LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC&NBA(UnderTier-I), ISO9001:2015 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931
FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

PROGRAM : II B. Tech., II-Sem., MECH-A
ACADEMIC YEAR : 2021-22
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	07-03-22		TLM1	
2.	Basic concepts of probability	1	10-03-22		TLM1	
3.	problems on basic probability	1	11-03-22		TLM1	
4.	Addition theorem, problems	1	14-03-22		TLM1	
5.	Multiplication theorem, examples	1	17-03-22		TLM1&2	
6.	Independent events, theorems	1	19-03-22		TLM1	
7.	Baye's theorem, Examples	1	21-03-22		TLM1&2	
8.	Problems on Baye's theorem	1	24-03-22		TLM1	
9.	Random variables, Expectations	1	25-03-22		TLM1	
10.	Problems on PMF	1	26-03-22		TLM1	
11.	Problems on PDF	1	28-03-22		TLM1	
No. of classes required to complete UNIT-I: 11				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	31-03-22		TLM1&2	
2.	Problems on Binomial distribution	1	01-04-22		TLM1	
3.	Fitting of binomial distribution	1	04-04-22		TLM1	
4.	Poisson distribution, mean and variance	1	07-04-22		TLM1&2	
5.	Problems on Poisson distribution	1	08-04-22		TLM1	
6.	Fitting of Poisson distribution	1	11-04-22		TLM1	
7.	Normal distribution: mean &variance	1	16-04-22		TLM1&2	
8.	Problems on Normal Distribution	1	18-04-22		TLM1	
9.	Exponential distribution:	1	20-04-22		TLM1	
No. of classes required to complete UNIT-II: 10				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	21-04-22		TLM1&2	
2.	Sampling distribution of mean, variance	1	22-04-22		TLM1	
3.	Central limit theorem, Examples	1	23-04-22		TLM1&2	
4.	**Mid-I examinations**		25-04-22 to 30-04-22			
5.	Problems on central limit theorem	1	02-05-22		TLM1	
6.	Point and interval estimation	1	05-05-22		TLM1&2	
7.	Confidence Interval of mean	1	06-05-22		TLM1	
8.	Confidence Interval of proportion	1	07-05-22		TLM1	
9.	Confidence Interval of mean (n<30)	1	09-05-22		TLM1	
10.	problems	1	12-05-22		TLM1	
No. of classes required to complete UNIT-III: 09				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	13-05-22		TLM1&2	
2.	Z-test for single mean	1	14-05-22		TLM1	
3.	Z-test for difference of means	1	16-05-22		TLM1	
4.	Z-test for single Proportion	1	19-05-22		TLM1	

5.	Z-test for difference of Proportions	1	20-05-22		TLM1	
6.	t-test for single mean	1	21-05-22		TLM1	
7.	t-test for difference of means	1	23-05-22		TLM1	
8.	Paired t-test	1	26-05-22		TLM1	
9.	F-test for variances	1	27-05-22		TLM1	
10.	χ^2-test for goodness of fit	1	28-05-22		TLM1	
11.	χ^2-test for independence of attributes	1	30-05-22		TLM1	
12.	problems					
No. of classes required to complete UNIT-IV: 12				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	02-06-22		TLM1&2	
2.	Problems on Pearson's Correlation	1	03-06-22		TLM1	
3.	Regression lines	1	04-06-22		TLM1	
4.	Problems on Regression lines	1	06-06-22		TLM1	
5.	Properties of Regression coefficients	1	09-06-22		TLM1&2	
6.	Problems on Regression coefficients	1	10-06-22		TLM1	
7.	Problems on rank Correlation	1	13-06-22		TLM1	
8.	Problems on repeated ranks	1	16-02-22		TLM1	
9.	Practice problems	1	17-06-22			
10.	Revision	1	18-06-22		TLM1	
No. of classes required to complete UNIT-V: 10				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/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.:** 2021-22
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	3		2			2	2					1	3		
CO2	2	3	3	2								1	3		
CO3	2	2	3	2		3						1	3		
CO4	2	3	3									1	3		
CO5	3	2	2	3			2					1	3		
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	07/03/2022		TLM1	
2.	Rankine Cycle	1	09/03/2022		TLM2	
3.	Actual Vapour Power Cycle	1	11/03/2022		TLM1	
4.	Methods to improve efficiency of Rankine cycle	1	14/03/2022		TLM1	
5.	Reheating of steam, Regeneration	1	16/03/2022		TLM1	
6.	Open and Closed Feed Water Heaters	1	19/03/2022		TLM1	
7.	Tutorial-I	1	21/03/2022		TLM3	
8.	Fuels used in power plant	1	23/03/2022		TLM1	
No. of classes required to complete UNIT-I: 8				**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
9.	Introduction, Boiler systems Function and Classification	1	25/03/2022		TLM1	
10.	Fire TubeCornish, Lancashire, Cochran Boilers	1	26/03/2022		TLM2	
11.	Water Tube-Babcock and Wilcox, High pressure boilers	1	28/03/2022		TLM1	
12.	Loeffler and Benson boilers, Boiler Mountings and Accessories	1	30/03/2022		TLM1	
13.	Draught system , Functions, Types	1	01/04/2022		TLM1	
14.	Natural Draft-Height of chimney for given draught and discharge	1	04/04/2022		TLM1	
15.	Tutorial-II	1	06/04/2022		TLM3	
16.	Condition for maximum discharge	1	08/04/2022		TLM1	
17.	Efficiency of chimney	1	09/04/2022		TLM1	
18.	artificial draught-induced and forced	1	11/04/2022		TLM1	
No. of classes required to complete UNIT-II: 10				**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
19.	Introduction, Types of nozzle	1	13/04/2022		TLM2	
20.	Flow through nozzles-thermodynamic Analysis	1	18/04/2022		TLM1	
21.	velocity of nozzle at exit, condition for maximum discharge, critical pressure ratio	1	20/04/2022		TLM1	
22.	Ideal and actual expansion in nozzle, velocity coefficient	1	22/04/2022		TLM1	
23.	Tutorial-III	1	23/04/2022		TLM3	

24.	Steam condensers, Introduction, Elements of a condenser plant	1	02/05/2022		TLM1	
25.	Types of Condensers-Jet condensers	1	04/05/2022		TLM1	
26.	Surface Condensers–working principle	1	06/05/2022		TLM1	
No. of classes required to complete UNIT-III: 8				**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
27.	Steam turbine, Introduction, Classification	1	07/05/2022		TLM2	
28.	Impulse turbine, Mechanical details, Working principle, Velocity diagram	1	09/05/2022		TLM1	
29.	effect of friction–power developed, axial thrust, blade or diagram efficiency	1	11/05/2022		TLM1	
30.	condition for maximum efficiency	1	13/05/2022		TLM1	
31.	De-Laval Turbine – its features	1	16/05/2022		TLM1	
32.	Method store ducerotor speed-velocitycompounding (Curtis Turbine)	1	18/05/2022		TLM1	
33.	Tutorial-IV	1	20/05/2022		TLM3	
34.	Pressure compounding (Rateau Turbine) and pressure and velocity compounding.	1	21/05/2022		TLM1	
35.	Reaction turbines, Introduction	1	23/05/2022		TLM1	
36.	Parson‘s reaction turbine	1	25/05/2022		TLM1	
37.	performance analysis, degree of reaction	1	27/05/2022		TLM1	
38.	condition for maximum efficiency	1	28/05/2022		TLM1	
No. of classes required to complete UNIT-IV: 12				**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
39.	Compressors, Introduction, Classification	1	30/05/2022		TLM2	
40.	Reciprocating compressors, Principle of operation, Work required	1	01/06/2022		TLM1	
41.	Isothermal Efficiency, Volumetric efficiency and Effect of clearance volume	1	03/06/2022		TLM1	
42.	MultistageCompression.	1	06/06/2022		TLM1	
43.	Rotary compressors, Roots blower and Vane‘s sealed compressor	1	08/06/2022		TLM1	
44.	Tutorial-V	1	10/06/2022		TLM3	
45.	principle ofworking and applications	1	13/06/2022		TLM1	
46.	Centrifugal compressors	1	15/06/2022		TLM1	
47.	Axial flow compressors	1	17/06/2022		TLM1	
48.	Principle of operation and	1	18/06/2022		TLM1	

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

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

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.S.PICHI REDDY**
Signature				

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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.:** 2021-2022

