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 2020 - 2021)

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.

PRE-REQUISITES FOR PROFESSIONAL ELECTIVES

Professional Elective Number	Subject Code	Title of the Subject	Pre- Requisite Subject Code	Pre-Requisite Subject Title
1	R20A0318	Design of Hydraulic and Pneumatic Systems	R20A0305	Fluid Mechanics & Hydraulic Machinery
			R20A0308	Theory of Machines
			R20A0310	Strength of Materials
	R20A0352	Design Thinking	R20A0301	Engineering Graphics
			R20A0307	Computer Aided Machine Design
	R20A0319	Mechanical Vibrations	R20A0308	Theory of Machines
			R20A0310	Strength of Materials
2	R20A0325	Smart Manufacturing Technologies	R20A0308	Theory of Machines
			R20A0312	Manufacturing Processes
			R20A0313	Computer Integrated Manufacturing Technologies
	R20A0330	Finite Element Analysis	R20A0021	Mathematics – I
			R20A0022	Mathematics – II
			R20A0303	Engineering Mechanics
	R20A0327	Tribology	R20A0303	Engineering Mechanics
			R20A0315	Design of Machine Elements
3	R20A0331	Refrigeration & Air Conditioning	R20A0304	Engineering Thermodynamics
	R20A0332	Renewable Energy Sources	R20A0304	Engineering Thermodynamics
			R20A0319	Heat Transfer
	R20A0319	Industrial Robotics	R20A0021	Mathematics
			R20A0261	Basic Electrical and Electronics Engineering
			R20A0308	Theory of Machines
4	R20A0334	Production and Operations Management	R20A0312	Manufacturing Processes
			R20A0061	Managerial Economics & Financial Analysis
	R20A0335	Maintenance and Safety Engineering	R20A0308	Theory of Machines
			R20A0312	Manufacturing Processes
	R20A0333	Operations Research	R20A0024	Probability and Statistics
			R20A0061	Managerial Economics & Financial Analysis
			R20A0313	Computer Integrated Manufacturing Technologies

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE STRUCTURE

I Year B. Tech – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0001	English	2	-	-	2	30	70
2	R20A0021	Mathematics – I	3	1	-	4	30	70
3	R20A0012	Engineering Physics	3	-	-	3	30	70
4	R20A0013	Advanced Material Chemistry	3	-	-	3	30	70
5	R20A0501	Programming for Problem Solving	3	-	-	3	30	70
6	R20A0083	Engineering Physics Lab	-	-	3	1.5	30	70
7	R20A0084	Engineering and IT Workshop	-	-	2	1	30	70
8	R20A0581	Programming for Problem Solving Lab	-	-	3	1.5	30	70
9	R20A0014*	Financial Institutions, Markets and Services	1	-	-	1	100	-
		TOTAL	**15**	**1**	**8**	**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

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0002	Professional English	2	-	-	2	30	70
2	R20A0022	Mathematics – II	3	1	-	4	30	70
3	R20A0261	Basic Electrical and Electronics Engineering	3	-	-	3	30	70
4	R20A0301	Engineering Graphics	2	-	2	3	30	70
5	R20A0502	Python Programming	3	-	-	3	30	70
6	R20A0081	English Language Communication Skills Lab	-	-	2	1	30	70
7	R20A0289	Basic Electrical and Electronics Engineering Lab	-	-	3	1.5	30	70
8	R20A0582	Python Programming Lab	-	-	3	1.5	30	70
9	R20A0003*	Human Values and Professional Ethics	1	-	-	1	100	-
		TOTAL	**14**	**1**	**10**	**20**	**340**	**560**

