MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India) Sponsored by CMR Educational Society
(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2015 Certified)
Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India. Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

BACHELOR OF TECHNOLOGY
MECHANICAL ENGINEERING

Course Structure and Syllabus
(Batches admitted from the academic year 2018 - 2019)

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

"Autonomous Institution /College" means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

"Academic Autonomy" means freedom to the College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

"Commission" means University Grants Commission.

"AICTE" means All India Council for Technical Education.

"University" the Jawaharlal Nehru Technological University, Hyderabad.

"College" means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.

"Program" means:

Bachelor of Technology (B.Tech) degree program
UG Degree Program: B.Tech

"Branch" means specialization in a program like B.Tech degree program in Electronics & Communication Engineering, B.Tech degree program in Computer Science and Engineering etc.

"Course" or "Subject" means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester.

T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

FOREWORD

The autonomy is conferred on Malla Reddy College of Engineering & Technology (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Malla Reddy College of Engineering & Technology (MRCET) is proud to win the credence of all the above bodies monitoring the quality of education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stakeholders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

"A thought beyond the horizons of success committed for educational excellence"

PRINCIPAL

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India) Sponsored by CMR Educational Society

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2015 Certified)
Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India. Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

VISION

To establish a pedestal for the integral innovation, team spirit, originality and competence in the students, expose them to face the global challenges and become technology leaders of Indian vision of modern society.

MISSION

To become a model institution in the fields of Engineering, Technology and Management.

To impart holistic education to the students to render them as industry ready engineers.

To ensure synchronization of MRCET ideologies with challenging demands of International Pioneering Organizations.

QUALITY POLICY

To implement best practices in Teaching and Learning process for both UG and PG courses meticulously.

To provide state of art infrastructure and expertise to impart quality education.

To groom the students to become intellectually creative and professionally competitive.

To channelize the activities and tune them in heights of commitment and sincerity, the requisites to claim the never - ending ladder of **SUCCESS** year after year.

For more information: www.mrcet.ac.in

Department of Mechanical Engineering

Department Vision:

To become an innovative knowledge center in mechanical engineering through state-of-the-art teaching-learning and research practices, promoting creative thinking professionals.

Articulation of Department Vision Statement:

The science and technological developments have been proliferating the scope of mechanical engineering over i1.0 through i4.0. Innovative practices, Sustainable systems and wide-spread adoption of intelligent systems have been the integral domains in development of product, technology or a service. These technological advances opened numerous research opportunities in Automation, Computational fluid dynamics, Smart manufacturing, Smart-Grids, Transportation, Sustainable energy systems and Environment etc. At this juncture the next generation mechanical engineering professionals should be well trained to provide pragmatic solutions to the dynamic challenges.

The department of Mechanical engineering practices innovative Teaching-Learning methodologies to become an innovative knowledge center in mechanical engineering through state-of-the-art teaching-learning and research practices, promoting creative thinking professionals.

Department Mission:

The Department of Mechanical Engineering is dedicated for transforming the students into highly competent Mechanical engineers to meet the needs of the industry,inachangingandchallengingtechnicalenvironment,bystronglyfocusing in the fundamentals of engineering sciences for achieving excellent results in their professional pursuits.

Articulation of Department Mission Statement:

The Department of Mechanical Engineering mission is on lieu with that of CMR Educational Society and Malla Reddy College of Engineering & Technology. Our Students are provided with a strong theoretical foundation, practical engineering skills, experience in interpersonal communication and teamwork, and a daily emphasis on ethics, professional critical thinking. Our graduates are prepared for successful engagement in commercial and industrial enterprise, research and development, and graduate study. Students are trained to THINK as Engineers. This show cases the mission of the department.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Programme Educational Objectives of the programme offered by the department are broadly listed below:

PEO1: PREPARATION To provide sound foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems.
PEO2: CORE COMPETANCE To provide thorough knowledge in Mechanical Engineering subjects including theoretical knowledge and practical training for preparing physical models pertaining to Thermodynamics, Hydraulics, Heat and Mass Transfer, Dynamicsof Machinery, Jet Propulsion, Automobile Engineering, Element Analysis,Production Technology, Mechatronics etc.
PEO3: INVENTION, INNOVATION AND CREATIVITY To make the students to design, experiment, analyze, interpret in the core field with the help of other inter disciplinary concepts wherever applicable.
PEO4: CAREER DEVELOPMENT To inculcate the habit of lifelong learning for career development through successful completion of advanced degrees, professional development courses, industrial training etc.
PEO5: PROFESSIONALISM Toimparttechnicalknowledge,ethicalvaluesforprofessionaldevelopmentofthe student to solve complex problems and to work in multi-disciplinaryambience, whose solutions lead to significant societal benefits.

The Program Educational Objectives of the program offered by the department are articulated as follows.

PEO1: PREPARATION To provide sound foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems.	The basic requirement for any student is to become asuccessful graduate is to have basic knowledge onfundamentals. Therefore, the first andforemost the objective is defined as Preparation.
PEO2: CORE COMPETANCE To provide thorough knowledge in Mechanical Engineering subjects including theoretical knowledge and practical training for preparing physical models pertaining to core field.	Providing services as per the Government & Industrial development plans andthrust areas. Considering reports and projections of CII, ELIAP,AICTE, HRD etc., on industrial developmentsrequirements.
PEO3: INVENTION, INNOVATION AND CREATIVITY To make the students to design,	Preparing students to solve complex engineeringproblems, which require idea about inventing, innovationand

Program Specific Outcomes (PSOs)

PEO1: PREPARATION To provide sound foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems.	The basic requirement for any student is to become asuccessful graduate is to have basic knowledge onfundamentals. Therefore, the first andforemost the objective is defined as Preparation.
PEO2: CORE COMPETANCE To provide thorough knowledge in Mechanical Engineering subjects including theoretical knowledge and practical training for preparing physical models pertaining to core field.	Providing services as per the Government & Industrial development plans andthrust areas. Considering reports and projections of CII, ELIAP,AICTE, HRD etc., on industrial developmentsrequirements.
PEO3: INVENTION, INNOVATION AND CREATIVITY To make the students to design,	Preparing students to solve complex engineeringproblems, which require idea about inventing, innovationand

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 modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and

responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary 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.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE STRUCTURE

I Year B. Tech – I Semester (Non - Circuit Branches)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R18A0001	English	2	-	-	2	30	70
2	R18A0021	Mathematics – I	3	1	-	4	30	70
3	R18A0013	Engineering Chemistry	3	-	-	3	30	70
4	R18A0261	Basic Electrical and Electronics Engineering	3	-	-	3	30	70
5	R18A0501	Programming for Problem Solving	3	-	-	3	30	70
6	R18A0082	Engineering/IT Workshop	-	-	4	2	30	70
7	R18A0581	Programming for Problem Solving Lab	-	-	3	1.5	30	70
8	R18A0289	Basic Electrical and Electronics Engineering Lab	-	-	3	1.5	30	70
9*	R18A0003	Human Values & Societal Perspectives	2	-	-	-	100	-
TOTAL			**16**	**1**	**10**	**20**	**340**	**560**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

I Year B. Tech – II Semester (Non - Circuit Branches)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R18A0002	Professional English	2	-	-	2	30	70
2	R18A0022	Mathematics – II	3	1	-	4	30	70
3	R18A0012	Engineering Physics	3	-	-	3	30	70
4	R18A0502	Object Oriented Programming	3	-	-	3	30	70
5	R18A0301	Engineering Graphics	1	-	4	3	30	70
6	R18A0083	Engineering Physics/Chemistry Lab	-	-	4	2	30	70
7	R18A0582	Object Oriented Programming Lab	-	-	3	1.5	30	70
8	R18A0081	English Language Communication Skills Lab	-	-	3	1.5	30	70
TOTAL			**12**	**1**	**14**	**20**	**240**	**560**

II Year B. Tech – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R18A0302	Engineering Mechanics	3	-	-	3	30	70
2	R18A0303	Thermodynamics	3	-	-	3	30	70
3	R18A0304	Fluid Mechanics & Hydraulic Machines	2	1	-	3	30	70
4	R18A0305	Materials Engineering	3	-	-	3	30	70
5	R18A0306	Machine Drawing	3	-	-	3	30	70
6	R18A0307	Kinematics of Machinery	3	-	-	3	30	70
7	R18A0381	Fluid Mechanics & Hydraulic Machinery Lab.	-	-	3	1.5	30	70
8	R18A0382	Materials Engineering Lab.	-	-	3	1.5	30	70
9	R18A0014	Environmental Science	2	-	-	-	100	-
TOTAL			**19**	**1**	**6**	**21**	**340**	**560**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

II Year B. Tech – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R18A0308	Applied Thermodynamics	3	-	-	3	30	70
2	R18A0309	Strength of Materials	3	-	-	3	30	70
3	R18A0310	Dynamics of Machinery	2	1	-	3	30	70
4	R18A0311	Manufacturing Processes	3	-	-	3	30	70
5	R18A0024	Probability & Statistics	3	-	-	3	30	70
6	****	**OPEN ELECTIVE 1**	3	-	-	3	30	70
7	R18A0383	Strength of Materials Lab	-	-	3	1.5	30	70
8	R18A0384	Manufacturing Processes Lab.	-	-	3	1.5	30	70
9	R18A0005	Foreign Language(German)	2	-	-	-	100	-
		TOTAL	**19**	**1**	**6**	**21**	**340**	**560**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

OPEN ELECTIVE I		
S.NO	**SUBJECT CODE**	**SUBJECT**
1	R18A0351	Intellectual Property Rights
2	R18A0352	Green Energy Systems
3	R18A0553	Data Structures using python
4	R18A0451	Digital Electronics
5	R18A0551	Data Base Systems
6	R18A0555	Data Visualization

III Year B. Tech – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R18A0312	Computer Integrated Manufacturing Technologies	3	-	-	3	30	70
2	R18A0061	Managerial Economics & Financial Analysis	2	1	-	3	30	70
3	R18A0313	Internal Combustion Engines	3	-	-	3	30	70
4	R18A0314	Machine Design – I	3	-	-	3	30	70
5	***	**PROFESSIONAL ELECTIVE 1**	3	-	-	3	30	70
	R18A0315	Design of Hydraulic and Pneumatic Systems						
	R18A0316	Innovative Design Thinking						
	R18A0317	Mechanical Vibrations						
6	****	**OPEN ELECTIVE -2**	3	-	-	3	30	70
7	R18A0385	Thermal Engineering and EnergyResourcesLab.	-	-	3	1.5	30	70
8	R18A0386	Manufacturing Technology Lab.	-	-	3	1.5	30	70
9*	R18A0521	CYBER SECURITY	2	-	-	-	100	-
		TOTAL	**19**	**1**	**6**	**21**	**340**	**560**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

OPEN ELECTIVE II		
S.NO	**SUBJECT CODE**	**SUBJECT**
1	R18A0353	Enterprise Resource Planning
2	R18A0354	Nano Technology
3	R18A1251	Management Information Systems
4	R18A0552	Introduction to Java Programming
5	R18A1252	Software Project Management

III Year B. Tech – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R18A0318	Heat Transfer	2	1	-	3	30	70
2	R18A0319	Computer Aided Design	3	-	-	3	30	70
3	R18A0320	Machine Design –II	3	-	-	3	30	70
4	***	**PROFESSIONAL ELECTIVE 2**	3	-	-	3	30	70
	R18A0321	Smart Manufacturing Technologies						
	R18A0322	Computational Fluid Dynamics						
	R18A0323	Tool Design						
5	****	**OPEN ELECTIVE 3**	3	-	-	3	30	70
6	R18A0387	Computer Aided Design and Manufacturing Lab	-	-	3	1.5	30	70
7	R18A0388	Heat Transfer Lab.	-	-	3	1.5	30	70
8	R18A0394	Mini Project (Summer Internship)	-	-	6	3	30	70
9*	R18A1205	Artificial Intelligence	2	-	-	-	100	-
TOTAL			**16**	**1**	**12**	**21**	**340**	**560**

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

OPEN ELECTIVE III		
S.NO	**SUBJECT CODE**	**SUBJECT**
1	R18A0355	Total Quality Management
2	R18A0452	Robotics & Automation
3	R18A0251	Electrical Systems & Applications
4	R18A0453	Internet of Things & Its Applications
5	R18A1253	Software Testing Techniques
6	R18A0554	Operating System Concepts

IV Year B. Tech – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R18A0324	Automation and Control Engineering	3	-	-	3	30	70
2	R18A0325	Operations Research	2	1	-	3	30	70
3	R18A0326	Mechanical Measurements and Instrumentation	3	-	-	3	30	70
4	R18A0327	Finite Element Analysis	3	-	-	3	30	70
5	***	**PROFESSIONAL ELECTIVE 3**	3	-	-	3	30	70
	R18A0328	Production and Operations Management						
	R18A0329	Heating Ventilation and Air Conditioning						
	R18A0330	Product Design and Development						
6	R18A0389	Mechanical Measurements and Instrumentation Lab	-	-	3	1.5	30	70
7	R18A0390	Automation and Control Engineering Lab	-	-	3	1.5	30	70
8	R18A0395	Project-I (Project or Summer Internship)	-	-	6	3	30	70
TOTAL			**14**	**1**	**12**	**21**	**240**	**560**

IV Year B. Tech – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R18A0331	Automobile Engineering	3	-	-	3	30	70
2	***	**PROFESSIONAL ELECTIVE 4**	3	-	-	3	30	70
	R18A0332	Industrial Engineering and Management						
	R18A0333	Maintenance and Safety Engineering						
	R18A0334	Technology Management						
3	***	**PROFESSIONAL ELECTIVE 5**	3	-	-	3	30	70
	R18A0335	Renewable Energy Sources						
	R18A0336	Biomass Engineering						
	R18A0337	Energy Conservation and Management						
4	R18A0396	Project –II	-	-	12	6	60	140
TOTAL			**9**	-	**12**	**15**	**150**	**350**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH- I- YEAR- I- SEM -MECH **L T/P/D /C**
2/ - / - / - / 2

(R18A0001)ENGLISH

INTRODUCTION:

English is a global language which is a means to correspond globally. Keeping in account of its vital role in the global market, emphasis is given to train the students to acquire language and communication skills. The syllabus is designed to develop and attain the competency in communicative skills.

The lectures focus on the communication skills and the selected act as resources for the teachers to develop the relevant skills in the students. The lessons stimulate discussions and help in comprehending the content effectively. The focus is on skill development, nurturing ideas and practicing the skills.

Course OBJECTIVES:

1. To enable students to enhance their lexical, grammatical and communicative competence.
2. To equip the students to study the academic subjects with better perspective through theoretical and practical components of the designed syllabus.
3. To familiarize students with the principles of writing to ensure error-free writing.
4. To know to use sentence structure effectively and to understand how to convert ideas logically within a sentence.
5. To expose students to various techniques of reading skills which hone their comprehensive skills.

SYLLABUS:

Unit –I

Chapter entitled "***The Road Not Taken****" by* Robert Frost (8 hrs)
Grammar –Tenses and Punctuation(Sequences of Tenses)
Vocabulary –Word Formation - Prefixes and Suffixes
Writing – Paragraph writing –I (Focusing on Tenses and Punctuations)
Reading – Techniques for effective reading-Reading Exercise –Type 1

Unit – II

Chapter entitled "***Abraham Lincoln's Letter to His Son's Teacher***" (7 hrs)
Grammar – Voices, Transitive and Intransitive Verbs
Vocabulary – Synonyms, Antonyms
Writing – E-mail Writing, Letter Writing (complaints, requisitions, apologies).
Reading – Skimming, scanning- Reading Exercise –Type 2

Unit – III

Chapter entitled "***War***" by L. Pirandello (6 hrs)
Grammar –Degrees of Comparison, Prepositions
Vocabulary – Phrasal Verbs
Writing – Essay Writing (Introduction, body and conclusion)
Reading – Comprehension- Reading Exercise – Type 3

Unit – IV
Chapter entitled "***J K Rowling's Harvard Speech***" (6 hrs)
Grammar – Articles, Misplaced Modifiers
Vocabulary – One-Word Substitutes
Writing – Précis Writing
Reading – Intensive and Extensive reading - Reading Exercise – Type 4

Unit –V
Sentence Structures (phrases and clauses) (7 hrs)
Grammar –Subject-Verb Agreement, Noun-Pronoun Agreement
Vocabulary – Commonly Confused Words
Writing – Memo Writing
Reading – Identifying Errors - Reading Exercise – Type 5

* Exercises apart from the text book shall also be used for classroom tasks.

REFERENCE BOOKS:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course OUTCOMES:

Students will be able to:

1. write formal or informal letters and applications for different purposes.
2. select and extract relevant information through skimming and scanning.
3. utilize the strategy of brainstorming in preparing analytical, argumentative and expository essays.
4. draft concise emails following professional email etiquette.
5. enhance their grammatical competency by spotting errors.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH- I- YEAR- I- SEM –MECH

L	T/P/D	C
3	1/-/-	4

(R18A0021) MATHEMATICS -I

Course Objectives:

1. The concept of rank of a matrix which is used to know the consistency of system of linear equations and to find the eigen vectors of a given matrix.
2. Finding maxima and minima of functions of several variables.
3. Applications of first order ordinary differential equations. (Newton's law of cooling, Natural growth and decay)
4. How to solve first order linear, nonlinear partial differential equations and also method of separation of variables technique to solve typical second order partial differential equations.
5. Solving differential equations using Laplace Transforms.

UNIT I: Matrices

Introduction, types of matrices-symmetric, skew-symmetric, Hermitian, skew-Hermitian, orthogonal, unitary matrices. Rank of a matrix - echelon form, normal form, consistency of system of linear equations (Homogeneous and Non-Homogeneous). Eigen values and Eigen vectors and their properties (without proof), Cayley-Hamilton theorem (without proof), Diagonalisation.

UNIT II:Functions of Several Variables

Limit continuity, partial derivatives and total derivative. Jacobian-Functional dependence and independence. Maxima and minima and saddle points, method of Lagrange multipliers, Taylor's theorem for two variables.

UNIT III:Ordinary Differential Equations

First order ordinary differential equations: Exact, equations reducible to exact form. Applications of first order differential equations - Newton's law of cooling, law of natural growth and decay.

Linear differential equations of second and higher order with constant coefficients: Non-homogeneous term of the type f(x) = e^{ax}, sinax, cosax, x^n, e^{ax} V and x^n V. Method of variation of parameters.

UNIT IV: Partial Differential Equations

Introduction, formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order Lagrange's linear equation and non-linear equations, Charpit's method, Method of separation of variables for second order equations and applications of PDE to one dimensional (Heat equation).

UNIT V: Laplace Transforms

Definition of Laplace transform, domain of the function and Kernel for the Laplace transforms, Existence of Laplace transform, Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied or divided by “t”, Laplace transforms of derivatives and integrals of functions, Unit step function, Periodic function.

Inverse Laplace transform by Partial fractions, Inverse Laplace transforms of functions when they are multiplied or divided by ”s”, Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem, Solving ordinary differential equations by Laplace transforms.

TEXT BOOKS:

i) Higher Engineering Mathematics by B V Ramana ., Tata McGraw Hill.

ii) Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.

iii) Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.

REFERENCE BOOKS:

i)Advanced Engineering Mathematics by R.K Jain & S R K Iyenger, Narosa Publishers.

ii)Advanced Engineering Mathematics by Michael Green Berg, Pearson Publishers .

iii)Engineering Mathematics by N.P Bali and Manish Goyal.

Course Outcomes: After learning the concepts of this paper the student will be able to

1. Analyze the solution of the system of linear equations and to find the Eigen values and Eigen vectors of a matrix.
2. Find the extreme values of functions of two variables with / without constraints.
3. Solve first and higher order differential equations.
4. Solve first order linear and non-linear partial differential equations.
5. Solve differential equations with initial conditions using Laplace Transform.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH – I YEAR – I SEM - MECH

L	T/P/D	C
3	-/-/-	3

(R18A0013) ENGINEERING CHEMISTRY

COURSE OBJECTIVES:

1. To apply the electrochemical principles in batteries, understand the fundamentals of corrosion and development of different techniques in corrosion control.
2. To analyze microscopic chemistry in terms of atomic and molecular orbitals.
3. To analyze water for its various parameters and its significance in industrial and domestic applications.
4. To impart the knowledge of organic reaction mechanisms which are useful for understanding the synthesis of organic compounds.
5. To analyze different types of fuels and their applications in various engineering fields.

Unit-I: Electrochemistry and Corrosion (12 lectures)

Electrochemistry: Introduction to electrochemistry; Electrochemical cells - electrode potentials, construction and working of a galvanic cell, EMF and its applications - potentiometric titration; Nernst equation and its applications; Batteries - classification of batteries, primary cell - lithium cells and secondary cells - lead acid battery and lithium ion battery; Fuel cells - H_2-O_2 fuel cell, its applications and advantages.

Corrosion: Introduction, causes and effects of corrosion; Theories of corrosion- chemical (oxidation corrosion) and electrochemical corrosion, mechanism of electrochemical corrosion; Corrosion control methods - cathodic protection - sacrificial anodic protection & impressed current cathodic protection; Methods of application of metallic coatings - hotdipping - galvanizing & tinning, electroplating (Cu plating) and electroless plating (Ni plating) - advantages and applications of electroplating/electroless plating.

Unit -II: Atomic and Molecular Structure (8 lectures)

Atomic and molecular orbitals; Postulates of molecular orbital theory - Linear Combination of Atomic Orbitals (LCAO); Molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2 and O_2; Metallic bonding, limitations of Valence Bond Theory (VBT).

Crystal field theory (CFT) – Salient features of CFT, crystal field splitting of transition metal ion d-orbitals in tetrahedral and octahedral geometries.

Unit -III: Water and its Treatment (**6 lectures**)

Hardness of water- Types and units of hardness; Estimation of hardness of water by EDTA method; Softening of water by Ion exchange process; Potable water- specifications, methods of disinfectation-chlorination and ozonization; Desalination of water by Reverse Osmosis.

Unit-IV: Organic Reactions (10 lectures)

Introduction to Organic Reactions - Types of reactions; Substitution - Nucleophilic substitution reactions, mechanism of S_N1 and S_N2; Addition - electrophilic and nucleophilic

addition reactions; addition of HBr to propene - Markownikoff and Anti-Markownikoff's additions; Elimination reactions - dehydrohalogenation of alkyl halides; Oxidation reactions - oxidation of alcohols using $KMnO_4$ and chromic acid; Reduction reactions - reduction of carbonyl compounds using $LiAlH_4$ and $NaBH_4$.

Unit-V: Energy Sources (8 lectures)

Fuels- Definition, classification (solid, liquid & gaseous fuels) - characteristics of a good fuel; Coal - analysis of coal-proximate and ultimate analysis and their significance; Petroleum - refining, knocking - octane and cetane number, cracking - fluid bed catalytic cracking; Natural gas, LPG, CNG - constituents, characteristics and uses.

Suggested Text Books:

1. Engineering Chemistry by P.C. Jain & M. Jain, Dhanpat Rai Publishing Company (P) Ltd, 16th Edition, New Delhi.
2. Engineering Chemistry by Prasanta Rath, B. Rama Devi, C. H. Venkata Ramana Reddy, SubhenduChakroborty, Cengage Learning Publication, India Private Limited , 2018.

Reference Books:

1. University Chemistry by B. H. Mahan, Pearson, IV Edition.
2. Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
3. Reactions, Rearrangements and Reagents by S.N. Sanyal, Bharati Bhavan Publishers.

COURSE OUTCOMES: The basic concepts included in this course will help the student to:

1. Understand the operating principles of various types of electrochemical cells, including fuel cells and batteries. Analyze and develop a technically sound, economic and sustainable solution to corrosion problems related to engineering service.
2. Achieve basic concepts of atomic, molecular and electronic changes related to conductivity and magnetism.
3. Familiarize the student with the fundamentals of the treatment technologies and the considerations for its design and implementation in water treatment plants.
4. Gain knowledge on synthesis of organic compounds by using different reaction mechanisms.
5. Comprehend the types of fuels, characteristics and combustion systems with emphasis on engineering applications.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH – I YEAR – I SEM - MECH

L	T/P/D	C
3	-/-/-	3

(R18A0261) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course OBJECTIVES:

1. To apply the electrochemical principles in batteries, understand the fundamentals of corrosion and development of different techniques in corrosion control.
2. To analyze microscopic chemistry in terms of atomic and molecular orbitals.
3. To analyze water for its various parameters and its significance in industrial and domestic applications.
4. To impart the knowledge of organic reaction mechanisms which are useful for understanding the synthesis of organic compounds.
5. To analyze different types of fuels and their applications in various engineering fields.

UNIT –I:

Introduction to Electrical Circuits: Concept of Circuit and Network, Types of elements, R-L-C Parameters, Independent and Dependent sources, Source transformation and Kirchhoff's Laws. (Simple Problems).

UNIT –II:

Network Analysis: Network Reduction Techniques- Series and parallel connections of resistive networks, Star–to-Delta and Delta-to-Star Transformations for Resistive Networks and meshanalysis

Network Theorems: Thevenin's Theorem, Norton's Theorem and Superposition Theorem.

UNIT-III:

Electrical Machines (elementary treatment only):

DC.Generator: principle of operation, constructional features, emf equation. DC Motor: principle of operation, Back emf, torque equation.

Single phase transformer: principle of operation, constructional features and emf equation.

UNIT –IV:

Diodes: P-n junction diode, symbol, V-I Characteristics, Diode applications, Zener Diode: characteristics , Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems).

UNIT –V:

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations. (elementary treatment only)

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University.
2. Basic Electrical and electronics Engineering-D P Kothari. I J NagarathMcGraw Hill Education.

3. Electric Circuits - A. Chakrabarhty, Dhanipat Rai & Sons.

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabratajit, TMH, 2/e, 1998. 3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
3. Linear circuit analysis (time domain phasor and Laplace transform approaches)- 2 nd edition by Raymond A. DeCarlo and Pen-Min-Lin, Oxford University Press-2004.
4. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

Course OUTCOMES: After this course, the student will be able

1. To analyze and solve electrical circuits using network laws and theorems.
2. To identify and characterize diodes and various types of transistors.
3. Design and analyse the DC bias circuitry of BJT
4. Fundamentals Of Constructional Details And Principle Of Operation Of DC Machines And Transformers.
5. Solve differential equations with initial conditions using Laplace Transform.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH – I- YEAR –I SEM- MECH

L	T/P/D	C
3	-/-/-	3

(R18A0501) PROGRAMMING FOR PROBLEM SOLVING

COURSE OBJECTIVES

1. To understand the various steps in Program development.
2. To understand the basic concepts in C Programming Language.
3. To learn how to write modular and readable C Programs
4. To learn to write programs (using structured programming approach) in C to solve problems.
5. To Learn the solving and logical skills to programming in C language and also in other languages.

UNIT - I

Introduction to Computing – Computer Systems-Hardware and Software, Computer Languages, Algorithm, Flowchart, Representation of Algorithm and Flowchart with examples.

Introduction to C– History of C, Features of C, Structure of C Program, Character Set, C Tokens-Keywords, Identifiers, Constants, Variables, Data types, Operators.

UNIT-II

Statements-Selection statements (Decision Making)- if and switch statements with examples, Repetition statements (loops)- while, for, do-while statements with examples, Unconditional statements- break, continue, goto statements with examples.

UNIT – III

Functions-Designing Structured Programs, Types of Functions-User defined functions, Standard functions, Categories of functions, Parameter Passing techniques, Storage classes, Recursion.

UNIT-IV

Arrays- Declaration and Initialization, One dimensional Arrays, Two dimensional Arrays.

Strings- Declaration and Initialization, String Input / Output functions, String manipulation functions.

UNIT-V

Pointers- Introduction, Definition and Declaration of pointers, address operator, Pointer variables, Pointers with Arrays.

Structures- Introduction, Declaration and Initialization, Array of Structures, Unions.

TEXT BOOKS:

1. Computer Programming with C, Special Edition-MRCET, Mc Graw Hill Publishers 2017.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg. Third Edition, Cengage Learning.

REFERENCE BOOKS:

1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
2. Computer Programming, E.Balagurusamy, First Edition, TMH.
3. C and Data structures – P. Padmanabham, Third Edition, B.S. Publications.
4. Programming in *C, Ashok Kamthane*. Pearson Education India.
5. Let us C ,YashwanthKanethkar, 13th Edition, BPB Publications.

