DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

PROGRAM **:**II B. Tech., II-Sem., MECH - A
ACADEMIC YEAR **:** 2022-23
COURSE NAME & CODE **:** PROBABILITY AND STATISTICS
L-T-P STRUCTURE **:** 3-0-0
COURSE CREDITS **:** 3
COURSE INSTRUCTOR **:** Y. P. C. S. Anil Kumar
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 - 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	1	2	-	-	-	-	-	-	-	2	-	-	-
CO2	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-
CO3	3	2	2	2	-	-	-	-	-	-	-	2	-	-	-
CO4	3	3	3	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	30-01-23		TLM1	
2.	Basic concepts of probability	1	02-02-23		TLM1	
3.	problems on basic probability	1	03-02-23		TLM1	
4.	problems on addition theorem	1	04-02-23		TLM1	
5.	Conditional probability	1	06-02-23		TLM1	
6.	Multiplication theorem, examples	1	09-02-23		TLM1	
7.	Independent events, theorems	1	10-02-23		TLM1	
8.	Problems on multiplication theorem, independent events	1	11-02-23		TLM1	
9.	Baye's theorem, problems	2	13-02-23 16-02-23		TLM1	
10.	Random variables, Expections	1	17-02-23		TLM1	
11.	Problems on PMF	1	20-02-23		TLM1	
12.	Problems on PDF	2	23-02-23 24-02-23		TLM1	
13.	Tutorial-1	1	25-02-23		TLM3	
No. of classes required to complete UNIT-I: 15				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	27-02-23		TLM1	
2.	Problems on Binomial distribution	2	02-03-23 02-03-23		TLM1	
3.	Fitting of binomial distribution	1	03-03-23		TLM1	
4.	Poisson distribution, mean and variance	1	04-03-23		TLM1	
5.	Problems on Poisson distribution and fitting of Poisson distribution	1	06-03-23		TLM1	
6.	Normal distribution: mean &variance	1	09-03-23		TLM1	
7.	Problems on Normal Distribution	2	10-03-23 11-03-23		TLM1	
8.	Exponential distribution:	1	13-03-23		TLM1	
9.	Tutorial -2	1	16-03-23		TLM3	
No. of classes required to complete UNIT-II: 11				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	17-03-23		TLM1	
2.	Sampling distribution of mean, variance	1	18-03-23		TLM1	
3.	Problems	1	20-03-23		TLM1	
4.	Problems	1	23-03-23		TLM1	
5.	Problems on central limit theorem	1	24-03-23		TLM1	
6.	Problems on Central limit theorem	1	25-03-23		TLM1	
7.	I MID		27-03-23			
8.	I MID		31-03-23			
9.	I MID		01-04-23			
10.	Estimation	1	03-04-23		TLM1	
11.	Point and interval estimation	1	06-04-23		TLM1	
12.	Interval estimation of mean and proportions in large samples	1	08-04-23		TLM1	
13.	Interval estimation of mean in small samples	1	10-04-23		TLM1	
14.	Problems	1	13-04-23		TLM1	
15.	Tutorial-3	1	15-04-23		TLM3	

No. of classes required to complete UNIT-III: 12   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	17-04-23		TLM1	
2.	Z-test for means	2	20-04-23 / 21-04-23		TLM1	
3.	Z-test for proportions	2	24-04-23 / 27-04-23		TLM1	
4.	t-test for means	2	28-04-23 / 29-04-23		TLM1	
5.	paired t-test	1	01-05-23		TLM1	
6.	F-test for variances	1	04-05-23		TLM1	
7.	χ^2-test for goodness of fit	1	05-05-23		TLM1	
8.	χ^2-test for independence of attributes	1	06-05-23		TLM1	
9.	Tutorial-4	1	08-05-23		TLM3	

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	11-05-23		TLM1	
2.	Problems on Pearson's Correlation	1	12-05-23		TLM1	
3.	Regression lines	1	13-05-23		TLM1	
4.	Problems on Regression lines	1	15-05-23		TLM1	
5.	Properties of Regression coefficients	1	18-05-23		TLM1	
6.	Problems on rank Correlation	1	19-05-23		TLM1	
7.	Problems on repeated rank	1	20-05-23		TLM1	
8.	Tutorial-5	1	22-05-23		TLM3	
9.	Revision	3	25-05-23 25-05-23 25-05-23		TLM1	
10.	II MID		05-06-23			
11.	II MID		08-06-23			
12.	II MID		09-06-23			
13.	II MID		10-06-23			
No. of classes required to complete UNIT-V: 11				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 (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

Course Instructor
(Y.P.C.S.Anil Kumar)

Course Coordinator
(M.Rami Reddy)

Module Coordinator
(Dr.A.Rami Reddy)

HOD
(Dr.A.Rami Reddy)

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor   :   Dr.V.DHANA RAJU
Course Name & Code   :   Applied Thermodynamics – 20ME07
L-T-P Structure   : 2-1-0   Credits : 3
Program/Sem/Sec   : B.Tech., MECH., IV-Sem., Section- A   A.Y   : 202-23

PRE-REQUISITE: Thermodynamics

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

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

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

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

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

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

BOS APPROVED TEXT BOOKS:

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

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

BOS APPROVED REFERENCE BOOKS:

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Vapour Power cycles

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Applied Thermodynamics	1	30-01-2023		TLM2	
2.	Course Outcomes of ATD, Introduction to the vapour power cycles	1	01-02-2023		TLM2	
3.	Formation of steam and its properties, Carnot vapour power cycle	1	03-02-2023		TLM1	
4.	Rankine cycle efficiency using P-V, T-S and h-s diagrams	1	04-02-2023		TLM1	
5.	Comparison of Rankine and Carnot vapour power cycles	1	06-02-2023		TLM1	
6.	Tutorial-1	1	08-02-2023		TLM3	
7.	Numerical problems, Reheating cycle	1	10-02-2023		TLM1	
8.	Regeneration cycle, Open and closed feed water heaters	1	13-02-2023		TLM3	
9.	Fuels and combustion	1	15-02-2023		TLM1	
10.	Chemical reaction equations for solid and gaseous fuels	1	17-02-2023		TLM1	
No. of classes required to complete UNIT-I: 10				No. of classes taken:		

UNIT-II: Steam Boilers and Draught system

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Boilers - Boiler systems classification	1	20-02-2023		TLM2	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
2.	fire tube boilers-Cornish ,Lancashire, Cochran boilers	1	22-02-2023		TLM2	
3.	Water tube –Babcock and Wilcox,		24-02-2023		TLM2	
4.	Boiler accessories	1	25-02-2023		TLM2	
5.	Boiler mountings, Tutorial -2	1	27-02-2023		TLM3	
6.	Draught system- functions and types	1	01-03-2023		TLM1	
7.	Condition for maximum discharge,	1	03-03-2023		TLM1	
8.	Efficiency of chimney, induced draft and forced draft	1	04-03-2023		TLM1	
9.	Numerical Problems	1	06-03-2023		TLM1	
10.	Tutorial -3	1	10-03-2023		TLM3	

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

UNIT-III: Steam Nozzles and Condensers

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to nozzles, Flow through nozzles-thermodynamic analysis	1	13-03-2023		TLM2	
2.	Velocity of nozzle at exit, Condition for maximum discharge	1	15-03-2023		TLM1	
3.	Ideal and actual expansion, Supersaturated flow in nozzles	1	17-03-2023		TLM1	
4.	Tutorial -4	1	18-03-2023		TLM3	
5.	Degree of super cooling and super saturation-Wilson line,	1	20-03-2023		TLM1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
6.	Numerical Problems	1	224-03-2023		TLM1	
7.	Steam condensers-introduction, Types of condensers, Elements of condenser,	1	25-03-2023		TLM2	
8.	jet condensers, surface condensers, Air leakage through condensers	1	03-04-2023		TLM2	
9.	Performance parameters of condensers, Tutorial - 5	1	08-04-2023		TLM3	

No. of classes required to complete UNIT-III: 09		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
1.	Introduction to steam turbines, Classification of steam turbines	1	10-04-2023		TLM2	
2.	Impulse turbine working principle,	1	12-04-2023		TLM2	
3.	Velocity diagrams of impulse turbine	1	17-04-2023		TLM2	
4.	Numerical problems	1	19-04-2023		TLM1	
5.	Tutorial -6	1	21-04-2023		TLM3	
6.	Blade, stage efficiencies and De-Laval turbine and its features	1	24-04-2023		TLM1	
7.	Compounding of turbines	1	26-04-2023		TLM1	
8.	Velocity, pressure and combined compounding of steam turbines	1	28-04-2023		TLM1	
9.	Combined velocity triangle for a velocity compounded impulse turbine	1	29-04-2023		TLM1	
10.	Reaction turbine - Introduction ,Degree of	1	01-05-2023		TLM1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	reaction(Parsons), Parsons reaction turbine					
11.	Numerical Problems	1	03-05-2023		TLM1	

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

UNIT-V : Compressors

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Compressors- Reciprocating compressors- principle of operation	1	05-05-2023		TLM2	
2.	Work required, free air delivery	1	06-05-2023		TLM2	
3.	Isothermal, volumetric efficiency, Condition for minimum work	1	08-05-2023		TLM2	
4.	Effect of clearance volume, Multistage compression	1	10-05-2023		TLM2	
5.	Numerical Problems	1	12-05-2023		TLM1	
6.	Tutorial -7	1	15-05-2023		TLM3	
7.	Roots blower, Vanes compressor, Efficiency considerations	1	17-05-2023		TLM2	
8.	Centrifugal compressors, Degree of reaction ,	1	19-05-2023		TLM2	
9.	Energy transfer, velocity diagram	1	20-05-2023		TLM2	
10.	Axial flow compressors and degree of reaction,	1	22-05-2023		TLM2	
11.	Revision and	1	24-05-2023		TLM2	
12.	content beyond syllabus	1	26-05-2023		TLM1	

13.	content beyond syllabus	1	27-05-2023		TLM1	
No. of classes required to complete UNIT-V: 13				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R17 Regulations):

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

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.V.Dhana Raju	Dr. P.Vijay Kumar	Dr. P.Vijay Kumar	Dr. S. Pichi Reddy

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.K.Murahari, Associate Professor

Course Name & Code : Production Technology & 20ME08   **Regulation**: R20

L-T-P Structure   : 3-0-0   **Credits:** 03

Program/Sem/Sec : B.Tech IV Sem (A)   **A.Y.:** 2022-2023

PREREQUISITE: Metallurgy and Material Science

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

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

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

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

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

TEXTBOOKS:

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

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

REFERENCE BOOKS:

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - B

UNIT-I: Introduction to manufacturing, Casting

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CEO's and COs of Production Technology Introduction to manufacturing technology, Definitions.	1	31/01/2023		TLM1/TLM2	
2.	Importance of manufacturing	1	01/02/2023		TLM1/TLM2	
3.	Classification of Manufacturing.	1	02/02/2023		TLM1/TLM2	
4.	**Casting:** Casting Introduction,	1	03/02/2023		TLM1/TLM2	
5.	Steps involved in making of casting	1	07/02/2023		TLM1/TLM2	
6.	Advantages, Limitations andapplications of casting.	1	08/02/2023		TLM1/TLM2	
7.	Materialsused for patterns, Cores and Core prints, Chaplets, Moulding sand and its Properties.	1	09/02/2023		TLM1/TLM2	
8.	Pattern and its types	1	10/02/2023		TLM1/TLM2	
9.	Pattern allowances and construction.	1	14/02/2023		TLM1/TLM2	
10.	Principal of gating.	1	15/02/2023		TLM1/TLM2	
11.	Gating ratio and design ofgating system.	1	16/02/2023		TLM1/TLM2	
12.	Riser, types,	1	17/02/2023		TLM1/TLM2	
13.	Function anddesign.	1	21/02/2023		TLM1/TLM2	
14.	Centrifugal casting,	1	22/02/2023		TLM1/TLM2	
15.	Die casting,	1	23/02/2023		TLM1/TLM2	
16.	Investment casting, clean casting	1	24/02/2023		TLM1/TLM2	
17.	Defects and remedies	1	28/02/2023		TLM1/TLM2	
No. of classes required to complete UNIT-I: 17				**No. of classes taken:**		

UNIT-II: Welding, Electric Arc Welding

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	Introduction, Classification of welding process, Gas welding-Oxy-acetylene welding Equipment.	1	01/03/2023		TLM1/TLM2	
19.	Oxy-acetylene process and applications, Hydrogen welding, Gas cutting process, Gas cutting applications.	1	02/03/2023		TLM1/TLM2	

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20.	Electric arc welding, electrodes,polarities.	1	03/03/2023		**TLM1/TLM2**	
21.	Consumable and non-Consumable, MIG welding.	1	07/03/2023		**TLM1/TLM2**	
22.	Sub-merged arc welding (SAW), Inert gas elding,	1	09/03/2023		**TLM1/TLM2**	
23.	Carbon arc welding, Tungsten Inert Gas Welding (TIG)process and applications.	1	10/03/2023		**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
24.	Principle and types of resistance welding and Applications.	1	14/03/2023		**TLM1/TLM2**	
25.	resistance welding and Applications.	1	15/03/2023		**TLM1/TLM2**	
26.	Thermit welding.	1	16/03/2023		**TLM1/TLM2**	
27.	Friction welding.	1	17/03/2023		**TLM1/TLM2**	
28.	Explosive welding,	1	21/03/2023		**TLM1/TLM2**	
29.	inductionwelding.	1	23/03/2023		**TLM1/TLM2**	
30.	Soldering and brazing,	1	24/03/2023		**TLM1/TLM2**	
31.	Applications of soldering andbrazing processes	1	4/04/2023		**TLM1/TLM2**	
32.	Welding defects, causes andremedies	1	06/04/2023		**TLM1/TLM2**	
31.	non-destructive Examination of eldments.		11/04/2023		**TLM1/TLM2**	

| **No. of classes required to complete UNIT-III: 06** | | | **No. of classes taken:** | |

UNIT-IV: Metal Forming processes

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Nature of plastic deformation, Hot working and cold working processes	1	12/04/2023		**TLM1/TLM2**	
33.	Hot working and cold working processes	1	18/04/2023		**TLM1/TLM2**	
34.	Rolling fundamentals, Theory of rolling, Types of rollingmills	1	19/04/2023		**TLM1/TLM2**	
35.	Types of rollingmills	1	20/04/2023		**TLM1/TLM2**	
36.	Theory of Drawing, Wire drawing and tube rawing	1	21/04/2023		**TLM1/TLM2**	
37.	Coining, spinning	1	25/04/2023		**TLM1/TLM2**	
38.	Principle of forging, types offorging	1	26/04/2023		**TLM1/TLM2**	

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
39.	Smith and drop forging, machine forging, Forging defects	1	27/04/2023		**TLM1/TLM2**	
40.	Causes and remedies, Applications of forming andforging processes	1	28/04/2023		**TLM1/TLM2**	
No. of classes required to complete UNIT-IV: 07				**No. of classes taken:**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Basic Extrusion process andits characteristics,	1	02/05/2025		**TLM1/TLM2**	
42.	Hot extrusion and its types	1	03/05/2023		**TLM1/TLM2**	
43.	Cold extrusion and its process	1	04/05/2023		**TLM1/TLM2**	
44.	Forward extrusion	1	05/05/2023		TLM1/TLM2	
45.	Backward extrusion	1	09/05/2023		**TLM1/TLM2**	
46.	Impact extrusion,	1	10/05/2023		**TLM1/TLM2**	
47.	Hydrostatic extrusion	1	11/05/2023		**TLM1/TLM2**	
48.	Introduction of sheet metal	1	12/05/2023		**TLM1/TLM2**	
49.	sheet metal operation,	1	16/05/2023		**TLM1/TLM2**	
50.	Stamping,Forming	1	17/05/2023		**TLM1/TLM2**	
51.	Blanking and piercing and forming	1	18/05/2023		**TLM1/TLM2**	
52.	Bending and Stretching Forming	1	19/05/2023		**TLM1/TLM2**	
53.	Embossing and Coining	1	23/05/2023		**TLM1/TLM2**	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Revision	1	24/05/2023		**TLM1/TLM2**	
2.	Gate Questions	1	25/05/2023		**TLM5/ TLM6**	
3.	Gate Questions	1	26/05/2023		**TLM5/ TLM6**	

Contents beyond the Syllabus

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution Of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering Sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

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

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   : 2022-23

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	31-01-2023		TLM1		
2.	**MECHANISMS:** Mechanism & Machine, Differences between Mechanism & Machine	1	01-02-2023		TLM1		
3.	Elements-classification Joints -classification Difference between Chain, Mechanism and Inversion,	1	03-02-2023		TLM1/TLM4		
4.	Pair, Types of kinematic Pairs	1	04-02-2023		TLM1/TLM4		
5.	Types of constrained motions	1	07-02-2023		TLM1		
6.	Grashof Law	1	08-02-2023		TLM1		
7.	inversion of mechanism, inversions of quadric cycle chain (4-bar chain)	1	10-02-2023		TLM1/TLM4		
8.	Inversions of single slider crank chain	1	14-02-2023		TLM1/TLM4		
9.	Inversions of single slider crank chain		15-02-2023		TLM1/TLM4		
10.	Inversions of double slider crank chain	1	17-02-2023		TLM1		
11.	Degree of freedom-Gruebler's criterion	1	21-02-2023		TLM1		
12.	Problems Gruebler's criterion, Limitations of Gruebler's criterion	1	22-02-2023		TLM1		
13.	Tutorial-1	1	24-02-2023		TLM3		
14.	Unit-I Revision	1	25-02-2023		TLM1		
No. of classes required to complete UNIT-I: 14				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	28-02-2023		TLM1		
2.	Instantaneous centre - Kennedy's theorem	1	01-03-2023		TLM1		
3.	Determination of angular velocity of points and links for simple mechanisms	1	03-03-2023		TLM1		

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
4.	Tutorial-2	1	04-03-2023		TLM3		
5.	Relative velocity – Velocity Polygon, Velocity diagrams for simple mechanisms	1	07-03-2023		TLM1		
6.	Acceleration Polygon- acceleration diagrams for simple mechanisms	1	10-03-2023		TLM1		
7.	Problems on velocity & acceleration diagrams	1	14-03-2023		TLM1		
8.	Coriolis acceleration & problem, Klein's construction	1	15-03-2023		TLM1		
9.	Tutorial-3	1	17-03-2023		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	18-03-2023		TLM1/TLM2		
2.	Involute gearing- Velocity of sliding	1	21-03-2023		TLM1/ TLM2		
3.	Path of Contact, Arc of Contact & Contact Ratio	1	22-03-2023		TLM1/TLM2		
4.	interference and undercutting	1	24-03-2023		TLM1/ TLM2		
5.	Tutorial-4 Assignment-1	1	25-03-2023		TLM3		
6.	Introduction about Turning moment	1	04-04-2023		TLM1		
7.	Angular velocity and acceleration of piston, connecting rod	1	05-04-2023		TLM1		
8.	Engine force analysis- piston and crank effort & Inertia torque of connecting rod	1	11-04-2023		TLM1		
9.	Introduction to turning moment diagrams- single and multi- cylinder engines	1	12-04-2023		TLM1		
10.	Problems on single cylinder engines & multi cylinder engines	1	15-04-2023		TLM1		
11.	Fluctuation of energy- Problems	1	18-04-2023		TLM1		
12.	Tutorial-5	1	19-04-2023		TLM3		
No. of classes required to complete UNIT-III: 12				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	21-04-2023		TLM1/TLM4		

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
2.	Porter governor working & derivation	1	25-04-2023		TLM1/TLM4		
3.	Porter governor Problems	1	26-04-2023		TLM1/TLM4		
4.	Tutorial-6	1	28-04-2023		TLM3		
5.	Proell governor working & derivation	1	29-04-2023		TLM1/TLM4		
6.	Hartnell governor working, derivation & Problems	1	02-05-2023		TLM1/TLM4		
7.	Sensitiveness, Isochronism, and hunting	1	03-05-2023		TLM1		
8.	Tutorial-7	1	05-05-2023		TLM3		
9.	Unit-IV Revision	1	06-05-2023		TLM1		
No. of classes required to complete UNIT-IV: 09				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	09-05-2023		TLM1/ TLM2		
2.	Balancing of several masses rotating in different planes	1	10-05-2023		TLM1/TLM2		
3.	Analytical and graphical methods	1	12-05-2023		TLM1/ TLM2		
4.	Introduction Types of Vibrations (Longitudinal, Transverse & Torsional)	1	16-05-2023		TLM1/ TLM2		
5.	Undamped free longitudinal vibrations of spring mass system	1	17-05-2023		TLM1		
6.	Problems	1	19-05-2023		TLM1		
7.	Critical Damping, Under Damping & Over damping (Definitions only). Under-damped free vibrations of spring mass system Logarithmic decrement	1	20-05-2023		TLM1/ TLM2		
8.	Problems on Under-damped free vibrations of spring mass system	1	23-05-2023		TLM1		
9.	Tutorial-10 Assignmen-2	1	24-05-2023		TLM3		
10.	Revision	1	26-05-2023		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	27-05-2023		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	31/01/2023	25/03/2023	8
I Mid Examinations	27/03/2023	01/04/2023	1
II Phase of Instructions	03/04/2023	27/05/2023	8
Summer Vacation	29/05/2023	03/06/2023	1
II Mid Examinations	05/06/2023	10/06/2023	1
Preparation and Practicals	12/06/2023	17/06/2023	1
Semester End Examinations	19/06/2023	01/07/2023	2

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**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.