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	09/03/2022		**TLM1/TLM2**	
2.	Importance of manufacturing, Classification of Manufacturing.	1	10/03/2022		**TLM1/TLM2**	
3.	**Casting:** Casting Introduction, Steps involved in making of casting.	1	16/03/2022		**TLM1/TLM2**	
4.	Advantages, Limitations and applications of casting.	1	17/03/2022		**TLM1/TLM2**	
5.	Pattern and its types, Materials used for patterns, Cores and Core prints, Chaplets, Moulding sand and its properties.	1	19/03/2022		**TLM1/TLM2**	
6.	Pattern allowances and construction.	1	23/03/2022		**TLM1/TLM2**	
7.	Principal of gating.	1	24/03/2022		**TLM1/TLM2**	
8.	Gating ratio and design of gating system.	1	26/03/2022		**TLM1/TLM2**	
9.	Riser, types, function and design.	1	30/03/2022		**TLM1/TLM2**	
10.	Centrifugal casting, Die casting, Investment casting, and clean casting Defects and remedies.	1	31/03/2022		**TLM1/TLM2**	
No. of classes required to complete UNIT-I: 10				**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
11.	Introduction, Classification of welding process, Gas welding-Oxy-acetylene welding equipment.	1	06/04/2022		**TLM1/TLM2**	
12.	Oxy-acetylene process and applications, Hydrogen welding, Gas cutting process, Gas cutting applications.	1	07/04/2022		**TLM1/TLM2**	
13.	Electric arc welding, electrodes, polarities.	1	13/04/2022		**TLM1/TLM2**	
14.	Consumable and non-consumable, MIG welding.	1	16/04/2022		**TLM1/TLM2**	
15.	Sub-merged arc welding (SAW), Inert gas welding,	1	20/04/2022		**TLM1/TLM2**	
16.	Carbon arc welding, Tungsten Inert Gas Welding (TIG) process and applications.	1	21/04/2022		**TLM1/TLM2**	
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	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Principle and types of resistance welding and applications.	1	23/04/2022		**TLM1/TLM2**	
18.	Thermit welding.	1	04/05/2022		**TLM1/TLM2**	
19.	Friction welding.	1	05/05/2022		**TLM1/TLM2**	
20.	Explosive welding, induction welding.	1	07/05/2022		**TLM1/TLM2**	
21.	Soldering and brazing, Applications of soldering and brazing processes	1	11/05/2022		**TLM1/TLM2**	
22.	Welding defects, causes and remedies, non-destructive examination of weldments.	1	12/05/2022		**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
23.	Nature of plastic deformation, Hot working and cold working processes	1	18/05/2022		**TLM1/TLM2**	
24.	Rolling fundamentals, Theory of rolling, Types of rolling mills	1	19/05/2022		**TLM1/TLM2**	
25.	Theory of Drawing, Wire drawing and tube drawaing	1	21/05/2022		**TLM1/TLM2**	
26.	Coining, spinning	1	25/05/2022		**TLM1/TLM2**	
27.	Principle of forging, types of forging	1	26/05/2022		**TLM1/TLM2**	
28.	Smith and drop forging, machine forging, Forging defects	1	28/05/2022		**TLM1/TLM2**	
29.	Causes and remedies, Applications of forming and forging processes	1	01/06/2022		**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
30.	Basic Extrusion process and its characteristics, Hot extrusion and its types, Cold extrusion and its process	1	02/06/2022		**TLM1/TLM2**	
31.	Forward, extrusion, backward extrusion	1	04/06/2022		**TLM1/TLM2**	
32.	Impact extrusion, Hydrostatic extrusion	1	08/06/2022		**TLM1/TLM2**	
33.	Introduction of sheet metal operation, Stamping, Forming	1	09/06/2022		**TLM1/TLM2**	
34.	Blanking and piercing and forming	1	15/06/2022		**TLM1/TLM2**	
35.	Bending and Stretching	1	16/06/2022		**TLM1/TLM2**	

	Forming					
36.	Embossing and Coining	1	18/06/2022		**TLM1/TLM2**	
No. of classes required to complete UNIT-V: 07				**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				
Signature				

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. P.V. Chandra Sekhar 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 : 2021-22

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
12.	Introduction to Theory of Machines CEO & COs	1	07-03-2022		TLM1		
13.	**MECHANISMS:** Mechanism & Machine, Differences between Mechanism & Machine	1	08-03-2022		TLM1		
14.	Elements-classification Joints -classification Difference between Chain, Mechanism and Inversion, Pair, Types of kinematic Pairs	1	09-03-2022		TLM1/TLM4		
15.	Types of constrained motions	1	11-03-2022		TLM1		
16.	Grashof Law	1	14-03-2022		TLM1		
17.	inversion of mechanism, inversions of quadric cycle chain (4-bar chain)	1	15-03-2022		TLM1/TLM4		
18.	Inversions of single slider crank chain	1	16-03-2022		TLM1/TLM4		
19.	Inversions of double slider crank chain	1	21-03-2022		TLM1		
20.	Degree of freedom-Gruebler's criterion	1	22-03-2022		TLM1		
21.	Problems Gruebler's criterion, Limitations of Gruebler's criterion	1	23-03-2022		TLM1		
22.	Tutorial-1	1	25-03-2022		TLM3		
No. of classes required to complete UNIT-I: 11					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
10.	Introduction to Velocity & Acceleration Analysis Absolute and relative motions	1	28-03-2022		TLM1		
11.	Instantaneous centre - Kennedy's theorem	1	29-03-2022		TLM1		
12.	Determination of angular velocity of points and links for simple mechanisms	1	30-03-2022		TLM1		
13.	Tutorial-2	1	01-04-2022		TLM3		
14.	Relative velocity – Velocity Polygon, Velocity diagrams for simple mechanisms	1	04-04-2022		TLM1		
15.	Acceleration Polygon-acceleration diagrams for simple mechanisms	1	05-04-2022		TLM1		

16.	Problems on velocity & acceleration diagrams	1	06-04-2022		TLM1		
17.	Coriolis acceleration & problem, Klein's construction	1	08-04-2022		TLM1		
18.	Tutorial-3	1	11-04-2022		TLM3		
No. of classes required to complete UNIT-II: 09					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
11.	GEARS: Terminology - law of gearing- Profile for gears	1	12-04-2022		TLM1/TLM2		
12.	Involute gearing- Velocity of sliding	1	13-04-2022		TLM1/ TLM2		
13.	Path of Contact, Arc of Contact & Contact Ratio	1	18-04-2022		TLM1/TLM2		
14.	interference and undercutting	1	19-04-2022		TLM1/ TLM2		
15.	Problems	1	20-04-2022		TLM1		
16.	Tutorial-4 Assignment-1	1	22-04-2022		TLM3		
17.	Introduction about Turning moment	1	02-05-2022		TLM1		
18.	Angular velocity and acceleration of piston, connecting rod	1	04-05-2022		TLM1		
19.	Engine force analysis- piston and crank effort & Inertia torque of connecting rod	1	06-05-2022		TLM1		
20.	Introduction to turning moment diagrams- single and multi-cylinder engines	1	09-05-2022		TLM1		
21.	Problems on single cylinder engines & multi cylinder engines	1	10-05-2022		TLM1		
22.	Fluctuation of energy- Problems	1	11-05-2022		TLM1		
23.	Tutorial-5	1	13-05-2022		TLM3		
No. of classes required to complete UNIT-III: 13					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
13.	Governor - introduction, Watt governor working & Derivation for speed of governor	1	16-05-2022		TLM1/TLM4		
14.	Porter governor working & derivation	1	17-05-2022		TLM1/TLM4		
15.	Porter governor Problems	1	18-05-2022		TLM1/TLM4		
16.	Tutorial-6	1	20-05-2022		TLM3		
17.	Proell governor working & derivation	1	23-05-2022		TLM1/TLM4		

18.	Hartnell governor working, derivation & Problems	1	24-05-2022		TLM1/TLM4		
19.	Sensitiveness, Isochronism, and hunting	1	25-05-2022		TLM1		
20.	Tutorial-7	1	27-05-2022		TLM3		
No. of classes required to complete UNIT-IV: 08					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
11.	Introduction to Balancing - Balancing of rotating masses in single plane	1	30-05-2022		TLM1/ TLM2		
12.	Balancing of several masses rotating in different planes	1	31-05-2022		TLM1/TLM2		
13.	Analytical and graphical methods	1	01-06-2022		TLM1/ TLM2		
14.	Introduction Types of Vibrations (Longitudinal, Transverse & Torsional)	1	03-06-2022		TLM1/ TLM2		
15.	Undamped free longitudinal vibrations of spring mass system	1	06-06-2022		TLM1		
16.	Problems	1	07-06-2022		TLM1		
17.	Tutorial-9	1	08-06-2022		TLM3		
18.	Critical Damping, Under Damping & Over damping (Definitions only). Under-damped free vibrations of spring mass system Logarithmic decrement	1	10-06-2022		TLM1/ TLM2		
19.	Problems on Under-damped free vibrations of spring mass system	1	13-06-2022		TLM1		
20.	Tutorial-10 Assignmen-2	1	14-06-2022		TLM3		
21.	Revision	1	15-06-2022		TLM1		
No. of classes required to complete UNIT-V: 10					No. of classes taken:		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Gyroscope & Whirling Speed of Shaft (Used for lab also)	01	16-06-2022		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	07/03/2022	22/04/2022	7
I Mid Examinations	25/04/2022	30/04/2022	1
II Phase of Instructions	02/05/2022	18/06/2022	7
II Mid Examinations	20/06/2022	25/06/2022	1
Preparation and Practicals	27/06/2022	02/07/2022	1
Semester End Examinations	04/07/2022	16/07/2022	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. Chandra Sekhar Rao)	(Mr.K.V.Viswanadh)	(Mr. B. Sudheer Kumar)	(Dr.S.Pichi Reddy)