COURSE OUTCOMES:

1. Demonstrate the basic knowledge of computer hardware and software.
2. To formulate simple algorithms for arithmetic and logical problems.
3. To translate the algorithms to programs (in C language).
4. To test and execute the programs and correct syntax and logical errors.
5. Ability to apply solving and logical skills to programming in C language and also in other languages.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH – I- YEAR –I SEM- MECH

L	T/P/D	C
-	-/-/ 4	2

(R18A0082)ENGINEERING WORKSHOP/IT WORKSHOP

COURSEOBJECTIVES:

1. Student able to learn about different tools used in the lab
2. Student able to learn about foundry, welding, plumbing, house wiring and Tin smithy operations
3. Student able to learn about different Carpentry and Fitting tools.
4. Student able to learn about different tools used in the lab.
5. Student able to learn about foundry, welding, plumbing, house wiring and Tin smithy operations.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Fitting
3. Tin-Smithy and Development of jobs carried out and soldering.
4. Black Smithy
5. House-wiring

2. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing
2. Machine Shop
3. Welding
4. Foundry

TEXT BOOK:

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
   Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition

COURSE OUTCOMES:

1. Apply knowledge for computer assembling and software installation that meets the specified needs of office considerations.
2. Ability to solve the trouble shooting problems in designing IT tools or any other component related to soft ware.
3. Apply the tools for preparation of PPT, Documentation and budget sheet etc. so that the students cope with any kind of complex activities in their engineering work set up.
4. Students can understand different machine shop operations
5. Students can understand Foundry, welding, plumbing, house wiring and Tin smithy operation and learned about metal cutting processes.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH- I YEAR- I SEM-MECH L T/P/D C

-/ 4 /- 2

(R18A0082)IT WORKSHOP LAB

Course OBJECTIVES:

1. The IT Workshop for engineers is a training lab course spread over 54 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, and Power Point
2. PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows; In addition hardware and software level troubleshooting process, tips and tricks would be covered.
3. Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.
4. Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools.
5. HTML introduction for creating static web pages

PC HARDWARE

Week 1:

Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral

Week 2:

Assembling and disassembling of PC

Week 3:

Every student should individually install MS windows on the personal computer. Basic DOS Commands

Week 4:Hardware Troubleshooting

Students have to be given a PC which does not boot due to improper assembly or defective peripherals Software Troubleshooting: Students have to be given amalfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

Week 5: INTERNET & WEB BROWSERS

Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers And How to access the websites and email& Search Engines & various threats on the internet and would be asked to configure their computer to be safe on the internet, Antivirus downloads to avoid viruses and/or worms.

MS OFFICE

Week 6: MICROSOFT WORD

Word Orientation: an overview of Microsoft (MS) office 2007/ 10: Importance of MS office 2007/10, overview of toolbars, saving files, Using help and resources, rulers, format painter. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Using Word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word &Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Week 7: MICROSOFT EXCEL

Excel Orientation: The importance of MS office 2007/10 tool Excel as a Spreadsheet tool, Accessing, overview of toolbars, saving excel files, Using help and resources.

Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Sorting, Conditional formatting .

Week 8: MICROSOFT POWER POINT

Basic power point utilities and tools which helpful to create basic power point presentation. Topic covered during this includes PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both Latex and Power point.

Create the presentation using the following tools:

Formatting: Color, font type, font size, font style etc.

Header and Footer

Bullets and Numbering

Drawing Toolbar: Auto shapes, Textboxes, etc

Design Template

Introduction to custom animation.

b)Create a presentation to conduct a creativity session using the following tools:

1. Slide transition
2. Master slide view
3. Insert picture – clipart, image
4. Action button
5. Drawing tool bar – lines, arrows
6. Hyperlink
7. Custom animation
8. Hide slide
9. Wash out

Week 9: **HTML**

Introduction to HTML & Basic HTML Tags: Understand what are the tasks used for creation of website

Designing a static web page: Understand how to create a webpage

Course OUTCOMES:

1. The Students are able to identify the major components of a computer and its basic peripherals. They are capable of assembling a personal computer, and can perform installation of system software like MS Windows and required device drivers.
2. Students can detect and perform minor hardware and software level troubleshooting.
3. The Students are capable of working on Internet & World Wide Web and can make effective usage of the internet for academics.
4. The Students develop ability to prepare professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools.
5. The students are able to create a static webpage's using HTML.

Text Books:

1. Introduction to Information Technology,ITL Education Solutions limited,Pearson Education
2. PC Hardware and A+ Handbook-Kate J.Chase PHI(Microsoft)

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH- I YEAR- I SEM-MECH

L	T/P/D	C
-	-/3/-	1.5

(R18A0581) PROGRAMMING FOR PROBLEM SOLVING LAB

Course OBJECTIVES:

1. Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, and Structures.
2. Acquire knowledge about the basic concept of writing a program.
3. Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
4. Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
5. Role of Functions involving the idea of modularity.
6. Programming using gcc compiler in Linux.

Week 1:

a) Write a C program to find sum and average of three numbers.

b) Write a C program to find the sum of individual digits of a given positive integer.

Week 2:

a) Write a C program to generate the first n terms of the Fibonacci sequence.

b) Write a C program to generate prime numbers from 1 to n.

c) Write a C program to check whether given number is Armstrong Number or not.

Week 3:

a) Write a C program to check whether given number is perfect number or not.

b) Write a C program to check whether given number is strong number or not.

Week 4:

a) Write a C program to find the roots of a quadratic equation.

b) Write a C program to performarithmeticoperationsusing switch statement.

Week 5:

a) Write a C program to find factorial of a given integer using non-recursive function.

b) Write a C program to find factorial of a given integer using recursive function.

Week 6:

a) Write C program to find GCD of two integers by using recursive function.

b) Write C program to find GCD of two integers using non-recursive function.

Week 7:

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program to Sort the Array in an Ascending Order

c) Write a C program to find whether given matrix is symmetric or not.

Week 8:

Revision of programs

Week 9:

a) Write a C program to perform addition of two matrices.

b) Write a C program that uses functions to perform multiplication of two Matrices.

Week 10:

a) Write a C program to use function to insert a sub-string in to given main string from a given position.

b) Write a C program that uses functions to delete n Characters from a given position in a given string.

Week 11:

a) Write a C program using user defined functions to determine whether the given string is palindrome or not.

b) Write a C program that displays the position or index in the main string S where the sub string T begins, or - 1 if S doesn't contain T.

Week 12:

a) Write C program to count the number of lines, words and characters in a given text.

b) Write a C program to find the sum of integer array elements using pointers.

Week 13:

a) Write a C program to Calculate Total and Percentage marks of a student using structure.

Week 14:

Revision of Programs

TEXT BOOKS

1. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
2. Computer programming in C.V.RAjaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.NVenkateswarlu and E.V.Prasad,S.Chand Publishers
5. Mastering C,K.R.Venugopal and S.R.Prasad, TMH Publishers.

Course OUTCOMES:

1. Acquire knowledge about the basic concept of writing a program.
2. Understand the Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.

3. Learn how to use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
4. Understand the Role of Functions involving the idea of modularity.
5. Understand the Concept of Array and pointers dealing with memory management.
6. Learn Structures and unions through which derived data types can be formed.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH- I YEAR- I SEM-MECH L T/P/D C

- -/3/- 1.5

(R18A0289) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

Course OBJECTIVES:

1. To Design Electrical Systems.
2. To Analyze A Given Network By Applying Various Network Theorems.
3. To Expose The Students To The Operation Of DC Generator.
4. To Expose The Students To The Operation Of DC Motor and Transformer.
5. To get the knowledge using electrical measuring devices.

CYCLE – 1

1. Verification of KVL and KCL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Verification of Superposition theorem.
5. Swinburne's test on DC shunt machine.
6. OC & SC tests on single phase transformer.

CYCLE – 2

1. PN Junction diode characteristics.
2. Zener diode characteristics.
3. Half wave rectifier with and without filter.
4. Full wave rectifier with and without filter.
5. Transistor CB Characteristics (Input And Output)
6. Transistor CE Characteristics (Input And Output)

NOTE: Any 10 of Above Experiments Are To Be Conducted

Course OUTCOMES:

After successfully studying this course, students will:

1. Explain the concept of circuit laws and network theorems and apply them to laboratory measurements.
2. Be able to systematically obtain the equations that characterize the performance of an electric circuit as well as solving both single phase and DC Machines.
3. Acknowledge the principles of operation and the main features of electric machines and their applications.
4. Acquire skills in using electrical measuring devices.
5. Acquire skills in using electrical measuring devices.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH- I YEAR- I SEM-MECH L T/P/D C
2 - / - / - -

(R18A0003) HUMAN VALUES AND SOCIETAL PERSPECTIVES
(Mandatory Course)

INTRODUCTION:
Human values are the virtues that guide us to take into account human element when one interacts with other human beings. It's both what we expect others to do for us and what we aim to give to other human beings. These human values give the effect of bonding, comforting and reassuring.

Course OBJECTIVES:

This introductory course input is intended:

1. to help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. to facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way.
3. to highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.
4. To learn trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature
5. To facilitate Such a holistic perspective forms the basis of value based living in a natural way.

UNIT - I:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education.

Self Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self exploration. Continuous Happiness and Prosperity

A look at basic Human Aspirations- Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority.

Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT - II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.

Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).

Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT - III:

Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.

Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship.

Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha) - from family to world family!

UNIT - IV:

Understanding Harmony in the nature and Existence - Whole existence as Coexistence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature.

Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT - V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order.
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ekParichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer& Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan& V. S Senthil kumar, Engineering Ethics (includingHumna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story

Course OUTCOMES:

1. The students will be able to obtain happiness and prosperity in their life.
2. They will develop harmony at all levels.
3. They can have satisfying human behavior throughout their life.
4. They will learn trustful and mutually satisfying human behavior.
5. Students will be able to know holistic perspective forms the basis of value based living in a natural way.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

B. TECH- I YEAR- II SEM-MECH

L	T/P/D	C
2	- / - / -	2

(R18A0002) PROFESSIONAL ENGLISH

INTRODUCTION:

English is a tool for global communication and is the dominant language which is sweeping almost all the fields in the world. It has become a necessity for people to speak in English comfortably, if they want to enter the global workforce. Hence, the course is designed to help the students to meet the global standards. Each unit focuses on English skill-set to improve: Interview skills, giving presentations and professional etiquette.

Course OBJECTIVES:

1. To enrich students to express themselves appropriately and fluently in professional contexts.
2. To enhance their employability through regular participation in group discussions and interview skills.
3. To lay foundation with writing strategies for the future workplace needs.
4. To acquaint students with different components of professional presentation skills.
5. To equip students with necessary training in listening to comprehend dialects of English language.

SYLLABUS:

UNIT-I (7 hrs)

Listening - Bill Gate's TED talk on Solving Big Problems
Speaking - Description of Pictures, Places, Objects and Persons
Grammar - Finite and Non-finite verbs
Vocabulary - Business Vocabulary
Writing - Paragraph Writing

Unit –II (8 hrs)

Listening - Google CEO Sundar Pichai's Speech I/O 2017 Keynote
Speaking - Oral presentations
Grammar - Transformation of Sentences
Vocabulary - Idioms
Writing - Abstract Writing

Unit –III (8 hrs)

Listening - Sample Interviews (videos)
Speaking - Mock Interviews
Grammar - Direct and Indirect Speech
Vocabulary - Standard Abbreviations (Mini Project)
Writing - Job applications I (Cover Letter)

Unit – IV (6 hrs)

Listening - Telephonic Interviews

Speaking - Telephonic Expressions
Grammar - Auxiliary verbs
Vocabulary - Word Analogy-I
Writing - Job Application II (Resume)

Unit – V (5 hrs)

Listening - Tanmay Bhakshi's ITU interview
Speaking - Professional Etiquette
Grammar - Common Errors
Vocabulary - Word Analogy-II
Writing - Report Writing

* Exercises apart from the text book shall also be referred for classroom tasks.

REFERNCE BOOKS:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course OUTCOMES:

Students will be able to:

1. draft coherent and unified paragraphs with adequate supporting details.
2. demonstrate problem solving skills, decision-making skills, analytical skills.
3. comprehend and apply the pre-interview preparation techniques for successful interview.
4. achieve expertise in writing resume and cover letter formats.
5. understand the steps of writing 'Reports and Abstract'.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

B. TECH- I YEAR- II SEM-MECH

L	T/P/D	C
3	1/-/ -	4

(R18A0022)MATHEMATICS-II

Course OBJECTIVES:

1. The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data and also used to find the roots of an equation.
2. To learn the concepts curve fitting, numerical integration and numerical solutions of first order ordinary differential equations.
3. Evaluation of improper integrals using Beta and Gamma functions.
4. Evaluation of multiple integrals.
5. In many engineering fields the physical quantities involved are vector valued functions. Hence the vector calculus aims at basic properties of vector valued functions and their applications to line, surface and volume integrals.

UNIT – I: Solutions of algebraic, transcendental equations and Interpolation

Solution of algebraic and transcendental equations: Introduction, Bisection Method, Method of false position, Newton Raphson method and their graphical interpretations.
Interpolation: Introduction, errors in polynomial interpolation, Finite differences - Forward differences, backward differences, central differences. Newton's formulae for interpolation, Gauss's central difference formulae. Interpolation with unevenly spaced points - Lagrange's Interpolation.

UNIT – II: Numerical Methods

Numerical integration: Generalized quadrature - Trapezoidal rule, Simpson's $1/3^{rd}$ and Simpson's $3/8^{th}$ rules.
Numerical solution of ordinary differential equations: Solution by Taylor's series method, Euler's method, Euler's modified method, Runge-Kutta fourth order method.
Curve fitting: Fitting a straight line, second degree curve, exponential curve, power curve by method of least squares.

Unit III: Beta and Gamma functions

Introduction of improper integrals-Beta and Gamma functions - Relation between them, their properties, Evaluation of improper integrals using Beta and Gamma functions.

Unit IV: Double and Triple Integrals

Double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar).

Unit V: Vector Calculus

Introduction, Scalar point function and vector point function, Directional derivative, Gradient, Divergence, Curl and their related properties, Laplacian operator, Line integral - Work done, Surface integrals, Volume integral. Vector integral theoerem-Green's Theorem, Stoke's theorem and Gauss's Divergence Theorems (Statement & their Verification).

TEXT BOOKS:

i) Higher Engineering Mathematics by B V Ramana ., Tata McGraw Hill.
ii) Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
iii) Mathematical Methods by S.R.KIyenger, R.K.Jain, Narosa Publishers.

REFERENCE BOOKS:

i) Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.

ii) Advanced Engineering Mathematics by Michael Greenberg –Pearson publishers.

iii) Introductory Methods of Numerical Analysis by S.S. Sastry, PHI

Course Outcomes: After learning the contents of this paper the student must be able to

1. Find the roots of algebraic, non algebraic equations and predict the value of the data at an intermediate point from a given discrete data.
2. Find the most appropriate formula for a guesses relation of the data variables using curve fitting and this method of analysis data helps engineers to understand the system for better interpretation and decision making.
3. Find a numerical solution for a given differential equation.
4. Evaluate multiple integrals and to have a basic understanding of Beta and Gamma functions..
5. Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

MALLAREDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

B.TECH- I- YEAR- II- SEM –MECH

L	T/P/D	C
3	-/-/-	3

(R18A0012) ENGINEERING PHYSICS

COURSE OBJECTIVES:

1. To understand the basic concepts of oscillations exhibited by various systems in nature.
2. To understand the basic concepts of light through interference and diffraction.
3. To understand band structure of the solids and classification of materials.
4. To understand dielectric and magnetic properties of the materials and enable them to design and apply in different fields.
5. To be able to distinguish ordinary light with a laser light and their applications in different fields.

UNIT – I

HARMONIC OSCILLATIONS (7Hours)

Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator: over, critical and lightly-damped oscillators; Energy decay in damped harmonic oscillator, Quality factor, forced damped harmonic oscillator.

UNIT – II

WAVEOPTICS (10Hours)

Huygen's principle, Interference: Superposition of waves, interference of light by division of wave front and amplitude, Newton's rings, Michelson interferometer, Diffraction: difference between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to single slit, Diffraction grating: Grating spectrum and resolving power.

UNIT- III

INTRODUCTION TO SOLIDS (7 Hours)

Free electron theory, Fermi level, Density of states, Periodic potential, Bloch's theorem, Kronig – Penny modal , E – K diagram, Effective mass, Origin of energy bands in solids, Classification of materials : Metals, semi conductors and insulators.

UNIT – IV

DIELECTRICS AND MAGNETIC PROPERTIES OF MATERIALS (10 Hours)

Dielectrics: Introduction, Types of polarizations (Electronic and Ionic) and calculation of their polarizabilities, Internal fields in a solid, Clausius-Mossotti relation.

Magnetism: Introduction, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Properties of anti-ferro and ferri magnetic materials, Hysteresis curve based on domain theory, Soft and hard magnetic materials.

UNIT-V

LASERS (6Hours)

Characteristics of lasers, Absorption, Spontaneous and Stimulated emissions, Einstein's Coefficients, population inversion, meta stable state, types of pumping, lasing action, construction and working of Ruby Laser, Helium-Neon Laser, Applications of lasers.

TEXT BOOKS:

1. Engineering Physics by Arumugam, Anuradha publications.

2. Engineering Physics- B.K.Pandey, S.Chaturvedi, Cengage Learning.

REFERENCES:

1. Engineering Physics – R.K. Gaur and S.L.Gupta, Dhanpat Rai Publishers.
2. Engineering Physics, S Mani Naidu- Pearson Publishers.
3. Engineering physics 2nd edition –H.K.Malik and A.K. Singh.
4. Engineering Physics – P.K. Palaniswamy, Scitech publications.
5. Physics by Resnick and Haliday.

COURSE OUTCOMES: After completion of studying Engineering Physics the student is able to,

1. Analyze the various oscillations made by different oscillating bodies in nature.
2. Learn to design a device to go to maximum accuracy in measuring the dimensions optically.
3. Get the knowledge of classification of materials which is used for various applications in material technology.
4. Learn dielectric, magnetic properties of the materials and apply them in material technology.
5. Learn the principles, production of LASER beam and application of LASER in various fields.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH- I- YEAR- II- SEM –MECH L T/P/D C
3 -/-/- 3

(R18A0502)OBJECT ORIENTED PROGRAMMING

OBJECTIVES:

To teach the student the concepts of object oriented and generic programming.
To differentiate between object oriented programming and procedural programming.
To design applications using object oriented features.
To teach the student to implement object oriented concepts.

Unit - I

Introduction to Object Oriented Programming: Object oriented paradigm-Differences between Object Oriented Programming and Procedure oriented programming, Basic concepts of Object Oriented Programming, Benefits of OOP, Structure of a C++ program, namespace, Data types, C++ tokens, Identifiers, Variables, Constants, Operators, Control structures &Loops.

Functions: Introduction to functions, Inline functions, Command Line arguments.

Unit - II

Classes and Objects:

Introduction of Classes: Class Definition, Defining a Members, Objects, Access Control, Class Scope, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Friend Functions.

Constructors and Destructors:

Introduction to Constructors, Default Constructors, Parameterized Constructors, Copy Constructors, Destructors.

Unit - III

Inheritance: Introduction to inheritance, Defining Derived Classes, Single Inheritance, Multiple Inheritance, Multi level Inheritance, Hierarchical Inheritance, Hybrid Inheritance.

Pointers: Introduction to Memory management, new operator and delete operator, Pointers to objects, Pointers to Derived Classes.

Unit - IV

Virtual Functions and Polymorphism:

Polymorphism, Compile time polymorphism: Overloading- Function Overloading, Operator overloading, Run time polymorphism, Virtual Functions.

Exception handling:

Basics of Exception Handling, Types of exceptions, Exception Handing Mechanism, Throwing and Catching Mechanism.

Unit -V

Templates:

Introduction to Templates, Class Templates, Class Templates with Multiple Parameters, Function Templates, Function Templates with Multiple Parameters, Standard Template Library Classes: STL Container classes-Array class, Vector,stack,queue, STL Algorithm classes- Sort, reverse, max, min.

Application Development using C++

Text Books:

1. Object Oriented Programming with C++ by Balaguruswamy
2. C++, the Complete Reference, 4th Edition, Herbert Schildt,TMH.

References:

1. C++ Primer, 3rd Edition, S.B.Lippman and J.Lajoie, Pearson Education.

The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Education.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH- I- YEAR- II- SEM –MECH L T/P/D C

1 -/-/4 3

(R18A0301)ENGINEERING GRAPHICS

Course Objectives:

1. To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient and to introduce fundamental concepts of curves used in engineering,
2. Students are capable to understand the Orthographic Projections of Points and Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products.
3. Understands and becomes efficient in applying the concept of Orthographic Projections of Points, Lines and Planes in industrial applications
4. Can employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
5. Analyze a drawing and can efficiently communicate ideas graphically.

UNIT – I

Introduction To Engineering Drawing: Principles of Engineering Drawing/Graphics – Various DrawingInstruments – Conventions in Drawing- Dimensioning – Lettering practice – BIS Conventions.

a) Polygons – Construction of regular polygons (General Method only)
b) Conic Sections (General Method only- Eccentricity Method)
c) Cycloid, Epicycloid and Hypocycloid
d) Scales-Plain, Diagonal and Vernier

UNIT – II

Orthographic Projection in First Angle only: Principles of Orthographic Projections – Conventions – First and Third Angle projections (Introduction).

Projections of Points. Points in all four quadrants.

Projections of Lines– Parallel and inclined to both planes.

UNIT – III

Projections of Planes: Projection of regular planes, Plane inclined to both reference planes (No conditional problems).

Projections of Solids: Projections of regular solids prism and pyramid inclined to both planes (No conditional problems).

UNIT – IV

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Plane Figures, Simple and Compound Solids.

UNIT – V

Transformation of Projections: Conversion of Isometric Views to Orthographic Views.

Conversion oforthographic views to isometric views – simple objects

Basic Principles of ACAD – Demo Only.

TEXT BOOKS

1. Engineering Drawing, Special Edition-MRCET, McGrahill Publishers, 2017.
2. Engineering Drawing, N.D. Bhatt
3. Engineering Drawing by K.Venu Gopal&V.Prabu Raja New Age Publications.

REFERENCES

1. Engineering drawing – P.J. Shah .S.Chand Publishers.
2. Engineering Drawing- Johle/Tata Macgraw Hill Book Publishers.

Course Outcomes:

1. Get knowledge on usage of various drawing instruments and capable to draw various curves like conic curves, cycloidal curves and involutes.
2. Understand the Orthographic Projections of Points and Lines and are able to improve their visualization skills so that they can apply these skills in developing the new products.
3. Understand about orthographic projection and able to draw planes and solids according to orthographic projections.
4. Can employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
5. To convert and draw the given orthographic view to isometric view and vice versa.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH- I YEAR – II- SEM - MECH L T/P/D C

- -/4/- 2

(R18A0082)ENGINEERING PHYSICS / CHEMISTRY LAB

(Any 8 experiments compulsory)

COURSE OBJECTIVES

1. The engineering students are exposed in physics lab to understand physical parameters practically.
2. The list of experiments enables the students to know different branches like mechanics, optics and electronics.
3. The students are thoroughly trained in learning practical skills by completing all the experiments in physics lab.
4. Practical implementation of fundamental concepts.
5. The students are thoroughly trained in learning practical skills by completing all the experiments in chemistry lab.

This course on physics lab is designed with 10 experiments in an academic year. It is common to all branches of Engineering in B.Tech 1st year.

LIST OF EXPERIMENTS: (Any eight experiments compulsory)

1. Torsional pendulum-Rigidity modulus of given wire.
2. Melde's experiment –Transverse and Longitudinal modes.
3. Stewart and Gee's method- Magnetic field along the axis of current carrying coil.
4. Spectrometer-Dispersive power of the material of a prism
5. Diffraction grating-using laser -Wave length of light.
6. Newton's Rings –Radius of curvature of Plano convex lens.
7. C-R circuit – Time Constant of RC circuit
8. Characteristics of LED.
9. Characteristics of a Solar cell.
10. Evaluation of numerical aperture of optical fiber.

Reference practical physics books:

1. Practical physics by **Dr. Aparna**, V.G.S.publications.
2. Engineering physics practical lab manual – **MRCET.**

COURSE OUTCOMES:

1. The students learn the concepts of error, analyze and try to formulate new solutions to the problems related to engineering physics.

2. B.Tech students basically learning the mechanical behavior of the wire and practically determining the elastic constant. Transverse and longitudinal waves are practically studied. Variation of the magnetic fields along with terrestrial magnetism is practically studied.
3. Dispersion of the composite light is clearly observed by the students. Wavelengths of the source of light/laser are determined experimentally.
4. Opto electronic devices and their working are practically realized by the students. In addition the functioning of optical fiber is practically studied.
5. The students learn experimental skills to design new experiments suitable for requirements in different fields(industrial, medical, scientific fields etc.)

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH- I YEAR – II- SEM - MECH

L	T/P/D	C
-	-/4/-	2

(R18A0082) ENGINEERING CHEMISTRY LAB

(Any Eight Experiment Compulsory)

COURSE OBJECTIVES:

This course on chemistry lab is designed with 10 experiments in an academic year. It is common to all branches of Engineering in 1st B.Tech.

The objective of the course is that the student will have exposure to various experimental skills which is very essential for an Engineering student. At the end of the course the student is expected to

1. Provide the students with a solid foundation in chemistry laboratory required to solve engineering problems.
2. Practical implementation of fundamental concepts.
3. The students are thoroughly trained in learning practical skills by completing all the experiments in chemistry lab.
4. Prepare synthetic drug molecule.
5. Determine the strength of an acid by conductometric and potentiometric methods.
6. Find the amount of Fe^{+2} and Cu^{2+} present in unknown substances using titrimetric and instrumental methods.

List of Experiments

Titrimetry:

1. Estimation of hardness of water by EDTA method.

Instrumental Methods:

Colorimetry:

2. Determination of Ferrous iron in cement by Colorimetric method
3. Estimation of Copper by Colorimetric method.

Conductometry:

4. Estimation of HCl by Conductometric titrations.
5. Estimation of Acetic acid in a mixture of HCl and Acetic acid by Conductometric titrations.

Potentiometry:

6. Estimation of HCl by Potentiometric titrations.
7. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$.

Preparation:

8. Preparation of Aspirin.

Physical properties:

9. Determination of Viscosity of sample oil by Redwood Viscometer.
10. Determination of Surface Tension of a given liquid by Stalagmometer.

Text Book:

1. Inorganic quantitative analysis, Vogel
2. A text book on experiments and calculation in Engineering Chemistry by S.S. Dara

Suggested Readings:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Text Book of Engineering Chemistry by R. N. Goyal and Harrmendra Goel, Ane Books Private Ltd.

COURSE OUTCOMES: At the end of the course students will be able to

1. Estimate the total hardness present in a sample of water.
2. Select lubricants for various purposes and determine the surface tension of a given liquid.
3. Prepare synthetic drug molecule.
4. Determine the strength of an acid by conductometric and potentiometric methods.
5. Find the amount of Fe^{+2} and Cu^{2+} present in unknown substances using titrimetric and instrumental methods.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH- I YEAR – II- SEM - MECH L T/P/D C
- -/3/- 1.5

(R18A0582)OBJECT ORIENTED PROGRAMMING LAB

COURSE OBJECTIVES:

1. To strengthen problem solving ability by using the characteristics of an object-oriented approach.
2. To design applications using object oriented features
3. To handle Exceptions in programs.
4. To teach the student to implement object oriented concepts.
5. To strengthen problem solving ability by using the characteristics of an object-oriented approach

Week 1:

Basic C++ Programs

Week2:

a) Write a C++ program to find the sum of individual digits of a positive integer.
b) Write a C++ program to generate the first n terms of the sequence.

Week 3:

a) Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
b) Write a C++ program to find both the largest and smallest number in a list of integers.

Week 4:

a) Write a C++ program to sort a list of numbers in ascending order.
b) Write a Program to illustrate New and Delete Keywords for dynamic memory allocation

Week 5

a) Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.

b) Program to illustrate default constructor, parameterized constructor and copy constructors

c) Write a Program to Implement a Class STUDENT having Following Members:

Member	Description
Data members	
Sname	Name of the student
Marks array	Marks of the student

Total	Total marks obtained
Tmax	Total maximum marks
Member functions	
Member	Description
ssign()	Assign Initial Values
compute()	to Compute Total, Average
display()	to Display the Data.

Week 6:

a) Write a Program to Demonstrate the i)OperatorOverloading.ii) Function Overloading.

b) Write a Program to Demonstrate Friend Function and Friend Class.

Week 7:

a) Write a Program to Access Members of a STUDENT Class Using Pointer to Object Members.

b) Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.