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)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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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 : Universal Human Values 2: Understanding Harmony (20HS01)
L-T-P Structure : 3-0-0 **Credits** : 3
Program/Sem/Sec : B.Tech IV Semester – MECH Section-A **A.Y.** : 2022-23

PREREQUISITE: Nil

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

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

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

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

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

TEXTBOOKS:

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

REFERENCE BOOKS:

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	30-1-2023		TLM1,2	
2.	'Natural Acceptance' and Experiential Validation	1	01-2-2023		TLM1,2	
3.	Process for self-exploration	1	02-2-2023		TLM1,2	
4.	Continuous Happiness and Prosperity	1	03-2-2023		TLM1,2	
5.	A look at basic human aspirations: Right understanding	1	06-2-2023		TLM1,2	
6.	Active learning activity	1	08-2-2023		TLM6	
7.	Right understanding, Relationship and Physical Facility	1	09-2-2023		TLM1,2	
8.	Understanding Happiness, and Prosperity	1	10-2-2023		TLM1,2	
9.	Formative Assessment	1	13-2-2023		TLM3	
No. of classes required to complete UNIT-I: 9				**No. of classes taken 9**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Introduction, COs, POs and articulation matrix	1	15-2-2023		TLM1,2	
11.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	16-2-2023		TLM1,2	
12.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	17-2-2023		TLM1,2	
13.	Active learning activity	1	20-2-2023		TLM6	
14.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	22-2-2023		TLM1,2	
15.	Understanding the harmony of I with the Body: Sanyam and Health	1	23-2-2023		TLM1,2	
16.	Active learning activity	1	24-2-2023		TLM1,2	
17.	Correct appraisal of Physical needs	1	27-2-2023		TLM1,2	
18.	Formative Assessment	1	01-3-2023		TLM3	
No. of classes required to complete UNIT-II: 9				**No. of classes taken:**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Understanding values in human-human relationship: meaning of justice	1	02-3-2023		TLM1,2	
20.	Program for fulfillment to ensure mutual happiness and Trust	1	03-3-2023		TLM1,2	
21.	Program for fulfillment to ensure mutual happiness and Respect as the foundational values of relationship	1	06-3-2023		TLM1,2	
22.	Understanding Harmony in the society: Resolution	1	09-3-2023		TLM1,2	
23.	Active learning activity	1	10-3-2023		TLM6	
24.	Understanding the harmony in the society: Resolution, Prosperity	1	13-3-2023		TLM1,2	
25.	Understanding the harmony in the society: fearlessness, and co-existence as comprehensive Human Goals	1	15-3-2023		TLM1,2	
26.	Unit end questions format, Question modelling	1	16-3-2023		TLM1	
27.	Multiple choice questions	1	17-3-2023		TLM1,2	
28.	Formative Assessment	1	20-3-2023		TLM6	
29.	Prosperity, fearlessness, and co-existence as comprehensive human goals	1	23-02-2023		TLM1,2	
30.	Visualizing a universal harmonious order in the society-undivided society	2	24-4-2023		TLM1,2	
31.	I-Mid examinations	1	27-3-2023 to 01-4-2023		TLM1,2	
32.	Universal order-from family to world family	1	03-4-2023		TLM1,2	
33.	Gratitude as a universal value in relationships	1	06-4-2023		TLM1,2	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Introduction, COs, POs and articulation matrix	1	10-4-2023		TLM1,2	
35.	Understanding Harmony in the Nature	1	12-4-2023		TLM1,2	
36.	Interconnectedness and mutual fulfillment among four orders of nature	2	13-4-2023 to 20-4-2023		TLM1,2	

37.	Recyclability and self-regulation in nature	1	21-4-2023		TLM1,2	
38.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	24-4-2023		TLM1,2	
39.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	26-4-2023		TLM1,2	
40.	Holistic perception of harmony at all levels of existence	1	27-4-2023		TLM1,2	
41.	Active learning activity	1	28-4-2023		TLM6	
42.	Formative Assessment	1	01-5-2023		TLM3	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Introduction, COs, POs and articulation matrix	1	03-5-2023		TLM1,2	
44.	Natural acceptance of human values	1	04-5-2023		TLM1,2	
45.	Definitiveness of ethical human conduct	1	05-5-2023		TLM1,2	
46.	Basis for humanistic education	1	08-5-2023		TLM1,2	
47.	Humanistic constitution and humanistic universal order	1	10-5-2023		TLM1,2	
48.	Competence in professional ethics	1	11-5-2023		TLM1,2	
49.	Strategy for transition from the present state to universal human order	1	12-5-2023		TLM1,2	
50.	Active learning activity	1	15-5-2023		TLM6	
51.	Formative Assessment	1	17-5-2023		TLM3	
52.	Revision	6	18-5-2023 19-5-2023 22-5-2023 24-5-2023 25-5-2023 26-5-2023		TLM1,2	
No. of classes required to complete UNIT-V: 9				**No. of classes taken:**		

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

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-	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Dr. P. VIJAYA KUMAR	Dr. M. UMA VANI	Dr. B. SRINIVASA RAO	Dr. S. PICHI REDDY
Signature				

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: 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.:**2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

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

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

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

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

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

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

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

Mapping of COs with POs and PSOs:

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

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

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

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DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM OUTCOMES (POs)
Engineering Graduates will be able to:
1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
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: 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.:**2022-2023

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

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: 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.:**2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

Batches (Section – B)

S.No	Batches	Regd. No's	Total No. of Students
1	B. Tech –A/S	21761A0301 – 21761A0329, 21761A0331, 22765A0301-22765A0329	60
2	Batch B1	21761A0301 – 21761A0330	30
3	Batch B2	21761A0331, 22765A0301 - 22765A0329	30

Sub Batches of B1:

S. No	Batch	Registered No's	Total
1	B11	21761A0301 – 21761A0306	06
2	B12	21761A0307 – 21761A0312	06
3	B13	21761A0313 – 21761A0318	06
4	B14	21761A0319 – 21761A0324	06
5	B15	21761A0325 – 21761A0330	06
		Total (B1)	30

Sub Batches of B2:

S. No	Batch	Registered No's	Total
1	B21	21761A0331,22765A0301-22765A0305	06
2	B22	22765A0306-22765A0311	06
3	B23	22765A0312-22765A0317	06
4	B24	22765A0318 -22765A0323	06
5	B25	22765A0324 -22765A03329	06
		Total (B2)	30

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: 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.:** 2022-2023

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 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)**

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: 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.:** 2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – A)

Batch   B1:21761A0301-21761A0330

Date	Experiment (Batch)				
	Exp - 1	**Exp – 2**	**Exp – 3**	**Exp – 4**	**Exp – 5**
14-02-2023	B11	B12	B13	B14	B15
21-02-2023	B12	B13	B14	B15	B11
28-02-2023	B13	B14	B15	B11	B12
07-03-2023	B14	B15	B11	B12	B13
14-03-2023	B15	B11	B12	B13	B14
21-03-2023	*REPETITION*				
27-03-2023 To 01-04-2023	*I Mid Examinations*				
	Exp - 6	**Exp – 7**	**Exp– 8**	**Exp – 9**	**Exp – 10**
04-04-2023	B11	B12	B13	B14	B15
11-04-2023	B12	B13	B14	B15	B11
18-04-2023	B13	B14	B15	B11	B12
25-04-2023	B14	B15	B11	B12	B13
02-05-2023	B15	B11	B12	B13	B14
09-05-2023	*REPETITION*				
16-05-2023	**Internal Examinations and Viva Voice**				
05-06-2023 TO 10-06-2023	*II Mid Examinations*				
12-06-2023 TO 17-06-2023	**Preparation and Practical's**				
19-06-2023 TO 01-07-2023	**Semester End Examinations**				

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: 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.:**2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

<u>Schedule of Experiments (Section – A)</u>

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

Date	Experiment (Batch)				
	Exp- 1	**Exp– 2**	**Exp – 3**	**Exp – 4**	**Exp – 5**
15-02-2023	B21	B22	B23	B24	B25
22-02-2023	B22	B23	B24	B25	B21
01-03-2023	B23	B24	B25	B21	B22
08-03-2023	B24	B25	B21	B22	B23
15-03-2023	B25	B21	B22	B23	B24
22-03-2023	*REPETITION*				
27-03-2023 To 01-04-2023	*I Mid Examinations*				
	Exp - 6	**Exp – 7**	**Exp – 8**	**Exp – 9**	**Exp – 10**
05-04-2023	B21	B22	B23	B24	B25
12-04-2023	B22	B23	B24	B25	B21
19-04-2023	B23	B24	B25	B21	B22
26-04-2023	B24	B25	B21	B22	B23
03-05-2023	B25	B21	B22	B23	B24
10-05-2023	*REPETITION*				
17-05-2023	**Internal Mid Examinations and Viva Voice**				
05-06-2023 TO 10-06-2023	*II Mid Examinations*				
12-06-2023 TO 17-06-2023	**Preparation and Practical's**				
19-06-2023 TO 01-07-2023	**Semester End Examinations**				

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

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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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

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

COURSE HANDOUT

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

ACADEMIC YEAR   : 2022-2023

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

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

COURSE CREDITS   : 1

COURSE INSTRUCTOR   : Mr.B. Udaya Lakshmi/Mr S. Srinivas 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-A

Batch: A1 (21761A0331 & 22765A0301-330)

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	31-1-2023		TLM8	-	
2.	Experiment-1	3	07-02-2023		TLM8	R1	
3.	Experiment-2	3	14-02-2023		TLM8	R1	
4.	Experiment-3	3	21-02-2023		TLM8	R1	
5.	Experiment-4	3	28-02-2023		TLM8	R1	
6.	Experiment-5	3	14-03-2022		TLM8	R1	
7.	Demonstration	3	21-03-2023		TLM8	-	
8.	**I MID EXAMINATION (27-3-2023 TO 01-4-2023)**						
9.	Experiment-6	3	11-04-2023		TLM8	R1	
10.	Experiment-7	3	18-04-2023		TLM8	R1	
11.	Experiment-8	3	25-04-2023		TLM8	R1	
12.	Experiment-9	3	02-05-2023		TLM8	R1	
13.	Experiment-10	3	09-05-2023		TLM8	R1	
14.	Repetition	3	16-05-2023		TLM8	R1	
15.	Lab Internal	3	23-05-2023		-	-	

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	16-05-2023		TLM8	-	

Batch: A2 (21761A0301-21761A0330)

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	01-02-2023		TLM8	-	
2.	Experiment-1	3	08-02-2023		TLM8	R1	
3.	Experiment-2	3	15-03-2023		TLM8	R1	
4.	Experiment-3	3	22-02-2023		TLM8	R1	

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
5.	Experiment-4	3	01-03-2023		TLM8	R1	
6.	Experiment-5	3	15-03-2023		TLM8	R1	
I MID EXAMINATION (27-3-2023 TO 01-4-2023)							
7.	Experiment-6	3	05-05-2023		TLM8	R1	
8.	Experiment-7	3	12-04-2023		TLM8	R1	
9.	Experiment-8	3	19-04-2023		TLM8	R1	
10.	Experiment-9	3	26-04-2023		TLM8	R1	
11.	Experiment-10	3	03-05-2023		TLM8	R1	
12.	Repetition	3	10-05-2023		TLM8	-	
13.	Lab Internal	3	24-05-2023		-	-	

Additional Experiments:

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
14.	Cam Jump Analysis & Gyroscope	3	17-05-2023		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	30/01/2023	25/01/2023	8
I Mid Examinations	27/03/2023	01/04/2023	1
II Phase of Instructions	03/04/2023	27/05/2023	8
II Mid Examinations	05/06/2023	10/06/2023	1
Preparation and Practicals	12/06/2023	17/06/2022	1
Semester End Examinations	19/06/2022	01/07/2023	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	Batch No.	Reg. No. of Students	Number of Students
A1A	21761A0331-22765A0301-305	06	A2A	21761A0301-306	06
A1B	22765A0306-312	06	A2B	21761A0307-312	06
A1C	22765A0313-318	06	A2C	21761A0313-318	06
A1D	22765A0319-324	06	A2D	21761A0319-324	06
A1E	22765A0325-330	06	A2E	21761A0325-330	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	CO4

		beams with different end conditions.	