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

Course Name: UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

PART-A

Name of Course Instructor : Dr.P.Vijaya Kumar
Course Name & Code : UHV-2 &20HS01 R-20 Regulations
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., Mech Engg., IV-Sem., Section- A A.Y : 2021-22

PRE-REQUISITES: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, students will be able to

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

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

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

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

TEXTBOOK:

Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

REFERENCE BOOKS:

R1	Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
R2	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
R3	The Story of My Experiments with Truth - by 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
23.	Need, Basic Guidelines, Content and Process for Value Education	1	10.03.2022		TLM1	
24.	'Natural Acceptance' and Experiential Validation	1	11.03.2022		TLM1	
25.	Process for self-exploration Continuous Happiness and Prosperity	1	12.03.2022		TLM1, TLM5	
26.	A look at basic Human Aspirations	1	17.03.2022		TLM1, TLM5	
27.	Right understanding, Understanding Happiness, and Prosperity	1	19.03.2022		TLM1	
28.	Relationship and Physical Facility	1	24.03.2022		TLM1, TLM5	
29.	Student Seminars	1	25.03.2022		TLM1, TLM6	
No. of classes required to complete UNIT-I:7				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
19.	Understanding human being as a co-existence of the sentient 'I' and the material 'Body'; Understanding the needs of Self ('I') and 'Body'	1	26.03.2022		TLM1	
20.	Happiness and physical facility	1	31.03.2022		TLM1	
21.	Understanding the Body as an instrument of 'I' (I am being the doer, seer, and enjoyer);	1	01.04.2022		TLM1	
22.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	07.04.2022		TLM1, TLM5	
23.	Understanding the harmony of I with the Body, Sanyam and Health	1	08.04.2022		TLM1, TLM5	
24.	Correct appraisal of Physical needs, Meaning of Prosperity in detail	1	09.04.2022		TLM1, TLM5	
25.	Student Seminars	1	16.04.2022		TLM1, TLM6	
No. of classes required to complete UNIT-II:7				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
24.	Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships)	1	21.04.2022		TLM1, TLM5	
25.	Program for its fulfilment to ensure mutual happiness;	1	22.04.2022		TLM1, TLM5	
26.	Trust and Respect as the foundational values of relationship	1	23.04.2022		TLM1, TLM5	
27.	Understanding the harmony in the society:	1	05.05.2022		TLM1, TLM5	
28.	Resolution, Prosperity, fearlessness	1	06.05.2022		TLM1, TLM5	
29.	Co-existence as comprehensive Human Goals	1	07.05.2022		TLM1, TLM5	

30.	Visualizing a universal harmonious order in society- Undivided Society	1	12.05.2022		TLM1, TLM5	
31.	Universal Order- from family to world family	1	13.05.2022		TLM1, TLM5	
32.	Gratitude as a universal value in relationships.	1	14.05.2022		TLM1, TLM5	
33.	Student Seminars	10	19.05.2022		TLM3	
No. of classes required to complete UNIT-III:10				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
21.	Understanding the harmony in the Nature	1	20.05.2022		TLM1	
22.	Interconnectedness and mutual fulfilment among the four orders of nature	1	21.05.2022		TLM1, TLM5	
23.	recyclability and self-regulation in nature	1	10.05.2022		TLM1, TLM5	
24.	Understanding Existence as Coexistence of mutually interacting units in all-pervasive space	1	26.05.2022		TLM1, TLM5	
25.	Holistic perception of harmony at all levels of existence.	1	27.05.2022		TLM1, TLM5	
26.	Student Seminars	1	28.05.2022		TLM1, TLM5 TLM6	
No. of classes required to complete UNIT-IV:6				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
22.	Natural acceptance of human values	1	02.06.2022		TLM1, TLM6	
23.	Definitiveness of Ethical Human Conduct	1	03.06.2022		TLM1, TLM5	
24.	Basis for Humanistic Education	1	04.06.2022		TLM1, TLM5	
25.	Humanistic Constitution and Humanistic Universal Order	1	09.06.2022		TLM1, TLM6	
26.	Competence in professional ethics	1	10.06.2022		TLM1, TLM5	
27.	Strategy for transition from the present state to Universal Human Order	1	11.06.2022		TLM5	
28.	Student Seminars	1	16.06.2022		TLM1, TLM5	
29.	Student Seminars	1	17.06.2022		TLM5 TLM6	
30.	Student Seminars	1	18.06.2022		TLM5 TLM6	
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/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=20
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=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
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=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
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 SPECIFC 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.Vijaya Kumar)	(Dr.P.Vijaya Kumar)	(Dr.P.Vijaya Kumar)	Dr.S.Pichi Reddy

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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.SPR/Dr.KM/Mr.MO

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.:**2021-2022

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**

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.

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.

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Dr.SPR/Dr.KM/Mr.MO

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.:**2021-2022

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. Moulding Making, 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**

Name of Course Instructor: Dr.SPR/Dr.KM/Mr.MO
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.:**2021-2022

PREREQUISITE: Engineering Workshop, Engineering Graphics

Batches (Section – B)

S.No	Batches	Regd.Nos	Total No. of Students
1	**B. Tech –A/S**	**20761A0301 – 20761A0333, 20761A0334-347, 21765A0301 - 21765A0319**	**66**
2	**Batch B1**	**20761A0301 – 20761A0333**	**33**
3	**Batch B2**	**20761A0334-347, 21765A0301 - 21765A0319**	**33**

Sub Batches of B1:

S. No	Batch	Registered Nos	Total
1	B11	20761A0301 – 20761A0304	04
2	B12	20761A0305 – 20761A0308	04
3	B13	20761A0309 – 20761A0312	04
4	B14	20761A0313 – 20761A0316	04
5	B15	20761A0317 – 20761A0320	04
6	B16	20761A0321– 20761A0324	04
7	B17	20761A0325– 20761A0328	04
8	B18	20761A0329– 20761A0333	05
Total (B1)			33

Sub Batches of B2:

S. No	Batch	Registered Nos	Total
1	B21	20761A0334-20761A337	04
2	B22	20761A0338-20761A0341	04
3	B23	20761A0342-20761A0345	04
4	B24	21765A0346 -21765A0302	04
5	B25	21765A0303 -21765A0 306	04
6	B26	21765A0307 - 21765A0 310	04
7	B27	21765A0311 - 21765A0 314	04
8	B28	21765A0315- 21765A0 319	05
Total (B2)			33

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.SPR/Dr.KM/Mr.MO

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.:**2021-2022

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 and determine the tensile strength of the specimen **(AW1)**
5. To prepare a butt joint on Mild Steel Strip using ARC Welding technique and determine 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 onMild Steel Strip using TIG Welding technique and determine 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 of die using Hydraulic Press **(H1)**
12. To perform Piercing operation with the help of die using Hydraulic Press **(H2)**
13. To perform Deep Drawing operation with the help of die using Hydraulic Press **(H3)**
14. To perform Extrusion operation with the help of die using Hydraulic Press **(H4)**
15. To perform Bending operation with the help of die 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.SPR/Dr.KM/Mr.MO

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.:**2021-2022

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – A)

Batch B1:20761A0301-20761A0333

Date	Experiment (Batch)				
	Exp - 1	**Exp – 2**	**Exp – 3**	**Exp – 4**	**Exp – 5**
07-03-2022	B11,B12	B13,B14	B15,B16	B17	B18
14-03-2022	B18	B11,B12	B13,B14	B15,B16	B17
21-03-2022	B17	B18	B11,B12	B13,B14	B15,B16
28-03-2022	B15,B16	B17	B18	B11,B12	B13,B14
04-04-2022	B13,B14	B15,B16	B17	B18	B11,B12
11-04-2022	B17,B18	B11,B12	B13	B16	B14,B15
18-04-2022					
25-04-2022 To 30-04-2022	*I Mid Examinations*				
	Exp - 6	**Exp – 7**	**Exp– 8**	**Exp – 9**	**Exp – 10**
02-05-2022	B11,B12	B13,B14	B15,B16	B17	B18
09-05-2022	B18	B11,B12	B13,B14	B15,B16	B17
16-05-2022	B17	B18	B11,B12	B13,B14	B15,B16
23-05-2022	B15,B16	B17	B18	B11,B12	B13,B14
30-05-2022	B13,B14	B15,B16	B17	B18	B11,B12
06-06-2022	B17,B18	B11,B12	B13	B16	B14,B15
13-06-2022	**Internal Mid Examinations and Viva Voice**				
20-06-2022 TO 25-06-2022	*II Mid Examinations*				
27-06-2022 To 02-07-2022	**Preparation and Practical's**				
04-07-2022 To 16-07-2022	**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.SPR/Dr.KM/Mr.MO
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.:**2021-2022