Week 8:

Revision laboratory

Week 9

Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are:

a) Reading a matrix. b) Addition of matrices. c) Printing a matrix.

d) Subtraction of matrices. e) Multiplication of matrices

Week 10

Write C++ programs that illustrate how the following forms of inheritance are supported:

a)Single inheritance b)Multiple inheritance c)Multi level inheritance d)Hierarchical inheritance

Week 11

a.)Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.

b) Write a Program to Invoking Derived Class Member Through Base Class Pointer.

Week 12

a) Write a Template Based Program to Sort the Given List of Elements.

b) Write a C++ program that uses function templates to find the largest and smallest number in a list of integers and to sort a list of numbers in ascending order.

Week 13

a) Write a Program Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly.
b) Write a Program to Demonstrate the Catching of All Exceptions.

Week 14

Revision

Text Books:

1. Object Oriented Programming with C++ by Balagurusamy
2. C++, the Complete Reference, 4th Edition, Herbert Schildt, TMH.

References:

1. C++ Primer, 3rd Edition, S.B.Lippman and J.Lajoie, Pearson Education.
2. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Education.

COURSE OUTCOMES:

1. Learn problem solving ability by using the characteristics of an object-oriented approach.
2. Explain the applications using object oriented features.
3. Explain the handling exception handlings
4. Able to the student to implement object oriented concepts.
5. To teach problem solving ability by using the characteristics of an object-oriented approach

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH- I YEAR – II- SEM - MECH

L	T/P/D	C
-	-/3/-	1.5

(R18A0081)ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The Language Lab focuses on phonetic knowledge of the English language and its use in everyday situations and contexts.

COURSE OBJECTIVES:

1. To expose students to a variety of self-instructional, learner-friendly modes of language learning
2. To enable students to learn accurate pronunciation through stress on word accent, intonation and rhythm.
3. To enable students to overcome public speaking anxiety and equip them to become employable.
4. To familiarize students with formal telephonic expressions by means of appropriate tone.
5. To foster sentence-level and holistic understanding of the context through active listening.

Syllabus: English Language Communication Skills Lab has two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English Language Communication Skills Lab.

UNIT –I

CALL Lab: Introduction to Phonetics –Speech Sounds –Vowels and Consonants- Transcriptions

ICS Lab: Ice-Breaking Activity - JAM Session- Greetings –Taking Leave – Introducing Oneself and Others.

UNIT –II

CALL Lab: Syllabification - Stress &Intonation- Rules of Stress Markings and Intonation

ICS Lab: Situational Dialogues/Role Plays - MakingRequests and Seeking Permissions.

UNIT –III

CALL Lab: Listening Activities (Its Importance – Purpose- Process- Listening for General and Specific Details.)

ICS Lab: Communication at Work Place - Professional Etiquettes, Telephone Etiquette.

ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i) P –IV Processor
   a)Speed –2.8 GHZ
   b)RAM –512 MB Minimum
   c)HardDisk –80 GB

ii) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab :

A spacious room with movable chairs and audio-visual aids with a public address system, a T. V, a digital stereo –audio & video system and camcorder etc.

DISTRIBUTION AND WEIGHTAGE OF MARKS

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year-end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the other institution.

COURSE OUTCOMES:

Students will be able to:

1. understand the importance of learning phonetics.
2. learn how to pronounce words using phonetic transcription.
3. know the importance of speaking English with rhythm and intonation.
4. effectively participate in JAM session.
5. use polite expressions in all formal situations.
6. effectively communicate through telephone.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B.Tech MECH-I SEM **L T/P/D C**

3 **-/-/-** **3**

(R18A0302) ENGINEERING MECHANICS

Course Objectives:

1. Explain the resolution of a system of forces, compute their resultant and solveproblems using equations of equilibrium.
2. Perform analysis of bodies lying on rough surfaces.
3. Explain the concept of analysis of trusses using method of joints and method of sections.
4. Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections.
5. Explain kinetics and kinematics of particles, projectiles, curvilinear motion,centroidal motion and plane motion of rigid bodies.

Unit – I

Introduction**Resultants of Force System** Parallelogram law **–**Forces and components-Resultant of coplanar Concurrent Forces Moment of Force-problems.

Equilibrium of Force Systems: Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems

Unit – II

FRICTION: Introduction **–** Theory of Friction – Angle of friction - Laws of Friction – Static and Dynamic Frictions

Analysis of Pin-Jointed Plane Frames: Determination of Forces in members of plane, pin jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever &simply–supported trusses-by method of joints, method of sections

Unit – III

Centroids and Centers of Gravity: Introduction – Centroids and Centre of gravity of simple figures (frombasicprinciples) – Centroids of Composite Figures - Theorem of Pappus – Center of gravity of bodies and centroids of volumes.

Unit – IV

Moments of Inertia: Definition – Polar Moment of Inertia –Radius of gyration - Transfer formula for moment ofinertia - Moments of Inertia for Composite areas - Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses- Transfer Formula for Mass Moments of Inertia - massmoment of inertia of composite bodies.

Unit – V

Kinematics of a Particle: Motion of a particle – Rectilinear motion – motion curves – Rectangular components of curvilinear motion.

Kinetics of particles: D'AlembertsPrincile for plane motion and Connected bodies

TEXT BOOKS:

1. Engineering Mechanics/ S. Timoshenko and D.H. Young, Mc Graw Hill Book Company.
2. Engineering Mechanics - Statics and Dynamics by Vijaya Kumar Reddy K , Suresh Kumar J.BS Publications

REFERENCES:

1. Engineering Mechanics / S.S. Bhavikati& K.G. Rajasekharappa
2. A text of Engineering Mechanics / YVD Rao / K. GovindaRajulu/ M. Manzoor Hussain, Academic Publishing Company
3. Engg. Mechanics / M.V. Seshagiri Rao & D Rama Durgaiah/ Universities Press
4. Engineering Mechanics, Umesh Regl / Tayal.
5. Engineering Mechanics / KL Kumar / Tata McGraw Hill.
6. Engineering Mechanics / Irving Shames / Prentice Hall

Course Outcomes:

1. Gain the knowledge on the concepts of force, moment and its application.
2. Understand and apply the knowledge on drawing free body diagrams and solve the problems using analytical methods and law of triangle of forces.
3. Students are capable of finding centroid, center of gravity, moment of inertia and polar moment of inertia including transfer methods and their applications.
4. Understanding the motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion
5. Understand and apply the knowledge on concepts of D'Alembert's principle and particle motion

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

	L	T/P/D	C
II Year B.Tech MECH-I SEM	**3**	**0**	**3**

(R18A0303) THERMODYNAMICS

Course Objectives:

1. To understand the concepts of energy transformation, conversion of heat into work.
2. To understand why and how natural processes occur only in one direction unaided.
3. To apply the concepts of thermodynamics to basic energy systems.
4. To understand how the change of state results in a process.
5. Why air standard cycles are important.

UNIT-I

Basic Concepts : System - Types of Systems - Control Volume - Macroscopic and Microscopic viewpoints - Thermodynamic Equilibrium- State, Property, Process, Cycle – Reversibility – Quasi static Process, Irreversible Process, Causes of Irreversibility – Work and Heat, Point and Path functions. Zeroth Law of Thermodynamics – Principles of Thermometry –Constant Volume gas Thermometer – Scales of Temperature – PMM I - Joule's Experiment – First law of Thermodynamics – Corollaries – First law applied to a Process– Steady Flow Energy Equation.

UNIT-II

Limitations of the First Law - Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Clausius Inequality, Entropy, Principle of Entropy Increase – Energy Equation, Availability and Irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz Functions, Maxwell Relations – Elementary Treatment of the Third Law of Thermodynamics.

UNIT-III

Pure Substances: p-V-T- surfaces, T-S and h-s diagrams, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Mollier charts – Various Thermodynamic processes and energy Transfer – Steam Calorimetry. Perfect Gas Laws – Equation of State, specific and Universal Gas constants – Various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy – Throttling and Free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander Waals Equation of State.

UNIT-IV

Mixtures of perfect Gases : Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction , Volume fraction and partial pressure, Equivalent Gas constant, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases, Vapour, and Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature,

Thermodynamic Wet Bulb Temperature, Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation – Psychrometric chart.

UNI-V

Power Cycles : Otto cycle, Diesel cycle, Dual Combustion cycle and Brayton cycle description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – Comparison of Cycles. Basic Rankine cycle – Performance Evaluation.

TEXT BOOKS:

1. Engineering Thermodynamics, Special Edition. MRCET, McGrahill Publishers.
2. Engineering Thermodynamics / PK Nag /TMH, III Edition
3. Thermodynamics – J.P.Holman / McGrawHill

REFERENCE BOOKS:

1. Engineering Thermodynamics – Jones & Dugan
2. Thermodynamics – An Engineering Approach – YunusCengel& Boles /TMH
3. An introduction to Thermodynamics / YVC Rao / New Age
4. Engineering Thermodynamics – K. Ramakrishna / Anuradha Publisher

Course Outcomes:

1. To differentiate between quality and quantity of energy, heat and work, enthalpy and entropy, etc.
2. Quantify the irreversibilites associated with each possibility and choose an optimal cycle.
3. Able to analyze Mollier chart, Gas tables in order to estimate thermodynamic properties such as WBT, DBT, RH etc.
4. Able to utilize psychrometric chart and estimate the various psychrometric properties.
5. Assess which cycle to use for a given application and source of heat.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-I Sem

L	P	C
2	1	3

(R18A0304) FLUID MECHANICS & HYDRAULIC MACHINES

Course Objectives:

1. To give insight knowledge on fluid statics and kinematics.
2. To gain knowledge on fluid dynamics.
3. To give basic understanding of Hydro Electric power plant and importance of impact of jets.
4. To become familiar about different types of turbines and able to analyze the performance characteristics of various turbines.
5. To be able to understand the working of power absorbing devices like pumps and able to analyze their performance characteristics.

UNIT-I

Fluid Statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT-II

Fluid Kinematics : Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

Fluid Dynamics: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT-III

Boundary Layer Concept: Definition, thickness, characteristics along thin plate, laminar and turbulent boundary layers (No derivation).

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Major and Minor losses - pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pitot tube, venturimeter, and orifice meter.

UNIT-IV

Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes.

Hydraulic Turbines: Classification of turbines, impulse and reaction turbines,

Pelton wheel turbine, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies. Hydraulic design- draft tube theory- functions and efficiency.

Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, cavitation, surge tank, water hammer.

UNIT-V

Centrifugal Pumps: Classification, working, work done – manomertic head and efficiencies specific speed- performance characteristic curves, NPSH.

Reciprocating Pumps: Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.
3. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International

REFERENCE BOOKS:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria& Sons.
2. Hydraulic Machines by Banga& Sharma, Khanna Publishers.
3. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley , Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements).

Course Outcomes:

1. Gain the knowledge on fluid mechanics fundamentals like fluid statics and fluid kinematics
2. Have basic idea about the fundamental equations used in Fluid Dynamics and are able to apply these concepts in real working environment
3. Study the fundamentals of turbo machinery and elements of hydroelectric power plant.
4. Measure the performance of the different types of Hydraulic Turbines
5. Calculate the performance of the different types of Hydraulic Pumps**.**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R18A0305) MATERIALS ENGINEERING

Course Objectives:

1. To understand various mechanical properties of materials.
2. To understand how and why the properties of materials are controlled by its structure at the microscopic and macroscopic levels.
3. To understand how and why the structure and composition of a material may be controlled by processing.
4. To create different types of composite materials and its applications.
5. To remember polymer material classifications and applications.

UNIT-I

Structure of Materials: Structure of atom – Atomic models – Bonding in solids – Bonding forces and energies – Ionic, Covalent, metallic and van der Waals Bond - Crystal structure - Unit Cell – Bravais lattice – BCC – FCC – HCP - Interstitial sites – NaCl crystal – CsCl crystal – Perovskite structure – Diamond structure – Graphite – Crystal directions and planes.

UNIT-II

Structure of Metals and Alloys - Imperfection in crystals – Point defects – Dislocations – Slip plane – Movement of dislocations – Planar defects and grain boundaries – solid solutions – Hume Rothery rule – Phase diagram – Lever rule – Gibb's phase rule – Phase diagram for binary alloys – Eutectic – Peritectic – Eutectoid – Zone refining, Solidification of pure metals and alloys, Short and long freeze range alloys, basic concepts of powder metallurgy.

UNIT-III

Ferrous and Non Ferrous Alloys: Allotropy and phase change of pure iron – Classification of steels and cast iron – iron – carbon equilibrium diagram – Microstructure of iron and steel - Ferrous alloys and their applications, High Resistivity alloys – nichrome, manganin, constantan and kanthal and their composition and applications – Super hard materials - Tungsten carbide and Boron nitrides.

Heat Treatment Methods: Annealing, hardening, tempering, normalizing, surface hardening

UNIT-IV

Ceramic Materials:Introduction to Ceramics, Advanced Ceramic Materials - Crystal Structures –Silicate ceramics, glass and its manufacturing process, Functional properties and applications of ceramic materials.

Composites Materials: Introduction,Classification of composites - Fiber reinforced materials – Law of mixtures – Continuous fibers – discontinuous fibers – Particle-reinforced materials – Cermets – Dispersion strengthened materials – Laminates - Application of composites in electrical and mechanical components – nuclear industry.

UNIT-V

Polymer Materials: Polymers,Classification of polymer – Mechanisms of polymerization - Some commercially important individual polymer – Thermoplastics - Elastomers –

Thermosets – Engineering plastics - Liquid crystal polymers - Conductive polymers – High Performance fibers - Biomedical applications – Photonic polymers.

TEXT BOOKS:

1. Material Science by Dr. Kodgire, Everest publications,Pune.
2. V.Raghavan, Material Science and Engineering, Prentice –Hall of India Pvt. Ltd., 2007
3. Sidney H. Avner, Introduction to physical metallurgy, Tata Mc-Graw-Hill, Inc. 1997.

REFERENCE BOOKS:

1. Donald R. Askeland, Pradeep P. Phule, The Science and Engineering of Materials 4thEdition,Thomson/Brooks/Cole,2003.
2. William F.Smith, Structural Properties of Engineering Alloys, Tata Mc-Graw-Hill, Inc., 1993.
3. Kingery. W.D., Bowen H.K. and Uhlmann D.R., Introduction to Ceramics, 2nd Edition, John Wiley & Sons, New York, 1976.

Course Outcomes:

1. Summarizing the concepts of material science properties in the design and development of mechanical systems.
2. Creativeness in new systems components and processes in the field of engineering.
3. Interpreting the heat treatment process and types of alloys for mechanical engineering applications useful to the society.
4. Produce different methods of composite materials for automobile and aeronautical applications.
5. To recalling relevant knowledge from long term memory in types of polymers.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-ISem

L	T/P/D	C
3	0	3

(R18A0306) MACHINE DRAWING

Course Objectives:

1. To visualize an object and convert it into a drawing.
2. To gain knowledge of conventional representation of various machining and mechanical details as per IS.
3. To gain knowledge of threads, bolts, nuts, stud bolts, tap bolts, set screws,Keys, cottered joints and knuckle joint.
4. To gain knowledge ofRivetedjoints,shaftcoupling,pipe joints.
5. To become conversant with 2-D and 3-D drafting

MACHINE DRAWING CONVENTIONS:

1.Need for drawing conventions –Introduction to IS conventions.

2. Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears.

3. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, canters curved and tapered features.

4.Title boxes, their size, location and details -common abbreviations & their liberal usage

5.Types of Drawings –working drawings for machine parts.

I. DRAWING OF MACHINE ELEMENTS AND SIMPLE PARTS:

Selection of Views, additional views for the following machine elements and parts with everydrawing proportion.

a) Screwed fasteners: Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

b) Keys, Cottersand Pin joints:

i)Saddle keys, sunk keys

ii)Cotter joint with sleeve, cotter joint with socket &spigot ends, cotter joint with a gib.

iii)knuckle joint

c) Riveted joints for plates

d) Shaft couplings:

i)Rigid couplings-sleeve or muff couplings, Flanged couplings

ii)Flexible couplings-Bushed pin type flanged coupling, compression coupling

iii)Dis-engaging couplings-claw coupling, cone coupling

iv)Non-Aligned couplings-Universal coupling(Hooke's Joint),Oldham coupling, cushion coupling&spigot and socket pipe joint.

e) Journal, pivot and collar and foot step bearings.

II. ASSEMBLY DRAWINGS:

Drawings of assembled views for the part drawings ofthe following using conventions and easydrawing proportions.

a) Engine parts –stuffing box, cross head, Eccentric, Petrol Engine connecting rod.

b) Other machine parts -Screws jack, Machine Vice, Plummer block, Tailstock.

c) Valves:spring loaded safety valve, feed check valve .

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:

1. Machine Drawing –K.L.Narayana, P.Kannaiah&K.VenkataReddy / New Age/ Publishers

2. Machine Drawing –Dhawan, S.Chand Publications

3. Machine Drawing BySiddeswar.N&Kannaiah.P and V.V.S Sastry.

REFERENCE BOOKS:

1. Machine Drawing –P.S.Gill.

2. Machine Drawing –Luzzader

3. Machine Drawing –Rajput

Course Outcomes:

1. Student will be able to Visualize and prepare detail drawing of a given object.
2. Student will able to draw threads, bolts, nuts, stud bolts, tap bolts, set screws,Keys, Cottered joints and knuckle joint.
3. Draw Riveted joints, shaft coupling, pipe joints.
4. Draw details and assembly of mechanical systems, Read and interpret a given drawing
5. Create 2-D and 3-D models using any standard CAD software with manufacturing considerations.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-I Sem

L	T/P/D	C
3	-	3

(R18A0307) KINEMATICS OF MACHINERY

Course Objectives:

1. To impart knowledge on various types of Mechanisms and synthesis
2. To Synthesize and analyze 4 bar mechanisms
3. To impart skills to analyse the position, velocity and acceleration of mechanisms
4. To perform synthesis of mechanism by analytical and graphical method
5. To familiarize higher pairs like cams and principles of cams design
6. To study the relative motion analysis and design of gears, gear trains.

UNIT-I

Mechanisms : Elements or Links , Classification, Rigid Link, flexible and fluid link, Types of kinematic pairs , sliding, turning, rolling, screw and spherical pairs lower and higher pairs, closed and open pairs, constrained motion, completely, partially or successfully constrained and incompletely constrained .

Machines : Mechanism and machines, classification of machines, kinematic chain , inversion of mechanism, inversion of mechanism , inversions of quadric cycle, chain , single and double slider crank chains.

UNIT-II

Straight Line Motion Mechanisms: Exact and approximate copiers and generated types Peaucellier, Hart and Scott Russul Grasshopper Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

Steering Mechanisms: Conditions for correct steering Davis Steering gear, Ackermans steering gear velocity ratio.

Hooke's Joint: Single and double Hookes joint Universial coupling application problems.

UNIT-III

Kinematics: Velocity and acceleration - Motion of link in machine - Determination of Velocity and acceleration diagrams - Graphical method - Application of relative velocity method four bar chain.

Plane motion of body: Instantaneous center of rotation, centroids and axodes - relative motion between two bodies - Three centres in line theorem - Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT-IV

Cams: Definitions of cam and followers their uses Types of followers and cams Terminology Types of follower motion - Uniform velocity Simple harmonic motion and uniform acceleration. Maximumm velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers: Roller follower circular cam with straight, concave and convex flanks.

UNIT-V

Gears: Higher pairs, friction wheels and toothed gears types law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding phenomena of interferences. Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact - Introduction to Helical, Bevel and worm gearing.

Gear Trains: Introduction - Train value - Types - Simple and reverted wheel train

Epicycle gear Train. Methods of finding train value or velocity ratio - Epicycle gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:

1. Kinematics of Machinery – Special Edition. MRCET, McGrahill Publishers.
2. Theory of Machines by Thomas Bevan/ CBS
3. Theory of machines/ PL. Balaney/khanna publishers.

REFERENCE BOOKS:

1. The theory of Machines /Shiegley/ Oxford.
2. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age International Publishers
3. Theory of Machines / R.K Bansal/Fire Wall media Publisher

Course Outcomes:

1. Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms.
2. Analyze the planar mechanisms for position, velocity and acceleration.
3. Synthesize planar four bar and slider crank mechanisms for specified kinematic conditions.
4. Design cams and followers for specified motion profiles
5. Evaluate gear tooth geometry and select appropriate gears for the required applications.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech ME – I Sem

L	P	C
0	3	1.5

(R18A0381) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Objectives:

1. To gain knowledge in performance testing of Hydraulic Turbines and Hydraulic Pumps at constant speed and head.
2. To provide practical knowledge in verification of principles of fluid flow.
3. To calculate c_d, c_c, c_v and Coefficient of impact of various hydraulic systems
4. To understand Major and minor losses.
5. Student able to learn about measuring pressure, discharge and velocity of fluid flow.

List of Experiments

1. Determination of coefficient of discharge of Orifice meter.
2. Determination of coefficient of discharge of Venturimeter.
3. Determination of friction factor for a given pipe line.
4. Verification of Bernoulli's theorem.
5. Determination of loss of head in a pipeline.
6. Performance Test on Single Stage Centrifugal Pump.
7. Performance Test on Multi Stage Centrifugal Pump.
8. Performance Test on Reciprocating Pump.
9. Performance Test on Pelton Wheel.
10. Performance Test on Francis Turbine.
11. Performance Test on Kaplan Turbine.
12. Determination of Impact of Jet on Vanes

Note: Total 10 experiments are to be conducted.

Course Outcomes:

1. To provide the students' knowledge in calculating performance analysis in turbines.
2. Students exposure to study various operating characteristics of Centrifugal pump and Reciprocating pump.
3. Analyze a variety of fluid flow devices and utilize fluid mechanics principles in design.
4. Get Exposure to verification of Bernoulli's Theorem.
5. To provide the students with a solid foundation in fluid flow principles.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech ME - I Sem

L	P	C
0	3	1.5

(R18A0382) MATERIALS ENGINEERING LAB

Course Objectives:

1. To Remembering the composition of metals, mechanical properties depending upon their micro structure.
2. To Understand the Heat treatment methods and their effect on micro structure of materials.
3. To applying the procedure for Micro Structure of pure metals.
4. To Know the Hardness of steels by different tests.
5. To learn the processing of different materials in the lab.

List of Experiments:

1. To Prepare the specimen by mounting powder.
2. To the study of Microstructure of Low, Medium & High carbon steels.
3. To the study of Microstructure Cast Irons. (Grey cast Iron & White cast Iron).
4. To the study of Microstructure Non – Ferrous pure metals. (Copper&Aluminum).
5. To the study of Microstructure Non-Ferrous alloys. (Brass & Bronze).
6. To the study of Microstructure Heat treated steels.
7. To find out the hardenability of steels by Jominy End Quench Test.
8. To find out the hardness of various treated and untreated steels.
9. Study of the Composite Material with the help of UTM.
10. Study of Microstructure of Composite Material subjected to tensile testing.
11. Join the sheets using Ultrasonic Joining process.

Note: Total 10 experiments are to be conducted.

Course Outcomes:

1. Summarizing can understand micro structures of different material.
2. Different heat treatment methods and change of mechanical properties based on micro structure of methods.
3. Produce different methods in Iron carbon equilibrium diagrams for material science applications
4. Find out the hardenability of the steels Jominy End Quench Test.
5. Understand the processing of different materials in the lab.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B.Tech. I Sem	L	T/P/D	C
	2	-/-/-	0

(R18A0014) ENVIRONMENTAL STUDIES (Mandatory Courses)

Course Objectives:

1. To understand the importance of ecological balance for sustainable development
2. To understand the importance of Natural resources
3. To understand the impacts of developmental activities and mitigation measures for recognizing each and every action of us, reflects on the environment and vice versa.
4. To understand waste management.
5. To understand the Social Issues and the Environment related issues.

UNIT I- ECOSYSTEMS

Definition Structure and function of an ecosystem, Food chain and Food Web, Ecological Pyramids.

*Activity: Poster making/Seminar/ Slogans making/ Group discussion on importance of Environmental Education

UNIT II- NATURAL RESOURCES

Introduction: definition of Natural Resources Types

Forest resources- Uses, Causes and consequences of deforestation, Water resources Benefits and problems of DAMs, Energy resources-Renewable and Non-renewable energy resources with Examples.

*Activity: Poster making/Seminar/ Slogans making/ Group discussion on Natural Resources

UNIT III- ENVIRONMENTAL POLLUTION

Pollution – Sources, effects and control of Air, Climate change-ozone layer depletion, Global warming/greenhouse effect.

*Activity: Poster making/Seminar/ Slogans making/ Group discussion on Environmental pollution.

UNIT IV- WASTE MANAGEMENT

Sources Types effects and management of solid waste, E-waste and its management.

*Activity: Poster making/Seminar/ Slogans making/ Group discussion on Cleanliness, segregation of waste and Swacha-Bharath.

UNIT V- Social Issues and the Environment

Concept, threats and strategies of sustainable development, Importance and need for awareness for Environmental Education value orientated environmental education.

*Activity: Poster making/Seminar/ Slogans making/ Group discussion on Social Issues and the Environment.

TEXT BOOKS:

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age international

Publishers.

2. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS

Publications.

3. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL

Learning Private Ltd. New Delhi.

2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela

.2008 PHI Learning Pvt. Ltd.

3. Environmental Science by Daniel B.Botkin& Edward A.Keller, Wiley INDIA edition.

4. Principles of Environmental Science by William . P. Cunnningham& Mary Inn Cunnningham Tata McGRAW –Hill Publishing Company Ltd.

5. Environmental Studies by S. Rama Lakshmi & Purnima Smarath Kalyani Publishers.

Course Outcomes:

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of Ecological principles and environmental regulations which in turn will help in sustainable development
2. This course will sensitise the students through activities assigned to them after every unit.
3. This course will help the students understand the complex relationships between natural and human systems.
4. Will be able to understand waste management.
5. Will be having knowledge the impacts of developmental activities and mitigation measures for recognizing each and every action of us, reflects on the environment and vice versa.

MALLAREDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-II Sem

L	P	C
3	0	3

(R18A0308) APPLIED THERMODYNAMICS

Course Objectives:

1. Applications and the principles of thermodynamics to components and systems.
2. The purpose of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behavior of various systems
3. Student have knowledge of methods of analysis and design of complicated thermodynamic systems
4. Acquires knowledge about thermodynamic analysis for steam nozzles.
5. Acquires knowledge on condensers and steam turbines.

UNIT-I

Basic Concepts: Rankine cycle - Schematiclayout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance - Regeneration & reheating

Boilers: Classification - Working principles with sketches including H.P. Boilers - Mountings and Accessories - Working principle.

UNIT-II

Steam Nozzles: Function of nozzle - Applications and Types- Flow through nozzles- Thermodynamic analysis.

Steam Condensers: Requirements of steam condensing plant - Classification of condensers - Working principle of different types.

UNIT-III

Steam Turbines: Classification - Impulse turbine; Mechanical details - Velocity diagram - Effect of friction - Power developed, Axial thrust, Blade or diagram efficiency - Condition for maximum efficiency.

Reaction Turbine: Mechanical details - Principle of operation, Thermodynamic analysis of a stage, Degree of reaction - Velocity diagram - Parson's reaction turbine - Condition for maximum efficiency.

UNIT-IV

Gas Turbines: Simple gas turbine plant - Ideal cycle, essential components - Parameters of performance - Actual cycle - Regeneration, Inter cooling and Reheating - Closed and Semi - closed cycles - Merits and Demerits.

UNIT-V

Jet Propulsion: Principle of Operation - Classification of jet propulsive engines - Working Principles with schematic diagrams and representation on T-S diagram- Thrust, Thrust Power and Propulsion Efficiency - Turbo jet engines - Needs and Demands met by Turbo jet - Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation - Methods.

Rockets: Application - Working Principle - Classification - Propellant Type - Thrust, Propulsive Efficiency - Specific Impulse - Solid and Liquid propellant Rocket Engines

TEXT BOOKS:

1. Thermal Engineering / Rajput / Lakshmi Publications.
2. Gas Turbines / V. Ganesan / TMH.
3. Thermal Engineering /P.L. Ballaney / Khanna Publishers, NewDelhi.

REFERENCE BOOKS:

1. Gas Turbines and Propulsive Systems / P. Khajuria & S.P. Dubey / Dhanapatrai Pub.
2. Thermal Engineering / R.S. Khurmi& J.K. Gupta / S. Chand Pub.
3. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot

Course Outcomes:

1. Recognize and recall the importance of thermal power plant and its thermodynamic analysis for improvement of efficiency.
2. Understand the operation of steam boiler, steam nozzle, condenser and steam turbine.
3. Able to do thermodynamic analysis for steam nozzles, condensers and steam turbines.
4. Evaluate the thermodynamic efficiency of gas turbine and jet propulsion systems.
5. Create the jet propulsion system and do the thermodynamic analysis for better efficiency.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

	L	T/P/D	C
II Year B. Tech ,ME-II Sem	**3**	**0**	**3**

(R18A0309) STRENGTH OF MATERIALS

Course Objectives:

1. To understand the nature of stresses induced in material under different loads.
2. To plot the variation of shear force and bending moments over the beams underdifferent types of loads.
3. To understand the behavior of beams subjected to shear loads.
4. To understand the behavior of beams under complex loading.
5. To analyze the cylindrical shells under circumferential and radial loading

UNIT-I

Simple Stresses & Strains : Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT-II

Shear Force and Bending Moment Diagrams: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure.