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.Udaya Lakshmi Mr.S.Srinivas Reddy	Mr.K.V.Viswanadh	Mr.B.Sudheer Kumar	Dr.S.Pichi Reddy
Course Instructor(s)	Course Coordinator	Module Coordinator	HOD

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

COURSE HANDOUT

PROGRAM : B.Tech., IV-Sem., ME-A/S
ACADEMIC YEAR : 2022-23
COURSE NAME & CODE : Computer Aided Machine Drawing Lab - 20ME59
L-T-P STRUCTURE : 0-0-2
COURSE CREDITS 1
COURSE INSTRUCTOR : Mrs.B.Sudheer Kumar/ Mr.K.Sai Babu/Ms. P.Mounika Reddy
COURSE COORDINATOR: Mrs.B.Sudheer Kumar
PRE-REQUISITE : Computer Aided Engineering Graphics

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

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

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO				1					3		2	1			3
CO				1					3		2	1			3
CO				1					3		2	1			3
CO				1					3		2	1			3

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

MATERIAL:
M1 Lab Manual
BOS APPROVED TEXT BOOKS:
T1 K.L.Narayana, P.Kannaiah& K. Venkata Reddy, Machine Drawing, 4th Edition New Age Publishers. 2004
T2 P.S Gill, Machine Drawing, 18th Edition Eastern Publisher, 2013.
BOS APPROVED REFERENCE BOOKS:
R1 N.Sidheshwar, Machine Drawing, 4th Edition, Tata McGraw Hill, 2001
R2 Dhawan, Machine Drawing, revised edition, S.Chand Publications, 2002
R3 K. C. JOHN, Machine Drawing 6th Edition, Stronck publishers, 2007
R4 N.D.Bhatt, V.M.Panchal Machine Drawing Charotar Publishing House, 2005

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	CO-PO Discussion	03	02/02/23		TLM8	--	M1	
2.	Demonstration To Machine Drawing	03	09/02/23		TLM8	CO1	M1	
3.	Demonstration To Catia-V5	03	16/02/23		TLM8	CO1-4	M1	
4.	Conventional Representations of Various Materials	03	23/02/23		TLM8	CO1	M1	
5.	Conventional Representations of Various Machine Parts	03	02/03/23		TLM8	CO1	M1	
6.	Sectional Views, Thread Profiles	03	09/03/23		TLM8	CO1	M1	
7.	Bolt With Nut And Washer	03	16/03/23		TLM8	CO2	M1	
8.	Flanged Coupling	03	23/03/23		TLM8	CO2	M1	
9.	Rivetted Joints	03	06/04/23		TLM8	CO2	M1	
10.	Stuffing Box Assembly	03	13/04/23		TLM8	CO2	M1	
11.	Piston Assembly	03	20/04/23		TLM8	CO3	M1	
12.	Plummer Block Assembly	03	27/04/23		TLM8	CO3	M1	
13.	Universal Joint Assembly	03	04/05/23		TLM8	CO3	M1	
14.	Screw Jack Assembly	03	11/05/23		TLM8	CO4	M1	
15.	Backlog Experiments	03	18/05/23		TLM8	--	M1	
16.	Repetition	03	25/05/23		TLM8	--	M1	
17.	Lab Internal Exam	03	01/06/23		TLM8	--	--	
No. of classes required to complete		**51**			**No. of classes taken:**			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	30/01/2023	25/03/2023	8
I Mid Examinations	27/03/2023	01/04/2023	1
II Phase of Instructions	03/04/2023	27/05/2023	8
Summer Vacation	29/05/2023	03/06/2023	1
II Mid Examinations	05/06/2023	10/06/2023	1
Preparation and Practicals	12/06/2023	17/06/2023	1
Semester End Examinations	19/06/2023	01/07/2023	2
Internship	03/07/2023	15/07/2023	2

EVALUATION PROCESS:

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

List of Experiments:

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

PROGRAMME EDUCATIONAL OBJECTIVES:

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

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

PEO3: To develop inquisitiveness towards good communication and lifelonglearning.
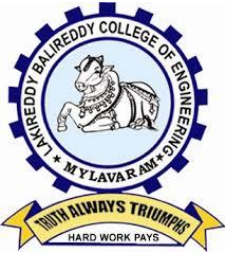
PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

2. **Problem analysis**: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HoD
Mrs.B.Sudheer Kumar	Mrs.B.Sudheer Kumar	Mr.B.Sudheer Kumar	Dr.S.Pichi Reddy

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.V.Sankara Rao, Mrs. B. Kamala Priya, Mr.K.Venkateswara Reddy

Course Name & Code: – STRUCTURAL AND MODAL ANALYSIS USING ANSYS & 20MES1

Regulation: R20

L-T-P Structure **: 1-0-2** **Credits:** 2
Program/Sem/Sec : B.Tech/IV/A **A.Y.:** 2022-23

PREREQUISITE: Strength of Materials

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

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

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

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

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

1 - Low	**2 –**Medium	**3 -** High

SOFTWARE PACKAGES: ANSYS

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

Schedule of Experiments (Section – A)

S.No	Batches	Regd. Nos	Total No. of Students
1	Batch B1	21761A0301-21761A0331, 22765A0301-21765A0329	60

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Structural and Modal Analysis Using ANSYS, Demonstration of all experiments, CEOs, and COs of the Laboratory	4	30-01-2023		TLM4	
Cycle-I						
2.	Introduction to Finite Element Method, Basics of ANSYS interface and its utilities	4	06-02-2023		TLM4	
3.	Structural Analysis of Stepped Bar and Tapered Bar, Static Analysis of a Planar Truss	4	13-02-2023		TLM4	
4.	Static Analysis of a Cantilever Beam, Static Analysis of a Simply Supported Beam with Point Load	4	27-02-2023		TLM4	
5.	Static Analysis of a Simply Supported Beam with Uniformly Distributed Load, Static Analysis of a Simply Supported Beam with Uniformly Varying Load.	4	06-03-2023		TLM4	
6.	Static Analysis of a Fixed Beam Subjected to Axial Load, Stress Analysis of Flat Plates and Simple Shells	4	13-03-2023		TLM4	
Cycle-II						
7.	Stress Analysis of Axi-symmetric Components	4	20-03-2023		TLM4	
8.	Vibration Analysis of Spring-Mass Systems	4	03-04-2023		TLM4	
9.	Mode - Frequency Analysis of Beams and Machine Elements	4	10-04-2023		TLM4	
10.	Revision	4	17-04-2023		TLM4	
11.	Report Preparation	4	24-04-2023		TLM4	
12.	Report Preparation	4	01-05-2023		TLM4	

13.	Reviews	4	08-05-2023		TLM4	
14.	Reviews	4	15-05-2023		TLM4	
15.	Reviews	4	22-05-2023		TLM4	
No. of classes required to complete:				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Expt. no's	Marks
Report = **A**	1,2,3,4,5,6,7,8…	A = 10
Quality of Work = **B**	1,2,3,4,5,6,7,8	B = 10
Presentation = **C**	1,2,3,4,5,6,7,8	C = 20
Interaction/Queries = **D**	1,2,3,4,5,6,7,8	D = 10
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8	**50**

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty				
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME) under Tier - I

Approved by AICTE and Permanently Affiliated to JNTUK, Kakinada

CENTRE FOR CAREER GUIDANCE AND TRAINING
LESSON PLAN

Faculty Name **: Dr.T.Radha Rani**
Date: 30-01-23

Dept & Section : **MECH-A**
Semester: IV

Subject : **Quantitative Aptitude**
A.Y.: 2022-2023

S.No.	No. of Lecture Hours	Date	Planned Topics	Actual Date	Remarks
1	1	31-01-23	Introduction-Percentages		
2	1	03-02-23	Problems on Percentages		
3	1	07-02-23	Exercise on Percentages		
4	1	10-02-23	Introduction-Simple and Compound Interest		
5	1	14-02-23	Problems on Simple Interest		
6	1	17-02-23	Problems on Compound Interest		
7	1	21-02-23	Exercise on Simple and Compound Interest		
8	1	24-02-23	Introduction-Profit & Loss		
9	1	28-02-23	Problems on Profit & Loss		
10	1	03-03-23	Problems on Discounts, Marked Price		
11	1	07-03-23	Introduction-Partnership		
12	1	10-03-23	Problems on Partnership		
13	1	14-03-23	Introduction-Alligations/Mixtures		
14	1	17-03-23	Problems on Alligations/Mixtures		
15	1	21-03-23	Introduction-Syllogism		
16	1	24-03-23	Problems on Syllogism		

17	1	04-04-23	Introduction-Data Interpretation		
18	1	11-04-23	Problems on Data Interpretation		
19	1	18-04-23	Introduction-Direction Sense Test		
20	1	21-04-23	Problems on Direction Sense Test		
21	1	25-04-23	Introduction Data Sufficiency		
23	1	28-04-23	Problems on Data Sufficiency		
23	1	02-05-23	Introduction Data arrangements		
24	1	05-05-23	Problems on Data arrangements		
25	1	09-05-23	Introduction Cubes and Dice		
26	1	12-05-23	Problems on Cubes and Dice		
27	1	16-05-23	Introduction-Surds and Indices		
28	1	19-05-23	Problems on Surds and indices		
29	1	23-05-23	Introduction-Areas & Volumes		
30	1	26-05-23	Problems on Areas & Volumes		

Signature of Faculty   Signature of HOD

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Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

PROGRAM : II B. Tech., IV-Sem., MECH-B
ACADEMIC YEAR : 2022-23
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