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – A)

Batch B2:20761A0334 – 20761A0347, 21765A0301-319

Date	Experiment (Batch)				
	Exp- 1	**Exp– 2**	**Exp – 3**	**Exp – 4**	**Exp – 5**
09-03-2022	B21,B22	B23,B24	B25,B26	B27	B28
16-03-2022	B28	B21,B22	B23,B24	B25,B26	B27
23-03-2022	B27	B28	B21,B22	B23,B24	B25,B26
30-03-2022	B25,B26	B27	B28	B21,B22	B23,B24
06-04-2022	B23,B24	B25,B26	B27	B28	B21,B22
13-04-2022	B27,B28	B21,B22	B23	B26	B24,B25
20-04-2022					
25-04-2022 To 30-04-2022	***I Mid Examinations***				
	Exp - 6	**Exp – 7**	**Exp – 8**	**Exp – 9**	**Exp – 10**
04-05-2022	B21,B22	B23,B24	B25,B26	B27	B28
11-05-2022	B28	B21,B22	B23,B24	B25,B26	B27
18-05-2022	B27	B28	B21,B22	B23,B24	B25,B26
25-05-2022	B25,B26	B27	B28	B21,B22	B23,B24
01-06-2022	B23,B24	B25,B26	B27	B28	B21,B22
06-06-2022	B27,B28	B21,B22	B23	B26	B24,B25
13-06-2022	**Internal Mid Examinations and Viva Voice**				
20-06-2022 TO 25-06-2022	***II Mid Examinations***				
27-06-2022 To 02-07-2022	**Preparation and Practical's**				
04-07-2022 To 16-07-2022	**Semester End Examinations**				

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

CYCLE –I

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

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

(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi,
NAAC Accredited with 'A' grade, accredited by NBA Tier-I, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

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

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.B. Sudheer Kumar/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-A

Batch: A1 (20761A0334 - 347 & 20765A0301-319)

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
30.	Demonstration	3	07-03-2022		TLM8	-	

31.	Experiment-1	3	14-03-2022		TLM8	R1	
32.	Experiment-2	3	21-03-2022		TLM8	R1	
33.	Experiment-3	3	28-03-2022		TLM8	R1	
34.	Experiment-4	3	04-04-2022		TLM8	R1	
35.	Experiment-5	3	11-04-2022		TLM8	R1	
36.	Demonstration	3	18-04-2022		TLM8	-	
37.	**I MID EXAMINATION (25-4-2022 TO 30-4-2022)**						
38.	Experiment-6	3	02-05-2022		TLM8	R1	
39.	Experiment-7	3	09-05-2022		TLM8	R1	
40.	Experiment-8	3	16-05-2022		TLM8	R1	
41.	Experiment-9	3	23-05-2022		TLM8	R1	
42.	Experiment-10	3	30-05-2022		TLM8	R1	
43.	Repetition	3	06-06-2022		TLM8	R1	
44.	Lab Internal	3	13-06-2022		-	-	

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
45.	Cam Jump Analysis & Gyroscope	3	06-06-2022		TLM8	-	

Batch: A2 (20761A0301-20761A0333)

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	09-03-2022		TLM8	-	
2.	Experiment-1	3	16-03-2022		TLM8	R1	
3.	Experiment-2	3	23-03-2022		TLM8	R1	
4.	Experiment-3	3	30-03-2022		TLM8	R1	
5.	Experiment-4	3	06-04-2022		TLM8	R1	
6.	Experiment-5	3	13-04-2022		TLM8	R1	
7.	Demonstration	3	20-04-2022		TLM8	-	
8.	**I MID EXAMINATION (25-4-2022 TO 30-4-2022)**						
9.	Experiment-6	3	04-05-2022		TLM8	R1	
10.	Experiment-7	3	11-05-2022		TLM8	R1	
11.	Experiment-8	3	18-05-2022		TLM8	R1	

12.	Experiment-9	3	25-05-2022		TLM8	R1	
13.	Experiment-10	3	01-06-2022		TLM8	R1	
14.	Repetition	3	08-06-2022		TLM8	-	
15.	Lab Internal	3	15-06-2022		-	-	

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
16.	Cam Jump Analysis & Gyroscope	3	08-06-2022		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	07/03/2022	23/03/2022	7
I Mid Examinations	25/04/2022	30/04/2022	1
II Phase of Instructions	02/05/2022	18/06/2022	7
II Mid Examinations	20/06/2022	25/06/2022	1
Preparation and Practicals	27/06/2022	02/07/2022	1
Semester End Examinations	04/07/2022	16/07/2022	2

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:

Batch No.	Reg. No. of Students	Number of Students
A1A	20761A0334-340	07
A1B	20761A0341-347	07
A1C	20765A0301-307	07

Batch No.	Reg. No. of Students	Number of Students
A2A	20761A0301-307	07
A2B	20761A0308-314	07
A2C	20761A0315-321	07

A1D	20765A0308-314	06
A1E	20765A0315-319	06

A2D	20761A0322-327	06
A2E	20761A0328-333	06

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.

Mr.B.Sudheer Kumar **Mr.V.Sankara Rao**	**Mr.K.V.Viswanadh**	**Mr.B.Sudheer Kumar**	**Dr.S.Pichi Reddy**
Course Instructor(s)	**Course Coordinator**	**Module Coordinator**	**HOD**

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http://cse.lbrce.ac.in, cselbreddy@gmail.com, Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.V.Sankararao/Dr.Ch.Siva Sankara Babu/Mr.K.Srinivasa Rao
Course Name & Code : Computer Aided Machine Drawing Lab - 20ME59
L-T-P Structure : 1-0-2

Program/Sem/Sec : B.Tech., Mech., IV-Sem., A Credits : 2
PRE-REQUISITE **:** Engineering Graphics A.Y: 2021-22

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).

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

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	10-03-2022		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	17-03-2022		TLM4	CO 1,2,3,4	
3.	Methods of dimensioning, general rules for sizes and placement of dimensions for	03	24-03-2022		TLM4	CO1	

	holes, centres, curved and tapered features.						
4.	Title boxes, their size, location and details - common abbreviations & their liberal usage	03	31-03-2022		TLM4	CO1	
5.	Types of Drawings	03	07-04-2022		TLM4	CO1	
6.	Popular forms of screw threads, bolts, nuts, stud bolts, tap bolts and set screws.	03	14-04-2022		TLM4	CO2	
7.	Keys, cotter joints and knuckle joint.	03	21-04-2022		TLM4	CO2	
8.	Riveted joints for plates	03	05-05-2022		TLM4	CO2	
9.	Shaft coupling, spigot and socket pipe joint.	03	12-05-2022		TLM4	CO3	
10.	Journal, pivot and collar and foot step bearings	03	19-05-2022		TLM4	CO3	
11.	Engine parts – Stuffing box, Cross head, Eccentric, Connecting rod, Piston assembly.	03	26-05-2022		TLM4	CO4	
12.	Other machine parts - Screws jack, Bench Vice, Pipe vice, Plummer block, Tailstock.	03	02-06-2022		TLM4	CO4	
13.	Internal Exam	03	16-06-2022		-	-	

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

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.
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4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
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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.V.Sankararao/ Dr.Ch.Siva Sankara Babu Mr.K.Srinivasa Rao	Mr.K.V.Viswanadh	Mr.B.Sudheer Kumar	Dr.S.Pichi Reddy
Course Instructor	Course Coordinator	Module Coordinator	HOD

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http://lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931
FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