UNIT-III

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T sections.

UNIT-IV

Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods –Determination of slope and deflection for cantilever and simply supported beams subjected to point loads,- U.D.L uniformly varying load..

UNIT-V

Torsion of Circular Shafts: Theory of pure torsion, Derivation of torsion equations: T/J=q/r=Nθ/L- Assumptions made in theory of pure torsion-Torsional moment of resistance– Polar section modulus – Power transmitted by shafts.

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders.

TEXT BOOKS:

1.Strength of Materials by R.K. Bansal ,Laxmi Publications 2010.
2. Strength of materials by Sadhu Singh.Khanna Publications.
3. Strength of Materials by S.Timshenko

REFERENCE BOOKS:

1. Strength of Materials -By Jindal, Umesh Publications.
2. Strength of materials by Bhavikatti, Lakshmi publications.
3. Mechanics of Structures Vol-III, by S.B.Junnarkar.

Course Outcomes:

1. Determine the simple stresses and strains when members are subjected to axial loads.
2. Draw the shear force and bending moment diagrams for the beam subjected to different loading conditions.
3. Evaluate stresses induced in different cross-sectional members subjected to shear loads.
4. Evaluate the deflections in beams subjected to different loading conditions.
5. Analyze the Shafts and thick cylindrical shells.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-II Sem

L	T/P/D	C
2	1	3

(R18A0310) DYNAMICS OF MACHINERY

Course Objectives:

1. To study about gyroscope and its effects during precession motion of moving vehicles.
2. To understand the force-motion relationship in components subjected to external forces and analysis of standard mechanisms.
3. Able to learn about the working of Clutches, Brakes, Dynamometers and Fly wheel.
4. To study about the balancing, unbalancing of rotating masses and the effect of Dynamics of undesirable vibrations.
5. To understand the working principles of different type governors and its characteristics.

UNIT-I

Precession: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

UNIT-II

Static and Dynamic Force Analysis of Planar Mechanisms: Introduction -Free Body Diagrams – Conditions for equilibrium – Two, Three and Four Members – Inertia forces and D'Alembert's Principle – planar rotation about a fixed centre.

Friction in Machine Elements: Inclined plane-Friction of screw and nuts – Pivot and collars-uniform pressure, uniform wear-friction circle and friction axis: lubricated surfaces-boundary friction-film lubrication.

UNIT–III

Clutches: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

Brakes and Dynamometers: Simple block brakes, internal expanding brake, band brake of vehicle. Dynamometers – absorption and transmission types. General description and methods of operations.

Turning Moment Diagram and Fly Wheels: Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design.

UNIT–IV

Balancing: Balancing of rotating masses Single and multiple – single and different planes.

Balancing of Reciprocating Masses- Primary, Secondary, and higher balancing of reciprocating masses. Analytical and graphical methods.

Vibration: Free Vibration of mass attached to vertical spring – Simple problems on forced damped vibration, Vibration Isolation & Transmissibility Whirling of shafts.

UNIT–V

Governers : Watt, Porter and Proell governors. Spring loaded governors – Hartnell and hartung with auxiliary springs. Sensitiveness, isochronism and hunting.

TEXT BOOKS:

1. Theory of Machines / Thomas Bevan / CBS Publishers
2. Theory of Machines / Jagadish Lal &J.M.Shah / Metropolitan.
3. Theory of machines / Khurmi/S.Chand Publications

REFERENCE BOOKS:

1. Theory of Machines / Shiegly / MGH Publishers.
2. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age International Publishers
3. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publi*sh*ers

Course Outcomes:

1. Knowledge acquired about Gyroscope and its precession motion.
2. Able to predict the force analysis in mechanical system and able to solve the problem.
3. The student will learn about the kinematics and dynamic analysis of machine elements.
4. Ability to understand the importance of balancing and implications of computed results in dynamics to improve the design of a mechanism
5. Student gets the exposure of different governors and its working principle.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R18A0311) MANUFACTURING PROCESSES

Course Objectives:

1. The primary objective of this course is to introduce the concept of manufacturing technology with the help of various processes widely employed in industries.
2. The course consists of casting, welding, sheet metal forming, extrusion and forging processes with the related details of equipment and applications.
3. To understand various metal working process. To appreciate the capabilities, advantages and the limitations of the processes.
4. To understand the various concepts of drawing, its classification and their applications.
5. To understand the various concepts of metal forming and forging along with their applications.

UNIT-I:

Casting: Introduction, Steps involved in Design of Casting – Types of Patterns and allowances, Principles of Gating and its types, Solidification of Casting, Risers- Types, function, Cores: Material, Types, advantages & limitations. Special Casting processes. Melting of metal by cupola operation.

Advanced Casting Processes: Metal mould casting- Low & High Pressure, Continuous casting, Squeeze casting, Vacuum mould casting, Evaporative pattern casting, Ceramic shell casting.

UNIT-II:

Welding: Introduction, Classification –Types of welds and welded joints, Welding Positions, Detailed Classification of Gas, Arc, Forge, Resistance, Thermit and Plasma (Air and water) welding, Soldering & Brazing. Heat affected zones in welding, welding defects – causes and remedies – Destructive & Nondestructive testing of welds.

Cutting of Metals: Oxy – Acetylene Gas cutting, Water Plasma

Advanced Welding Processes: Electron beam Welding, Laser beam welding, Friction Stir Welding, Heat flow welding, Ultrasonic Welding.

UNIT-III:

Metal Forming: Introduction, Strain Hardening, Recovery, Recrystallization and Grain growth, forming processes - Bending, Coining, embossing etc.

Hot and Cold working processes: Rolling and types of Rolling and Roll mills, Injection and blow molding.

Advanced Metal Forming Process: Details of High energy rate forming process, Electro Magnetic Forming, Explosive Forming, Electro-Hydraulic Forming, Stretch Forming, Contour Roll forming.

UNIT-IV:

Extrusion and Forging: Basic Extrusion process and types, Forging operations and its classification, drawing: wire and tube drawing, Swaging, Blanking, Piercing, Punching and Trimming.

UNIT-V:

Additive manufacturing: Introduction to Rapid Prototyping, material, applications, limitations, Classification of Rapid Manufacturing Process, Traditional Prototyping vs Rapid Prototyping.

Additive Manufacturing Techniques: Photo polymerization, Stereo lithography, Powder Bed Fusion, Selective Laser Sintering, Electron Beam Melting, Fused Deposition Modeling, 3D Printing, Laminated Object Manufacturing, Laser Engineered Net Shaping and Direct Metal Deposition.

TEXTBOOKS:

1. Manufacturing Technology, P.N.Rao,TMH
2. Manufacturing Technology, Kalpak Jain, Pearson education.
3. Production Technology, R.K.Jain

REFERENCE BOOKS:

1. Principles of Metal Castings, Rosenthal.
2. Welding Process, Parmar
3. Manufacturing Technology, R.K. Rajput, Laxmi Pub
4. Manufacturing Engineering &Technology, Kalpak Jain,S.

Course Outcomes:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Acquire knowledge and hands-on competence in applying the concepts of manufacturing science in the design and development of mechanical systems.
3. Competence to design a system, component or process to meet societal needs within realistic constraints.
4. Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
5. An ability to formulate solve complex engineering problem using modern engineering and information Technology tools.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B.Tech II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0024) Probability & Statistics

Course Objectives

1. To understand a random variable that describes randomness or an uncertainty in certain realistic situations which can be either discrete or continuoustype.
2. To learn functions of multiple random variables through joint distributions since the random situations are described as functions of multiple randomvariables.
3. To learn some of the important probability distributions like Binomial, Poisson Distributions (discrete case) and the Normal Distribution (continuouscase).
4. To understand linear relationship between two variables and also to predict how a dependent variable changes based on adjustments to an independentvariable.
5. To make inferences about a population from sample data(large and small samples) using probabilitytheory.

UNIT – I

Random Variables

Single and multiple random variables -discrete and continuous. Probability distribution function, mass function and density function of probability distributions.Mathematical expectation and variance.

UNIT-II

Probability distributions

Binomial distribution – properties, mean and variance, Poisson distribution – properties, mean and variance and normal distribution – properties, mean and variance.

UNIT –III

Correlation and Regression

Correlation -coefficient of correlation, rank correlation. Regression-regression coefficients, lines of regression.

UNIT –IV: Sampling

Sampling: Definitions of population, sampling, statistic, parameter - types of sampling - expected values of sample mean and variance, standard error - sampling distribution of means and variance. Estimation - point estimation and interval estimation.Testing of hypothesis: Null and Alternative hypothesis - Type I and Type II errors, critical region - confidence interval - Level of significance, one tailed and two tailed test.

Unit-V: Statistical Inferences

Large sample Tests: Test of significance - Large sample test for single mean, difference of means, single proportion, and difference of proportions.

Small samples: Test for single mean, difference of means, test for ratio of variances (F-test) - Chi-square test for goodness of fit and independence of attributes.

TEXT BOOKS:

1. Fundamental of Statistics by S.C. Gupta, Himalaya PublishingHouse.
2. Fundamentals of Mathematical Statistics by SC Gupta and V.K. Kapoor, Sultan Chand Publishers.
3. Higher Engineering Mathematics by B.S. Grewal, KhannaPublishers.

REFERENCES:

1. ProbabilityandStatisticsforEngineersandScientistsbySheldonM.Ross ,Academic Press.
2. Probability and Statistics by Dr.T.K.V Iyengar , B.KrishnaGandhi ,S. Ranganatham& M V S S A N Prasad. S ChandPublishers.

Course Outcomes:

At the end of the course the students are able to:

1. Describe randomness in certain realistic situation which can be either discrete or continuoustype.
2. Provide very good insight which is essential for industrial applications by learning probabilitydistributions.
3. Make data-driven decisions by using correlation andregression.
4. Understand the importance of sampling distribution of a given statistic of a random sample.
5. Draw statistical inference using samples of a given size which is taken from a population and to apply statistical methods for analyzing experimentaldata.

OPEN ELECTIVE - I

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

	L	T/P/D	C
II Year B.Tech II Sem	**3**	**-/-/-**	**3**

(R18A0351) INTELLECTUAL PROPERTY RIGHTS

(OPEN ELECTIVE – I)

Course Objectives:

1. To create an understanding on Intellectual Properties and the importance of it.
2. To acquire knowledge on Trademarks, Trade secrets & unfair completion methods.
3. To create awareness on the protection of copyrights and patents.
4. To attain basic understanding of Cyber laws, Cyber Crime and get an understanding of Privacy of Data.
5. To gain knowledge on international aspects and the Emerging Trends in IPR.

UNIT - I:

Introduction: Introduction to Intellectual property, types of intellectual property, importance of intellectual property rights, agencies Responsible for Intellectual property Registration, Regulatory – Compliance and Liability Issues.

UNIT - II:

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, Transfer of Rights, protectable matter, selecting and evaluating trade mark, Registrations of Trade Marks, Claims.

Trade Secrets: Determination of trade secret status, liability for misappropriations of trade secrets, protection for submission.

Unfair competition- Misappropriation right of publicity, false advertising

UNIT - III:

Copy rights: Fundamental of copy right, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, notice of copyright.

Patents: introduction, patent searching process, ownership rights and transfer.

UNIT - IV:

Cyber Law – Information Technology Act – Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy – International aspects of Computer and Online Crime.

UNIT - V:

New development of Intellectual Property: Emerging trends in trade mark; copy rights, patent, International overview on intellectual property.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengagelearning.
2. Cyber Law. Text & Cases, South-Western's Special Topicscollections.
3. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi
4. A short course in International Intellectual Property Rights – Karla C. Shippey, World Trade Press – 2nd Edition.
5. Intellectual Property Rights – Heritage, Science, & Society under international treaties – A. Subbian, - Deep & Deep Publications – New Delhi.
6. Intellectual Property Rights: N K Acharya: ISBN: 9381849309
7. Intellectual Property Rights: C B Raju: ISBN-8183870341

Course Outcomes:

Student will be able to:

1. Prepare and protect the Inventions, startup ideas and rights of patents and copy rights etc.,
2. Gain knowledge on Trademarks and Trade Secrets.
3. Brings awareness on the various types of Unfair Competition and gets well versed with exposure to licensing and transfer of Copyrights and Patents
4. Attain awareness of Cyber laws and Cyber Crime, to protect the data from Cybercrime.
5. Comprehend emerging trends in IPR globally.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B.Tech II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0352) GREEN ENERGY SYSTEMS

(OPEN ELECTIVE – I)

Course Objectives:

1. The course aims to highlight the significance of alternative sources of energy.
2. Green energy systems and processes and provides the theory and working principlesof probable sources of renewable and green energy systems that are environmental friendly.
3. To understand the bio-mass conservation concetps.
4. To understand the energy efficient systems.
5. To understand thegreen buildings concepts.

UNIT-I

Introduction:

Solar Radiation: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion –
types of PV cells, I-V characteristics.

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT – II

Solar Energy Storage And Applications: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

UNIT – III

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio fuels,
I.C. engine operation and economic aspects.

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles of utilization, setting of OTEC plants,thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT –IV

Energy Efficient Systems:(A) Electrical Systems: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning),
demand site management.

(B) Mechanical Systems: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.

UNIT-V

Energy Efficient Processes: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

Green Buildings: Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, Ferro cement and Ferro-concrete, alternate roofing systems, paints to reduce heat gain of the buildings. Energy management.

TEXT BOOKS:

1. Sukhatme S.P. and J.K.Nayak, Solar Energy – Principles of Thermal Collection and Storage, TMH.
2. Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.
3. Green Manufacturing Processes and Systems, Edited by J. Paulo Davim, Springer 2013.

REFERENCES:

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Ra.
2. Principles of Solar Energy / Frank Krieth& John F Kreider.
3. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa

Course Outcomes:

1. The student shall understand the principles and working of solar, wind, biomass, geo ,thermal, ocean energies .
2. Green energy systems and appreciate their significance in view of their importance in the current scenario and their potential future applications.
3. The student will understand the Principles of bio-conversion, anaerobic/aerobic digestion.
4. Learn the concepts of different types of bio-gas digesters, gas yield, combustion characteristics of bio-gas.
5. Student will learn the concepts of Bio gas utilization for cooking, bio fuels, I.C. engine operation and economic aspect.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

II Year B.Tech.IISem

L	T/P/D	C
3	-/-/-	3

OPEN ELECTIVE I

(R18A0555) DATA VISUALIZATION

Course Objectives:

To learn different statistical methods for Data visualization.
To understand the basics of R and Python.
To learn usage of Watson studio.
To understand the usage of the packages likeNumpy, pandas and matplotlib.
To know the functionalities and usages of Seaborn.

UNIT I

Introduction to Statistics : Introduction to Statistics, Difference between inferential statistics and descriptivestatistics, Inferential Statistics- Drawing Inferences fromData, RandomVariables, Normal ProbabilityDistribution, Sampling, Sample Statistics and SamplingDistributions.

R overview and Installation- Overview and About R, R and R studio Installation, Descriptive Data analysis using R, Description of basic functions used to describe data in R.

UNIT II

Data manipulation withR: Data manipulation packages-dplyr,data.table, reshape2, tidyr, Lubridate, Data visualization withR.

Data visualization in Watson Studio: Adding data to datarefinery, Visualization of Data on WatsonStudio.

UNIT III

Python: Introduction toPython, How toInstall, Introduction to JupyterNotebook, Python scriptingbasics, NumpyandPandas-Creating and Accessing Numpy Arrays, Introduction to pandas, read and write csv, Descriptive statistics using pandas, Working with text data and datetime columns, Indexing and selecting data, groupby, Merge / Join datasets

UNIT IV

Data Visualization Tools inPython- Introduction to Matplotlib, Basic plots usingmatplotlib, Specialized Visualization Tools usingMatplotlib, Advanced Visualization Tools usingMatplotlib- WaffleCharts, WordClouds.

UNIT V

Introduction to Seaborn: Seaborn functionalities and usage, Spatial Visualizations and Analysis in Python with Folium, Case Study.

TEXT BOOKS:

1. Core Python Programming - Second Edition,R. Nageswara Rao, Dreamtech Press.
2. Hands on programming with R by Garrett Grolemund,Shroff/O'Reilly; First edition

3. Fundamentals of Mathematical Statistics by S.C. Gupta, Sultan Chand & Sons

REFERENCE BOOKS:

1. Learn R for Applied Statistics: With Data Visualizations, Regressions, and Statistics by Eric Goh Ming Hui, Apress
2. Python for Data Analysis by William McKinney, Second Edition, O'Reilly Media Inc. \
3. The Comprehensive R Archive Network- https://cran.r-project.org
4. https://seaborn.pydata.org/
5. https://dataplatform.cloud.ibm.com/

Course Outcomes:

At Completion of this course, students would be able to -

Apply statistical methods for Data visualization.
Gain knowledge on R and Python
Understand usage of various packages in R and Python.
Demonstrate knowledge of Watson studio.
Apply data visualization tools on various data sets.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B.Tech II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0451) DIGITAL ELECTRONICS
(OPEN ELECTIVE – I)

Course Objectives:

The main objectives of the course are:

1. To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions.
2. To introduce the methods for simplifying Boolean expressions.
3. To outline the formal procedures for the analysis and design of combinational and sequential circuits.
4. To introduce the concept of memories and programmable logic devices.
5. To illustrate the concept of synchronous and asynchronous sequential circuits.

UNIT I

BINARY SYSTEMS AND LOGIC GATES:

Binary Systems: The Advantage of Binary, Number Systems, The Use of Binary in Digital Systems,

AND, OR, NOT, NAND, NOR, Exclusive-OR, Exclusive-NOR and Exclusive-NAND implementations of Logic Functions using gates, NAND-NOR implementations.

UNIT II

MINIMIZATION TECHNIQUES:

Minimization Techniques: Boolean postulates and laws-De-Morgan's Theorem-Principle of Duality-Boolean expression-Minimization of Boolean expressions-Minterm-Maxterm-Sum of Products (SOP)-Product of Sums (POS)-Karnaugh map minimization-Don't care conditions-Quine Mc-Cluskey method of minimization.

UNIT III

COMBINATIONAL CIRCUITS:

Design Procedure-Half Adder-Full Adder-Half Subtractor-Full Subtractor-Parallel binary adder-Parallel Binary Subtractor-Multiplexer/ Demultiplexer-Decoder-Encoder.

UNIT IV

SEQUENTIAL CIRCUITS:

Latches, Flip-flops-SR, JK, D, T and Master-Slave-Characteristic table and equation-Application Table-Edge Triggering-Level Triggering-Realization of one flip-flop using other flip-flops-serial adder/subtractor-Asynchronous Counter-Asynchronous Up/Down Counter, Decade counter-Synchronous Counters-Synchronous Up/Down Counters, Decade Counters

UNIT V

MEMORY DEVICES:

Classification of Memories-ROM_ROM Organization, PROM-EPROM-EEPROM-EAPROM, RAM-RAM Organization-Write operation-Read Operation-Programmable Logic Devices-Programmable Logic Array (PLA), Programmable Array Logic (PAL)-Implementation of combinational logic circuits suing ROM, PLA, PAL.

TEXT BOOK:

1. M Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India PVt., Ltd., 2008/Pearson Education (Singapore) Pvt., Ltd., New Delhi, 2003.
2. Donald P Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006.

REFERENCES:

1. John F Wakerly. "Digital Design, Fourth Edition, Pearson/PHI, 2008
2. John M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006
3. Charles H Roth, "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013
4. Thomas L Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011.
5. Donald D Givone, "Digital Principles and Design", TMH, 2003.

Course Outcomes:

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

1. Analyse different methods used for simplification of Boolean expressions.
2. Design and implement Combinational and Sequential circuits.
3. Design and implement Synchronous and Asynchronous Sequential Circuits.
4. Explain about memories &Programmable logic devices.
5. Implement the concept of synchronous and asynchronous sequential circuits.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B.Tech II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0551) DATABASE SYSTEMS
(OPEN ELECTIVE – I)

Course Objectives:

1. To understand the basic concepts and the applications of database systems
2. To Master the basics of SQL and construct queries using SQL
3. To understand the relational database design principles
4. To become familiar with the basic issues of transaction processing and concurrency control
5. To become familiar with database storage structures and access techniques

UNIT I: INTRODUCTION

Data- Database: File Processing System Vs DBMS,History, Characteristic-Three schema Architecture of a database, Functional components of a DBMS.DBMS Languages-Database users and DBA.

UNIT II: DATABASE DESIGN

ER Model: Objects, Attributes and its Type. Entity set and Relationship set-Design Issues of ER model-Constraints. Keys-primary key, Super key, candidate keys. Introduction to relational model-Tabular, Representation of Various ER Schemas. ER Diagram Notations-Goals of ER Diagram- Weak Entity Set- Views.

UNIT III: STRUCTURED QUERY LANGUAGE

SQL: Overview, The Form of Basic SQL Query -UNION, INTERSECT, and EXCEPT– join operations: equi join and non equi join-Nested queries - correlated and uncorrelated-Aggregate Functions-Null values.

UNIT IV - DEPENDENCIES AND NORMAL FORMS

Importance of a good schema design,:- Problems encountered with bad schema designs, Motivation for normal forms- functional dependencies, -Armstrong's axioms for FD's-Closure of a set of FD's,- Minimal covers-Definitions of 1NF,2NF, 3NF and BCNF-Decompositions and desirable properties -

UNIT V:

Transactions: Transaction concept, transaction state, System log, Commit point, Desirable Properties of a Transaction, concurrent executions, serializability, recoverability, implementation of isolation, transaction definition in SQL, Testing for serializability**,** Serializability by Locks-Locking Systems with Several Lock Modes-Concurrency Control by Timestamps, validation.

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan," Database System Concepts", McGraw-Hill, 6th Edition , 2010.
2. Fundamental of Database Systems, by Elmasri, Navathe, Somayajulu, and Gupta, Pearson Education.

REFERENCES:

1. Raghu Ramakrishnan, Johannes Gehrke, “Database Management System”, McGraw Hill., 3rd Edition 2007.
2. Elmasri&Navathe,”Fundamentals of Database System,” Addison-Wesley Publishing, 5th Edition, 2008.
3. Date.C.J, “An Introduction to Database”, Addison-Wesley Pub Co, 8th Edition, 2006.
4. Peter rob, Carlos Coronel, “Database Systems – Design, Implementation, and Management”, 9th Edition, Thomson Learning, 2009.

Course Outcomes:

1. Demonstrate the basic elements of a relational database management system.
2. Ability to identify the data models for relevant problems.
3. Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
4. Ability to explain issues of transaction processing and concurrency control.
5. Ability to select the database storage structures and access techniques.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B.Tech. II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0553) DATA STRUCTURES USING PYTHON
(OPEN ELECTIVE I)

COURSE OBJECTIVES:

1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and call them.
4. To use Python data structures lists, tuples, dictionaries.
5. To do input/output with files in Python.

UNIT I

Introduction to Python, Installation and Working with Python, Understanding Python variables Python basic Operators, Understanding python blocks, Python Data Types: Declaring and using Numeric data types: int, float,complex,Using string data type and string operations.

UNIT II

Control Flow- if, if-elif-else,loops ,For loop using ranges, string,Use of while loops in python,Loop manipulation using pass, continue, break and else,Programming using Python conditional and loops block,Python arrays.

UNIT III

Functions -Calling Functions, Passing Arguments, Keyword Arguments,Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.PowerfulLamda function in python.

UNIT IV

Data Structures-List Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions,Dictionary manipulation, list and dictionary in build functions

UNIT V

Sorting:Bubble Sort,Selection Sort,Insertion Sort,Mergesort,Quick sort.Linked Lists,Stacks,Queues

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Read, write, execute by hand simple Python programs.
2. Structure simple Python programs for solving problems.
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python Programs

TEXT BOOKS

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016.
2. R. Nageswara Rao, “Core Python Programming”, dreamtech
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

REFERENCE BOOKS:

1. Core Python Programming, W.Chun, Pearson.
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Learning Python, Mark Lutz, Orielly

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech ME - II Sem

L	P	C
0	3	1.5

(R18A0383) STRENGTH OF MATERIALS LAB

Course Objectives:

1. To determine experimental data include universal testing machines and torsion equipment.
2. To determine experimental data for spring testing machine, compression testing machine, impact tester, hardness tester.
3. To determine stress analysis and design of beams subjected to bending and shearing loads using several methods.
4. To determine Flexural strength of a beam.
5. To determine experimental stress with fatigue and compression Tests.

LIST OF EXPERIMENTS

1. Tension test
2. Deflection test on Cantilever beam
3. Deflection test on simply supported beam
4. Torsion test
5. Spring test
6. Izod Impacttest
7. Shear test
8. Tensile test on composite materials using UTM
9. Charpy impact test on metal specimen
10. Flexural strength of a beam
11. Fatigue Testing machine
12. Compressive Test on Cube
13. Brinell hardness test
14. Rockwell hardness test

Note: Total 10 Experiments are to be conducted

Course Outcomes:

1. Analyse and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behaviour of materials.
2. Understand the basic concepts of stress, strain, deformation, and material behaviour under different types of loading (axial, torsion, bending).
3. Perform stress analysis and design of beams subjected to bending and shearing loads using several methods.
4. Calculate the stresses and strains in axially-loaded members subject to flexural loadings.
5. Ability to conduct compression tests and Fatigue of cast iron and steel.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

	L	P	C
II Year B. Tech ME - II Sem	**0**	**3**	**1.5**

(R18A0384) MANUFACTURING PROCESSES LAB

Course Objectives:

1. To know about the casting of different materials.
2. Study and Practice different welding processes.
3. To learn the operation of hydraulic press operation for different materials.
4. Understand the Process of blow and Injection Moulding.
5. To learn the Processing of different materials.

List of Experiments

1. To design and making of pattern - for one casting drawing.
2. To determine sand properties- Exercise -for strengths, and permeability.
3. To PrepareMould for Casting.
4. To prepare a butt joint with the specimens by Arc Welding.
5. To join the sheets by Spot Welding operation.
6. To join the specimens by TIG welding process.
7. To perform Plasma welding and Brazing.
8. To perform blanking & piercing operation.
9. To perform deep drawing and extrusion operation.
10. To prepare the product by Injection Moulding machine.
11. To prepare the product by Blow Moulding machine.
12. Making of components by 3D printing.

Note: Total 10 experiments are to be conducted.

Course Outcomes:

1. Learn about patterns and casting of metals.
2. Understand the concept of Arc, Spot, TIG welding and brazing process.
3. Understand the Process of simple, compound and progressive press and Hydraulic press
4. Learn the Moulding process of plastic materials
5. Understand the processing of different materials in the lab.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH II YEAR II SEM (ME, ANE) L T/P/D /C

2/ - / - / - / -

(R180005)GERMAN

(Mandatory Course)

INTRODUCTION

This is the age of globalization. Faster communication, extensive travel, greater interaction, outsourcing of jobs, demand of skilled person had made the engineering graduates to learn GERMAN language. Nowadays Aircraft and mechanical domain require more and more graduates with minimum knowledge to speak in German language

German language has been one of the fastest learning language in the world. This course is customized according to the demand of the requirement in job industries.

Course Objectives:

1. To equip the students with the required vocabulary and accent to create new sentences, sentence pattern, correct pronunciation.
2. To make the students effective German language speakers.