CO 1	Understand various probabilistic situations using the laws of probability and Random variables.	Understand - L2
CO 2	Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems.	Apply - L3
CO 3	Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on sample data.	Apply - L3
CO 4	Analyze the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis.	Analyze - L4
CO 5	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	01-02-23		TLM1	
2.	Basic concepts of probability	1	02-02-23		TLM1	
3.	problems on basic probability	1	04-02-23		TLM1	
4.	Axioms, Addition theorem	1	06-02-23		TLM1	
5.	Problems on Addition theorem	1	08-02-23		TLM1	
6.	Multiplication theorem, examples	1	09-02-23		TLM1&2	
7.	Independent events, theorems	1	13-02-23		TLM1	
8.	Problems	1	15-02-23		TLM1	
9.	Baye's theorem, Examples	1	16-02-23		TLM1&2	
10.	Problems on Baye's theorem	1	20-02-23		TLM1	
11.	Random variables, Expectations	1	22-02-23		TLM1	
12.	Problems on PMF	1	23-02-23		TLM1	
13.	Problems on PDF	1	25-02-23		TLM1	
No. of classes required to complete UNIT-I: 13				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	27-02-23		TLM1&2	
2.	Problems on Binomial distribution	1	01-03-23		TLM1	
3.	Fitting of binomial distribution	1	02-03-23		TLM1	
4.	Poisson distribution, mean and variance	1	04-03-23		TLM1	
5.	Problems on Poisson distribution	1	06-03-23		TLM1	
6.	Fitting of Poisson distribution	1	08-03-23		TLM1	
7.	Normal distribution: mean &variance	1	09-03-23		TLM1&2	
8.	Problems on Normal Distribution	1	11-03-23		TLM1	
9.	Problems on Normal Distribution	1	13-03-23		TLM1	
10.	Applications of Normal Distribution	1	15-03-23		TLM1	
11.	Exponential distribution:	1	16-03-23		TLM1	
No. of classes required to complete UNIT-II: 11				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	18-03-23		TLM1&2	
2.	Sampling distribution of mean, variance	1	20-03-23		TLM1	
3.	Central limit theorem, Examples	1	23-03-23		TLM1	
4.	Problems on Central Limit Theorem	1	25-03-23		TLM1	
5.	**Mid-I examinations**		27-03-23 to 01-04-23			
6.	Problems on central limit theorem	1	03-04-23		TLM1	
7.	Point and interval estimation	1	05-04-23		TLM1&2	
8.	Confidence Interval of mean	1	06-04-23		TLM1	
9.	Confidence Interval of proportion	1	08-04-23		TLM1	
10.	Problems	1	10-04-23		TLM1	
11.	Confidence Interval of mean (n<30)	1	12-04-23		TLM1	

S.No.	Topics to be covered				TLM1	
	problems	1	13-04-23		TLM1	

No. of classes required to complete UNIT-III: 11	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	15-04-23		TLM1&2	
2.	Z-test for single mean	1	17-04-23		TLM1	
3.	Z-test for difference of means	1	19-04-23		TLM1	
4.	Applications on mean tests	1	20-04-23		TLM1	
5.	Z-test for single Proportion	1	24-04-23		TLM1	
6.	Z-test for difference of Proportions	1	26-04-23		TLM1	
7.	Applications on proportions tests	1	27-04-23		TLM1	
8.	t-test for single mean	1	29-04-23		TLM1	
9.	t-test for difference of means	1	01-05-23		TLM1	
10.	Paired t-test	1	03-05-23		TLM1	
11.	Applications on t-tests	1	04-05-23		TLM1	
12.	F-test for variances	1	06-05-23		TLM1	
13.	-test for goodness of fit	1	08-05-23		TLM1	
14.	-test for independence of attributes	1	10-05-23		TLM1	

No. of classes required to complete UNIT-IV: 14	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	11-05-23		TLM1&2	
2.	Problems on Pearson's Correlation	1	13-05-23		TLM1	
3.	Regression lines	1	15-05-23		TLM1	
4.	Problems on Regression lines	1	17-05-23		TLM1	
5.	Properties of Regression coefficients	1	18-05-23		TLM1&2	
6.	Problems on Regression coefficients	1	20-05-23		TLM1	
7.	Problems on rank Correlation	1	22-05-23		TLM1	
8.	Problems on repeated ranks	1	24-05-23		TLM1	
9.	Practice problems	1	25-05-23		TLM1	
10.	Revision	1	27-05-23		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)

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., MECH., IV-Sem., Section- B A.Y : 2022-23

PRE-REQUISITE: Thermodynamics

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

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

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

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

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

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

BOS APPROVED TEXT BOOKS:
T1 Mahesh. M. Rathore, Thermal Engineering, 1st Edition, 2012, TMH.
T2 R. K. Rajput, Thermal Engineering, 5th Edition, 2005, Laxmi publications.

BOS APPROVED REFERENCE BOOKS:
R1 T.D. Eastop and A. McConkey, Applied Thermodynamics, Pearson, 5th Edition, 2013.
R2 R. Yadav, Thermodynamics and Heat Engines,5th Edition,Voleme-II,1999.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Vapour Power cycles

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Applied Thermodynamics	1	30-01-2023		TLM2	
2.	Course Outcomes of ATD, Introduction to the vapour power cycles	1	31-01-2023		TLM2	
3.	Formation of steam and its properties, Carnot vapour power cycle	1	01-02-2023		TLM1	
4.	Rankine cycle efficiency using P-V, T-S and h-s diagrams	1	02-02-2023		TLM1	
5.	Comparison of Rankine and Carnot vapour power cycles	1	06-02-2023		TLM1	
6.	Tutorial-1	1	07-02-2023		TLM3	
7.	Numerical problems, Reheating cycle	1	08-02-2023		TLM1	
8.	Regeneration cycle, Open and closed feed water heaters	1	09-02-2023		TLM3	
9.	Fuels and combustion	1	13-02-2023		TLM1	
10.	Chemical reaction equations for solid and gaseous fuels	1	14-02-2023		TLM1	
No. of classes required to complete UNIT-I: 10				No. of classes taken:		

UNIT-II: Steam Boilers and Draught system

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Boilers - Boiler systems classification	1	15-02-2023		TLM2	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
2.	fire tube boilers- Cornish ,Lancashire, Cochran boilers	1	16-02-2023		TLM2	
3.	Water tube –Babcock and Wilcox,		20-02-2023		TLM2	
4.	Boiler accessories	1	21-02-2023		TLM2	
5.	Boiler mountings, Tutorial -2	1	22-02-2023		TLM3	
6.	Draught system- functions and types	1	23-02-2023		TLM1	
7.	Condition for maximum discharge,	1	27-02-2023		TLM1	
8.	Efficiency of chimney, induced draft and forced draft	1	28-02-2023		TLM1	
9.	Numerical Problems	1	01-03-2023		TLM1	
10.	Tutorial -3	1	02-03-2023		TLM3	
No. of classes required to complete UNIT-II: 10				No. of classes taken:		

UNIT-III: Steam Nozzles and Condensers

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to nozzles, Flow through nozzles-thermodynamic analysis	1	06-03-2023		TLM2	
2.	Velocity of nozzle at exit, Condition for maximum discharge	1	07-03-2023		TLM1	
3.	Ideal and actual expansion, Supersaturated flow in nozzles	1	09-03-2023		TLM1	
4.	Tutorial -4	1	13-03-2023		TLM3	
5.	Degree of super cooling and super saturation-Wilson line,	1	14-03-2023		TLM1	
6.	Numerical Problems	1	15-03-2023		TLM1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
7.	Steam condensers-introduction, Types of condensers, Elements of condenser,	1	16-03-2023		TLM2	
8.	jet condensers, surface condensers, Air leakage through condensers	1	20-03-2023		TLM2	
9.	Performance parameters of condensers, Tutorial - 5	1	21-03-2023		TLM3	

No. of classes required to complete UNIT-III: 09			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
1.	Introduction to steam turbines, Classification of steam turbines	1	23-03-2023		TLM2	
2.	Impulse turbine working principle,	1	03-04-2023		TLM2	
3.	Velocity diagrams of impulse turbine	1	04-04-2023		TLM2	
4.	Numerical problems	1	06-04-2023		TLM1	
5.	Tutorial -6	1	10-04-2023		TLM3	
6.	Blade, stage efficiencies and De-Laval turbine and its features	1	11-04-2023		TLM1	
7.	Compounding of turbines	1	12-04-2023		TLM1	
8.	Velocity, pressure and combined compounding of steam turbines	1	13-04-2023		TLM1	
9.	Combined velocity triangle for a velocity compounded impulse turbine	1	17-04-2023		TLM1	
10.	Reaction turbine - Introduction ,Degree of reaction(Parsons), Parsons reaction turbine	1	18-04-2023		TLM1	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	Numerical Problems	1	19-04-2023		TLM1	

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

UNIT-V : Compressors

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Compressors- Reciprocating compressors- principle of operation	1	20-04-2023		TLM2	
2.	Work required, free air delivery	1	24-04-2023		TLM2	
3.	Isothermal, volumetric efficiency, Condition for minimum work	1	25-04-2023		TLM2	
4.	Effect of clearance volume, Multistage compression	1	26-04-2023		TLM2	
5.	Numerical Problems	1	27-04-2023		TLM1	
6.	Tutorial -7	1	01-05-2023		TLM3	
7.	Roots blower, Vanes compressor, Efficiency considerations	1	02-05-2023		TLM2	
8.	Centrifugal compressors, Degree of reaction ,	1	03-05-2023		TLM2	
9.	Energy transfer, velocity diagram	1	04-05-2023		TLM2	
10.	Axial flow compressors and degree of reaction,	1	08-05-2023		TLM2	
11.	content beyond syllabus	1	09-05-2023		TLM2	
12.	content beyond syllabus	1	10-05-2023		TLM1	
13.	Revision	1	11-05-2023		TLM1	

14.	Revision	1	15-05-2023		TLM1	
15.	Revision	1	16-05-2023		TLM1	
16.	Revision	1	17-05-2023		TLM1	
17.	Revision	1	18-05-2023		TLM1	
18.	Revision	1	22-05-2023		TLM1	
19.	Revision	1	23-05-2023		TLM1	
20.	Revision	1	24-05-2023		TLM1	
21.	Revision	1	25-05-2023		TLM1	

No. of classes required to complete UNIT-V: 12   No. of classes taken:

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

PART-C

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

PART-D

PROGRAMME OUTCOMES (POs):

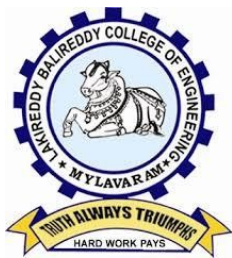| PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr. P.Vijay Kumar	Dr. P.Vijay Kumar	Dr. P.Vijay Kumar	Dr. S. Pichi Reddy

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.K.Murahari, Associate Professor
Course Name & Code : Production Technology & 20ME08   **Regulation**: R20
L-T-P Structure   : 3-0-0   **Credits:** 03
Program/Sem/Sec   : B.Tech IV Sem (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, Philip Rosenthal & Karl R.Loper, Principles of metal casting, TMHEdition, 2017.