PROGRAM : II B. Tech., II-Sem., MECH-B
ACADEMIC YEAR : 2021-22
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	08-03-22		TLM1	
2.	Basic concepts of probability	1	09-03-22		TLM1	
3.	problems on basic probability	1	11-03-22		TLM1	
4.	Addition theorem, problems	1	15-03-22		TLM1	
5.	Multiplication theorem, examples	1	16-03-22		TLM1&2	
6.	Independent events, theorems	1	19-03-22		TLM1	
7.	Baye's theorem, Examples	1	22-03-22		TLM1&2	
8.	Problems on Baye's theorem	1	23-03-22		TLM1	
9.	Random variables, Expectations	1	25-03-22		TLM1	
10.	Problems on PMF	1	26-03-22		TLM1	
11.	Problems on PDF	1	29-03-22		TLM1	
No. of classes required to complete UNIT-I: 11				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	30-03-22		TLM1&2	
2.	Problems on Binomial distribution	1	01-04-22		TLM1	
3.	Fitting of binomial distribution	1	06-04-22		TLM1	
4.	Poisson distribution, mean and variance	1	08-04-22		TLM1&2	
5.	Problems on Poisson distribution	1	12-04-22		TLM1	
6.	Fitting of Poisson distribution	1	13-04-22		TLM1	
7.	Normal distribution: mean &variance	1	16-04-22		TLM1&2	
8.	Problems on Normal Distribution	1	19-04-22		TLM1	
9.	Exponential distribution:	1	20-04-22		TLM1	
No. of classes required to complete UNIT-II: 10				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	21-04-22		TLM1&2	
2.	Sampling distribution of mean, variance	1	22-04-22		TLM1	
3.	Central limit theorem, Examples	1	23-04-22		TLM1&2	
4.	**Mid-I examinations**		25-04-22 to 30-04-22			
5.	Problems on central limit theorem	1	02-05-22		TLM1	
6.	Point and interval estimation	1	05-05-22		TLM1&2	
7.	Confidence Interval of mean	1	06-05-22		TLM1	
8.	Confidence Interval of proportion	1	07-05-22		TLM1	
9.	Confidence Interval of mean (n<30)	1	09-05-22		TLM1	
10.	problems	1	12-05-22		TLM1	
No. of classes required to complete UNIT-III: 09				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	13-05-22		TLM1&2	
2.	Z-test for single mean	1	14-05-22		TLM1	
3.	Z-test for difference of means	1	16-05-22		TLM1	
4.	Z-test for single Proportion	1	19-05-22		TLM1	

5.	Z-test for difference of Proportions	1	20-05-22		TLM1	
6.	t-test for single mean	1	21-05-22		TLM1	
7.	t-test for difference of means	1	23-05-22		TLM1	
8.	Paired t-test	1	26-05-22		TLM1	
9.	F-test for variances	1	27-05-22		TLM1	
10.	χ^2-test for goodness of fit	1	28-05-22		TLM1	
11.	χ^2-test for independence of attributes	1	30-05-22		TLM1	
12.	problems					
No. of classes required to complete UNIT-IV: 12				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	02-06-22		TLM1&2	
2.	Problems on Pearson's Correlation	1	03-06-22		TLM1	
3.	Regression lines	1	04-06-22		TLM1	
4.	Problems on Regression lines	1	06-06-22		TLM1	
5.	Properties of Regression coefficients	1	09-06-22		TLM1&2	
6.	Problems on Regression coefficients	1	10-06-22		TLM1	
7.	Problems on rank Correlation	1	13-06-22		TLM1	
8.	Problems on repeated ranks	1	16-02-22		TLM1	
9.	Practice problems	1	17-06-22			
10.	Revision	1	18-06-22		TLM1	
No. of classes required to complete UNIT-V: 10				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/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, 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.P.Vijaya Kumar
Course Name & Code : APPLIED THERMODYNAMICS&20ME07
L-T-P Structure : 2-1-0 **Credits:** 3
Program/Sem/Sec : B.Tech/IV/B section **A.Y.:** 2021-22
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 for power plants **(Remembering- Level-1)**
CO2	**Identify** the need of various boilers and draught systems for a thermal power plant **(Understanding-Level-2)**
CO3	**Apply** thermodynamic analysis to study the characteristics of steam nozzles and steam **(Apply Level-3).**
CO4	**Evaluate** the performance characteristics of an impulse and reaction turbines**(Apply Level-3)**
CO5	**Comprehend** the different compressors used in thermal systems.**(Understanding Level-2)**

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	1	1	-	-	-	-	2	3	-	-
CO2	3	3	2	2	-	-	1	-	-	-	-	2	3	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-
CO5	3	2	2	1	-	-	-	-	-	-	-	2	3	-	-
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	08/03/2022		TLM1	
2.	Rankine Cycle	1	11/03/2022		TLM2	
3.	Actual Vapour Power Cycle	1	11/03/2022		TLM1	
4.	Methods to improve efficiency of Rankine cycle	1	14/03/2022		TLM1	
5.	Reheating of steam, Regeneration	1	15/03/2022		TLM1	
6.	Open and Closed Feed Water Heaters	1	21/03/2022		TLM1	
7.	Tutorial-I	1	22/03/2022		TLM3	
8.	Fuels used in power plant	1	25/03/2022		TLM1	
No. of classes required to complete UNIT-I: 8				**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
9.	Introduction, Boiler systems Function and Classification	1	25/03/2022		TLM1	
10.	Fire TubeCornish, Lancashire, Cochran Boilers	1	28/03/2022		TLM2	
11.	Water Tube-Babcock and Wilcox, High pressure boilers	1	29/03/2022		TLM1	
12.	Loeffler and Benson boilers, Boiler Mountings and Accessories	1	01/04/2022		TLM1	
13.	Draught system , Functions, Types	1	01/04/2022		TLM1	
14.	Natural Draft-Height of chimney for given draught and discharge	1	04/04/2022		TLM1	
15.	Tutorial-II	1	08/04/2022		TLM3	
16.	Condition for maximum discharge	1	08/04/2022		TLM1	
17.	Efficiency of chimney	1	11/04/2022		TLM1	
18.	artificial draught-induced and forced	1	12/04/2022		TLM1	
No. of classes required to complete UNIT-II: 10				**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
19.	Introduction, Types of nozzle	1	18/04/2022		TLM2	
20.	Flow through nozzles-thermodynamic Analysis	1	19/04/2022		TLM1	

21.	velocity of nozzle at exit, condition for maximum discharge, critical pressure ratio	1	22/04/2022		TLM1	
22.	Ideal and actual expansion in nozzle, velocity coefficient	1	22/04/2022		TLM1	
23.	Tutorial-III	1	02/05/2022		TLM3	
24.	Steam condensers, Introduction, Elements of a condenser plant	1	06/05/2022		TLM1	
25.	Types of Condensers-Jet condensers	1	06/05/2022		TLM1	
26.	Surface Condensers–working principle	1	09/05/2022		TLM1	
No. of classes required to complete UNIT-III: 8				**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
27.	Steam turbine, Introduction, Classification	1	10/05/2022		TLM2	
28.	Impulse turbine, Mechanical details, Working principle, Velocity diagram	1	13/05/2022		TLM1	
29.	effect of friction–power developed, axial thrust, blade or diagram efficiency	1	13/05/2022		TLM1	
30.	condition for maximum efficiency	1	16/05/2022		TLM1	
31.	De-Laval Turbine – its features	1	17/05/2022		TLM1	
32.	Method store ducerotor speed-velocitycompounding (Curtis Turbine)	1	20/05/2022		TLM1	
33.	Tutorial-IV	1	20/05/2022		TLM3	
34.	Pressure compounding (Rateau Turbine) and pressure and velocity compounding.	1	23/05/2022		TLM1	
35.	Reaction turbines, Introduction	1	24/05/2022		TLM1	
36.	Parson's reaction turbine	1	27/05/2022		TLM1	
37.	performance analysis, degree of reaction	1	27/05/2022		TLM1	
38.	condition for maximum efficiency	1	30/05/2022		TLM1	
No. of classes required to complete UNIT-IV: 12				**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
39.	Compressors, Introduction, Classification	1	31/05/2022		TLM2	
40.	Reciprocating compressors, Principle of operation, Work required	1	03/06/2022		TLM1	
41.	Isothermal Efficiency, Volumetric efficiency and Effect of clearance	1	03/06/2022		TLM1	

	volume					
42.	Multistage Compression.	1	06/06/2022		TLM1	
43.	Rotary compressors, Roots blower and Vane's sealed compressor	1	07/06/2022		TLM1	
44.	Tutorial-V	1	10/06/2022		TLM3	
45.	principle ofworking and applications	1	10/06/2022		TLM1	
46.	Centrifugal compressors	1	13/06/2022		TLM1	
47.	Axial flow compressors	1	14/06/2022		TLM1	
48.	Principle of operation and applications	1	17/06/2022		TLM1	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

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

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 multi disciplinary environments.
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.S.PICHI REDDY**
Signature				

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Bandaru.Dyva Isac Premkumar, Assistant 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 (B) **A.Y.:** 2021-2022