UNIT 1

Basics of Deutsch

1.1 Introduction – (About German Country, Language & Culture)
1.2 Formal and Informal Greetings
1.3 Alphabet
1.4 Numbers (0-50)
1.5 Days of the week and Months of the year
Vocabulary, Exercises and Assignments

UNIT 2

Getting closer with Deutsch

2.1 Family
2.2 Seasons & Weather
2.3 Time & Directions, Days Of Weak, Months
2.4 Colours& Shapes, Numbers (51 – 100)
2.5 Subject Pronouns
Vocabulary, Exercises and Assignments

Unit 3

Construction of Simple Sentences

3.1 Formal Introduction
3.2 Asking Questions
3.3 Responding to the Questions
3.4 Simple Sentences
3.5 Articles, Numbers (101 And Above)
Vocabulary, Exercises and Assignments

Unit 4

Dialogue Writing

4.1 Introduce Oneself
4.2 Introduce Others
4.3 At the Restaurant
4.4 At the Railway Station
4.5 At the University
Vocabulary, Exercises and Assignments

REFERENCE BOOKS

1. Collins easylearning GERMAN dictionary
2. Hallo deutsch – Parulsharma
3. Studio D A1 – Hermann
4. So gehtdas – New Saraswati book house
5. Practice German language for beginners – Dominic
6. German Made easy – Diego Agundez

Course Outcomes:

Student will be able to:

1. stand ahead of getting the opportunity in the Job market by learning German language.
2. learn German language with engineering degree that will give them a sense of identity among the competitive global engineering industry.
3. learn German language on a regular basis that will help them in improving multi-lingual ability.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R18A0312) COMPUTER INTEGRATED MANUFACTURING TECHNOLOGIES

Course Objectives:

1. Learn about the geometry of metal cutting theory, mechanism of chip formation and mechanics of orthogonal cutting and merchant's force diagram.
2. Gain the knowledge and features, working principles and applications of lathe, shaper, planer, slotter, milling, drilling, and machines.
3. Learn about the ways to reduce the surface roughness by using different Machining processes.
4. To understand computer aided planning and control and computer monitoring.
5. To understand APT and CNC programming concepts.
6. To know about tooling for CNC machines.

UNIT – I

Metal cutting theory: Elements of cutting process – Geometry of single point tool and angles, chip formation and types of chips, built up edge and its effects- chip breakers. Mechanics of orthogonal cutting,cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, mechanability. Lathe Machine: Principle of working, specification of lathe and types of lathes, operations of lathe and work holding and tool holding devices

UNIT - II

Shaping, slotting and planning machines:-Principles of working – classifications, operations performed, machining time calculations.Drilling and Boring Machines – Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig Boring machine. Deep hole drilling machine.

UNIT - III

Computer-Aided Programming: General information, APT programming, Examples Apt programming problems (2D machining only). NC programming on CAD/CAM systems, Introduction to CAD/CAM software, Automatic Tool Path generation. Tooling for CNC Machines: Interchangeable tooling system, preset and qualified tools, coolant fed tooling system, modular featuring, quick change tooling system, automatic head changers.

UNIT – IV

DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages and disadvantages of DNC, adaptive control with optimization, Adaptive control with constrains, Adaptive control of machining processes like turning, grinding. Post Processors for CNC:

Introduction to Post Processors: The necessity of a Post Processor, the general structure of a Post Processor, the functions of a Post Processor.

UNIT - V

Computer Aided Process Planning: Hybrid CAAP System, Computer Aided Inspection and quality control, Coordinate Measuring Machine, Limitations of CMM, Computer Aided Testing, Optical Inspection Methods, Artificial Intelligence and expert system: Artificial Neural Networks, Artificial Intelligence in CAD, Experts systems and its structures.

TEXT BOOKS

1. Computer Control of Manufacturing Systems / YoramKoren / McGraw Hill. 1983.
2. CAD/CAM Principles and Applications, P.N.Rao, TMH
3. Manufacturing Technology by P.N.Rao, Volume II, McGraw Hill
4. Production Technology by R.K. Jain and S.C. Gupta, Khanna Publications

REFERENCES

1. CAD / CAM / CIM, Radhakrishnan and Subramanian, New Age
2. Principles of Computer Aided Design and Manufacturing, FaridAmirouche, Pearson
3. Computer Numerical Control Concepts and programming, Warren S Seames, Thomson.
4. Machine Tools – C Elanchezhian and M. Vijayan, Anuradha Publications
5. Workshop Technology – B.S.Raghu Vamshi – Vol II, Dhanpatrai publications

Course Outcomes:

1. Students should be able to understand the function of micro controllers and PLCs.
2. Apply Computer aided process planning, MRP and CNC part programming.
3. Understand the fundamentals of metal cutting, chip formation, cutting forces involved in orthogonal metal cutting, and different cutting forces will be learned.
4. Analyze the classification of lathe, shaper, planer, slotter, milling, drilling, and machines.
5. Evaluate the surface finishing operations with abrasive processes such as Grinding and broaching machines, types and working principle.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
2	1	3

(R18A0061) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations that are needed for sound economic decision making.

The main purpose is to provide inputs on an overall analysis of an individual firm namely: demand and supply, production function, cost analysis, markets etc.

To understand and analyse the financial formats of the organisation for smooth running of the business.

Course Outcomes:

Students should be able,

To understand the basic economic principles, forecast demand and supply.

To estimate cost and understand market structure, pricing practices.

To interpret the financial results of the organisation.

Unit-I

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics, Micro and Macroeconomic Concepts.

Demand Analysis: Demand Determinants, Law of Demand and exceptions.

Elasticity of Demand: Definition, Types, Measurement and Significance of elasticity of Demand.

Demand Forecasting: Factors governing Demand Forecasting, Methods of Demand Forecasting (Survey Methods, Expert Opinion, Test Marketing, Controlled Experience, Judgemental Approach, and Time Series Analysis).

Unit-II

Production & Cost Analysis: Production Function- Isocost and Isoquants, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production Function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost Concepts. Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)

Unit-III

Markets: Types of Competition and Markets, Features of Perfect Competition, Monopoly and Monopolistic Competition;

Pricing: Objectives, Methods of Pricing;

Business: Features of different forms of Business Organisation (Sole Trader, Partnership, Joint Stock Company, Cooperative Society, and Public Enterprises).

Unit-IV

Introduction to Capital and Financial Accounting: Need for Capital, Types of Capital, Working Capital Analysis, Methods and Sources of raising Finance.

Accounting: Definition, Concepts and Conventions (GAAP); Accounting Cycle; Formats for preparation of Trial Balance and Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet).

Unit-V

Investment Decision: Capital Budgeting - Features, Objectives, and Methods (Payback Method, Accounting Rate of Return and Net Present Value) - advantages & disadvantages. (Simple Problems)

Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital Structure Ratios and Profitability Ratios. (Simple Problems)

References:

1. Managerial Economics & Financial Analysis, Special Edition-MRCET. McGraw Hill Publications, 2017
2. D.N. Dwivedi, Managerial Economics, Vikas Publications.
3. Justin Paul, Leena, Sebastian, Managerial Economics, Cengage
4. P. L. Mehta, Managerial Economics: Analysis, Problems and Cases, Sultan Chand & Sons.
5. S. N. Maheswari & S. K. Maheswari, Financial Accounting, Vikas Publications.
6. M. Y. Khan and P. K. Jain, Financial Management, McGraw Hill

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R18A0313) INTERNAL COMBUSTION ENGINES

Course Objectives:

1. Introduction, Engine Types and their Operation. Application of the principles of thermodynamics to components and systems.
2. Understand and describe the gas exchange and combustion processes in diesel engines.
3. Good understanding of the various IC engines, Compressors and cycles for electricity generation.
4. The purpose of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behavior of various systems
5. Student have knowledge of methods of analysis and design of complicated thermodynamic systems

UNIT-I

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.

I.C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

UNIT-II

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

Combustion in C.I. Engines : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT-III

Testing and Performance of IC Engines : Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT-IV

Compressors – Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, undercooling, saving of work, minimum work condition for stage compression.

Rotary (Positive displacement type) : Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations.

UNIT-V

Dynamic Compressors : Centrifugal compressors: Mechanical details and principle of operation –velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

Axial Flow Compressors : Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency-pressure rise calculations – Polytropic efficiency.

TEXT BOOKS:

1. I.C. Engines / V. GANESAN- TMH
2. Thermal Engineering / Rajput / Lakshmi Publications.
3. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.

REFERENCE BOOKS:

1. Thermal Engineering / Rudramoorthy - TMH
2. Thermodynamics & Heat Engines / R.S. Yadav/ Central Book Depot., Allahabad
3. Thermal Engineering – R.S. Khurmi&J.K.Gupta – S.Chand

Course Outcomes:

To be able to recognize main and supplementary elements of SI and CI engines and define operational principles.

2. To be able to describe the most important combustion concepts and problems in concern with SI engines and CI engines.
3. To be able to analyze energy distribution in an internal combustion engines.Develop problem solving skills through the application of thermodynamics.
4. To understand the velocity triangles in compressors. Solve problems associated with Rotodynamic compressors.
5. Solve problems associated with reciprocating compressors and expanders and internal combustion engines.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

	L	T/P/D	C
(R18A0314) MACHINE DESIGN-I	**3**	**0**	**3**

NOTE: Design Data Book is permitted. Design of all components should include design for strength and rigidity apart from engineering performancerequirements.

Course objectives:

1. The students should be able to understand. Types of loading on machine elements and allowable stresses. To apply different materials of construction and their properties and factors determining the selection of material for various applications
2. To understand Stress concentration and the factors responsible. Determination of stress concentration factor; experimental and theoretical methods. • Fatigue strength reduction factor and notch sensitivity factor.
3. To develop the Knowledge on Basic failure mechanisms of riveted joints. Concepts of design of a riveted joint, welded joints and Bolted Joints to determine the forces in welds and riveted joints and formulate design solution for size of weld and size of rivet
4. To learn the design Procedure for the different machine elements such as fasteners, couplings, keys, axially loaded joints etc.
5. To learn the design Procedure for the different Shafts under loading condition, able to know various shafts coupling.

UNIT – I

INTRODUCTION:

General considerations in the design of Engineering Materials and their properties – selection – Manufacturing consideration in design.BIS codes of steels.

DESIGN FOR STATIC STRENGTH: Simple stresses – Combined stresses – Torsional and Bending stresses – Impact stresses – Stress strain relation – Various theories of failure – Factor of safety – Design for strength and rigidity– preferrednumbers.Theconceptofstiffnessintension,bending,torsionandcombinedsituations.

UNIT – II

DESIGN FOR FATIGUE STRENGTH : Stress concentration – Theoretical stress Concentration factor – Fatigue stress concentration factor- Notch Sensitivity – Design for fluctuating stresses – Endurance limit – Estimation of Endurance strength – Gerber's curve, Goodman's line – Modified Goodman's line – Soderberg's line.

UNIT – III

RIVETED, WELDED AND BOLTED JOINTS:

Riveted joints- Methods of failure of riveted joints-strength equations-efficiency of riveted joints-eccentrically loaded rivetedjoints.

Welded joints -Design of fillet welds-axial loads-circular fillet welds under bending, torsion.

Welded joints under eccentric loading.
Bolted joints – Design of bolts with pre-stresses – Design of joints under eccentric loading – locking devices – bolts of uniformstrength.

UNIT – IV
KEYS, COTTERS AND KNUCKLE JOINTS : Design of keys-stresses in keys - cottered joints-spigot and socket, sleeve and cotter, jib and cotter joints-Knuckle joints.

UNIT – V
SHAFTS : Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code. Use of internal and external circlips, Gaskets and seals (stationary&rotary).
SHAFT COUPLINGS : Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings – Flange coupling (Modified).

TEXT BOOKS:

1. Machine Design by R.S.Khurmi and J.K.Gupta, S.ChandPublishers,New Delhi.
2. Machine Design, S MD Jalaludin, Anuradha Publishers.
3. Design of Machine Elements by V. Bhandari TMH

REFERENCE BOOKS:

1. Machine Design Data Book by S MD Jalaludin, Anuradha Publishers
2. Machine Design Data Book by P.S.G. College of Technology
3. Machine Design by Pandya and Shah, Chortar Publications.
4. Machine Design / R.N. Norton
5. Mechanical Engineering Design / JE Shigley.

Course Outcomes:

Studentwillbeableto:

1. Acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure.
2. Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading. Analyze the fluctuating loads that will cause failure in real parts using the Soderberg, Gerber and Goodman techniques.
3. Understand different welded and riveted joints structure and able to apply its knowledge to analyze its strength when subjected to simple, coplanar and eccentric loading
4. Explain and design the basic of mechanical design process of simple machine components like, key, cotter joints and coupling.
5. Design the solid, hollow shafts and to finding the critical speeds

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R18A0315)DESIGN OF HYDRAULIC AND PNEUMATIC SYSTEMS

(PROFESSIONAL ELECTIVE 1)

Course Objectives:

1. To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries.
2. To study the fundamental principles, design and operation of hydraulic and pneumatic machines, components and systems and their application in recent automation revolution.
3. To provide students with an understanding of the fluids and components utilized in modern industrial fluid power system.
4. To develop a measurable degree of competence in the design, construction and operation of fluid power circuits.
5. To emphasize basic theory, components sizing, construction and function, how to read pneumatics and fluid power circuit diagrams using the correct symbols and troubleshooting techniques.

UNIT-I

FLUID POWER PRINICIPLES AND HYDRAULIC PUMPS

Introduction to Fluid power – Advantages and Applications – Fluid power systems – Types of fluids - Properties of fluids and selection – Basics of Hydraulics – Pascal's Law, Sources of Hydraulic power, Pump Classification – Construction, Working, Design, Advantages, and Disadvantages.

UNIT-II

HYDRAULIC ACTUATORS AND CONTROL COMPONENTS

Hydraulic Actuators: Cylinders – Types and construction, Application, Hydraulic cushioning – Hydraulic motors - Control Components: Direction Control, Flow control and pressure control valves – Types, Construction and Operation – Servo and Proportional valves.

UNIT-III

HYDRAULIC CIRCUITS AND SYSTEMS

Accumulators, Intensifiers, Industrial hydraulic circuits – Regenerative, Pump Unloading, Double-Pump, Pressure Intensifier, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-Safe, Speed Control, Hydrostatic transmission, Mechanical hydraulic servo systems.

UNIT-IV

PNEUMATIC AND ELECTRO PNEUMATIC SYSTEMS

Properties of air – Perfect Gas Laws – Compressor – Filters, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust Valves, Pneumatic actuators, Design of Pneumatic circuit – Cascade method – Electro Pneumatic System.

UNIT-V

TROUBLE SHOOTING AND APPLICATIONS

Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Design of hydraulic circuits for Drilling, Surface grinding, Press and Forklift applications. Design of Pneumatic circuits for Pick and Place applications and tool handling in CNC Machine tools.

TEXT BOOKS:

1. Anthony Esposito, “Fluid Power with Applications”, Prentice Hall, 2009.
2. James A. Sullivan, “Fluid Power Theory and Applications”, Fourth Edition, Prentice Hall, 1997.

REFERENCES:

1. Shanmugasundaram.K, “Hydraulic and Pneumatic Controls”. Chand & Co, 2006.
2. Majumdar, S.R., “Oil Hydraulics Systems – Principles and Maintenance”, Tata McGRaw Hill, 2001.
3. Majumdar, S.R., “Pneumatic Systems – Principles and Maintenance”, Tata McGRaw Hill, 2007.
4. Dudley, A. Pease and John J Pippenger, “Basic Fluid Power”, Prentice Hall, 1987
5. Srinivasan.R, “Hydraulic and Pneumatic Controls”, Vijay Nicole Imprints, 2008
6. Joshi.P, Pneumatic Control”, Wiley India, 2008.
7. Jagadeesha T, “Pneumatics Concepts, Design and Applications “, Universities Press, 2015.

Course Outcomes:

Upon completion of this course, the students will be able to:

1. Identify hydraulic and pneumatic components and its symbol and usage.
2. Ability to design hydraulic and pneumatic circuits.
3. Identify and analyse the functional requirements of a power transmission system for a given application.
4. Ability to visualize how the hydraulic/pneumatic circuit will work to accomplish the function.
5. Ability to Design and understand the electro-hydraulic and electro-pneumatic circuits.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R18A0316)INNOVATION AND DESIGN THINKING

(PROFESSIONAL ELECTIVE 1)

Course Objectives:

The objective of this subject is to provide knowledge of Innovation and Design Thinking

1. Understand the conceptual development techniques to find solution for a critical design issue.
2. Understand Principles to translate the conceptual ideas to engineering design.
3. Understand Principles of Design for Manufacturing and Assembly.
4. To know about the design for assembly principles
5. To know about the design for environment and design for recycling

UNIT-I

Introduction: Innovations in Design, Engineering Design Process, Prescriptive and integrative models of design, Design Review and societal considerations.

Identification of Customer Need: Evaluating Customer requirements and survey on customer needs, Conversion of customer needs into technical Specifications, Information sources.

UNIT-II

Theory of Inventive Problem solving (TRIZ), Creativity and Problem solving, Functional Decomposition of the problem for innovative concept development, Introduction to Axiomatic Design, Concept evaluation and decision making.

UNIT-III

Design for Manufacturing: Technical estimating, design of experiments, design for manufacturability, statistical process control, Introduction to FMEA (failure modes and effects analysis), and Case study of design for manufacturing: Manufacturing System Design Based on Axiomatic Design: Case of Assembly Line

UNIT-IV

Design for Assembly: Assembly Principles, Process, Worksheet, Assumptions.

Case study of design for Assembly: Manufacturing System Design Based on Axiomatic Design: Case of Assembly Line

UNIT-V

Design for Environment: Design for recycling; Design for disassembly, Design for energy Efficiency, Design for remanufacture, Design for disposability, Hazardous material minimization. Case study of design for Environment.

TEXT BOOKS:

1. Nigel Cross, Engineering Design Methods, John Wiley, 2009.
2. George E. Dieter, Engineering Design, McGraw-Hill, 2009.
3. GenrichAltshuller, The Innovation Algorithm, Technical Innovation Centre, 2011.

REFERENCE BOOKS

1. The Art of Innovation, by Tom Kelley.
2. Design Thinking, by Nigel Cross.
3. The Design of Business: by Roger Martin.

Course Outcomes:

1. The importance of design in innovation.
2. Design tools and processes can generate innovative new ideas.
3. Design and design thinking to innovative in areas such as engineering, software development and business operations.
4. Strengthen students' individual and collaborative capabilities to identify customer needs, create sound concept hypotheses, collect appropriate data, and develop a prototype that allows for meaningful feedback in a real-world environment.
5. To describe the various case studies for design for environment.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R18A0317) MECHANICAL VIBRATIONS
(PROFESSIONAL ELECTIVE 1)

Course Objectives:

1. Fully understand and appreciate the importance of vibrations in mechanical design of machine parts
2. To understand the fundamentals of Vibration Theory
3. Operate in different vibratory conditions**.**
4. To know about different degrees of freedom.
5. To be able to mathematically model real-world mechanical vibration problems.

UNIT- I

Single degree of freedom systems : Un-damped and damped free vibrations; forcedvibrations coulomb damping; Response to excitation; rotating unbalance and support excitation; vibration isolation and transmissibility- Response to Non Periodic Excitations: unit impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

UNIT-II

Two degree freedom systems: Principal modes- Un-damped and damped free andforced vibrations; Un-damped vibration absorbers.

UNIT-III

Multi degree freedom systems: Matrix formulation, stiffness and flexibility influencecoefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi- rotor systems and geared systems; Discrete- Time systems.

UNIT-IV

Vibration measuring instruments: Seismic instruments, vibrometers, velocity meters & accelerometers, frequency measuring devices-Fullarton and Fruhm Tachometers.

UNIT-V

Numerical methods: Raleigh's stodola's, Matrix iteration, Rayleigh- Ritz Method andHolzer's methods.

TEXT BOOKS:

1. Mechanical Vibrations/Groover/Nem Chand and Bros
2. Elements of Vibration Analysis by Meirovitch, TMH, 2001
3. Mechanical Vibrations/Schaum Series/ McGraw Hill

REFERENCE BOOKS:

1. Mechanical Vibrations / SS Rao/ Pearson/ 2009, Ed 4,
2. Vibration problems in Engineering / S.P. Timoshenko.
3. Theory and Practice of Mechanical Vibrations/JS Rao & K. Gupta/New Age Intl. Publishers/Revised 2nd Edition.

Course Outcomes:

1. Ability to analyze the mechanical model of a linear vibratory system
2. To be able to model reciprocating and oscillatory motions of mechanical systems
3. To be able to model undamped and damped mechanical systems and structures
4. To be able to model single- and multi-degree of freedom systems
5. An ability to identify, formulate, and solve engineering problems

OPEN ELECTIVES II

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A1251)MANAGEMENT INFORMATION SYSTEMS

OPEN ELECTIVE II

Course Objective:

1. To understand the competitive advantage of using information systems in the organization for the needful assistance in decision making and management.
2. To learn how to plan for information systems &implementation.
3. To learn about Management of IS: Information system planning.
4. To understand Building of Information Systems Structured Analysis Tools, System Design.
5. To study about security aspects of information systems.

UNIT-I

Introduction : MIS importance, definition, nature and scope of MIS, Structure and Classification of MIS, Information and Systems Concept, Types of Information, Information systems for competitive advantage.

Case Study: MIS at any business establishment.

UNIT-II

Business Applications of Information Systems : E-Commerce, ERP Systems, DSS, Business Intelligence and Knowledge Management System.

Case Study: Knowledge Management Systems at an Enterprise.

UNIT-III

Management of IS: Information system planning, system acquisition, systems implementation, evaluation & maintenance of IS, IS Security and Control.

Effectiveness of MIS: A Case Study.

UNIT-IV

Building of Information Systems: System Development Stages, System Development Approaches.

Systems Analysis and Design- Requirement Determination, Strategies for Requirement Determination.

Structured Analysis Tools, System Design – Design Objectives, Conceptual Design, Design Methods. Detailed system design.

UNIT-V

Introduction to Cyber Crime : Cyber Crime Defination and orgin of the word,cyber crime and information security, cyber criminals. Classification of cyber criminals-Legal Perspectives-Indian Perspectives-Cyber crimes and indian ITA 2000,Global perspective on cybercrime-Cybercrime era.(Refer : Nina Godbole et al)

TEXT BOOK

D P Goyal, Management Information Systems–Managerial Perspective, MacMillan, 3rd Edition, 2010.

REFERENCES:

1. Nina Godbole &SunitBelapure“ Cyber Security” Wiley india 2012.
2. Jawadekar, MIS Text and Cases, TMH, 2012.
3. Dr Milind M Oka “Cases in Management Information system ‘Everest, 2012.
4. A K Gupta, Sharma “Management of Systems” Macmillan, 2012.
5. Sandra Senf “Information Technology Control and Audit” 3e, CRC Press, 2012.
6. Apache OFBiz for Ecommerce and ERP - https://ofbiz.apache.org/
7. Magneto for Ecommerce (B2B Commerce) - https://magento.com/
8. Adempiere – ERP :http://www.adempiere.net/web/guest/welcome
9. Analytica – DSS - http://www.lumina.com
10. OpenRules – Business Rules and Decision Management system - http://openrules.com/

Course Outcome:

1. Ability to apply Concepts & applications of Management Information Systems.
2. Ability to perform Information Systems Planning & Implementations.
3. Able to explain Information system planning.
4. Ability to adapt Building of Information Systems Structured Analysis Tools, System Design.
5. Ability to adapt Cyber-crime and information security procedures.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

	L	T/P/D	C
III Year B.Tech. I Sem	**3**	**-/-/-**	**3**

(R18A0552) INTRODUCTION TO JAVA PROGRAMMING

(OPEN ELECTIVE II)

Course Objectives:

1. To Create Java Programs That Leverage The Object-Oriented Features Of The Java Language, Such As Encapsulation, Inheritance And Polymorphism;
2. Use Data Types, Arrays And Strings;
3. Implement Error-Handling Techniques Using Exception Handling,
4. Create And Event-Driven GUI Using AWT Components.
5. Able to develop applications using Applet, awt and GUI Programming.

UNIT I

OOPConcepts: Dataabstraction,encapsulation,inheritance,Polymorphism, classes and objects, Procedural and object oriented programmingparadigms.

Java Basics History of Java, Java buzzwords, data types, variables, constants, scope and life time of variables, operators, expressions, control statements, type conversion and casting, simple java programs, concepts of classes, objects, arrays, strings, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, BufferedReader class, Scanner class, StringTokenizer class, inner class.

UNIT II

Inheritance – Types of Inheritance, super keyword, and preventing inheritance: final classes and methods.

Polymorphism – Dynamic binding, method overriding, abstract classes and methods.

Interfaces- Interfaces Vs Abstract classes, defining an interface, implement interfaces, extending interface.

Packages- Defining, creating and accessing a package, importing packages.

UNIT III

Exception handling - Concepts of exception handling, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, checked exceptions and unchecked exceptions, built in exceptions.

Multi threading: Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, inter thread communication.

UNIT IV

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Event Handling: Events, Handling mouse and keyboard events, Adapter classes.

Files- Streams- Byte streams, Character streams, Text input/output.

UNIT V

GUI Programming with Java –AWT class hierarchy, component, container, panel, window, frame, graphics.

AWT controls: Labels, button, text field, check box, and graphics.

Layout Manager – Layout manager types: border, grid and flow.
Swing – Introduction, limitations of AWT, Swing vs AWT.

TEXT BOOKS:

1. Java- the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, pearsoneduction.
3. Core Java an integrated approach, dreamtech publication, Dr. R.Nageswara Rao.

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program , P.J.Deitel and H.M.Deitel, PHI
2. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, PE
4. Programming in Java, S. Malhotra and S. Choudhary, Oxford Universities Press.

Course Outcomes:

1. An understanding of the principles and practice of object oriented programming and design in the construction of robust, maintainable programs which satisfy their requirements;
2. A competence to design, write, compile, test and execute straightforward programs using a high level language;
3. An appreciation of the principles of object oriented programming;
4. An awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
5. Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
6. Be able to make use of members of classes found in the Java API.
7. Demonstrate the ability to employ various types of selection constructs in a Java program. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. I Sem

L	T/P/D	C
3	-/-/-	3

(R18A01252) SOFTWARE PROJECT MANAGEMENT

OPEN ELECTIVE II

Objectives:

1. The Main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience - based creation & improvement of models (process management).

The Objectives of the course can be characterized as follows:

1. Understanding the specific roles within a software organization as related to project and process management
2. Understanding the basic infrastructure competences (e.g., process modeling and measurement)
3. Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships

UNIT-I

Conventional Software Management: The waterfall Model, Conventional Software Management Performance, evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation. Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

UNIT-II

Conventional And Modern Software Management: Principles of Conventional Software Engineering, Principles of Modern Software Management, Transitioning to an interactive Process, Life Cycle Phases: Engineering and Production Stages Inception, Elaboration, Construction, Transition phases .

UNIT-III

Artifacts of the Process: The Artifact Sets. Management Artifacts, Engineering Artifacts, Programmatic Artifacts. Model Based Software Architectures: A Management Perspective and Technical Perspective.

UNIT-IV

Flows of the Process: Software Process Workflows. Inter Trans Workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cost and Schedule Estimating. Interaction Planning Process, Pragmatic Planning.

UNIT-V

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, and Evolution of Organizations. Process Automation Building Blocks, the Project Environment. Project Control and Process Instrumentation: Server Care Metrics, Management Indicators, Quality Indicators, Life Cycle Expectations Pragmatic Software Metrics Automation.

TEXT BOOKS:

1. Walker Royce, “Software Project Management”, 1998, PEA.

2. Henry, “Software Project Management”, Pearson.

REFERENCE BOOKS:

1. Richard H.Thayer.” Software Engineering Project Management”, 1997, IEEE Computer Society.

2. Shere K.D.: “Software Engineering and Management”, 1998, PHI.

3. S.A. Kelkar, “Software Project Management: A Concise Study”, PHI.

4. Hughes Cotterell, “Software Project Management”, 2e, TMH. 88 5. Kaeron Conway, “Software Project Management from Concept to D

Course Outcomes:

1. Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures.
3. It focuses Implement a project to manage project schedule, expenses and resource to with the application of suitable project management tools.
4. Principles, techniques, methods & tools for model-based management of software projects, assurance of product quality.
5. Models are required for determining target values and for continuously controlling these values.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. I Sem

L	T/P/D	C
3	-/-/-	3

(R18A0353) ENTERPRISE RESOURCE PLANNING

(OPEN ELECTIVE II)

Course Objectives:

1. To know the basics of ERP
2. To understand the key implementation of ERP
3. To know the business modules of ERP
4. To evaluate the current and future trends in ERP
5. To explain Organizational and Industrial impact; Success and Failure factors of ERP.

UNIT 1

INTRODUCTION: Overview and Benefits of ERP, ERP Related Technologies- Business Process Reengineering (BPR), Online Analytical Processing (OLAP), Supply chain Management (SCM). Applications of ERP.

UNIT II

ERP IMPLEMENTATION: Implementation and Product Lifecycle, Implementation Methodology, Planning Evaluation and selection of ERP systems, Organizing the Project Management and Monitoring. Case Study on Manufacturing.

UNIT III

ERP MODULES: Business modules in an ERP Package- Manufacturing, Human Resources, Plant Maintenance, Materials Management, Data Warehousing, Data Mining, Quality Management, Sales and Distribution. Case Study in Banking Sector.