REFERENCE BOOKS:

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section - B

UNIT-I: Introduction to manufacturing, Casting

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CEO's and COs of Production Technology Introduction to manufacturing technology, Definitions.	1	31/01/2023		**TLM1/TLM2**	
2.	Importance of manufacturing,	1	01/02/2023		**TLM1/TLM2**	
3.	Classification ofManufacturing.	1	02/02/2023		**TLM1/TLM2**	
4.	**Casting:** Casting Introduction,	1	03/02/2023		**TLM1/TLM2**	
5.	Steps involved in making of casting	1	07/02/2023		**TLM1/TLM2**	
6.	Advantages, Limitations and applications of casting.	1	08/02/2023		**TLM1/TLM2**	
7.	Materialsused for patterns, Cores and Core prints, Chaplets, Moulding sand and its Properties.	1	09/02/2023		**TLM1/TLM2**	
8.	Pattern and its types	1	10/02/2023		**TLM1/TLM2**	
9.	Pattern allowances and construction.	1	14/02/2023		**TLM1/TLM2**	
10.	Principal of gating.	1	15/02/2023		**TLM1/TLM2**	
11.	Gating ratio and design ofgating system.	1	16/02/2023		**TLM1/TLM2**	
12.	Riser, types,	1	17/02/2023		**TLM1/TLM2**	
13.	Function anddesign.	1	21/02/2023		**TLM1/TLM2**	
14.	Centrifugal casting,	1	22/02/2023		**TLM1/TLM2**	
15.	Die casting,	1	23/02/2023		**TLM1/TLM2**	
16.	Investment casting, clean casting	1	24/02/2023		**TLM1/TLM2**	
17.	Defects and remedies	1	28/02/2023		**TLM1/TLM2**	

	No. of classes required to complete UNIT-I: 15				No. of classes taken:	

UNIT-II: Welding, Electric Arc Welding

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	Introduction, Classification of welding process, Gas welding-Oxy-acetylene welding Equipment.	1	01/03/2023		TLM1/TLM2	
19.	Oxy-acetylene process and applications, Hydrogen welding, Gas cutting process, Gas cutting applications.	1	02/03/2023		TLM1/TLM2	
20.	Electric arc welding, electrodes, polarities.	1	03/03/2023		TLM1/TLM2	
21.	Consumable and non-Consumable, MIG welding.	1	07/03/2023		TLM1/TLM2	
22.	Sub-merged arc welding (SAW), Inert gas welding,	1	09/03/2023		TLM1/TLM2	
23.	Carbon arc welding, Tungsten Inert Gas Welding (TIG) process and applications.	1	10/03/2023		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
24.	Principle and types of resistance welding and Applications.	1	14/03/2023		TLM1/TLM2	
25.	resistance welding and Applications.	1	15/03/2023		TLM1/TLM2	
26.	Thermit welding.	1	16/03/2023		TLM1/TLM2	
27.	Friction welding.	1	17/03/2023		TLM1/TLM2	
28.	Explosive welding,	1	21/03/2023		TLM1/TLM2	
29.	inductionwelding.	1	23/03/2023		TLM1/TLM2	
30.	Soldering and brazing,	1	24/03/2023		TLM1/TLM2	
31.	Applications of soldering andbrazing processes	1	4/04/2023		TLM1/TLM2	
32.	Welding defects, causes and remedies	1	06/04/2023		TLM1/TLM2	
31.	non-destructive Examination of weldments.		11/04/2023		TLM1/TLM2	
No. of classes required to complete UNIT-III: 06				No. of classes taken:		

UNIT-IV: Metal Forming processes

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Nature of plastic deformation, Hot working and cold working processes	1	12/04/2023		**TLM1/TLM2**	
33.	Hot working and cold working processes	1	18/04/2023		**TLM1/TLM2**	
34.	Rolling fundamentals, Theory of rolling, Types of rolling mills	1	19/04/2023		**TLM1/TLM2**	
35.	Types of rollingmills	1	20/04/2023		**TLM1/TLM2**	
36.	Theory of Drawing, Wire drawing and tube drawing	1	21/04/2023		**TLM1/TLM2**	
37.	Coining, spinning	1	25/04/2023		**TLM1/TLM2**	
38.	Principle of forging, types of forging	1	26/04/2023		**TLM1/TLM2**	
39.	Smith and drop forging, machine forging, Forging defects	1	27/04/2023		**TLM1/TLM2**	
40.	Causes and remedies, Applications of forming and forging processes	1	28/04/2023		**TLM1/TLM2**	
No. of classes required to complete UNIT-IV: 07				**No. of classes taken:**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Basic Extrusion process and its characteristics,	1	02/05/2025		**TLM1/TLM2**	
42.	Hot extrusion and its types,	1	03/05/2023		**TLM1/TLM2**	
43.	Cold extrusion and its process	1	04/05/2023		**TLM1/TLM2**	
44.	Forward extrusion	1	05/05/2023		**TLM1/TLM2**	
45.	Backward extrusion	1	09/05/2023		**TLM1/TLM2**	
46.	Impact extrusion,	1	10/05/2023		**TLM1/TLM2**	
47.	Hydrostatic extrusion	1	11/05/2023		**TLM1/TLM2**	
48.	Introduction of sheet metal	1	12/05/2023		**TLM1/TLM2**	
49.	sheet metal operation,	1	16/05/2023		**TLM1/TLM2**	

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50.	Stamping,Forming	1	17/05/2023		**TLM1/TLM2**	
51.	Blanking and piercing and forming	1	18/05/2023		**TLM1/TLM2**	
52.	Bending and Stretching Forming	1	19/05/2023		**TLM1/TLM2**	
53.	Embossing and Coining	1	23/05/2023		**TLM1/TLM2**	

No. of classes required to complete UNIT-V: 07 | **No. of classes taken:**

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	24/05/2023		**TLM1/TLM2**	
2.	Gate Questions	1	25/05/2023		**TLM5/ TLM6**	
3.	Gate Questions	1	26/05/2023		**TLM5/ TLM6**	

Contents beyond the Syllabus

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

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

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science,engineering fundamentals, and an engineering specialization to the solution Of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering Sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineeringproblems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques,resources, and modern engineering and IT tools including prediction and Modeling to complex engineering activities with an understanding of thelimitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextualknowledge 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 andresponsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as amember or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activitieswith 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 andability 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 variousthermal systems.
PSO 2	To apply the principles of manufacturing technology, scientific managementtowards 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 andpower, conservation of energy and other process equipment.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty				
Signature				

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 : 2022-23

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	31-01-2023		TLM1		
2.	**MECHANISMS:** Mechanism & Machine, Differences between Mechanism & Machine	1	03-02-2023		TLM1		
3.	Elements-classification Joints -classification Difference between Chain, Mechanism and Inversion,	1	06-02-2023		TLM1/TLM4		
4.	Pair, Types of kinematic Pairs	1	06-02-2023		TLM1/TLM4		
5.	Types of constrained motions	1	07-02-2023		TLM1		
6.	Grashof Law	1	10-02-2023		TLM1		
7.	inversion of mechanism, inversions of quadric cycle chain (4-bar chain)	1	13-02-2023		TLM1/TLM4		
8.	Inversions of single slider crank chain	1	13-02-2023		TLM1/TLM4		
9.	Inversions of single slider crank chain		14-02-2023		TLM1/TLM4		
10.	Inversions of double slider crank chain	1	17-02-2023		TLM1		
11.	Degree of freedom-Gruebler's criterion	1	20-02-2023		TLM1		
12.	Problems Gruebler's criterion, Limitations of Gruebler's criterion	1	20-02-2023		TLM1		
13.	Tutorial-1	1	21-02-2023		TLM3		
14.	Unit-I Revision	1	24-02-2023		TLM1		
No. of classes required to complete UNIT-I: 14				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	27-02-2023		TLM1		
2.	Instantaneous centre - Kennedy's theorem	1	27-02-2023		TLM1		
3.	Determination of angular velocity of points and	1	28-02-2023		TLM1		

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
	links for simple mechanisms						
4.	Tutorial-2	1	03-03-2023		TLM3		
5.	Relative velocity –Velocity Polygon, Velocity diagrams for simple mechanisms	1	06-03-2023		TLM1		
6.	Acceleration Polygon- acceleration diagrams for simple mechanisms	1	06-03-2023		TLM1		
7.	Problems on velocity & acceleration diagrams	1	07-03-2023		TLM1		
8.	Coriolis acceleration & problem, Klein's construction	1	10-03-2023		TLM1		
9.	Tutorial-3	1	13-03-2023		TLM3		
10.	Unit-II Revision	1	13-03-2023		TLM1		
No. of classes required to complete UNIT-II: 10				No. of classes taken:			

UNIT-III: GEARS &TURNING MOMENT DIAGRAMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	GEARS: Terminology - law of gearing- Profile for gears	1	14-03-2023		TLM1/TLM2		
2.	Involute gearing- Velocity of sliding	1	17-03-2023		TLM1/ TLM2		
3.	Path of Contact, Arc of Contact & Contact Ratio	1	20-03-2023		TLM1/TLM2		
4.	interference and undercutting	1	20-03-2023		TLM1/ TLM2		
5.	Tutorial-4 Assignment-1	1	21-03-2023		TLM3		
6.	Mid-I Revision	1	24-03-2023		TLM1		
7.	Introduction about Turning moment	1	03-04-2023		TLM1		
8.	Angular velocity and acceleration of piston, connecting rod	1	03-04-2023		TLM1		
9.	Engine force analysis- piston and crank effort & Inertia torque of connecting rod	1	04-04-2023		TLM1		
10.	Introduction to turning moment diagrams- single and multi-cylinder engines	1	10-04-2023		TLM1		
11.	Problems on single cylinder engines & multi cylinder engines	1	10-04-2023		TLM1		
12.	Fluctuation of energy- Problems	1	11-04-2023		TLM1		
13.	Tutorial-5	1	17-04-2023		TLM3		
14.	Unit-III Revision	1	17-04-2023		TLM1		
No. of classes required to complete UNIT-III: 14				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	18-04-2023		TLM1/TLM4		
2.	Porter governor working & derivation	1	21-04-2023		TLM1/TLM4		
3.	Porter governor Problems	1	24-04-2023		TLM1/TLM4		
4.	Tutorial-6	1	24-04-2023		TLM3		
5.	Proell governor working & derivation	1	25-04-2023		TLM1/TLM4		
6.	Hartnell governor working, derivation & Problems	1	28-04-2023		TLM1/TLM4		
7.	Sensitiveness, Isochronism, and hunting	1	01-05-2023		TLM1		
8.	Tutorial-7	1	01-05-2023		TLM3		
9.	Unit-IV Revision	1	02-05-2023		TLM1		
10.	Unit-IV Revision	1	05-05-2023		TLM1		
No. of classes required to complete UNIT-IV: 10				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	08-05-2023		TLM1/TLM2		
2.	Balancing of several masses rotating in different planes	1	08-05-2023		TLM1/TLM2		
3.	Analytical and graphical methods	1	09-05-2023		TLM1/TLM2		
4.	Introduction Types of Vibrations (Longitudinal, Transverse & Torsional)	1	12-05-2023		TLM1/TLM2		
5.	Undamped free longitudinal vibrations of spring mass system	1	15-05-2023		TLM1		
6.	Problems	1	15-05-2023		TLM1		
7.	Critical Damping, Under Damping & Over damping (Definitions only). Under-damped free	1	16-05-2023		TLM1/TLM2		

	vibrations of spring mass system Logarithmic decrement						
8.	Problems on Under-damped free vibrations of spring mass system	1	19-05-2023		TLM1		
9.	Tutorial-10 Assignmen-2	1	22-05-2023		TLM3		
10.	Unit-IV Revision	1	22-05-2023		TLM1		
11.	Revision	1	23-05-2023		TLM1		
No. of classes required to complete UNIT-V: 11				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	26-05-2023		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	31/01/2023	25/03/2023	8

I Mid Examinations	27/03/2023	01/04/2023	1
II Phase of Instructions	03/04/2023	27/05/2023	8
Summer Vacation	29/05/2023	03/06/2023	1
II Mid Examinations	05/06/2023	10/06/2023	1
Preparation and Practicals	12/06/2023	17/06/2023	1
Semester End Examinations	19/06/2023	01/07/2023	2

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**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.