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

II Year B. Tech – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0303	Engineering Mechanics	3	-	-	3	30	70
2	R20A0304	Engineering Thermodynamics	3	-	-	3	30	70
3	R20A0305	Fluid Mechanics & Hydraulic Machinery	2	1	-	3	30	70
4	R20A0306	Metallurgy & Material Science	3	-	-	3	30	70
5	R20A0307	Computer Aided Machine Design	2	-	2	3	30	70
6	R20A0308	Theory of Machines	3	-	-	3	30	70
7	R20A0381	Fluid Mechanics & Hydraulic Machinery Lab	-	-	3	1.5	30	70
8	R20A0382	Computer Aided Machine Design & Dynamics Lab	-	-	3	1.5	30	70
9	R20A0008*	Global Education & Professional Career/NCC	2	-	-	-	100	-
		TOTAL	**18**	**1**	**8**	**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	R20A0309	Applied Thermodynamics	3	-	-	3	30	70
2	R20A0310	Strength of Materials	3	-	-	3	30	70
3	R20A0311	Data Structures using Python	2	1	-	3	30	70
4	R20A0312	Manufacturing Processes	3	-	-	3	30	70
5	R20A0024	Probability and Statistics	3	-	-	3	30	70
6	OE I	Open Elective-I	3	-	-	3	30	70
7	R20A0383	Materials Testing & Manufacturing Processes lab	-	-	3	1.5	30	70
8	R20A0384	Data Structures using Python Lab	-	-	3	1.5	30	70
9	R20A0005*	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	R20A1251	WEB DESIGNING TOOLS
2	R20A0551	INTRODUCTION TO DBMS
3	R20A0351	INTELLECTUAL PROPERTY RIGHTS
4	R20A0051	ENTERPRISE RESOURCE PLANNING
5	R20A0451	BASICS OF COMPUTER ORGANIZATION

III Year B. Tech – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0313	Computer Integrated Manufacturing Technologies	3	-	-	3	30	70
2	R20A0314	Thermal Engineering	3	-	-	3	30	70
3	R20A0061	Managerial Economics & Financial Analysis	3	-	-	3	30	70
4	R20A0315 R20A0316 R20A0317	Professional Elective– I Design of Machine Elements Power Plant Engineering Nanomaterials	3	-	-	3	30	70
5	R20A0318 R20A0319 R20A0320	Professional Elective-II Design of Hydraulic and Pneumatic Systems Industrial Robotics Mechanical Vibrations	3	-	-	3	30	70
6	OE II	Open Elective-II	3	-	-	3	30	70
7	R20A0385	Computer Integrated Manufacturing Technology Lab.	-	-	3	1.5	30	70
8	R20A0386	Thermal Engineering and Energy Resources Lab.	-	-	3	1.5	30	70
9	R20A0391	Application Development - I	-	-	4	2	30	70
10	R20A0007	Constitution of India	2	-	-	-	100	-
		TOTAL	**20**	**-**	**10**	**23**	**370**	**630**

***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	R20A1252	MANAGEMENT INFORMATION SYSTEMS
2	R20A0552	JAVA PROGRAMMING
3	R20A1253	SOFTWARE PROJECT MANAGEMENT
4	R20A0452	INTERNET OF THINGS & ITS APPLICATIONS
5	R20A0553	OPERATING SYSTEM CONCEPTS
6	R20A0066	PUBLIC POLICY & GOVERNANCE

III Year B. Tech – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0321	Heat Transfer	3	-	-	3	30	70
2	R20A0566	Artificial Intelligence & Machine Learning	3	-	-	3	30	70
3	R20A0322 R20A0323 R20A0324	Professional Elective-III Design of Transmission Systems Unconventional Machining Processes Industrial Engineering	3	-	-	3	30	70
4	R20A0325 R20A0326 R20A0327	Professional Elective-IV Smart Manufacturing Technologies Automobile Engineering Tribology	3	-	-	3	30	70
5	OE III	Open Elective-III	3	-	-	3	30	70
6	R20A0387	Heat Transfer Lab	-	-	3	1.5	30	70
7	R20A0580	Artificial Intelligence & Machine Learning Lab	-	-	3	1.5	30	70
8	R20A0392	Application Development - II	-	-	4	2	30	70
9	R20A0006*	Technical Communication & Soft Skills	2	-	-	-	100	-
		TOTAL	**17**	**0**	**10**	**20**	**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	R20A0453	ROBOTICS & AUTOMATION
2	R20A1254	BIG DATA ARCHITECTURE
3	R20A0554	INFORMATION SECURITY
4	R20A0555	CLOUD COMPUTING FUNDAMENTALS
5	R20A0352	DESIGN THINKING
6	R20A0065	BUSINESS ANALYTICS