UNIT IV

POST IMPLEMENTATION: Overview of ERP software solution. Maintenance of ERP-Organizational and Industrial impact; Success and Failure factors of ERP Implementation. Case Study of Success Story and Failure of Processing Sector.

UNIT V

EMERGING TRENDS IN ERP: Extended ERP system, ERP add–ons –Customer Relations Management (CRM), Customer satisfaction (CS). Business analytics etc- Future trends in ERP systems-web enabled, Wireless technologies. Case Study in Service Sector.

TEXT BOOKS:

1. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008
2. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000
3. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2009.

REFERENCE BOOKS:

1. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.
2. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India,2 nd edition, 2006.
3. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001.

Course Outcomes:

1. To know the strategic importance of Enterprise Resource Planning.
2. To Understand and implement ERP in various Sectors.
3. To understand the business modules of ERP.
4. To explain the Future and current trends In ERP.
5. To understand the Industrial impact; Success and Failure factors of ERP.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. I Sem

L	T/P/D	C
3	-/-/-	3

(R18A0354) NANO TECHNOLOGY
OPEN ELECTIVE II

Course Objectives:

1. To learn about basis of Nano Materials.
2. In this course we focus on synthetic aspects for the design of nanostructured materials.
3. We describe different approaches including both the bottom-up(includes both chemical and physical methods) and the top-down methods(mainly physical methods) for the synthesis of nanostructured materials.
4. The course will then focus on different type of nanostructures with a special emphasis on carbon nanotubes(CNT), metal and metal oxide nanoparticles, core-shell nanostructures and self assembly of these nanostructures.
5. The dependence of various properties (dielectric, magnetic and optical) with size will be discussed.

UNIT-I

General Introduction: Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band .structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.

Silicon Carbide: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano-particles,nano particles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nano-composites,

UNIT-II

Mechanical properties: Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties.

Electrical properties: Switching glasses with nanoparticles, Electronic conduction with nano-particles.

Optical properties: Optical properties, special properties and the coloured glasses.

Magnetic Properties: Soft magnetic Nanocrystalline alloy, Permanent magnetic Nanocrystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

UNIT–III

Synthesis Routes: Top &Bottom up approaches: Physical Vapor Deposition, Micromulsion, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method, Spray Pyrolysis, Template Based synthesis, Lithography.

UNIT–IV

Tools to Characterize Nanomaterials: X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM), Three-dimensional Atom Probe (3DAP), Nanoindentation

UNIT–V

Applications of Nanomaterials: Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defence and Space Applications.

TEXT BOOKS:

1) Text Book of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press-IIM.
2) Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J. Owens, Wiley India Edition, 2012.
3) Guozhong Cao, Nanostructures and Nano-materials:Synthesis, Properties and Applications, Imperial College Press 2004.

REFERENCES BOOKS:

1. Nano: The Essentials by T. Pradeep, McGraw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.
3. Transport in Nano structures- David Ferry, Cambridge University press 2000
4. Nanofabrication towards biomedical application: Techniques, tools, Application and impact – Ed. ChallaS.,S. R. Kumar, J. H. Carola.
5. Carbon Nanotubes: Properties and Applications- Michael J. O'Connell.
6. Electron Transport in Mesoscopic systems – S. Dutta, Cambridge University press.
7. Nanomaterials Synthesis, Properties and Applications Edited by A S Edelstein and R C Cammarata, IOP Publishing Ltd 1996.

Course Outcomes:

1. Upon completion of course, students will familiarize about Nano Technology.
2. Students should demonstrate the preparation of Nano Technology.
3. Upon course completion, students will develop knowledge in characteristic Nano Technology & Nano Materials.
4. Student should able toexplain about carbon nanotube metal oxide formation.
5. Student able to understand different properties along with sizes.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech ME - I Sem

L	T/P/D	C
0	3	1.5

(R18A0385) THERMAL ENGINEERING& ENERGY RESOURCES LAB

Course Objectives:

1. To study procedure to draw the valve and port timing diagram of CI/SI engines.
2. To understand the performance characteristics of IC engines (both SI and CI engines) in terms of heat balancing, economical speed variations, air fuel ratio influence on the engine.
3. To demonstrate and understand Morse test on multi cylinder SI engine
4. To understand working and performance of reciprocating air compressor
5. To Study design and working of the different types of boilers

LIST OF EXPERIMENTS

1. I.C. Engine Valve / Port Timing Diagrams
2. I.C. Engine Performance Test for 4 Stroke SI engines
3. I.C. Engine Performance Test for 2 Stroke SI engines
4. I.C. Engine Morse / Retardation / Motoring Tests
5. I.C. Engine Heat Balance - CI/SI Engines
6. I.C. Engine Economical speed Test on a SI engine
7. I.C. Engine Effect of A/F Ratio in a SI engine
8. Performance Test on Variable Compression Ratio of IC Engine
9. IC Engine Performance Test on a 4S CI Engine at constant speed
10. Volumetric efficiency of Air - Compressor Unit
11. Disassembly / Assembly of Engines
12. Study of Boilers
13. To study V-I Characteristics of Solar Panel
14. To Study the Performance of Solar Flat Plate Collector
15. To Study the Performance of Evacuated Tube Collector

NOTE: 1. Minimum a total of 10 experiments are to be conducted

Course Outcomes:

1. Draw the valve and port timing diagram of SI engine & CI engine.
2. Calculate & Compare the performance characteristics of diesel and petrol engines.
3. Apply the concept of Morse test on multi cylinder SI engine.
4. Analyze the efficiency of reciprocating air compressor.
5. Understand the working of boilers.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
0	3	1.5

(R18A0386) MANUFACTURING TECHNOLOGY LAB

Course Objectives:

1. To learn the Step turning and taper turning and thread cutting on lathe machine
2. Practical exposure on Flat Surface machining, Shaping, Slotting, Milling, drilling and grinding operations.
3. Student able to learn about Mechanical parameter measuring systems.
4. Student able to learn about different alignment techniques.
5. To learn the measurement of the Angle and taper by Bevel protractor, Sine bar, etc.

PART A: MACHINE TOOLS

1. To perform various lathe operations such as plain turning, step turning, taper turning knurling and chamfering on a given material made of mild steel.
2. To perform milling operation on the given specimen to accurate dimensions.
3. To perform v and dovetail machining & u-cut on the given workpiece on shaping machine.
4. To perform drilling, counter drilling, boring, counter sinking and tapping operations on drilling machine.
5. To perform cylindrical & surface grinding operations for the given specimen.
6. To make a slot on the given aluminium work piece by slotting machine.

PART B: METROLOGY

1. To measure bore diameters by internal micrometers and dial bore indicators.
2. Measure the addendum and dedendum of the gear tooth using gear tooth vernier calipers.
3. To measure the pitch length and pitch angle using Tool maker's microscope.
4. To measure the angle and taper measurements by Bevel protractor and Sine bar.
5. To find the flatness of surface plate using spirit level.
6. To perform Thread measurement by Two wire/ Three wire method.

NOTE: 1. Minimum a total of 10 experiments are to be conducted

2. At least 4 experiments need to be conducted from each PART.

Course Outcomes:

1. Demonstrate the working principle and parts of different machine tools used in machine shop.
2. Inspect machine tools whether properly aligned or not.
3. Create stepped surface using shaper and keyways using milling machine, perform different turning operations.
4. Apply the procedures to measure length, width, depth, bore diameters, internal and external tapers, tool angles, and surface roughness by using different instruments.
   Measure effective diameter of thread profile using different methods.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
2	0	0

(R18A0521) CYBER SECURITY

Course objectives:

To understand various types of cyber-attacks and cyber-crimes
To learn threats and risks within context of the cyber security
To have an overview of the cyber laws & concepts of cyber forensics
To study the defensive techniques against these attacks

UNIT -I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT- II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of
International Law. The INDIAN Cyberspace, National Cyber Security
Policy.
Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

UNIT- III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT-IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

UNIT- V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. **Mini-Cases:** The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes,Computer Forensics and Legal Perspectives,Wiley
2. B.B.Gupta,D.P.Agrawal,HaoxiangWang,ComputerandCyberSecurity:Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&FGroup.

Course Outcomes:

The students will be able to:

1. Analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
2. Interpret and forensically investigate security incidents
3. Apply policies and procedures to manage Privacy issues
4. Design and develop secure software modules

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech ME - II Sem

L	P	C
2	1	3

(R18A0318) HEAT TRANSFER

***Note:** Heat and Mass Transfer data books are permitted

Course Objectives:

1. Student can able to learn about modes of heat transfer and conduction heat transfer
2. Solve lumped and Heisler charts parameter transient heat transfer problems
3. Student can learn types of convection and dimensional analysis.
4. Student can learn phases of heat transfer, heat exchanger performance
5. Student able to learn different laws of Radiation and its applications.

UNIT-I

Introduction: Basic modes of heat transfer- Rate equations – Differential heat conduction equation in Cartesian, Cylindrical and Spherical coordinate systems. Steady state one dimensional heat conduction solutions for plain and composite slabs, cylinders and spheres, electrical resistance concept - Critical thickness of insulation- Heat conduction through fins of uniform and variable cross section- Fin effectiveness and efficiency.

UNIT-II

Unsteady state Heat Transfer conduction: I-D Transient heat conduction- Lumped system analysis, and solutions by use of Heisler charts.

UNIT-III

Convection: Dimensional analysis- Continuity, momentum and energy equations - Boundary layer theory concept- Free, and Forced convection- Approximate solution of the boundary layer equations - Laminar and turbulent heat transfer correlation- Application of dimensional analysis to free and forced convection problems- Dimensionless numbers and Empirical correlations.

UNIT-IV

Heat Exchangers: Types of heat exchangers- Parallel flow- Counter flow- Cross flow heat exchangers- Overall heat transfer coefficient- LMTD and NTU methods- Fouling factor - Heat exchangers with phase change.

Boiling and Condensation: Different regimes of boiling- Nucleate, Transition and Film boiling. Condensation: Laminar film condensation-Empirical relations, Nusselt's theory- Condensation on vertical flat plate and horizontal tubes- Drop wise condensation.

UNIT- V

Radiation: Black body radiation- radiation field, Kirchhoff's laws- shape factor- Stefan Boltzman equation- Heat radiation through absorbing media- Radiant heat exchange, parallel and perpendicular surfaces - Radiation shields.

TEXT BOOKS:

1. Heat Transfer, by J.P.Holman, Int.Student edition, McGraw Hill Book Company.
2. Fundamentals of Heat and Mass Transfer- Sachdeva, New Age Publications

REFERENCE BOOKS:

1. Heat Transfer by S.P.Sukhatme.
2. Heat transfer by YunusACengel.
3. Heat transfer by Arora and Domakundwar, Dhanpat Rai & sons, New Delhi

Course Outcomes:

1. To identify the modes of heat transfer and calculate the conduction in various solids.
2. Calculate unsteady state heat conduction problems applied to different geometries.
3. To solve the heat convection in various medium.
4. To evaluate the heat transfer in phase change process, design heat exchange equipment based on the need that fit to application.
5. To learn about the radiation and its use in real life

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R18A0319) COMPUTER AIDED DESIGN

Course Objectives:

1. To provide an overview of how computers are being used in design, development of manufacturing plans and manufacture
2. Understand the Mathematical representations of curves and surfaces used in geometric construction.
3. Understand the Mathematical representations of solids used in geometric construction.
4. Understand the transformation of 2D and 3D parts
5. Understand the algorithm for visualization of various 2D and 3D parts

UNIT–I

Introduction: Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure.

Computer Graphics: Display Devices: Cathode Ray Tube, DVST, Raster display, pixel value and lookup table, estimation of graphical memory, LCD, LED fundamentals. Concept of Coordinate Systems: Working Coordinate System, Model Coordinate System, Screen Coordinate System. Graphics exchange standards and Database management systems.

UNIT–II

Curves and Surfaces: Introduction to curve representation, Classification of curves, Line and Curve generation algorithm: DDA algorithm. Synthetic Curves: Concept of continuity, Cubic Spline: equation, properties and blending. Bezier Curve: equations, properties; Properties and advantages of B-Splines and NURBS. Various types of surfaces along with their typical applications.

UNIT–III

Mathematical representation of solids: Geometry and Topology, Comparison of wireframe, surface and solid models, Properties of solid model, properties of representation schemes, Concept of Half-spaces, Boolean operations. Schemes: B-rep, CSG, Sweep representation, ASM, Primitive instancing, Cell Decomposition and Octree encoding

UNIT–IV

Geometric Transformations: Homogeneous representation; Translation, Scaling, Reflection, Rotation, Shearing in 2D; Orthographic and perspective projections.

UNIT–V

VISUAL REALISM: Hidden – Line-Surface-Solid removal algorithms – shading – colouring – Computer animation

TEXT BOOKS:

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH Publishers
2. CAD / CAM /A Zimmers&P.Groover/PE/PHI Publishers

REFERENCE BOOKS:

1. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age Publishers
2. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson Edu
3. CAD/CAM: Concepts and Applications/Alavala/ PHI Publishers Computer Numerical Control Concepts and programming / Warren S Seames / Thomson Publishers
4. CAD / CAM – P N RAO McGraw Hill Publications

Course Outcomes:

1. Understand the applications of computer in the design and manufacturing.
2. Understand and develop the Mathematical representations of curves used in geometric construction.
3. Understand and develop the Mathematical representations of solids used in geometric construction.
4. Able to get the transformed in 2D and 3D using transformation equations
5. Understand and develop the algorithm for visualization of various 2D and 3D parts

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R18A0320) MACHINE DESIGN–II

NOTE: Design Data Book is permitted. Design of all components should include design for strength and rigidity apart from engineering performancerequirements.

Course objectives:

1. To apply principles of design to mechanical power transmission elements like bearings and to design appropriate bearing
2. To design the engine parts like piston, connecting rod and analyze design procedure different loading conditions
3. To introduce the concept, procedures, and data to analyze machine elements in power transmission systems.
4. To apply principles of design and Analyze the forces in mechanical power transmission elements such gears
5. Implement basic principles for the design of power screws And the forces, couples, torques etc,

UNIT–I

BEARINGS: Types of Journal bearings – Lubrication – Bearing Modulus – Full and partial bearings –Clearance ratio – Heat dissipation of bearings, bearing materials – journal bearing design – Ball and roller bearings – Static loading of ball & roller bearings, Bearing life.

UNIT–II

ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – Pistons, Forces acting on piston – Construction, Design and proportions of piston.

UNIT–III

POWER TRANSIMISSION SYSTEMS AND PULLEYS : Transmission of power by Belt and Rope drives, Transmission efficiencies, Belts – Flat and V types .

MECHANICAL SPRINGS: Stresses and deflections of helical springs – Extension and compression springs – Design of springs for fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs .

UNIT–IV

GEARS: Spur gears & Helical gears- important Design parameters – Design of gears using AGMA procedure involving Lewis and Buckingham equations. Check forwear.

UNIT–V

DESIGN OF POWER SCREWS: Design of screw, Square ACME , Buttress screws, compound screw, differential screw.

TEXT BOOKS :

1. Machine Design byR.S.Khurmi and J.K.Gupta, S.ChandPublishers,New Delhi.
2. Machine Design, S MD Jalaludin, Anuradha Publishers.
3. Design of Machine Elements by V. Bhandari TMH

REFERENCE BOOKS:

1. Machine Design Data Book by S MD Jalaludin, Anuradha Publishers
2. Machine Design Data Book by P.S.G. College of Technology
3. Machine Design by Pandya and Shah, Chortar Publications.
4. Machine Design / R.N. Norton
5. Mechanical Engineering Design / JE Shigley.

Course Outcomes:

Studentwillbeableto:

1. To gain the knowledge on bearings and Select suitable bearings and its constituents from manufacturers catalogues under given loading conditions
2. Calculate the design parameter for energy storage element and engine components, connecting rod and piston
3. To understand the types belt drives and Select suitable belt drives and associated elements from manufacturers catalogues under given loading conditions to design the springs for different loading conditions
4. Select appropriate gears for power transmission on the basis of given load and speed Design gears based on the given conditions Apply the design concepts to estimate the strength of the gear
5. Analyze power screws subjected to loading

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R18A0321)SMART MANUFACTURING TECHNOLOGIES
(PROFESSIONAL ELECTIVE 2)

Course Objectives:

1. This course will cover the engineering processes, practices, technology and applications of Smart Manufacturing.
2. The objective of the course is to provide a strong orientation to the students on the new advancements in manufacturing in general and the relevant features of Smart Manufacturing to an Indian context, in particular.
3. The objective of this course is to learn the statistics and optimization methodologies in smart manufacturing technologies.
4. Evaluation criteria and industry benchmarks for determining where and how smart manufacturing processes can benefit your organization.

Unit I: Introduction to Smart Manufacturing

What is “smart manufacturing” really and how does it differ from conventional/legacy manufacturing, Computer Integrated Manufacturing Systems Structure and functional areas of CIM system, - CAD, CAPP, CAM, CAQC, ASRS. Advantages & Disadvantages of CIM.

Unit II: Smart Design/Fabrication

Digital Tools, Agile (Additive) Manufacturing Systems and Standards. Mass Customization, Smart Machine Tools, Robotics and Automation (perception, manipulation, mobility, autonomy).

Unit III: Intelligent Techniques for Manufacturing Process Optimization

Application of neural networks and fuzzy sets to machining and metal forming, artificial neural network modeling of surface quality characteristics in machining processes.

Unit IV: Knowledge Based Group Technology

Knowledge based group technology – Group technology in automated manufacturing system, Structure of knowledge based system for group technology (KBSGT) – Database, knowledge base, Clustering algorithms.

Unit V: Smart Applications

Online Predictive Modeling, Monitoring and Intelligent Control of Machining/Manufacturing and Logistics/Supply Chain Processes; Smart Energy Management of manufacturing processes and facilities

Course Outcomes:

1. To understand the advancements in the manufacturing, smart manufacturing in particular.
2. The course will delivers enough content about the applications in smart manufacturing.
3. Students should be able to understand basic concepts of computer integrated manufacturing.
4. Students should be able to understand basic Components of Knowledge Based Systems.
5. Students should be able to understand about grouping the parts.

Text Books:

1. Andrew Kussiak, “Intelligent Manufacturing Systems”, Prentice Hall , 1990
2. Badiru A.B., “Expert Systems Applications in Engineering and Manufacturing”, Prentice-Hall, New Jersey, 1992.
3. Artificial Neural Networks, Yagna Narayana

Reference Books:

1. Liu, Dikai, Wang, Lingfeng, Tan, Kay Chen (Eds.) Design and Control of Intelligent Robotic Systems, Springer-Verlag, London. ISBN 978-3-540-89932-7
2. Rao R. V. “Advanced Modeling and Optimization of Manufacturing Processes”, Springer-verlag, London. ISBN 978-0-85729-014-4
3. N. Singh and Divakar Rajamani, Cellular Manufacturing Systems- Design, planning and control, Springer US.
4. Robert Levine et al., A Comprehensive guide to AI and Expert Systems, McGraw Hill Inc, 1986.
5. Brent M. Gordon (Editor), Artificial Intelligence: Approaches, Tools and Applications, Nova Science Publisher, New York, 2011.
6. J. Paulo Davim (Editor), Artificial Intelligence in Manufacturing Research, Nova Science Publisher, New York, 2010.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

L	T/P/D	C
3	0	3

III Year B. Tech, ME-II Sem

(R18A0322) COMPUTATIONAL FLUID DYNAMICS
(PROFESSIONAL ELECTIVE 2)

Course Objectives:

To enable the students to

1. Provide with sufficient background to understand the mathematical representation of the governing equations of fluid flow and heat transfer.
2. Solve one and two-dimensional ordinary and partial differential equations using traditional CFD tools.
3. Understand the various discretization techniques.
4. Understand the turbulence models and grid generation techniques.
5. How to apply explicit, implicit and semi-implicit methods of finite differencing.
6. To help the students solve fluid flow field using some popular CFD techniques

UNIT-I

Governing Equations of fluid flow and Levels of approximation: Basics of computational fluid dynamics – Continuity equation, Navier-Stokes equation and various flow conditions, Chemical species transport and Physical boundary conditions – Turbulent Flow – Turbulent modeling – inviscid flow and Boundary layer approximations. Mathematicalbehavior of PDEs on CFD – Elliptic, Parabolic and Hyperbolic equations.

UNIT-II

Fundamentals of discretisation and Properties of Numerical Schemes:

Converting derivatives intoDiscrete Expressions – Spatial Discretisation. Discretisation methods- Finite difference method, Finite Element Method, Boundary value problems, Finite Volume method and Temporal Discretisation. The accuracy of Discretisation process and an illustrative example.

Properties of Numerical Schemes: Basic Definitions-Consistency, stability and convergence

UNIT-III

Finite Difference Method and Finite Element Method:

FDM**:** Basics of Forward, backward and central difference schemes with an example in fluid flow and heat transfer. Multi-dimensional finite difference formulae. Uniform and non uniform meshes.

FEM: Variational principles, weighted integral formulation, Functional, Rayleigh Ritz, Galerkin Concepts and Boundary conditions. Elements and shape functions in one, two and three dimensions. Discrete equations and assembly and solutions.

UNIT-IV

Finite Volume Method and solution methods of System of Equations:

The Diffusion Equation- Stokes equation, Finite volume Discretization, application of boundary condition. The convection diffusion equation, Upwind scheme. Extension to multi-dimensional problem. Unstructured grids. SIMPLE algorithm.

Linear and Nonlinear systems – Gauss elimination method, Newton method, and Quasi Newton Method. Iterative methods and multi grid acceleration.

UNIT-V

Turbulence Models and Mesh Generation: Turbulence models, mixing length model, Two equation (k-Є) models – High and low Reynolds number models – Structured Grid generation – Unstructured Grid generation – Mesh refinement – Adaptive mesh – Software tools.

TEXT BOOKS:

1. H.K.Versteeg& W. Malalasekera, An Introduction to Computational Fluid Dynamics, Longman Scientific & Technical.
2. Patankar, S.V. Numerical Heat Transfer and Fluid Flow, Hemisphere Publishing Corporation,2004.

REFERENCE BOOKS:

1. J.D. Anderson, Jr., (2000), Computational Fluid Dynamics – The basics with applications, McGraw-Hill.
2. Muralidhar, K., and Sundararajan, T.,Computational Fluid Flow and Heat Transfer, Narosa Publishing House, New Delhi, 1995.
3. Prodip Niyogi, Chakrabarty, S.K., Laha, M.K. Introduction to Computational Fluid Dynamics, Pearson Education, 2005.

Course Outcomes:

1. Demonstrate & explain geometrical model of a fluid flow.
2. Describe specific boundary conditions and solution parameters.
3. Analyze the results and draw the appropriate inferences.
4. Solve fluid flow fields using CFD methods
5. Model fluid flow problems and heat transfer.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R18A0323) TOOL DESIGN

(PROFESSIONAL ELECTIVE 2)

Course Objectives:

1. To understand the functions and design principles of Jigs, fixtures and press tools.
2. To gain proficiency in the development of required views of the final design.
3. To gain the knowledge on Press Working Terminologies And Elements Of Cutting Dies.
4. To explain between bending and drawing.
5. To know about different types of the forming techniques.

UNIT I

LOCATING AND CLAMPING PRINCIPLES:

Objectives of tool design- Function and advantages of Jigs and fixtures – Basic elements – principles of location – Locating methods and devices – Redundant Location – Principles of clamping – Mechanical actuation – pneumatic and hydraulic actuation Standard parts – Drill bushes and Jig buttons – Tolerances and materials used.

UNIT II

JIGS AND FIXTURES

Design and development of jigs and fixtures for given component- Types of Jigs – Post, Turnover, Channel, latch, box, pot, angular post jigs – Indexing jigs – General principles of milling, Lathe, boring, broaching and grinding fixtures – Assembly, Inspection and Welding fixtures – Modular fixturing systems- Quick change fixtures.

UNIT III

PRESS WORKING TERMINOLOGIES AND ELEMENTS OF CUTTING DIES

Press Working Terminologies – operations – Types of presses – press accessories – Computation of press capacity – Strip layout – Material Utilization – Shearing action – Clearances – Press Work Materials – Center of pressure- Design of various elements of dies – Die Block – Punch holder, Die set, guide plates – Stops – Strippers – Pilots – Selection of Standard parts – Design and preparation of four standard views of simple blanking, piercing, compound and progressive dies.

UNIT IV

BENDING AND DRAWING DIES

Difference between bending and drawing – Blank development for above operations – Types of Bending dies – Press capacity – Spring back – knockouts – direct and indirect – pressure pads – Ejectors – Variables affecting Metal flow in drawing operations – draw die inserts – draw beads- ironing – Design and development of bending, forming, drawing,

reverse redrawing and combination dies – Blank development for axisymmetric, rectangular and elliptic parts – Single and double action dies.

UNIT V

OTHER FORMING TECHNIQUES

Bulging, Swaging, Embossing, coining, curling, hole flanging, shaving and sizing, assembly, fine Blanking dies – recent trends in tool design- computer Aids for sheet metal forming Analysis – basic introduction – tooling for numerically controlled machines- setup reduction for work holding – Single minute exchange of dies – Poka Yoke.

TEXT BOOKS:

Joshi, P.H. "Jigs and Fixtures", Second Edition, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2004.

Joshi P.H "Press tools – Design and Construction", wheels publishing, 1996

REFERENCES:

Venkataraman. K., "Design of Jigs Fixtures & Press Tools", Tata McGraw Hill, New Delhi, 2005.

Donaldson, Lecain and Goold "Tool Design", 3rd Edition, Tata McGraw Hill, 2000.

Kempster, "Jigs and Fixture Design", Third Edition, Hoddes and Stoughton, 1974.

Hoffman "Jigs and Fixture Design", Thomson Delmar Learning, Singapore, 2004.

ASTME Fundamentals of Tool Design Prentice Hall of India.

Design Data Hand Book, PSG College of Technology, Coimbatore.

Course Outcomes:

1. Upon completion of this course, the students can able to design jigs, fixtures and press tools.
2. Students can able to follow the general principles to design jigs, fixtures and press tools.
3. Students can understand the terminology and elements of cutting dies.
4. Student can Differentiate between bending and drawing.
5. Student can explain about all other forms forming techniques.

OPEN ELECTIVES III

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0455) EMBEDDED SYSTEMS

(OPEN ELECTIVE III)

1. To understand the basics of microprocessors and microcontrollers architecture and its functionalities
2. Understand the core of an embedded system
3. To learn the design process of embedded system applications.
4. To understands the RTOS and inter-process communication.
5. Able to learn how to apply explicit, implicit and semi-implicit methods of finite differencing.

UNIT-I

INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS: 8086 Microprocessor: Architecture of 8086, Register Organization, Programming Model, Memory Segmentation, Signal descriptions of 8086, Addressing modes, Instruction Set.

8051 Microcontroller: 8051 Architecture, I/O Ports, Memory Organization, Instruction set of 8051, memory interfacing to 8051.

UNIT-II

INTRODUCTION TO EMBEDDED SYSTEMS:

History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, Applications of embedded systems, and characteristics of embedded systems, Operational and Non-operational attributes of embedded systems.

UNIT-III

TYPICAL EMBEDDED SYSTEM

Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory selection for embedded systems; Sensors and actuators , Onboard communication interfaces-I2C, SPI. External communication interfaces: RS232, WIFI.

UNIT-IV

EMBEDDED FIRMWARE DESIGN AND DEVELOPMENT: Embedded firmware design approaches-super loop based approach, operating system based approach; embedded firmware development languages-assembly language based development, high level language based development.

UNIT-V

RTOS BASED EMBEDDED SYSTEM DESIGN

Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling: non-preemptive and pre-emptive scheduling; Device drivers, How to choose an RTOS.

TEXT BOOKS:

1. D. V. Hall, Microprocessors and Interfacing, TMGH, 2nd Edition 2006.
2. Kenneth. J. Ayala, The 8051 Microcontroller , 3rd Ed., Cengage Learning
3. Introduction to Embedded Systems - shibu k v, Mc Graw Hill Education.

REFERENCE BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandi, TMH, 2nd Edition 2006
2. Embedded Systems- An integrated approach - Lyla B Das, Pearson education 2012.

Course Outcomes:

1. The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
2. Understand and design the Embedded systems
3. Understand Embedded Firmware design approaches
4. Learn the basics of RTOS.
5. Model fluid flow problems and heat transfer.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. I Sem	L	T/P/D	C
	3	-/-/-	3

OPEN ELECTIVE III
(R18A0452) ROBOTICS & AUTOMATION

Course Objectives:

1. This introductory course is valuable for students who wish to learn about robotics through a study of industrial robot systems analysis and design.
2. This course is suited to students from engineering and science backgrounds that wish to broaden their knowledge through working on a subject that integrates multi-disciplinary technologies.
3. This course is to analyse the industrial robotic applications.
4. T understand the robot manipulators of their Kinematics and Kinetic control m.
5. The performance of manipulate can analyse through simulation by MATLAB.