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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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. P. RAVINDRA KUMAR
Course Name & Code   : Universal Human Values 2: Understanding Harmony (20HS01)
L-T-P Structure   : 3-0-0   **Credits**   : 3
Program/Sem/Sec   : B.Tech IV Semester – MECH Section-B   **A.Y.**   : 2022-23

PREREQUISITE: Nil

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

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

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

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

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

TEXTBOOKS:

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

REFERENCE BOOKS:

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	31-1-2023		TLM1,2	
2.	'Natural Acceptance' and Experiential Validation	1	02-2-2023		TLM1,2	
3.	Process for self-exploration	1	03-2-2023		TLM1,2	
4.	Continuous Happiness and Prosperity	1	04-2-2023		TLM1,2	
5.	A look at basic human aspirations: Right understanding	1	06-2-2023		TLM1,2	
6.	Active learning activity	1	09-2-2023		TLM6	
7.	Right understanding, Relationship and Physical Facility	1	10-3-2022		TLM1,2	
8.	Understanding Happiness, and Prosperity	1	13-2-2023		TLM1,2	
9.	Formative Assessment	1	16-2-2023		TLM3	
No. of classes required to complete UNIT-I: 9				**No. of classes taken 9**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Introduction, COs, POs and articulation matrix	1	17-2-2023		TLM1,2	
11.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	20-2-2023		TLM1,2	
12.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	23-2-2023		TLM1,2	
13.	Active learning activity	1	24-2-2023		TLM6	
14.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	25-2-2023		TLM1,2	
15.	Understanding the harmony of I with the Body: Sanyam and Health	1	27-2-2023		TLM1,2	
16.	Active learning activity	1	02-3-2023		TLM1,2	
17.	Correct appraisal of Physical needs	1	03-3-2023		TLM1,2	
18.	Formative Assessment	1	04-3-2023		TLM3	
No. of classes required to complete UNIT-II: 9				**No. of classes taken:**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Understanding values in human-human relationship: meaning of justice	1	04-3-2023		TLM1,2	
20.	Program for fulfillment to ensure mutual happiness and Trust	1	06-3-2023		TLM1,2	
21.	Program for fulfillment to ensure mutual happiness and Respect as the foundational values of relationship	1	09-3-2023		TLM1,2	
22.	Understanding Harmony in the society: Resolution	1	10-3-2023		TLM1,2	
23.	Active learning activity	1	13-3-2023		TLM6	
24.	Understanding the harmony in the society: Resolution, Prosperity	1	16-3-2023		TLM1,2	
25.	Understanding the harmony in the society: fearlessness, and co-existence as comprehensive Human Goals	1	17-3-2023		TLM1,2	
26.	Unit end questions format, Question modelling	1	18-3-2023		TLM1	
27.	Multiple choice questions	1	20-3-2023		TLM1,2	
28.	Formative Assessment	1	23-3-2023		TLM6	
29.	I-Mid examinations	1	27-3-2023 to 01-4-2023			
30.	Prosperity, fearlessness, and co-existence as comprehensive human goals	2	03-4-2023		TLM1,2	
31.	Visualizing a universal harmonious order in the society-undivided society	1	06-4-2023		TLM1,2	
32.	Universal order-from family to world family	1	03-4-2023		TLM1,2	
33.	Gratitude as a universal value in relationships	1	10-4-2023		TLM1,2	
No. of classes required to complete UNIT-III: 15				**No. of classes taken:**		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Introduction, COs, POs and articulation matrix	1	13-4-2023		TLM1,2	
35.	Understanding Harmony in the Nature	1	15-4-2023		TLM1,2	
36.	Interconnectedness and mutual fulfillment among four orders of nature	2	17-4-2023 20-4-2023		TLM1,2	
37.	Recyclability and self-regulation in nature	1	21-4-2023		TLM1,2	
38.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	24-4-2023		TLM1,2	

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.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	27-4-2023		TLM1,2	
40.	Holistic perception of harmony at all levels of existence	1	28-4-2023		TLM1,2	
41.	Active learning activity	1	29-4-2023		TLM6	
42.	Formative Assessment	1	01-5-2023		TLM3	

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

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Introduction, COs, POs and articulation matrix	1	04-5-2023		TLM1,2	
44.	Natural acceptance of human values	1	05-5-2023		TLM1,2	
45.	Definitiveness of ethical human conduct	1	06-5-2023		TLM1,2	
46.	Basis for humanistic education	1	08-5-2023		TLM1,2	
47.	Humanistic constitution and humanistic universal order	1	11-5-2023		TLM1,2	
48.	Competence in professional ethics	1	12-5-2023		TLM1,2	
49.	Strategy for transition from the present state to universal human order	1	13-5-2023		TLM1,2	
50.	Active learning activity	1	15-5-2023		TLM6	
51.	Formative Assessment	1	18-5-2023		TLM3	
52.	Revision	3	25-5-2023 26-5-2023 27-5-2023		TLM1,2	

No. of classes required to complete UNIT-V: 9				No. of classes taken:		

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

PART-C

EVALUATION PROCESS (R17 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5

II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

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

PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

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

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Dr.S.Pichi Reddy,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/ B-Section   **A.Y.:**2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

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

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

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

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

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

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

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

Mapping of COs with POs and PSOs:

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

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

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

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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM OUTCOMES (POs)
Engineering Graduates will be able to:
1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
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.S.Pichi Reddy,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/ B-Section   **A.Y.:**2022-2023

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

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DEPARTMENT OF MECHANICAL ENGINEERING

Name of Course Instructor: Dr.S.Pichi Reddy, 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/ B-Section **A.Y.:**2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

Batches (Section – B)

S.No	Batches	Regd. No's	Total No. of Students
1	B. Tech –B/S	21761A0333 – 21761A0362,22765A0330,331,332 22765A0333-22765A0362	61
2	Batch B1	21761A0333 – 21761A0362,22765A0330,331,332	31
3	Batch B2	22765A0333 - 22765A0362	30

Sub Batches of B1:

S. No	Batch	Registered No's	Total
1	B11	21761A0333 – 21761A0338	06
2	B12	21761A0339 – 21761A0344	06
3	B13	21761A0345 – 21761A0351	06
4	B14	21761A0352 – 21761A0357	06
5	B15	21761A0358 – 21761A0362 22765A0330-22765A0332	07
		Total (B1)	31

Sub Batches of B2:

S. No	Batch	Registered No's	Total
1	B21	22765A0333 – 22765A0338	06
2	B22	22765A0339 – 22765A0344	06
3	B23	22765A0345 – 22765A0350	06
4	B24	22765A0351 – 22765A0356	06
5	B25	22765A0357 –22765A0362	06
		Total (B2)	30

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.S.Pichi Reddy,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/ B-Section   **A.Y.:**2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

Notification of Cycles (Section –B)

Cycle – I: <u>METAL CASTING, WELDING, MECHANICAL PRESS WORKING AND PROCESSING OF PLASTICS</u>**:**

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 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

Name of Course Instructor: Dr.S.Pichi Reddy, 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/ B-Section   **A.Y.:**2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – B)

Batch B1:21761A0333-21761A0362, 22765A0330-22765A0332

Date	Experiment (Batch)				
	Exp - 1	**Exp – 2**	**Exp – 3**	**Exp – 4**	**Exp – 5**
17-02-2023	B11	B12	B13	B14	B15
24-02-2023	B12	B13	B14	B15	B11
03-02-2023	B13	B14	B15	B11	B12
10-03-2023	B14	B15	B11	B12	B13
17-03-2023	B15	B11	B12	B13	B14
21-03-2023	*REPETITION*				
27-03-2023 To 01-04-2023	*I Mid Examinations*				
	Exp - 6	**Exp – 7**	**Exp– 8**	**Exp – 9**	**Exp – 10**
04-04-2023	B11	B12	B13	B14	B15
11-04-2023	B12	B13	B14	B15	B11
18-04-2023	B13	B14	B15	B11	B12
25-04-2023	B14	B15	B11	B12	B13
02-05-2023	B15	B11	B12	B13	B14
09-05-2023	*REPETITION*				
16-05-2023	**Internal Examinations and Viva Voice**				
05-06-2023 TO 10-06-2023	*II Mid Examinations*				
12-06-2023 TO 17-06-2023	**Preparation and Practical's**				
19-06-2023 TO 01-07-2023	**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.S.Pichi Reddy,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/ B-Section **A.Y.:**2022-2023

PREREQUISITE: Engineering Workshop, Engineering Graphics

Schedule of Experiments (Section – A)

Batch B2:22765A0333 – 22765A0362,

Date	Experiment (Batch)				
	Exp- 1	**Exp– 2**	**Exp – 3**	**Exp – 4**	**Exp – 5**
18-02-2023	B21	B22	B23	B24	B25
25-02-2023	B22	B23	B24	B25	B21
04-03-2023	B23	B24	B25	B21	B22
11-03-2023	B24	B25	B21	B22	B23
18-03-2023	B25	B21	B22	B23	B24
22-03-2023	*REPETITION*				
27-03-2023 To 01-04-2023	*I Mid Examinations*				
	Exp - 6	**Exp – 7**	**Exp – 8**	**Exp – 9**	**Exp – 10**
05-04-2023	B21	B22	B23	B24	B25
12-04-2023	B22	B23	B24	B25	B21
19-04-2023	B23	B24	B25	B21	B22
26-04-2023	B24	B25	B21	B22	B23
03-05-2023	B25	B21	B22	B23	B24
10-05-2023	*REPETITION*				
17-05-2023	**Internal Mid Examinations and Viva Voice**				
05-06-2023 TO 10-06-2023	*II Mid Examinations*				
12-06-2023 TO 17-06-2023	**Preparation and Practical's**				
19-06-2023 TO 01-07-2023	**Semester End Examinations**				

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

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DEPARTMENT OF MECHANICAL ENGINEERING

CYCLE –I

1. Pattern Design and making - for one casting drawing
2. Demonstration of TIG-welding
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   : 2022-2023