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 - 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	08/03/2022		**TLM1/TLM2**	
2.	Importance of manufacturing, Classification of Manufacturing.	1	10/03/2022		**TLM1/TLM2**	
3.	**Casting:** Casting Introduction, Steps involved in making of casting.	1	11/03/2022		**TLM1/TLM2**	
4.	Advantages, Limitations and applications of casting.	1	15/03/2022		**TLM1/TLM2**	
5.	Pattern and its types, Materials used for patterns, Cores and Core prints, Chaplets, Moulding sand and its properties.	1	17/03/2022		**TLM1/TLM2**	
6.	Pattern allowances and construction.	1	18/03/2022		**TLM1/TLM2**	
7.	Principal of gating.	1	22/03/2022		**TLM1/TLM2**	
8.	Gating ratio and design of gating system.	1	24/03/2022		**TLM1/TLM2**	
9.	Riser, types, function and design.	1	25/03/2022		**TLM1/TLM2**	
10.	Centrifugal casting, Die casting, Investment casting, and clean casting Defects and remedies.	1	29/03/2022		**TLM1/TLM2**	
No. of classes required to complete UNIT-I: 10				**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
11.	Introduction, Classification of welding process, Gas welding-Oxy-acetylene welding equipment.	1	31/03/2022		**TLM1/TLM2**	
12.	Oxy-acetylene process and applications, Hydrogen welding, Gas cutting process, Gas cutting applications.	1	01/04/2022		**TLM1/TLM2**	
13.	Electric arc welding, electrodes, polarities.	1	05/04/2022		**TLM1/TLM2**	
14.	Consumable and non-consumable, MIG welding.	1	07/04/2022		**TLM1/TLM2**	
15.	Sub-merged arc welding (SAW), Inert gas welding,	1	08/04/2022		**TLM1/TLM2**	
16.	Carbon arc welding, Tungsten Inert Gas Welding (TIG) process and applications.	1	12/04/2022		**TLM1/TLM2**	
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	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Principle and types of resistance welding and applications.	1	19/04/2022		**TLM1/TLM2**	
18.	Thermit welding.	1	21/04/2022		**TLM1/TLM2**	
19.	Friction welding.	1	22/04/2022		**TLM1/TLM2**	
20.	Explosive welding, induction welding.	1	05/05/2022		**TLM1/TLM2**	
21.	Soldering and brazing, Applications of soldering and brazing processes	1	06/05/2022		**TLM1/TLM2**	
22.	Welding defects, causes and remedies, non-destructive examination of weldments.	1	10/05/2022		**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
23.	Nature of plastic deformation, Hot working and cold working processes	1	12/05/2022		**TLM1/TLM2**	
24.	Rolling fundamentals, Theory of rolling, Types of rolling mills	1	13/05/2022		**TLM1/TLM2**	
25.	Theory of Drawing, Wire drawing and tube drawaing	1	17/05/2022		**TLM1/TLM2**	
26.	Coining, spinning	1	19/05/2022		**TLM1/TLM2**	
27.	Principle of forging, types of forging	1	20/05/2022		**TLM1/TLM2**	
28.	Smith and drop forging, machine forging, Forging defects	1	24/05/2022		**TLM1/TLM2**	
29.	Causes and remedies, Applications of forming and forging processes	1	26/05/2022		**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
30.	Basic Extrusion process and its characteristics, Hot extrusion and its types, Cold extrusion and its process	1	27/05/2022		**TLM1/TLM2**	
31.	Forward, extrusion, backward extrusion	1	31/05/2022		**TLM1/TLM2**	
32.	Impact extrusion, Hydrostatic extrusion	1	02/06/2022		**TLM1/TLM2**	
33.	Introduction of sheet metal operation, Stamping, Forming	1	03/06/2022		**TLM1/TLM2**	

34.	Blanking and piercing and forming	1	07/06/2022		**TLM1/TLM2**	
35.	Bending and Stretching Forming	1	09/06/2022		**TLM1/TLM2**	
36.	Embossing and Coining	1	10/06/2022		**TLM1/TLM2**	
No. of classes required to complete UNIT-V: 07				**No. of classes taken:**		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Revision	1	14/06/2022		**TLM1/TLM2**	
2.	Gate Questions	1	16/06/2022		**TLM5/ TLM6**	
3.	Gate Questions	1	17/06/2022		**TLM5/ TLM6**	

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				
Signature				

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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 : 2021-22

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	07-03-2022		TLM1		
2.	**MECHANISMS:** Mechanism & Machine, Differences between Mechanism & Machine	1	08-03-2022		TLM1		
3.	Elements-classification Joints -classification Difference between Chain, Mechanism and Inversion, Pair, Types of kinematic Pairs	1	09-03-2022		TLM1/TLM4		
4.	Types of constrained motions	1	11-03-2022		TLM1		
5.	Grashof Law	1	14-03-2022		TLM1		
6.	inversion of mechanism, inversions of quadric cycle chain (4-bar chain)	1	15-03-2022		TLM1/TLM4		
7.	Inversions of single slider crank chain	1	16-03-2022		TLM1/TLM4		
8.	Inversions of double slider crank chain	1	21-03-2022		TLM1		
9.	Degree of freedom-Gruebler's criterion	1	22-03-2022		TLM1		
10.	Problems Gruebler's criterion, Limitations of Gruebler's criterion	1	23-03-2022		TLM1		
11.	Tutorial-1	1	25-03-2022		TLM3		
No. of classes required to complete UNIT-I: 11					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	28-03-2022		TLM1		
2.	Instantaneous centre - Kennedy's theorem	1	29-03-2022		TLM1		
3.	Determination of angular velocity of points and links for simple mechanisms	1	30-03-2022		TLM1		
4.	Tutorial-2	1	01-04-2022		TLM3		
5.	Relative velocity – Velocity Polygon, Velocity diagrams for simple mechanisms	1	04-04-2022		TLM1		

6.	Acceleration Polygon-acceleration diagrams for simple mechanisms	1	05-04-2022		TLM1		
7.	Problems on velocity & acceleration diagrams	1	06-04-2022		TLM1		
8.	Coriolis acceleration & problem, Klein's construction	1	08-04-2022		TLM1		
9.	Tutorial-3	1	11-04-2022		TLM3		
No. of classes required to complete UNIT-II: 09					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	12-04-2022		TLM1/TLM2		
2.	Involute gearing- Velocity of sliding	1	13-04-2022		TLM1/ TLM2		
3.	Path of Contact, Arc of Contact & Contact Ratio	1	18-04-2022		TLM1/TLM2		
4.	interference and undercutting	1	19-04-2022		TLM1/ TLM2		
5.	Problems	1	20-04-2022		TLM1		
6.	Tutorial-4 Assignment-1	1	22-04-2022		TLM3		
7.	Introduction about Turning moment	1	02-05-2022		TLM1		
8.	Angular velocity and acceleration of piston, connecting rod	1	04-05-2022		TLM1		
9.	Engine force analysis-piston and crank effort & Inertia torque of connecting rod	1	06-05-2022		TLM1		
10.	Introduction to turning moment diagrams-single and multi-cylinder engines	1	09-05-2022		TLM1		
11.	Problems on single cylinder engines & multi cylinder engines	1	10-05-2022		TLM1		
12.	Fluctuation of energy-Problems	1	11-05-2022		TLM1		
13.	Tutorial-5	1	13-05-2022		TLM3		
No. of classes required to complete UNIT-III: 13					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	16-05-2022		TLM1/TLM4		
2.	Porter governor working & derivation	1	17-05-2022		TLM1/TLM4		
3.	Porter governor Problems	1	18-05-2022		TLM1/TLM4		

4.	Tutorial-6	1	20-05-2022		TLM3		
5.	Proell governor working & derivation	1	23-05-2022		TLM1/TLM4		
6.	Hartnell governor working, derivation & Problems	1	24-05-2022		TLM1/TLM4		
7.	Sensitiveness, Isochronism, and hunting	1	25-05-2022		TLM1		
8.	Tutorial-7	1	27-05-2022		TLM3		
No. of classes required to complete UNIT-IV: 08					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	30-05-2022		TLM1/ TLM2		
2.	Balancing of several masses rotating in different planes	1	31-05-2022		TLM1/TLM2		
3.	Analytical and graphical methods	1	01-06-2022		TLM1/ TLM2		
4.	Introduction Types of Vibrations (Longitudinal, Transverse & Torsional)	1	03-06-2022		TLM1/ TLM2		
5.	Undamped free longitudinal vibrations of spring mass system	1	06-06-2022		TLM1		
6.	Problems	1	07-06-2022		TLM1		
7.	Tutorial-9	1	08-06-2022		TLM3		
8.	Critical Damping, Under Damping & Over damping (Definitions only). Under-damped free vibrations of spring mass system Logarithmic decrement	1	10-06-2022		TLM1/ TLM2		
9.	Problems on Under-damped free vibrations of spring mass system	1	13-06-2022		TLM1		
10.	Tutorial-10 Assignmen-2	1	14-06-2022		TLM3		
11.	Revision	1	15-06-2022		TLM1		
No. of classes required to complete UNIT-V: 10					No. of classes taken:		