UNIT – I

Introduction & Basic Definitions: History pf robots-robot anatomy, Coordinate Systems, Human arm Characteristics, Cartesian, Cylindrical, Polar, coordinate frames, mapping transform.

UNIT – II

Kinematics – Inverse Kinematics: Kinematics, Mechanical structure and notations, description of links and joints, DenavitHatenberg notation, manipulator transformation matrix, examples inverse kinematics.

UNIT – III

Differential Motion – Statics – Dynamic Modeling: Velocity Propagation along links, manipulator Jacobian – Jacobian singularities – Lagrange Euler formulation Newton Euler formulation basics of trajectory planning.

UNIT – IV

Robot Systems : Actuators Sensors and Vision: Hydraulic and Electrical Systems Including Pumps, valves, solenoids, cylinders, stepper motors, Encoders and AC Motors Range and use of sensors, Micro switches, Resistance Transducers, Piezo-electric, Infrared and Lasers Applications of Sensors : Reed Switches, Ultrasonic, Barcode Readers and RFID – Fundamentals of Robotic vision.

UNIT – V

Robots and Applications: Industrial Applications – Processing applications – Assembly applications, Inspection applications, Non Industrial applications.

TEXTBOOKS

1. Robotics and Control: R.K. Mittal and I.J. Nagarath, TMH 2003.
2. Introduction to Robotics – P.J. Mckerrow, ISBN: 0201182408

REFERENCES

1. Robotics – K.S. Fu, R.C. Gonzalez and C.S.G. Lee, 2008, TMH.

2. Introduction to Robotics – S. Nikv, 2001, Prentice Hall,
3. Mechatronics and Robotics: Design & Applications – A. Mutanbara, 1999, CRC Press.

Course Outcomes:

1. Upon the completion of this course, the student will be able to:
2. Describe the various elements that make an industrial robot system
3. Discuss various applications of industrial robot systems
4. Analyze robot manipulators in terms of their kinematics, kinetics, and control
5. Model robot manipulators and analyze their performance, through running simulations using a MATLAB-based Robot Toolbox
6. Select an appropriate robotic system for a given application and discuss the limitationsof such a system
7. Program and control an industrial robot system that performs a specific task.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0453) INTERNET OF THINGS & APPLICATIONS

(OPEN ELECTIVE III)

Course Objectives:

i) To study the fundamentals about IoT
ii) To study about IoT Access technologies
iii) To study the design methodology and different IoT hardware platforms.
iv) To study the basics of IoT Data Analytics and supporting services.
v) To study about various IoT case studies and industrial applications.

UNIT I: FUNDAMENTALS OF IoT- Evolution of Internet of Things, Enabling Technologies, M2M Communication, IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture, Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II: IoT PROTOCOLS- IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks,6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT.

UNIT III: DESIGN AND DEVELOPMENT- Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks

IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details

UNIT IV: DATA ANALYTICS AND SUPPORTING SERVICES:

Data Analytics: Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M,

Supporting Services: Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models.

UNIT V: CASE STUDIES/INDUSTRIAL APPLICATIONS: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments, Industry 4.0 concepts.

1. ***Text Books:***

1. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017
2. Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015
3. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education

2. ***Reference Books:***

1. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
2. "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence",Jan Ho¨ ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
3. Architecting the Internet of Things,Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.
4. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition,Michael Margolis, Arduino Cookbook and O"Reilly Media, 2011.

Course Outcomes:

At the end of this course, students will be able to

- Understand the basics of IoT.
- Implement the state of the Architecture of an IoT.
- Understand design methodology and hardware platforms involved in IoT.
- Understand how to analyze and organize the data.
- Compare IOT Applications in Industrial & real world.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech - II Sem

L	T/P/D	C
3	-/-/-	3

(R18A1253) SOFTWARE TESTING TECHNIQUES

(OPEN ELECTIVE - III)

Course Objectives:

1. Knowing the concepts of Software Engineering and software development life cycle.
2. Understanding the foundations, techniques, and tools in the area of software testing and its practice in the industry.
3. Learning the functional aspect of the various testing techniques.
4. Knowledge of the creation of test cases and usage of testing tools.
5. Learning about different testing types in software testing.

UNIT – I **INTRODUCTION**

Software, Software Engineering, Process Models: Waterfall Model, Spiral Model, Prototyping, V Model. Software Testing – Definition of Software Testing – Objective and limits of testing – Testing Strategy – Roles and Responsibilities of a Software Tester – Independent Verification and Validation.

UNIT - II **SOFTWARE TESTING REQUIREMENTS**

Software Testing Requirements - Analyzing the requirements -Classifying the Functional and Non Functional Requirements. Software Testing Review Process - Objective of Software Testing Review - Types of Reviews: Peer Review – Walkthrough - Inspection - Checklists of Review Process - Review Log.

UNIT - III **TESTING TECHNIQUES**

White box testing techniques – Static and Dynamic Testing – Statement Coverage – Decision/Branch Coverage – Basic Path Testing – Control Flow Graph Coverage – Conditional Coverage – McCabe's Cyclomatic Complexity – Mutation Testing. Black Box Test Techniques: Boundary Value Analysis – Equivalent Class Partition – Cause-Effect Analysis – Decision Table – State Transition Table – Pair Wise Testing – Use Case Testing.

UNIT - IV **TESTING TYPES**

Unit Testing, Functional Testing: Smoke Testing – Integration, System Testing, User Acceptance Testing - Non Functional Testing:– Performance Testing – Recovery Testing – Security Testing – Compatibility Testing – Usability Testing – Ad Hoc Testing – Internationalization Testing – Configuration Testing - Data ware House Testing and Business Intelligence Testing – SOA Testing - Mobile Testing.

UNIT - V **TEST CASE DESIGN**

Definition of Test Case - Standards, Guidelines and Naming Conventions – Characteristics of Good Test Cases – Test Case templates – Creation of Test Case – Requirement Coverage –Traceability Matrix – Test Case Review Process – Test Execution – Test Log - Reporting of Test Execution – Definition of Risk - Risk Based Testing Approach.

Overview of Testing Tools like Winrunner, Loadrunner, Selenium, JMeter.

TEXT BOOKS :

1. Software Testing Techniques – BorisBeizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.
3. S.Subashni, N.Satheesh Kumar, Dr.B.G.Geetha, Dr.G.Singaravel, ”Software Testing”, Umayam Publications , First edition, 2013.

REFERENCE BOOKS:

1. Srinivasan Desikan, GopalaswamyRamesh,”Software Testing: Principles and Practice”, Pearson Education India, First Impression 2006.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing Concepts and Tools:P.NageshwarRao, dreamtechPress.
4. Art of Software Testing – Meyers, John Wiley.
5. Software Testing in the Real World – Edward Kit, Pearson.

Course Outcomes:

1. Analyze the strategies for software testing.
2. Identify the issues in test management and testing activity.
3. Apply the suitable testing strategy for a given application.
4. Development of test cases and selection of appropriate testing tool.
5. Identify the suitable testing techniques in software testing.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0355) TOTAL QUALITY MANAGEMENT

(OPEN ELECTIVE III)

Course Objectives:

1. To facilitate the understanding of Quality Management principles and process.
2. To understand Customer focus, Employee focus and their involvement and Supplier Management.
3. Student able to know about Organizing for TQM.
4. To gain the knowledge on The Cost of Quality
5. To gain the knowledge on all Universal Standards of Quality..

UNIT – I

Introduction, The concept of TQM, Quality and Business performance, attitude, and involvement of top management, communication, culture and management systems. Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs. Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling.

UNIT -II

Customer Focus and Satisfaction: internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer – Supplier relationships. Bench Marking: Evolution of Bench Marking, meaning of bench marking, benefits of bench marketing, the bench marking procedure, pitfalls of bench marketing.

UNIT- III

Organizing for TQM: The systems approach, organizing for quality implementation, making the transition from a traditional to a TQM organization, Quality Circles, seven Tools of TQM: Stratification, check sheet, Scatter diagram, Kepner &Tregoe Methodology.

UNIT- IV

The Cost of Quality: Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost information, Accounting Systems and Quality Management.

UNIT –V

ISO9000: Universal Standards of Quality: ISO around the world, The ISO9000 ANSI/ASQC Q-90. Series Standards, benefits of ISO9000 certification, the third party audit, Documentation ISO9000 and services, the cost of certification implementing the system.

TEXT BOOK:

1. Total Quality Management / Joel E. Ross/Taylor and Franscis Limited
2. Total Quality Management/P. N. Mukherjee/PHI

REFERENCE BOOKS:

1. Beyond TQM / Robert L.Flood
2. Total quality management by Paneer Selvam
3. Statistical Quality Control / E.L. Grant.
4. Total Quality Management:A Practical Approach/H. Lal
5. Quality Management/Kanishka Bedi/Oxford University Press/2011
6. Total Engineering Quality Management/Sunil Sharma/Macmillan

Course Outcomes:

1. The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
2. To give the students an overview of TQM, various Quality aspects and.
3. Student can able to manage industrial quality organizing for TQM.
4. To give importance of Top Management Commitment in any organization for maintaining product / services quality.
5. To give suitable standards of quality for TQM.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. II Sem	L	T/P/D	C
	3	-/-/-	3

(R18A0554)OPERATING SYSTEM CONCEPTS

OPEN ELECTIVE III

Course Objectives:

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS
4. Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management

Unit I:

Introduction, objectives and functions of OS, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, OS services, system calls, system programs, virtual machines.

Unit-II:

Process Management:

Process concept, Process states, threads, **CPU Scheduling** - Scheduling algorithms, multiple processors and real time scheduling. **Process synchronization** – Critical section problems, Peterson's Solution, semaphores, monitors.

Unit-III:

Memory Management:

Basic concept, Logical and Physical addresses, contiguous memory allocation, swapping, paging, segmentation. **Virtual memory** – Basics of Virtual Memory, Demand Paging, Page Replacement algorithms, allocation of frames, thrashing.

Unit-IV: **File Management**: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), Case study: UNIX, Windows.

Unit-V:

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk attachment, disk management.

Dead locks: Characterization, Dead lock Prevention, Dead lock Avoidance, Dead lock Detection and Recovery.

Text Book:

1. Operating Systems Concepts –AvilSilberschatz j, Peter Galvin, GreyGagne

Reference:

1.Modern Operating Systems –Andrew S. Tanenbaum, PHI
2.Operating Systems: Internals and Design Principles, 5th Edition, William Stallings,Prentice Hall of India

Course Outcomes:

At the end of the course the students are able to:

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech ME - II Sem

L	P	C
0	**3**	1.5

(R18A0387) COMPUTER AIDED DESIGN AND MANUFACTURING LAB

Course Objectives

1. To analyse the various mechanical components
2. To impart the students with necessary computer aided modeling skills using standard CAD packages.
3. To expose the students to the techniques of CNC programming and cutting tool path generation through CNC simulation software by using G-Codes and M-codes and writing part program for simple machine parts.
4. Simulation of mechanical components by visualization softwares
5. To know the process plan creation in design and manufacturing

LIST OF EXPERIMENTS:

1) Determination of deflection and stresses in 2D and 3D trusses and beams.
2) Determination of deflections component and principal and Von-mises stresses in plane stress, plane strain and Axisymmetric components.
3) Determination of stresses in 3D and shell structures (at least one example in each case)
4) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
5) Steady state heat transfer Analysis of plane and Axisymmetric components.
6) Development of process sheets for various components based on tooling Machines.
7) Development of manufacturing and tool management systems.
8) Study of various post processors used in NC Machines.
9) Development of NC code for free form and sculptured surfaces using CAM packages.
10) Machining of simple components on NC lathe by transferring NC Code / from a CAM package.
11) Simulation of Piston and connecting rod assembly
12) Simulation of pillow block bearing assembly
13) Simulation of pumps

NOTE: 1. Minimum a total of 10 experiments are to be conducted

Course Outcomes:

1. Understand the various types analysis in Ansys.
2. Understand the geometric modeling to represent curves and surfaces.
3. Understand the basic geometric commands and numerical control.
4. Able to do the Simulation of mechanical components by visualization softwares
5. Understand the concept of process plan in design and manufacturing

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech ME - II Sem

L	P	C
0	**3**	1.5

(R18A0388) HEAT TRANSFER LAB

Course Objectives :

Course Objectives:

1. The primary objective of this course is to provide the fundamental knowledge necessary
2. To understand the behavior of thermal systems.
3. This course provides a detailed experimental analysis,
4. Including the application and heat transfer through solids, fluids, and vacuum.
5. Convection, conduction, and radiation heat transfer in one and two dimensional steady and unsteady systems are examined

LIST OF EXPERIMENTS:

1. Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin.
6. Experiment on Transient Heat conduction.
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection.
9. Parallel and counter flow heat exchanger.
10. Emissive apparatus.
11. Stefan Boltzman Apparatus.
12. Critical Heat flux apparatus.
13. Study of heat pipe and its demonstration.

NOTE: 1. Minimum a total of 10 experiments are to be conducted

Course Outcomes:

1. Perform experiments to determine the thermal conductivity of a metal rod.
2. Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
3. Estimate the effective thermal resistance in composite slabs
4. Determine surface emissivity of a test plate
5. Estimate performance of effectiveness of fin
6. Calculate temperature distribution of study and transient heat conduction through plane wall, cylinder and fin using numerical approach.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II Sem

L	T/P/D	C
0	6	3

(R18A0394) MINI PROJECT (SUMMER INTERNSHIP)

COURSE OBJECTIVES:

1. To acquaint with the process of undertaking literature survey/industrial visit and identifying the problem
2. To familiarize the process of solving the problem in a group
3. To acquaint with the process of applying basic engineering fundamental in the domain of practical applications
4. To inculcate the process of research
5. To work with group and share responsibilities.

COURSE OUTCOMES:

1. Identify a topic in advanced areas of Mechanical Engineering.
2. Review literature to identify gaps and define objectives & scope of the work
3. Generate and implement innovative ideas for social benefit.
4. Develop conceptual design and methodology of solution for the problem.
5. Learn team work and share responsibility.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B.Tech. II Sem

L	T/P/D	C
2	-/-/-	-

(R18A1205) ARTIFICIAL INTELLIGENCE

Course Objectives: To train the students to understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning. Study of Markov Models enable the student ready to step into applied AI.

UNIT - I

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents **Basic Search Strategies**: Problem Spaces, Uninformed Search (Breadth- First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing,GenericBest-First,A*),Constraint Satisfaction (Backtracking,LocalSearch)

UNIT - II

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning

Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT -III

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non- monotonic Reasoning, Other Knowledge Representation Schemes

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks

UNIT - IV

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

UNIT - V

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, KnowledgeAcquisition.

TEXT BOOK:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, PrenticeHall, 2010.

REFERENCE BOOKS:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

L	T/P/D	C
3	0	3

IV Year B. Tech, ME-I Sem

(R18A0324) AUTOMATION AND CONTROL ENGINEERING

Course Objectives:

1. To perform one or more processing operations
2. To understand the need of Mechatronics systems
3. To make students familiar with the constructions and working principle of different types of sensors and transducers.
4. Understand the fundamental concepts of electro mechanics and fluid mechanics (hydraulics and pneumatics) ofActuators and drive systems.
5. To impart knowledge on the control elements
6. To understand the different control schemes generally used to get best output.

UNIT–I

Introduction to automation: Types and strategies of automation, pneumatic and hydraulic components circuits, Mechanical Feeding and machine tool control to transfer the automation.

Introduction to Mechatronics: Role of various engineering disciplines in Mechatronics, Mechatronics design elements, Scope of Mechatronics, Applications of Mechatronics.

UNIT-II

Sensors and Transducers: Sensors and transducers, performance terminology, displacement, position and proximity, velocity and motion, force, fluid pressure, liquid flow, liquid level, temperature, light sensors, selection of sensors.

UNIT-III

Actuators and drive systems: Mechanical, Electrical, Hydraulic drive systems, Characteristics of mechanical, Electrical, Hydraulic and pneumatic actuators and their limitations.

UNIT-IV

Control system components: Introduction, classification of control system- classification of control systems on the basis of control signal used, Adaptive control system, Process control systems

UNIT-V

Process control: Introduction, concept of process control, Automatic controllers- digital controller, Electronic controllers, Pneumatic controllers, P-I controller, PD controller, P-I-D controller, Hydraulic controllers.

TEXT BOOKS:

1. Mechatronics, W.Bolton, Pearson Education, Asia.
2. Mechatronics, M.D. Singh and J.G. Joshi, PHI.

REFERENCE BOOKS:

1. Mechatronics, D.A. Bradley, D. Dawson, N.C. Buru and A.J. Loader, Chapman Hall.
2. Microprocessor Architecture, Programming & Applications, S. Ramesh, Gaonkar, Wiley Eastern.
3. The Mechatronics Handbook with ISA– The Instrumentation, Systems, Automation, Robert H. Bishop. Ed.-in-chief., CRC Press.

Course Outcomes:

1. The importance of automation in industries and Identification of key elements of mechatronics system
2. Set up testing strategies to evaluate performance characteristics of different types of sensors and transducers and develop professional skills in acquiring and applying the knowledge outside the classroom through design of a real-life instrumentation system.
3. Describe and analyze working principles of various types of motors, differences, characteristics and selection criteria, control methods.
4. understand fundamental elements of drive systems, analyse the steady-state characteristics of a few commonly used types of actuators used in the industry.
5. The students will be able to handle different types of controller like electronic, pneumatic and hydraulic.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

	L	T/P/D	C
IV Year B. Tech, ME-I SEM	**2**	**1**	**3**

(R18A0325) OPERATIONS RESEARCH

Course Objectives:

1. Define and formulate linear programming problems and appreciate their limitations.
2. Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
3. Conduct and interpret post-optimal and sensitivity analysis and explain the primal-dual relationship.
4. Develop mathematical skills to analyze and solve integer programming and network models arising from a wide range of applications.
5. Effectively communicate ideas, explain procedures and interpret results and solutions in simulation.

UNIT–I

Introduction: Development of OR – Definitions-Operation Research models– applications.
Resource Allocation: Linear Programming Problem Formulation –Graphical solution – Simplex method –Artificial variables techniques -Big-M method

UNIT–II

Transportation Problem: Formulation – Optimal solution, unbalanced transportation problem –Degeneracy. **Assignment problem** –Formulation –Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.

UNIT–III

Theory of Games: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.

UNIT–IV

Replacement Analysis: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.**Inventory:** Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed

UNIT–V

Sequencing: Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.
Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages

TEXT BOOKS :

1 S.D.Sharma - Operations Research , Kedarnath, Ramnath 2015
2. Hiller &Libermann - Introduction to O.R , Mc Graw Hill 2011
3. Taha - Introduction to O.R , PHI 2010

REFERENCE BOOKS:

1. A.M.Natarajan,P.Balasubramani,A. Tamilarasi -Operations Research , Pearson . Education

2. R.Pannerselvam - Operations Research ,PHI Publications 2006
3. J.K.Sharma- Operation Research , MacMilan 2010

Course Outcomes:

1. Student will be able to Identify and develop operational research models from the verbal description of the real system.
2. Understand the mathematical tools that are needed to solve optimization problems.
3. Develop a report that describes the model and the solving technique, analyses the results and propose recommendations in language understandable in Management Engineering.
4. Student able to understand Multi-criteria decision techniques, Decision making under uncertainty and risk, Game theory, and Dynamic programming.
5. Use mathematical software to solve the proposed simulation models.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

	L	T/P/D	C
IV Year B. Tech, ME-I Sem	**3**	**0**	**3**

(R18A0326)MECHANICAL MEASUREMENTS AND INSTRUMENATION

Course Objectives:

To study concept of architecture of the measurement system.
To deliver working principle of mechanical measurement system.
To impart knowledge of mathematical modeling of the control system and control system under different time domain.
To analyze the stress and strain measurements and humidity measurements
To understand the Measurement of Force, Torque and Power Elements of Control Systems

UNIT–I Definition–Basicprinciplesofmeasurement–Measurementsystems,generalizedconfigurationandfunctionaldescriptionsofmeasuringinstruments–examples. Dynamic performance characteristics–sources oferror, Classification and elimination oferror.

MeasurementofDisplacement: Theoryandconstructionofvarioustransducerstomeasuredisplacement–Piezo electric, Inductive, capacitance, resistance, ionizationandPhotoelectric transducers, Calibration procedures.

UNIT–II MeasurementofTemperature: Classification–Ranges–VariousPrinciplesofmeasurement– Expansion,Electrical Resistance–Thermistor–Thermocouple– Pyrometers–Temperature Indicators.

MeasurementofPressure: Units–classification–differentprinciplesused.Manometers,Piston,Bourdonpressure gauges,Bellows–Diaphragmgauges.Lowpressuremeasurement–Thermalconductivitygauges–ionizationpressure gauges, Mcleodpressuregauge. **MeasurementofLevel:**Directmethod–Indirectmethods– capacitative,ultrasonic,magnetic,cryogenicfuellevel indicators –Bublerlevel indicators.

UNIT–III

FlowMeasurement: Rotameter,magnetic,Ultrasonic,Turbineflowmeter,Hotwireanemometer, LaserDoppler Anemometer(LDA).

MeasurementofSpeed: MechanicalTachometers- Electricaltachometers–Stroboscope,Noncontacttypeof tachometer

MeasurementofAccelerationandVibration: Differentsimpleinstruments–PrinciplesofSeismicinstruments– Vibrometer andaccelerometer using this principle.

UNIT–IV

StressStrainMeasurements: Varioustypesofstressandstrainmeasurements–electricalstraingauge–gaugefactor–methodofusageofresistancestraingaugeforbendingcompressiveandtensilestrains–usageformeasuringtorque, Strain gauge Rosettes.

MeasurementofHumidity–Moisturecontentofgases,slingpsychrometer,Absorptionpsychrometer,Dewpoint meter.

UNIT–V

MeasurementofForce,TorqueAndPower-Elastic forcemeters, loadcells, Torsionmeters, Dynamometers.

ElementsofControlSystems: Introduction,Importance–Classification–OpenandclosedsystemsServomechanisms– Exampleswith block diagrams– Temperature,speed&positioncontrolsystems.

TextBooks:

1. Mechanical Measurements /Beck With, Marangoni, Linehar/PHIPublisher
2. Measurement Systems: Applications&design /D.SKumar/McGraw Hill Publishers
3. Mechanical Measurements /Shawney/McGrawHill Publishers

ReferenceBooks:

1. Experimental Methods forEngineers /Holman/McGraw-Hill Education
2. Mechanical and Industrial Measurements /R.K. Jain/ Khanna Publishers.
3. Instrumentation and Mechanical Measurements /A.K. Tayal / GalgotiaPublications.

Course Outcomes:

Learner should be able to Identify and select proper measuring instrument for specific application Illustrate working principle of measuring instruments**.**

Explain calibration methodology and error analysis related to measuring instruments Mathematically model and analyze for different measuments.

4. Acquire knowledge in stress and strain measurements and Humidity measurement. Identify, analysis, and solve mechanical engineering problems useful to the society

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-I Sem

	L	T/P/D	C
(R18A0327) FINITE ELEMENT ANALYSIS	**3**	**0**	**3**

Objectives:

1. To enable the students to understand fundamentals of finite elementanalysis and the principles involved in the discretization of domain with various elements, polynomial interpolation and assembly of globalarrays.
2. To learntheapplicationofFEMequationsfortrussesandBeams
3. To learn the application of FEM equations for axisymmetric problems andCST by
4. TolearntheapplicationofFEMequationsforIso-Parametricandheattransferproblems
5. To learn the application of FEM equations for dynamic analysis

UNIT I

Introduction to Finite Element Method for solving field problems, Stress and Equilibrium, Strain - Displacement relations, Stress - strain relations.

One-Dimensional Problem: finite element modeling, local coordinates and shape functions. Potential Energy approach, Assembly of Global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions.

UNIT II

Trusses: Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses.

BEAMS: Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses.

Unit III

Two Dimensional Problems: Basic concepts of plane stress and plane strain, stiffness matrix of CST element, finite element solution of plane stress problems.

Axi-Symmetric Model: Finite element modelling of axi-symmetric solids subjected to axi-symmetric loading with triangular elements.

Unit IV

Iso-Parametric Formulation: Concepts, sub parametric, super parametric elements, 2 dimensional 4 nodediso-parametric elements, and numerical integration.

Heat Transfer Problems: One dimensional steady state analysis composite wall. One dimensional fin analysis and two-dimensional analysis of thin plate.

Unit V

Dynamic Analysis: Formulation of finite element model, element matrices, evaluation of Eigen values and Eigen vectors for a stepped bar and a beam.

Text Books:

1. Tirupathi.R. Chandrupatla and Ashok D. Belegundu, Introduction to Finite elements in Engineering. PHI.
2. S Senthil, Introduction of Finite Element Analysis. Laxmi Publications.
3. SMD Jalaluddin, Introduction of Finite Element Analysis.Anuradha Publications.

4. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald John Wiley & sons (ASIA) Pte Ltd.

References:

1. K. J. Bathe, Finite element procedures. PHI.
2. SS Rao, The finite element method in engineering. Butterworth Heinemann.
3. J.N. Reddy, An introduction to the Finite element method. TMH.
4. Chennakesava, R Alavala, Finite element methods: Basic concepts and applications. PHI.

Course Outcomes:

1. Identify mathematical model to solve common engineering problems by applying the finite element method and formulate the elements for one dimensional bar structures and solve problems in one dimensional bar structures.
2. DeriveelementmatricestofindstressesintrussesandBeams
3. FormulateFEcharacteristicequationsforaxisymmetricproblemsandanalyzeplain stress,plainstrainandDeriveelementmatrices for CST elements.
4. FormulateFEcharacteristicequationsforisoparamtericproblemsandheattransferprobl em.
5. Solvedynamicproblemswheretheeffectofmassmattersduringtheanalysis.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R18A0328) PRODUCTION AND OPERATIONS MANAGEMENT

(PROFESSIONAL ELECTIVE 3)

Course Objectives:

1. To create a comprehensive exposure toand its significance of POM in Industries.
2. To understand students with various activities of scheduling and control operation to give insight into the ongoing & futuristic trends in the control of inventory.
3. To analyze and apply techniques to quality control
4. To remember the importance of material management.
5. To understand and to apply various analyze in cost reduction in production.

UNIT–I

Introduction to Operations Management:
Role of Operations Management in total management System- Process planning and process design, Production Planning and Control: Basic functions of Production Planning and Control, Production Cycle Project, Job Shop, Assembly, batch and Continuous - Inter Relationship between product life cycle and process life cycle.

UNIT–II

Scheduling and control of production operations:
Aggregate planning, Master Production schedule (MPS), Product sequencing: Sequencing of products in multi- product multi-stage situations - Plant Capacity and Line Balancing. Maintenance Management: Objectives – Failure Concept, Reliability, Preventive and Breakdown maintenance, Replacement policies

UNIT–III Forecasting: Importanceofforecasting–Typesofforecastinganditsuses–Generalprinciplesofforecasting– Forecasting techniques –qualitativemethods and quantitivemethods.

UNIT–IV

Resource requirement planning: Resource requirement planning, material requirement planning-manufacturing resource planning (MRP)-general overview of MRP- definitions of terms used in MRP systems-MRP outputs and inputs-MRP computational procedure-Enterprise Resource planning- scope, Benefits, applications.

UNIT–V

Stores Management and materials handling:
Stores management –nature of stores- store lay out-stock verification-classification and codifcation - safety stock Inventory Control. Material handling:-organization of material handling-factors affecting the selection of material handling equipment- types of material handling system-selection of handling system.

TEXT BOOKS:

1. Aswathappa K. and Sridhara Bhat, "Production and Operations Management", 2010, HPH.
2. Mahadevan. B, "Operations Management", 2010, Pearson Education.
3. Paneer Selvam - Production and Operations Management, PHI 2006

REFERENCE BOOKS:

1. Buffa E, Modern Production and Operations Management, John wiley 2007
2. Chary SN, Production and Operations Management, TMH,2009
3. P Rama Murthy -Production and Operations Management , New Age International ,2005

Course Outcomes:

1. The understand significance of POM, students able to Illustrate production planning functions and manage manufacturing functions in a better way.
2. memorable competency in scheduling and sequencing in manufacturing operations and effect affordable manufacturing lead time.
3. To apply the techniques of quality control and control inventory with cost effectiveness.
4. Get conversant with various documents procedural aspects and preparation of orders for various MRP and stores management.
5. Analyzed and applied various techniques in cost reduction.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-I Sem

L	T/P/D	C
3	-	3

(R18A0329) HEATING VENTILATION AND AIR CONDITIONING
(PROFESSIONAL ELECTIVE 3)

Course Objectives:

1. The course aims to emphasize the importance of heating and ventilation systems.
2. This program includes heating, ventilation and air conditioning.
3. Graduates will possess the skills necessary to obtain an entry-level HVAC Technician position.
4. Graduates will have an understanding of safe HVAC practices and how important they are in the HVAC environment.
5. Graduates will understand the importance of professional behavior and life-long learning, and will meet the challenges of continued technological growth within the field.

