2024	1
Preparation and Practicals	06/05/2024	11/05/2024	1
Semester End Examinations	13/05/2024	25/05/2024	2

EVALUATION PROCESS:

Evaluation Task	**Cos**	**Marks**
Day to Day Evaluation: A	1,2,3,4	A=5
Internal Lab Exams: B	1,2,3,4	B=5
Viva Marks: C	1,2,3,4	C=5
Cumulative Internal Examination : CIE=A+B+C+D	**1,2,3,4**	**CIE=15**
Semester End Examinations: SEE	**1,2,3,4**	**SEE=35**
Total Marks: CIE+SEE	**1,2,3,4**	**50**

LIST OF EXPERIMENTS:

Expt. No.	**Type of Drawings**	**Name of the Experiment**
1.	Conventional Drawing	Conventional representations of various materials
2.		Conventional representations of various machine parts
3.		Sectional Views
4.	Drawing of Machine elements for simple parts	Thread Profiles
5.		Bolt with Nut and Washer
6.		Flanged Coupling
7.		Riveted Joint
8.	Assembly Drawing	Stuffing box

9.		Piston Assembly
10.		Plummer block
11.		Universal Joint
12.		Screw Jack

NOTIFICATION OF CYCLES:

Cycle	Exp. No.	Name of the Experiment	Related CO
Cycle-1	1	Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs and ribs.	CO1
	2	Types of sections – selection of section planes and drawing of sections and auxiliary sectional views, Parts not usually sectioned.	CO1
	3	Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centres, curved and tapered features.	CO1
Cycle-2	4	Title boxes, their size, location and details - common abbreviations & their liberal usage	CO2
	5	Types of Drawings	CO2
	6	Popular forms of screw threads, bolts, nuts, stud bolts, tap bolts and set screws.	CO2
Cycle-3	7	Keys, cotter joints and knuckle joint.	CO3
	8	Riveted joints for plates	CO3
	9	Shaft coupling, spigot and socket pipe joint.	CO3
Cycle-4	10	Journal, pivot and collar and foot step bearings	CO4
	11	Engine parts – Stuffing box, Cross head, Eccentric, Connecting rod, Piston assembly.	CO4
	12	Other machine parts - Screws jack, Bench Vice, Pipe vice, Plummer block, Tailstock.	CO4

PART-C

PROGRAMME EDUCATIONAL OBJECTIVES:

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

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

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

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

2. **Problem analysis**: Identify, formulate, review research literature, and analyse 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.
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PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. To apply the principles of thermal sciences to design and develop various thermal systems.
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Mr.V.Sankararao/ K.Sai Babu/ D.Mallikharuna Rao	Mr.K.V.Viswanadh	Dr.B.Sudheer Kumar	Dr.M.B.S.Sreekara Reddy
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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.K.V.Viswanadh, Mr.K.Venkateswara Reddy, Mr.D.Mallikarjuna Rao
Course Name & Code **:** Structural and Modal Analysis using ANSYS
Regulation : R20
L-T-P Structure **: 1-0-2** **Credits:** 02
Program/Sem/Sec : B.Tech – IV Semester – B Section **A.Y.:** 2023-24
Continuous Internal Assessment **: --**

PREREQUISITE: Strength of Materials

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objective of this course is to improve the modelling and analysis skills of students in ANSYS Workbench and enable them to solve problems related to structures and machine members.

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

CO1	Understand the basics and fundamentals related to Finite Element Method.**(Understanding - L2)**
CO2	Apply the konwledge of ANSYS to solve the engineering problems. **(Applying - L3)**
CO3	Perform the static structural analysis in 1D, 2D and 3D using ANSYS workbench.**(Applying - L3)**
CO4	Analyze the mode shapes of structures and machine elements.**(Analyzing - L4)**

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

SOFTWARE PACKAGES: ANSYS

Web REFERENCES:
1.https://www.slideshare.net/nageshsurner/introduction-to-ansys-workbench-80635115
2.https://www.youtube.com/watch?v=C8WvCQpzT2A
3.https://www.youtube.com/watch?v=FwKkjAr9Kbk
4.https://www.youtube.com/watch?v=6QaFX1CG-ZE

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-B

COURSE DELIVERY PLAN (LESSON PLAN): (Section – A)

Schedule of Experiments: Thursday (from 09.00 AM – 12.30 PM)

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
01	Introduction to Finite Element Method	4	05-01-2024		TLM4	
Cycle-I						
02	Basics of ANSYS interface and its utilities	4	**12-01-2024**		TLM4	
03	Structural analysis of Stepped Bar and Tappered Bar	4	**19-01-2024**		TLM4	
04	Static Analysis of a Planar Truss	4	**02-02-2024**		TLM4	
05	Static Analysis of a Cantilever Beam	4	**09-02-2024**		TLM4	
06	Static Analysis of a Simply supported Beam with point load.	4	**16-02-2024**		TLM4	
07	Static Analysis of a Simply supported Beam with Uniformly Distributed load.	4	**23-02-2024**		TLM4	
I Mid Exams: 26-02-2024 to 02-03-2024						
Cycle-II						
08	Static Analysis of a Simply supported Beam with Uniformly Varying load. Static Analysis of a Fixed Beam subjected to Axial Load.	4	**15-03-2024**		TLM4	
09	Stress Analysis of Flat plates and simple shells.	4	**22-03-2024**		TLM4	
10	Stress Analysis of Axi-symmetric Components.	4	**12-04-2024**		TLM4	
11	Vibration Analysis of Spring-Mass Systems.	4	**19-04-2024**		TLM4	
12	Mode-Frequency Analysis of Beam sand Machine Elements.	4	**26-04-2024**		TLM4	
II Mid Exams:29-04-2024 to 04-05-2024						
No. of classes required to complete: 15				**No. of classes taken:**		

PART-B

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Semester End Examination:	50
Total Marks:	**50**

Academic calendar

Commencement of VI Semester Classwork	**01-01-2024**

Description	From	To	Weeks
I Phase of Instructions	01-01-2024	24-02-2024	8 W
I Mid Examinations	26-02-2024	02-03-2024	1 W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II Mid Examinations	29-04-2024	04-05-2024	1 W
Preparation and Practicals	06-05-2024	11-05-2024	1 W
Semester End Examinations	13-05-2024	25-05-2024	2 W
Internship	27-05-2024	06-07-2024	6 W
Commencement of VII Semester Classwork	**08 – 07 - 2024**		

Lab Occupancy Time Table (B.Tech IV Sem:Section – B/ S)

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

Faculty – In Charges:

S.No	Class	Section	Lab Assistant	Faculty – In Charge
1	**B.Tech – IV Semester**	B	**Mr. P Guna Sundar Reddy**	Mr.K.V.Viswanadh, Mr.K.Venkateswara Reddy, Mr.D.Mallikarjuna Rao

PART-C

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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PSO 3	To apply the basic principles of mechanical engineering design for evaluation of performance of various systems relating to transmission of motion and power, conservation of energy and other process equipment.

Signature				
Name of the Faculty	Mr.K.V.Viswanadh, Mr.K.Venkateswara Reddy, Mr.D.Mallikarjuna Rao	**K V Viswanath**	**Jonnala Subba Reddy**	**Dr.M.B.S.Sreekara Reddy**
Designation	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**HOD**