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	Gyroscope & Whirling Speed of Shaft (Used for lab also)	01	16-06-2022		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	07/03/2022	22/04/2022	7
I Mid Examinations	25/04/2022	30/04/2022	1
II Phase of Instructions	02/05/2022	18/06/2022	7
II Mid Examinations	20/06/2022	25/06/2022	1
Preparation and Practicals	27/06/2022	02/07/2022	1
Semester End Examinations	04/07/2022	16/07/2022	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.S.Pichi Reddy)

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

PART-A

Name of Course Instructor : Dr.P.Ravindra Kumar
Course Name & Code : 20HS01
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., Mech Engg., IV-Sem., Sections- B A.Y : 2021-22

PRE-REQUISITE: 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, students will be able to

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

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

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

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

TEXTBOOK:

Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

REFERENCE BOOKS:

R1	Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
R2	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
R3	The Story of My Experiments with Truth - by 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.	Need, Basic Guidelines, Content and Process for Value Education	1	08.03.2022		TLM1	
2.	'Natural Acceptance' and Experiential Validation	1	14.03.2022		TLM1	
3.	Process for self-exploration Continuous Happiness and Prosperity	1	15.03.2022		TLM1, TLM5	
4.	A look at basic Human Aspirations	1	19.03.2022		TLM1, TLM5	
5.	Right understanding, Understanding Happiness, and Prosperity	1	21.03.2022		TLM1	
6.	Relationship and Physical Facility	1	22.03.2022		TLM1, TLM5	
7.	Student Seminars	1	26.03.2022		TLM1, TLM6	
No. of classes required to complete UNIT-I: 7				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
1.	Understanding human being as a co-existence of the sentient 'I' and the material 'Body'; Understanding the needs of Self ('I') and 'Body'	1	28.03.2022		TLM1	
2.	Happiness and physical facility	1	29.03.2022		TLM1	
3.	Understanding the Body as an instrument of 'I' (I am being the doer, seer, and enjoyer);	1	04.04.2022		TLM1	
4.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	09.04.2022		TLM1, TLM5	
5.	Understanding the harmony of I with the Body, Sanyam and Health	1	11.04.2022		TLM1, TLM5	
6.	Correct appraisal of Physical needs, Meaning of Prosperity in detail	1	12.04.2022		TLM1, TLM5	
7.	Student Seminars	1	16.04.2022		TLM1, TLM6	
No. of classes required to complete UNIT-II: 7				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
1.	Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships)	1	18.04.2022		TLM1, TLM5	
2.	Program for its fulfilment to ensure mutual happiness;	1	19.04.2022		TLM1, TLM5	
3.	Trust and Respect as the foundational values of relationship	1	23.04.2022		TLM1, TLM5	
4.	Understanding the harmony in the society:	1	02.05.2022		TLM1, TLM5	

5.	Resolution, Prosperity, fearlessness	1	07.05.2022		TLM1, TLM5	
6.	Co-existence as comprehensive Human Goals	1	09.05.2022		TLM1, TLM5	
7.	Visualizing a universal harmonious order in society- Undivided Society	1	10.05.2022		TLM1, TLM5	
8.	Universal Order- from family to world family	1	14.05.2022		TLM1, TLM5	
9.	Gratitude as a universal value in relationships.	1	16.05.2022		TLM1, TLM5	
10.	Student Seminars	10	17.05.2022		TLM3	
No. of classes required to complete UNIT-III:10				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
1.	Understanding the harmony in the Nature	1	07.05.2022		TLM1	
2.	Interconnectedness and mutual fulfilment among the four orders of nature	1	09.05.2022		TLM1, TLM5	
3.	recyclability and self-regulation in nature	1	10.05.2022		TLM1, TLM5	
4.	Understanding Existence as Coexistence of mutually interacting units in all-pervasive space	1	14.05.2022		TLM1, TLM5	
5.	Holistic perception of harmony at all levels of existence.	1	16.05.2022		TLM1, TLM5	
6.	Student Seminars	1	17.05.2022		TLM1, TLM5 TLM6	
No. of classes required to complete UNIT-IV:6				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
1.	Natural acceptance of human values	1	21.05.2022		TLM1, TLM6	
2.	Definitiveness of Ethical Human Conduct	1	23.05.2022		TLM1, TLM5	
3.	Basis for Humanistic Education	1	24.05.2022		TLM1, TLM5	
4.	Humanistic Constitution and Humanistic Universal Order	1	28.05.2022		TLM1, TLM6	
5.	Competence in professional ethics	1	30.05.2022		TLM1, TLM5	
6.	Strategy for transition from the present state to Universal Human Order	1	31.05.2022		TLM5	
7.	Student Seminars	1	04.06.2022		TLM1, TLM5	
8.	Student Seminars	1	06.06.2022		TLM5 TLM6	
9.	Student Seminars	1	07.06.2022		TLM5 TLM6	

10.	Student Seminars	1	11.06.2022		TLM5 TLM6	
No. of classes required to complete UNIT-V: 10				No. of classes taken:		

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

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=20
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=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
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=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
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 SPECIFC 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	HOD
(Dr.P.Ravindra Kumar)	(Dr.S.Pichi Reddy)

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Mr.B.D.I.Premkumar/ Mr.A.Dhanunjay Kumar
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/ B-Section **A.Y.:** 2021-2022

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 (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)																

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

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.

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.

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Mr.B.D.I.Premkumar/ Mr.A.Dhanunjay Kumar
Course Name & Code : Production Technology Lab & 20ME57 **Regulation:** R20
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Program/Sem/Sec : B. Tech/ IV-Sem/ B-Section **A.Y.:** 2021-2022

PREREQUISITE: Engineering Workshop, Engineering Graphics

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 Making, 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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Program/Sem/Sec : B. Tech/ IV-Sem/ B-Section **A.Y.:** 2021-2022

PREREQUISITE: Engineering Workshop, Engineering Graphics

Batches (Section – B)

S.No	Batches	Regd. Nos	Total No. of Students
1	B. Tech –B/S	20761A0348 – 20761A0375, 20761A0377-3A0, 21765A0320 - 21765A0334	67
2	Batch B1	20761A0348 – 20761A0375, 20761A0377-382	34
3	Batch B2	20761A0383-3A0, 21765A0320 - 21765A0334	33

Sub Batches of B1:

S. No	Batch	Registered Nos	Total
1	B11	20761A0348 – 20761A0353	06
2	B12	20761A0354 – 20761A0359	06
3	B13	20761A0360 – 20761A0365	06
4	B14	20761A0366 – 20761A0371	06
5	B15	20761A0372 – 20761A0378	06
6	B16	20761A0379– 20761A0382	04
Total (B1)			34

Sub Batches of B2:

S. No	Batch	Registered Nos	Total
1	B21	20761A0383-388	06
2	B22	20761A0389-394	06
3	B23	20761A0395-3A0	06
4	B24	21765A0320 - 325	06
5	B25	21765A0326 - 331	06
6	B26	21765A0332 - 334	03
Total (B2)			33

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DEPARTMENT OF MECHANICAL ENGINEERING

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Program/Sem/Sec : B. Tech/ IV-Sem/ B-Section **A.Y.:** 2021-2022

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 mold from the prepared pattern; To melt and pour Aluminium metal into the mold. **(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 and determine the tensile strength of the specimen **(AW1)**
5. To prepare a butt joint on Mild Steel Strip using ARC Welding technique and determine 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 Mild Steel Strip using TIG Welding technique and determine 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 of die using Hydraulic Press **(H1)**
12. To perform Piercing operation with the help of die using Hydraulic Press **(H2)**
13. To perform Deep Drawing operation with the help of die using Hydraulic Press **(H3)**
14. To perform Extrusion operation with the help of die using Hydraulic Press **(H4)**
15. To perform Bending operation with the help of die 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

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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/ B-Section **A.Y.:** 2021-2022

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – B)

Batch B2 : 20761A0383-3A0, 21765A0320 - 21765A0334

Date	Experiment (Batch)					
	Ex - 1	**Ex – 2**	**Ex – 3**	**Ex – 4**	**Ex – 5**	**Ex – 6**
12-03-2022	B21	B22	B23	B24	B25	B26
19-03-2022	B22	B21	B24	B23	B26	B25
26-03-2022	B25	B26	B21	B22	B23	B24
09-04-2022	B26	B25	B22	B21	B24	B23
16-04-2022	B23	B24	B25	B26	B21	B22
23-04-2022	B24	B23	B26	B25	B22	B21
25-04-2022 To 30-04-2022	***I Mid Examinations***					
	Ex – 7	**Ex – 8**	**Ex – 9**	**Ex – 10**	**Ex – 11**	**Ex – 12**
07-05-2022	B21	B22	B23	B24	B25	B26
14-05-2022	B22	B21	B24	B23	B26	B25
21-05-2022	B25	B26	B21	B22	B23	B24
28-05-2022	B26	B25	B22	B21	B24	B23
04-06-2022	B23	B24	B25	B26	B21	B22
11-06-2022	B24	B23	B26	B25	B22	B21
18-06-2022	**Internal Mid Examinations and Viva Voice**					
20-06-2022 TO 25-06-2022	***II Mid Examinations***					
27-06-2022 To 02-07-2022	**Preparation and Practical's**					
04-07-2022 To 16-07-2022	**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: Mr.B.D.I.Premkumar/ Mr.A.Dhanunjay Kumar
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/ B-Section **A.Y.:** 2021-2022