UNIT I
INTRODUCTION TO HVAC
Fundamentals-Modes of Heat Transfer-Sensible Heat and Latent Heat-**Basic Components of Air-Conditioning and Refrigeration machines**-Basic Refrigeration System or Vapor Compression Cycle-Pressure – Enthalpy Chart-Function & Types of Compressor-Function & Types of Condenser-Function & Types of Expansion Valves, Function & Types of Evaporator-Accessories used in the System-Refrigerant and Brines

UNIT II
CLASSIFICATION OF AIR-CONDITIONING SYSTEM
Window A/C-Working of Window A/C with Line Diagrams-**Split A/C**-Types - Working of Split A/C with Line Diagrams-**Ductable Split A/C**-Working of Ductable Split A/C with Line Diagrams-Variable Refrigerant Volume (VRV)/ Variable Refrigerant Flow (VRF)-**Ductable Package A/C**-Working of Ductable Package A/C with Line Diagrams

UNIT III
STUDY OF PSYCHROMETRIC CHARTS
Dry Bulb Temperature-Wet Bulb Temperature-Dew Point Temperature-Relative Humidity-Humidity Ratio-Processes, Heating, Cooling, Cooling and Dehumidification, Heating and Humidification

UNIT IV
LOAD CALCULATION
Survey of Building-Cooling Load Steps-Finding Temperature difference (ΔT)- Wall, Glass, Roof, partition-Finding 'U' Factor-Wall, Glass, Roof, Partition-Finding Ventilation

requirement for IAQ-Load Calculations (Manually using E-20 form)- ESHF, ADP & Air Flow Rate (CFM) Calculation

UNIT V

STATIC PRESSURE CALCULATION

Selection of Motor HP-Selection Fan/Blower RPM-**Hydronic System-**Classification of Water Piping-Pipe sizing for chill water system-Fittings used in the HVAC Piping System-Valves used in the HVAC Piping System-Function of Valves-Openings for CHW Pipes passing through Wall-Sectional drawing @ CHW Pipe supports-Pump Head Calculation-Selection of Pump

REFERENCES:

1. HVAC Fundamentals Volume-l / James E. Brumbou / Audel / 4 Edition
2. Fundamentals of HVAC Systems / Robert Mcdowall / Academic Press / 2007
3. Home Heating & Air Conditioning systems / James Kittle / MGH
4. HVAC Fundamentals / Samuel C. Sugarman / Fairmont Press / 2005.
5. R&AC Hand Book by ISHRAE
6. Ventilation Systems: Design and Performance/ Hazim B. Awbi. / Routledge / 2007.
7. Portable Ventilation Systems Hand Book / Neil McManus / CRC Press / 2000.
8. Design of Industrial Ventilation Systems / John L Alden / Industrial Press / 5 Edition.
9. Industrial Ventilation Applications / ISHRAE Hand Book / 2009.
10. HVAC Hand book / ISHRAE.

Course Outcomes:

1. Students will assist in the installations of Heating, Air Conditioning and Refrigeration equipment.
2. Perform preventive maintenance on heating and air conditioning systems.
3. Students will identify site hazards.
4. The student shall understand the principles and working HVAC systems.
5. To be able to study and analyze psychrometric chart in refrigeration systems. Develop problem solving skills through the application of thermodynamics.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R18A0330) PRODUCT DESIGN AND DEVELOPMENT (PROFESSIONAL ELECTIVE 3)

Course Objectives:

1. To study the basic concepts of product design and development process.
2. To study the applicability of product design and development in industrial applications.
3. To acquaint the practical knowledge regarding conceptualization design and development of a new product.
4. To study the concepts of Ergonomics in context of the product design has been explained with the help of case studies.
5. To understand the fundamental concept of Rapid Prototyping as well the working principles of the basic rapid prototyping techniques

Unit-I

Introduction: Design theory, design materials, human factors in design, man-machine system, applied ergonomics, characteristics of successful product development, challenges to product development. Development process and product planning: Generic development process, Concept development, product development process flows, product planning process, identity customer needs

Unit-II

Product specifications and concept generation: Product specification, steps to establish the target specifications, Concept generation, five step concept generation method, concept selection, concept screening, concept testing, product architecture

Unit-III

Product design methods: Creative and rational, clarifying objectives - the objective tree method, establishing functions- the function analysis method, setting requirements – the performance specification method, determining characteristics – the QFD method, generating alternatives – morphological chart method, evaluating alternatives – the weighted objective method, improving details – the value engineering method and design strategies.

Unit-IV

Design for manufacture: Estimating manufacturing cost, reducing component, assembly and support costs, design for assembly, design for disassembly, design for environment, design for graphics and packaging, effective prototyping – principle and planning

Unit-V

Fundamentals of PLM: Product data or Product information, Product lifecycle management concept, Information models and product structures-Information model, the product information (data) model, the product model, Reasons for the deployment of PLM systems.

TEXT BOOKS:

1. K.T. Ulrich and S.D. Eppinger, "Product design and development", Tata McGraw Hill
2. Chitale& Gupta, "Product Development", Tata McGraw Hill
3. Monks, J. G., "Operations Management", McGraw Hill, 1997.
4. David G Ullman, "The Mechanical Design Process." McGrawhillInc Singapore 1992 N J M Roozenberg , J Ekels , N F M Roozenberg " Product Design Fundamentals and Methods ." John Willey & Sons 1995

REFERENCEBOOKS:

1. George Dieter, A material and Processing approach, McGraw Hill.
2. KemnnethCrow,"ConcurrentEngg./Integrated Product Development", DRM Associates,26/3, Via Olivera, Palos Verdes, CA 90274(310) 377-569, Workshop Book.
3. Stephen Rosenthal, "Effective Product Design and Development", Business One Orwin, Homewood, 1992, ISBN 1-55623-603-4.
4. StaurtPugh,"Tool Design – Integrated Methods for Successful Product Engineering", Addison Wesley Publishing, New york, NY.
5. Hollins B & Pugh S "Successful Product Design." Butter worths London.
6. Baldwin E N &Neibel B W "Designing for Production." Edwin Homewood Illinois
7. Jones J C "Design Methods." Seeds of Human Futures. John Willey New York.
8. Bralla J G "Handbook of Product Design for Manufacture, McGrawhillNewYork.

Course Outcomes:

1. Ability to select suitable design and development process for a given application.
2. Suitable ergonomic principles can be identified for the product development.
3. Appropriate standardization method can be use for product and process development.
4. Cost estimation methods can be developed to minimise the cost.
5. Able to classify and select proper rapid prototyping and reverse engineering techniques for specific technical applications.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

L	P	C
0	3	1.5

IV Year B. Tech ME - I Sem

(R18A0389)MECHANICALMEASUREMENTSAND INSTRUMENTATION LAB

Course Objectives:

1. To prepare the students for successful career in industry and motivate for higher education.
2. To provide strong foundation in basic science and mathematics necessary to formulate, solve and analyze Control and Instrumentation problems
3. To provide strong foundation in circuit theory, control theory and signal processing concepts.
4. To provide good knowledge of Instrumentation systems and their applications.
5. To provide knowledge of advanced control theory and its applications to engineering problems and learn about representation of materials, fits and estimation of limits, tolerances

LIST OF EXPERIMENTS:

1. Calibration of Pressure Gauges
2. Study and calibration of LVDT transducer for displacement measurement.
3. Calibration of strain gauge for temperature measurement.
4. Calibration of thermocouple for temperature measurement.
5. Calibration of capacitive transducer for angular displacement.
6. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
7. Calibration of resistance temperature detector for temperature measurement.
8. Study and calibration of McLeod gauge for low pressure
9. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
10. Study and calibration of Rotameter for flow measurement.

NOTE: Minimum a total of 8 experiments are to be conducted

Course Outcomes:

1. At the end of the course, the student will be able to characterize and calibrate measuring devices.
2. Identify and analyze errors in measurement.
3. Analyze measured data using regression analysis.
4. To understand the Calibration of Pressure Gauges temperature.
5. Analyze LVDT, capacitive transducer and rotometer**.**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech ME - I Sem

L	P	C
0	3	1.5

(R18A0390) AUTOMATION AND CONTROL ENGINEERING LAB

Course Objectives:

1. To learn the different types of system and process controls in Automation.
2. To identify and study different control system components.
3. To understand simulation on controllers.
4. To demonstrate working of different actuating systems and sensors.
5. To learn and demonstrate IoT.

1. Simulation on P Controller.
2. Simulation on P+I Controller.
3. Simulation on P+D Controller.
4. Simulation of Hydraulic Actuation System.
5. Simulation of Pneumatic Actuation System.
6. Simulation on Stepper Motor.
7. Simulation on Logic gates, decoders and flip-flops.
8. Determination of Ambient Temperature using Arduino.
9. Experiment on Photo-resistor and LED using Arduino.
10. Determination of Temperature using IoT.
11. Determination of Humidity using IoT.
12. Experiment on speed control of stepper motor.
13. Obstacle detection using sensors.
14. Experiment on assessment of load characteristics of solar panels in series & parallel connection.

NOTE: 1. Minimum a total of 10 experiments are to be conducted

Course Outcomes: Students will be able

1. To apply the knowledge in real time applications.
2. To understand the components of control system.
3. To gain knowledge on simulation softwares.
4. To work on different actuating systems & sensors.
5. To understand technologies like IoT, machine languages.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-I Sem

L	T/P/D	C
0	6	3

(R18A0395) PROJECT –I (PROJECT OR SUMMER INTERNSHIP)

COURSE OBJECTIVES:

1. To acquaint with the process of undertaking literature survey/industrial visit and identifying the problem
2. To familiarize the process of solving the problem in a group
3. To acquaint with the process of applying basic engineering fundamental in the domain of practical applications
4. To inculcate the process of research
5. To work with group and share responsibilities.

COURSE OUTCOMES:

1. Identify a topic in advanced areas of Mechanical Engineering.
2. Review literature to identify gaps and define objectives & scope of the work
3. Generate and implement innovative ideas for social benefit.
4. Develop conceptual design and methodology of solution for the problem.
5. Learn team work and share responsibility.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II Sem	L	T/P/D	C
	3	0	3

(R18A0331) AUTOMOBILE ENGINEERING

Course Objectives:

1. To understand basics of automobile engineering, conversant with vehicle structure & Engines.
2. To make the student conversant with auxiliary systems.
3. To make the student conversant with transmission systems.
4. To make the student conversant with steering , brakes & suspension systems
5. To make the student conversant with alternative energy sources.

UNIT–I VEHICLE STRUCTURE AND ENGINES

Types of automobiles vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines components-functions and materials, variable valve timing (VVT).

UNIT–IIENGINE AUXILIARY SYSTEMS

Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor typeand common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).

UNIT–IIITRANSMISSION SYSTEMS

Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints, Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.

UNIT–IVSTEERING, BRAKES AND SUSPENSION SYSTEMS

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control.

UNIT–VALTERNATIVE ENERGY SOURCES

Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cells.

TEXTBOOKS:

1. Jain K.K. and Asthana .R.B, Automobile Engineeri Tata McGraw Hill Publishers, New Delhi, 2002.

2. Kirpal Singh, Automobile Engineering, Vol 1 & 2, Seventh Edition, Standard Publishers, New
Delhi, 13th Edition 2014.

REFERENCEBOOKS:

1. Ganesan V. Internal Combustion Engines, Third Edition, Tata McGraw-Hill, 2012.
2. Heinz Heisler, Advanced Engine Technology, SAE International Publications USA, 1998.
3. Joseph Heitner, Automotive Mechanics, Second Edition, East-West Press, 1999.
4. Martin W, Stockel and Martin T Stockle , Automotive Mechanics Fundamentals, The Good
heart - Will Cox Company Inc, USA ,1978.
5. Newton ,Steeds and Garet, Motor Vehicles, Butterworth Publishers,1989.

Course Outcomes:

1. Ability to identify & description of different components & system of automobile.
2. Students will able to explain working principle of various systems automobile.
3. Students will able to explain working principle of transmission systems.
4. Able to understand steering, brakes & suspension systems.
5. Students will be able to understand different alternative energy sources used in IC engine.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R18A0332) INDUSTRIAL ENGINEERING AND MANAGEMENT (PROFESSIONAL ELECTIVE 4)

Course Objectives:

1. To understand the concepts of management and organization structure
2. To Remember the plant location and work study objectives and work measurements
3. To Create importance of material management and TQM
4. To evaluate PERT CPM for various projects
5. To apply quality control techniques and to understand functions of HRM

UNIT-I

Concepts of Management and Organization – Functions and Levels of Management. Evolution of Management Thought, Taylor's Scientific Management, Fayol's Principles of Management, Douglas Theory X and Y, Mayo's Hawthorne Experiments, Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs.

Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, Types of Organizations- their merits and demerits.

UNIT-II

Plant location: definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant. Plant Layout – definition, objectives, types of production– various data analyzing forms

Work Study: Definition, objectives, method study- definition, objectives, steps involved-various types of associated charts. Work measurement-definition, time study, Work Sampling– definition, steps involved, standard time calculations.

UNIT-III

Materials Management: Objectives, Inventory – functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory Control Systems-Continuous and periodical review systems. Stores Management and Stores Records. Purchase management, functions of purchase manager.

UNIT-IV

Introduction to PERT / CPM: Project management, Network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

UNIT-V

Inspection and quality control: Types of inspections - SQC-techniques-variables and attributes-assignable and non assignable causes- variable control charts, X and R charts, attributes control charts, p and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Human Resource Management: Functions of HRM, different types of evaluation methods. Job description.

TEXT BOOKS:

1. Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.
2. Industrial Engineering and Management O.P. Khanna Dhanpat Rai.
3. Industrial Engineering and Management by BUFFA .

REFERENCE BOOKS:

1. Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2005.
2. Phillip Kotler, Marketing Management, Pearson, 2004.
3. A.R.Aryasri, Management Science for JNTU (B.Tech), Tata McGraw-Hill, 2002.

Course Outcomes:

1. The concepts of management and organization structureare understood by students
2. The plant location and work study objectives and learned and remembered
3. Importance of material management and TQM are known
4. Evaluated PERT CPM various techniques for various projects
5. Applied quality control techniques and remembered functions of HRM

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II SEM

L	T/P/D	C
3	0	3

(R18A0333) MAINTENANCE AND SAFETY ENGINEERING (PROFESSIONAL ELECTIVE 4)

Course Objectives:

1. To ensure the desired plant availability at an optimum cost within the safety prescription.
2. Student able to know about the objectives of maintenance.
3. To minimize the total cost of unavailability and resources.
4. Explain the repair methods of beds and slide ways.
5. Discuss various condition monitoring techniques.

UNIT-I

Introduction to the Development of Industrial Safety and Management: History and development of Industrial safety: Implementation of factories act, Safety and productivity, Safety organizations. Safety committees and structure, Role of management and role of Govt. in Industrial safety.

UNIT-II

Accident Preventions, Protective Equipments and the Acts: Personal protective equipment, Survey the plant for locations, Part of body to be protected, Education and training in safety, Prevention causes and cost of accident, Housekeeping, First aid, Firefighting equipment, Accident reporting, Investigations, Industrial psychology in accident prevention, Safety trials.

UNIT-III

Safety Acts: Features of Factory Act, Introduction of Explosive Act, Boiler Act, ESI Act, Workman's compensation Act, Industrial hygiene, Diseases prevention, Ergonomics, Occupational diseases, stress, fatigue, health, safety and the physical environment, methods of controlling chemical hazards, safety and the physical environment, Control of industrial noise and protection against it, Code and regulations for worker safety.

UNIT-IV

Principles and Practices of Maintenance Planning: Basic Principles of maintenance planning – Objectives, Sound Maintenance systems – Reliability and machine availability, Equipment Life cycle, Measures for Maintenance Performance: Equipments breakdowns, Mean Time Between Failures and Repair, Factors of availability, Maintenance organization and economics.

UNIT-V

Maintenance Policies and Preventive Maintenance:

Maintenance categories –Merits of each category – Preventive maintenance, Maintenance schedules: Repair cycle, Principles and methods of lubrication, Fault Tree Analysis, Total Productive Maintenance: Methodology and Implementation.

TEXT BOOKS:

1) Industrial Maintenance Management -Srivastava, S.K. - S. Chand and Co.
2) Occupational Safety Management and Engineering Willie Hammer - Prentice Hall
3) Installation, Servicing and Maintenance Bhattacharya, S.N. - S. Chand and Co.

REFERENCE BOOKS:

1) Occupational Safety Management and Engineering Willie Hammer - Prentice Hall
2) Reliability, Maintenance and Safety Engineering by Dr. A. K. Gupta
3) A Textbook of Reliability and Maintenance Engineering by Alakesh Manna.

Course Outcomes:

1. Describe the various categories of maintenance.
2. Assemble, dismantle and align mechanisms in sequential order.
3. Carry out plant maintenance using tribology, corrosion and preventive maintenance.
4. Student gets the exposure of Maintenance Policies and Preventive Maintenance.
5. Explain the repair methods of material handling equipments.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II SEM

L	T/P/D	C
3	0	3

(R18A0334) TECHNOLOGY MANAGEMENT
(PROFESSIONAL ELECTIVE 4)

Course Objectives

1. The course aims at providing an overview of various issues connected with Management of Technology in organizations.
2. The course provides an exposure to technology related issues like technology identification, technology forecasting, technology acquisition and technology absorption.
3. The course also provides an appreciation of linkages of technology with policy and support systems.
4. This course aims to know Technology forecasting, technology acquisition and technology absorption.
5. This course aims to know Technology environment in country Science & Technology in India.

UNIT – I

Introduction, Definitions, Role and importance, Technology developments, implications of Technology Management, Technology change, TLC, Diffusion and Growth of Technologies, Technological Transformation alternatives, Socio-Economic planning, Macro effects of Technology change.

UNIT – II

Technology Development and Acquisition - Forecasting and Technology Innovation chain, Role of Technology Forecasting approaches and methodologies; Technology Strategy, Generation, and Development.

UNIT – III

Technology Transfer - Models, Modes, Technology search strategy, Dimensions of Technology Transfer, Features & Routes of Technology Transfer, Technology absorption capabilities, Pricing of Technology Transfer agreements, Code of conduct for Technology transfer, Government initiative.

UNIT – IV

Technology absorption and diffusion - Technology - package and Technology dependence, concepts, constraints of Technology absorption, Technology import in India, Government initiatives, Benefits of Technology absorption. Technology Assessment (TA) Organization

UNIT – V

Technology Environment - Science & Technology in India, R &D, Technology Missions, Trade Policy Missions, Trade Policy, Education, and other policies, Linkages. Technology Support Systems Technology up-gradation, Technology Information Systems (TIS),

Technology Strategy for a firm, Technology Gaps and needs,Evaluation of Technology option and Routes, R&D Resource Management.

Suggested Readings

1. Sharif Nawaz: Management of Technology Transfer & Development, APCFT, Bangalore, 1983.
2. Rohtagi P K, Rohtagi K and Bowonder B: Technological Forecasting, Tata McGraw Hill, New Delhi.
3. Betz Fredrick: Managing Technology, Prentice Hall, New Jersey.
4. Gaynor: Handbook of Technology Management, McGraw Hill.
5. Tarek Khalil: Management of Technology, McGraw Hill International, 2000.

Course Outcomes:

1. Understanding Technology Management and applying thoughts.
2. Carry out Technology Transfers.
3. Student gets the exposure of Technology strategy.
4. Student can understand the Technology forecasting, technology acquisition and technology absorption.
5. Student can explain Technology environment in country Science & Technology in India.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R18A0335) RENEWABLE ENERGY SOURCES (PROFESSIONAL ELECTIVE 5)

Course Objectives:

1. To explain concept of various forms of Non-renewable and renewable energy
2. To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
3. To analysis the environmental and cost economics of using renewable energy sources compared to fossil fuels.
4. At the end of the course, the students are expected to identify the new methodologies / technologies for effective utilization of renewable energy sources
5. This course aims to understand the Technologies For Effective Utilization Of Renewable Energy Sources.

UNIT—I

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option. Environmental impact of solar power – Physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measLiring solar radiation and sun shine, solar radiation data.

UNIT —II

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Solar Energy Storage and Applications: Different methods, sensible, latent heat and stratified storage, solar ponds. Solar applications – solar heating? cooling techniques, solar distillation and drying, Photovoltaic energy conversion.

UNIT — III

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics.
Bio-Mass: Principles of Bio-Conversion, Anaerobic /aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, l.C. Engine operation, and economic aspects.

UNIT –IV

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India. OTEC: Principles, utilization, setting of OTEC plants, thermodynamic cycles. Tidal and Wave Energy: Potential and conversion techniques, mini-hydel power plants, their economics.

UNIT —V

Direct Energy Conversion: Need for DEC. Carnot cycle, limitations, Principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principle, faraday's laws, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Renewable Energy Sources I Twidell& Weir / Taylor and Francis / 2nd Special Indian Edition.
2. Non- conventional Energy Sources / G.D. Rai / DhanpatRal and Sons.

REFERENCE BOOKS:

1. Energy Resources Utilization and Technologies /Anjaneyulu & Francis/ BS Publications/2012.
2. Principles of Solar Energy / Frank Krieth& John F Kreider / Hemisphere Publications.
3. Non-Conventional Energy / Ashok V Desai I Wiley Eastern.
4. Non-Conventional Energy Systems / K Mittal / Wheeler.
5. Renewable Energy Technologies I Ramesh & Kumar / Narosa.
6. Renewable Energy Resources I Tiwari and Ghosal I Narosa.

Course Outcomes:

1. Understanding Of Commercial Energy And Renewable Energy Sources
2. Knowledge In Working Principle Of Various Energy Systems
3. Capability To Do Basic Design Of Renewable Energy Systems
4. Upon Completion Of This Course, The Students Can Able To Identify The New
5. Methodologies / Technologies For Effective Utilization Of Renewable Energy Sources.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II Sem

L	T/P/D	C
3	-	3

(R18A0336) BIOMASS ENGINEERING

(PROFESSIONAL ELECTIVE 5)

Course Objectives:

1. Gain knowledge on biomass energy.
2. Gain knowledge of sustainable energy.
3. Gain knowledge on renewable energy policies.
4. To have an exposure on the types of biomass, its surplus availability and characteristics.
5. Analyze the technologies available for conversion of biomass to energy in terms of its technical competence and economic implications.

UNIT —I

Origin of Biomass: Resources - Classification and characteristics - Techniques for biomass assessment - Application of remote sensing in forest assessment - Biomass estimation.

UNIT —II

Thermochemical Conversion: Different processes - Direct combustion – Incineration – Pyrolysis - Gasification and liquefaction - Economics of thermochemical conversion.

UNIT —III

Biological Conversion: Biodegradation and biodegradability of substrate - Biochemistry and process parameters of biomethanation - Biogas digester types - Digester design and biogas utilization. Biomethanation Process - Economics of biogas plant with their environmental and social impacts - Bioconversion of substrates into alcohol - Methanol & ethanol Production - Organic acids – Solvents - Amino acids - Antibiotics etc.

UNIT —IV

Chemical Conversion: Hydrolysis & hydrogenation - Solvent extraction of hydrocarbons - Solvolysis of wood - Biocrude and biodiesel - Chemicals from biomass

UNIT —V

Power Generation: Utilisation of gasifier for electricity generation - Operation of spark ignition and compression ignition engine with wood gas – Methanol - ethanol & biogas - Biomass integrated gasification/combined cycles systems - Sustainable cofiring of biomass with coal - Biomass productivity - Energy plantation and power programme.

REFERENCE BOOKS :

a. Biotechnology and Alternative Technologies for Utilization of Biomass, Chakraverthy A
b. Biogas Systems: Principles and Applications, Mital K.M
c. Biomass Energy Systems, Venkata Ramana P and Srinivas S.N

d. Gasification Technologies, A Primer for Engineers and Scientists Rezaiyan. J and N. P. Cheremisinoff.
e. Biomass Gasification – Principles and Technology, Tom B Reed, Noyce Data Corporation, 1981.

TEXTBOOKS:

Bio Energy Technology Thermodynamics and costs, David Boyles, Ellis Hoknood Chichester,1984.
Khandelwal KC, Mahdi SS, Biogas Technology – A Practical Handbook, Tata McGraw Hill, 1986. Bio Energy for Rural Energisation, Mahaeswari, R.C. Concepts Publication,1997
Best Practises Manual for Biomass Briquetting, I R E D A, 1997.
The briquetting of Agricultural wastes for fuel, Eriksson S. and M. Prior, FAO Energy and Environment paper, 1990
.Thermochemical Characterization of Biomass, Iyer PVR , M N E S

Course Outcome:

1. Students should able to get knowledge on bio-mass energy.
2. Students should able to understand the concept Thermo chemical Conversion.
3. Students should able to implement Biological Conversion.
4. Students should able to know about Chemical Conversion.
5. Student gets a practical understanding on the various biomass energy conversion technologies and its relevance towards solving the present energy crisis.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R18A0337) ENERGY CONSERVATION AND MANAGEMENT (PROFESSIONAL ELECTIVE 5)

Course Objectives:

1. Understand and analyze the energy data of industries.
2. Carryout energy accounting and balancing.
3. Conduct energy audit and suggest methodologies for energy savings and utilize the available resources in optimal ways.
4. To impart knowledge in the domain of energy conservation.
5. To bring out Energy Conservation Potential and Business opportunities across different user segments under innovative business models.

UNIT I : INTRODUCTION:

Energy – Power – Past & Present scenario of World; National Energy consumption Data – Environmental aspects associated with energy utilization –Energy Auditing: Need, Types, Methodology and Barriers. Role of Energy Managers. Instruments for energy auditing.

UNIT II : ELECTRICAL SYSTEMS:

Components of EB billing – HT and LT supply, Transformers, Cable Sizing, Concept of Capacitors, Power Factor Improvement, Harmonics, Electric Motors – Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types of lighting, Efficacy, LED Lighting and scope of Encon in Illumination.

UNIT III : THERMAL SYSTEMS:

Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency computation and encon measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators & Refractories

UNIT IV : ENERGY CONSERVATION IN MAJOR UTILITIES:

Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems – Cooling Towers – D.G. sets

UNIT V: ECONOMICS: Energy Economics – Discount Rate, Payback Period, Internal Rate of Return, Net Present Value, Life Cycle Costing –ESCO concept

TEXT BOOKS:

Energy Manager Training Manual (4 Volumes) available at www.energymanager training.com, a website administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India, 2004.

REFERENCES:

Witte. L.C., P.S. Schmidt, D.R. Brown, “Industrial Energy Management and Utilisation” Hemisphere Publ, Washington, 1988.

Callaghn, P.W. “Design and Management for Energy Conservation”, Pergamon Press, Oxford, 1981.
Dryden. I.G.C., “The Efficient Use of Energy” Butterworths, London, 1982
Turner. W.C., “Energy Management Hand book”, Wiley, New York, 1982.
Murphy. W.R. and G. Mc KAY, “Energy Management”, Butterworths, London 1987.

Course Outcomes:

Upon completion of this course, the students can able to analyze the energy data of industries.

1. Students should able to carry out energy accounting and balancing.
2. Students should able to suggest methodologies for energy savings.
3. Students can able to analyze the energy data of industries.
4. Apply knowledge of Energy Conservation Opportunities in a range of contexts.
5. Develop innovative energy efficiency solutions and demand management strategies.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

IV Year B. Tech, ME-II Sem

L	T/P/D	C
0	12	6

(R18A0396) PROJECT -II

COURSE OBJECTIVES

1. To survey selected topics addressing issues of science in society today.
2. To familiarize with scientific literature.
3. To collect information on each topic.
4. To assimilate, synthesize and integrate information.
5. To organize the information on each topic into an analysis.

COURSE OUTCOMES

1. Identify and compare technical and practical issues related to the area of program specialization.
2. Outline annotated bibliography of research demonstrating scholarly skills.
3. Prepare a well-organized report employing elements of technical writing and critical thinking.
4. Demonstrate the ability to describe, interpret and analyse technical issues and develop competence in presenting.
5. To effectively communicate by making an oral presentation before an evaluation committee.