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

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

COURSE CREDITS   : 1

COURSE INSTRUCTOR   : Mr.K.V.Viswanadh/Mrs.B.Udaya Lakshmi

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

PRE-REQUISITE: Engineering Mechanics, Theory of Machines

COURSE OBJECTIVE:

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

COURSE OUTCOMES (CO)

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

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

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

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

REFERENCE:

R1	Lab Manual

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

Batch: B1 (21761A0333-362 & 22765A0330-332)

S.No.	Experiment to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Reference	HOD Sign Weekly
1.	Demonstration	3	04-02-2023		TLM8	-	
2.	Experiment-1	3	11-02-2023		TLM8	R1	
3.	Experiment-2	3	25-02-2023		TLM8	R1	
4.	Experiment-3	3	04-03-2023		TLM8	R1	
5.	Experiment-4	3	11-03-2023		TLM8	R1	
6.	Experiment-5	3	18-03-2023		TLM8	R1	
7.	Demonstration	3	25-03-2023		TLM8	-	
8.	**I MID EXAMINATION**						
9.	Experiment-6	3	08-04-2023		TLM8	R1	
10.	Experiment-7	3	15-04-2023		TLM8	R1	
11.	Experiment-8	3	29-04-2023		TLM8	R1	
12.	Experiment-9	3	06-05-2023		TLM8	R1	
13.	Experiment-10	3	13-05-2023		TLM8	R1	
14.	Lab Internal	3	20-05-2023		-	-	

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	27-05-2023		TLM8	-	

Batch:B2 (22761A0333-20761A0362)

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	03-02-2023		TLM8	-	
2.	Experiment-1	3	10-02-2023		TLM8	R1	
3.	Experiment-2	3	17-02-2023		TLM8	R1	
4.	Experiment-3	3	24-02-2023		TLM8	R1	
5.	Experiment-4	3	03-03-2023		TLM8	R1	
6.	Experiment-5	3	10-03-2023		TLM8	R1	
7.	Demonstration	3	17-03-2023		TLM8	-	
8.	Experiment-6	3	24-03-2023		TLM8	R1	

			I MID EXAMINATION					
10.	Experiment-7	3	21-04-2023		TLM8	R1	
11.	Experiment-8	3	28-04-2023		TLM8	R1	
12.	Experiment-9	3	05-05-2023		TLM8	R1	
13.	Experiment-10	3	12-05-2023		TLM8	R1	
14.	Lab Internal	3	19-05-2023		-	-	

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 & Balancing	3	26-05-2023		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	31/01/2023	25/03/2023	8
I Mid Examinations	27/03/2023	01/04/2023	1
II Phase of Instructions	03/04/2023	27/05/2023	8
Summer Vacation	29/05/2023	03/06/2023	1
II Mid Examinations	05/06/2023	10/06/2023	1
Preparation and Practicals	12/06/2023	17/06/2023	1
Semester End Examinations	19/06/2023	01/07/2023	2

EVALUATION PROCESS:

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

Details of Batches:

Batch No.	Reg. No. of Students	Number of Students	Batch No.	Reg. No. of Students	Number of Students
B1A	21761A0333-338	06	B2A	22761A0333-338	06

B1B	21761A0339-344	06		B2B	22761A0339-344	06
B1C	21761A0345-351	06		B2C	22761A0345-350	06
B1D	21761A0352-357	06		B2D	22761A0351-356	06
B1E	21761A0358-362 22761A0330-332	07		B2E	22761A0357-362	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	Whirling Speed of Rotating Shaft	CO1
TOM2	Gear Reducer unit	CO1
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	Verification of Dunkerley's formula for transverse vibrations of beams with different end conditions.	CO4
TOM10	Static and dynamic balancing of rotating masses	CO3
ADD	Study the cam jump phenomenon of various cams and followers.	CO2

NOTIFICATION OF CYCLE

Cycle	Exp.No.	Name of the Experiment	Related CO
Cycle-	TOM1	Whirling Speed of Rotating Shaft	CO1

1	TOM2	Gear Reducer unit	CO1
	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
Cycle-2	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	Verification of Dunkerley's formula for transverse vibrations of beams with different end conditions.	CO4
	TOM10	Static and dynamic balancing of rotating masses	CO3
	ADD	Study the cam jump phenomenon of various cams and followers.	CO2

PROGRAMME EDUCATIONAL OBJECTIVES:

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

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

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

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

2. **Problem analysis**: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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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/ Mrs.B.Udaya lakshmi	Mr.K.V.Viswanadh	Mr.B.Sudheer Kumar	Dr.S.Pichi Reddy
Course Instructor	Course Coordinator	Module Coordinator	HOD

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   **:** 2022-23
COURSE NAME & CODE : Computer Aided Machine Drawing Lab **-** 20ME59
L-T-P STRUCTURE   **:** 0-0-2
COURSE CREDITS   1
COURSE INSTRUCTOR   **:** Mrs.B.Sudheer Kumar/Mr.K.Karthik / Mr.K.Sai Babu
COURSE COORDINATOR: Mrs.B.Sudheer Kumar
PRE-REQUISITE   **:** Computer Aided Engineering Graphics

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

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

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO				1					3		2	1			3
CO				1					3		2	1			3
CO				1					3		2	1			3
CO				1					3		2	1			3

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

MATERIAL:
M1 Lab Manual
BOS APPROVED TEXT BOOKS:
T1 K.L.Narayana, P.Kannaiah& K. Venkata Reddy, Machine Drawing, 4th Edition New Age Publishers. 2004
T2 P.S Gill, Machine Drawing, 18th Edition Eastern Publisher, 2013.
BOS APPROVED REFERENCE BOOKS:
R1 N.Sidheshwar, Machine Drawing, 4th Edition, Tata McGraw Hill, 2001
R2 Dhawan, Machine Drawing, revised edition, S.Chand Publications, 2002
R3 K. C. JOHN, Machine Drawing 6th Edition, Stronck publishers, 2007
R4 N.D.Bhatt, V.M.Panchal Machine Drawing Charotar Publishing House, 2005

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	CO-PO Discussion	03	01/02/23		TLM8	--	M1	
2.	Demonstration To Machine Drawing	03	08/02/23		TLM8	CO1	M1	
3.	Demonstration To Catia-V5	03	15/02/23		TLM8	CO1-4	M1	
4.	Conventional Representations of Various Materials	03	22/02/23		TLM8	CO1	M1	
5.	Conventional Representations of Various Machine Parts	03	01/03/23		TLM8	CO1	M1	
6.	Sectional Views, Thread Profiles	03	15/03/23		TLM8	CO1	M1	
7.	Bolt With Nut And Washer	03	29/03/23		TLM8	CO2	M1	
8.	Flanged Coupling	03	12/04/23		TLM8	CO2	M1	
9.	Rivetted Joints	03	19/04/23		TLM8	CO2	M1	
10.	Stuffing Box Assembly	03	26/04/23		TLM8	CO2	M1	
11.	Piston Assembly	03	03/05/23		TLM8	CO3	M1	
12.	Plummer Block Assembly	03	10/05/23		TLM8	CO3	M1	
13.	Universal Joint Assembly	03	17/05/23		TLM8	CO3	M1	
14.	Screw Jack Assembly	03	24/05/23		TLM8	CO4	M1	
15.	Repetition Exercises	03	31/05/23		TLM8	--	M1	
No. of classes required to complete		**45**			**No. of classes taken:**			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	30/01/2023	25/03/2023	8
I Mid Examinations	27/03/2023	01/04/2023	1
II Phase of Instructions	03/04/2023	27/05/2023	8
Summer Vacation	29/05/2023	03/06/2023	1
II Mid Examinations	05/06/2023	10/06/2023	1
Preparation and Practicals	12/06/2023	17/06/2023	1
Semester End Examinations	19/06/2023	01/07/2023	2
Internship	03/07/2023	15/07/2023	2

EVALUATION PROCESS:

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

List of Experiments:

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

PROGRAMME EDUCATIONAL OBJECTIVES:

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

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

PEO3: To develop inquisitiveness towards good communication and lifelonglearning.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

2. **Problem analysis**: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

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Course Instructor	Course Coordinator	Module Coordinator	HoD
Mrs.B.Sudheer Kumar	Mrs.B.Sudheer Kumar	Mr.B.Sudheer Kumar	Dr.S.Pichi Reddy

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.K.V.Viswanadh, Mrs. B. Kamala Priya, Mr.K.Karthiky
Course Name & Code: – STRUCTURAL AND MODAL ANALYSIS USING ANSYS & 20MES1

Regulation: R20

L-T-P Structure   **: 1-0-2**   **Credits:** 2
Program/Sem/Sec   : B.Tech/IV/B   **A.Y.:** 2022-23
PREREQUISITE: Strength of Materials
COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

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

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

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

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

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

Schedule of Experiments (Section – A)

S.No	Batches	Regd. Nos	Total No. of Students
1	Batch B1	21761A0333-21761A0362, 22765A0333-22765A0362	61

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Structural and Modal Analysis Using ANSYS, Demonstration of all experiments, CEOs, and COs of the Laboratory	4	01-02-2023		TLM4	
Cycle-I						
2.	Introduction to Finite Element Method, Basics of ANSYS interface and its utilities	4	08-02-2023		TLM4	
3.	Structural Analysis of Stepped Bar and Tapered Bar, Static Analysis of a Planar Truss	4	15-02-2023		TLM4	
4.	Static Analysis of a Cantilever Beam, Static Analysis of a Simply Supported Beam with Point Load	4	22-02-2023		TLM4	
5.	Static Analysis of a Simply Supported Beam with Uniformly Distributed Load, Static Analysis of a Simply Supported Beam with Uniformly Varying Load.	4	01-03-2023		TLM4	
6.	Static Analysis of a Fixed Beam Subjected to Axial Load, Stress Analysis of Flat Plates and Simple Shells	4	15-03-2023		TLM4	
Cycle-II						
7.	Stress Analysis of Axi-symmetric Components	4	29-03-2023		TLM4	
8.	Vibration Analysis of Spring-Mass Systems	4	05-04-2023		TLM4	
9.	Mode - Frequency Analysis of Beams and Machine Elements	4	12-04-2023		TLM4	
10.	Revision	4	19-04-2023		TLM4	
11.	Report Preparation	4	26-04-2023		TLM4	
12.	Report Preparation	4	03-05-2023		TLM4	
13.	Reviews	4	10-05-2023		TLM4	
14.	Reviews	4	17-05-2023		TLM4	
15.	Reviews	4	24-05-2023		TLM4	
No. of classes required to complete:			**No. of classes taken:**			

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

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Expt. no's	Marks
Report = **A**	1,2,3,4,5,6,7,8…	A = 10
Quality of Work = **B**	1,2,3,4,5,6,7,8	B = 10
Presentation = **C**	1,2,3,4,5,6,7,8	C = 20
Interaction/Queries = **D**	1,2,3,4,5,6,7,8	D = 10
Total Marks: A + B + C + D = 50	1,2,3,4,5,6,7,8	**50**

PART-D

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Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty				
Signature				