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – B)

Batch B1: 20761A0348 – 20761A0375, 20761A0377-382

Date	Experiment (Batch)					
	Ex - 1	**Ex – 2**	**Ex – 3**	**Ex – 4**	**Ex – 5**	**Ex – 6**
10-03-2022	B11	B12	B13	B14	B15	B16
17-03-2022	B12	B11	B14	B13	B16	B15
24-03-2022	B15	B16	B11	B12	B13	B14
31-03-2022	B16	B15	B12	B11	B14	B13
07-04-2022	B13	B14	B15	B16	B11	B12
21-04-2022	B14	B13	B16	B15	B12	B11
25-04-2022 To 30-04-2022	***I Mid Examinations***					
	Ex – 7	**Ex – 8**	**Ex – 9**	**Ex – 10**	**Ex – 11**	**Ex – 12**
05-05-2022	B11	B12	B13	B14	B15	B16
12-05-2022	B12	B11	B14	B13	B16	B15
19-05-2022	B15	B16	B11	B12	B13	B14
26-05-2022	B16	B15	B12	B11	B14	B13
02-06-2022	B13	B14	B15	B16	B11	B12
09-06-2022	B14	B13	B16	B15	B12	B11
16-06-2022	**Internal Mid Examinations and Viva – Voce**					
20/06/2022 TO 25/06/2022	***II Mid Examinations***					
27-06-2022 To 02-07-2022	**Preparation and Practical's**					
04-07-2022 To 16-07-2022	**Semester End Examinations**					

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DEPARTMENT OF MECHANICAL ENGINEERING

CYCLE –I

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

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

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.S.Srinivasa Reddy

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: A1 (20761A0383-3A0 & 21765A0320-334)

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	09-03-2022		TLM8	-	
2.	Demonstration	3	16-03-2022		TLM8	-	
3.	Experiment-1	3	23-03-2022		TLM8	R1	
4.	Experiment-2	3	30-03-2022		TLM8	R1	
5.	Experiment-3	3	06-04-2022		TLM8	R1	
6.	Experiment-4	3	13-04-2022		TLM8	R1	
7.	Experiment-5	3	20-04-2022		TLM8	R1	
8.	**I MID EXAMINATION (25-4-2022 TO 30-4-2022**						
9.	Experiment-6	3	04-05-2022		TLM8	R1	
10.	Experiment-7	3	11-05-2022		TLM8	R1	
11.	Experiment-8	3	18-05-2022		TLM8	R1	
12.	Experiment-9	3	25-05-2022		TLM8	R1	
13.	Experiment-10	3	01-06-2022		TLM8	R1	
14.	Repetition	3	08-06-2022		TLM8	R1	
15.	Lab Internal	3	15-06-2022		-	-	

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
16.	Cam Jump Analysis & Gyroscope	3	08-06-2022		TLM8	-	

Batch:A2 (20761A0348-20761A0382)

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	19-03-2022		TLM8	-	
2.	Experiment-1	3	26-03-2022		TLM8	R1	
3.	Experiment-2	3	09-04-2022		TLM8	R1	
4.	Experiment-3	3	16-04-2022		TLM8	R1	
5.	Experiment-4	3	23-04-2022		TLM8	R1	
6.	Experiment-5		23-04-2022		TLM8	R1	
7.	**I MID EXAMINATION (25-4-2022 TO 30-4-2022**						

8.	Demonstration	3	07-05-2022		TLM8	-	
9.	Experiment-6	3	21-05-2022		TLM8	R1	
10.	Experiment-7	3	28-05-2022		TLM8	R1	
11.	Experiment-8		28-05-2022		TLM8	R1	
12.	Experiment-9	3	04-06-2022		TLM8	R1	
13.	Experiment-10		04-06-2022		TLM8	R1	
14.	Lab Internal	3	18-06-2022		-	-	

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.	Cam Jump Analysis & Gyroscope	3	11-06-2022		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	07/03/2022	23/03/2022	7
I Mid Examinations	25/04/2022	30/04/2022	1
II Phase of Instructions	02/05/2022	18/06/2022	7
II Mid Examinations	20/06/2022	25/06/2022	1
Preparation and Practicals	27/06/2022	02/07/2022	1
Semester End Examinations	04/07/2022	16/07/2022	2

EVALUATION PROCESS:

Evaluation Task	Cos	Marks
Day to Day Evaluation: A	1,2,3,4	A=20
Internal Lab Exams: B	1,2,3,4	B=10
Viva Marks: C	1,2,3,4	C=5
Attendance: D	-	D=5
Cumulative Internal Examination : CIE=A+B+C+D	**1,2,3,4**	**CIE=40**
Semester End Examinations: SEE	**1,2,3,4**	**SEE=60**
Total Marks: CIE+SEE	**1,2,3,4**	**100**

Details of Batches:

Batch No.	Reg. No. of Students	Number of Students
A1A	20761A0383-389	07
A1B	20761A0390-396	07
A1C	20765A0397-322	07
A1D	20765A0323-328	06
A1E	20765A0329-334	06

Batch No.	Reg. No. of Students	Number of Students
A2A	20761A0348-354	07
A2B	20761A0355-361	07
A2C	20761A0362-368	07
A2D	20761A0369-375	07
A2E	20761A0377-382	06

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
MT1	Study the cam jump phenomenon of various cams and followers.	CO1
MT2	Whirling Speed of Rotating Shaft	CO2
MT3	Determination of centrifugal forces and draw the characteristics curve of Watt and Porter governor.	CO2
MT4	Determination of centrifugal forces and draw the characteristics curve of Proell governor.	CO2
MT5	Determination of centrifugal forces and draw the characteristics curve of Hartnell governor.	CO2
MT6	Determination of damped and undamped forced vibrations of beams.	CO4
MT7	Determination of natural frequency of torsional vibrations of a single rotor system.	CO4
MT8	Determination of natural frequency of the spring-mass damped and undamped systems.	CO4
MT9	Balance the given rotor system dynamically with the aid of the force polygon and the couple polygon.	CO3
MT10	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.
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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.S.Srinivasa Reddy**	**Mr.K.V.Viswanadh**	**Mr.B.Sudheer Kumar**	**Dr.S.Pichi Reddy**
Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., IV-Sem., ME-B/S
ACADEMIC YEAR : 2021-22
COURSE NAME & CODE : Computer Aided Machine Drawing Lab - 17ME66
L-T-P STRUCTURE : 0-0-2
COURSE CREDITS : 1
COURSE INSTRUCTOR : Mrs.B.Udaya Lakshmi/ Mr.D.Mallikarjun Rao / S.Uma Maheswar Reddy
COURSE COORDINATOR: Mr.K.V.Viswanadh
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.	Demonstration To Machine Drawing	03	9-3-2022		TLM8	CO1	M1	
2.	Demonstration To Catia-V5	03	16-3-2022		TLM8	CO1-4	M1	
3.	Conventional Representations Of Various Materials	03	23-3-2022		TLM8	CO1	M1	
4.	Conventional Representations Of Various Machine Parts	03	30-3-2022		TLM8	CO1	M1	
5.	Sectional Views, Thread Profiles	03	6-4-2022		TLM8	CO1	M1	
6.	Bolt With Nut And Washer	03	13-4-2022		TLM8	CO2	M1	
7.	Flanged Coupling	03	20-4-2022		TLM8	CO2	M1	
8.	Rivetted Joints	03	4-5-2022		TLM8	CO2	M1	
9.	Stuffing Box Assembly	03	11-5-2022		TLM8	CO2	M1	
10.	Piston Assembly	03	18-5-2022		TLM8	CO3	M1	
11.	Plummer Block Assembly	03	25-5-2022		TLM8	CO3	M1	
12.	Universal Joint Assembly	03	1-6-2022		TLM8	CO3	M1	
13.	Screw Jack Assembly	03	8-6-2022		TLM8	CO4	M1	
14.	Lab Internal Exam	03	15-6-2022		TLM8	CO4	M1	
No. of classes required to complete UNIT-I		**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
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ACADEMIC CALENDAR:

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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

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Course Instructor	**Course Coordinator**	**Module Coordinator**	**HoD**
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