IV Year B. Tech – I Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0328	CAD/CAM	3	-	-	3	30	70
2	R20A0329	Mechanical Measurements & Instrumentation	3	-	-	3	30	70
3	R20A0330	Finite Element Analysis	3	-	-	3	30	70
4	R20A0331 R20A0332 R20A0333	Professional Elective-V Refrigeration & Air Conditioning Renewable Energy Sources Operations Research	3	-	-	3	30	70
5	R20A0334 R20A0335 R20A0336	Professional Elective-VI Production and Operations Management Maintenance and Safety Engineering Automation and Control Engineering	3	-	-	3	30	70
6	R20A0388	Mechanical Measurements & Instrumentation Lab	-	-	3	1.5	30	70
7	R20A0389	Computer Aided Design and Simulation Lab	-	-	3	1.5	30	70
8	R20A0393	Mini Project	-	-	6	3	30	70
		TOTAL	**15**	**-**	**12**	**21**	**240**	**560**

IV Year B. Tech – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0337	Start-up, Innovation&Entrepreneurship	3	1	0	4	30	70
2	R20A0394	Major Project	-	-	20	10	30	70
		TOTAL	**3**	**1**	**20**	**14**	**60**	**140**

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ME- I Sem **L/T/P/C**
2/-/-/2

(R20A0001) 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 excerpts support 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 and to ensure error-free writing.
4. To analyze, interpret and evaluate a text and critically appreciate it.
5. To improve the writing and speaking skills, the productive skills.

SYLLABUS

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To augment the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

Skimming the text

- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences
- Scanning the text

NOTE: The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:

Objectives

1. To develop an awareness in the students about basic formal writing skills.
2. To equip students with the components of different forms of writing, beginning with the required ones:
    - Writing sentences
    - Use of appropriate vocabulary
    - Coherence and cohesiveness
    - Formal and informal letter writing

Unit –I

"The Road not taken "by Robert Frost

Grammar	–	Tenses and Punctuation (Sequences of Tenses)
Vocabulary	–	Word Formation - Prefixes and Suffixes
Writing	–	Paragraph Writing (Focusing on Tenses and Punctuations)
Reading	–	The art of skimming and scanning -Reading Exercise Type 1 (Match the statements to the text they refer to)

Unit – II

Act II from 'Pygmalion' by G.B. Shaw

Grammar	–	Direct and Indirect Speech
Vocabulary	–	Synonyms, Antonyms
Writing	–	Essay Writing (Introduction, body and conclusion)
Reading	–	Comprehending the context– Reading Exercise Type 2 (Place the missing statement)

Unit – III

Satya Nadella's Email to His Employees on his First Day as CEO of Microsoft

Grammar	–	Voices
Vocabulary	–	One-Word Substitutes, Standard Abbreviations
Writing		E-mail Writing, Letter Writing (complaints, requisitions, apologies).
Reading	–	Reading Comprehension- Reading Exercise Type 3 (Reading between the lines)

Unit – IV

J K Rowling's Convocation Speech at Harvard

Grammar	–	Articles, Misplaced Modifiers
Vocabulary	–	Phrasal Verbs
Writing	–	Précis Writing
Reading	–	Reading Exercise Type 4 (Cloze test)

Unit –V

Abdul Kalam's Biography

Grammar	–	Subject-Verb Agreement, Noun-Pronoun Agreement
Vocabulary	–	Commonly Confused Words

Writing	–	Memo Writing
Reading	–	Reading Exercise Type 5(Identifying errors)

* Exercises apart from the textbook 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 Pushpa Lata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES:

At the end of the course students, would be able to

1. Gain competence and proficiency in 'productive' skills, i.e., writing and speaking with the recognition of the need for life-long learning of the same
2. Hone their language abilities in terms of comprehending complex technical texts with a potential to review literature
3. Present ideas clearly and logically to analyze data and provide valid conclusions in written communication
4. Enrich their grammatical accuracy and fluency to be adept at both the active and passive skills
5. Represent old conventions with a set of the new by professional verbal communicative ability

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ME- I Sem **L/T/P/C**
3/1/-/4

(R20A0021) MATHEMATICS -I

COURSE OBJECTIVES:

1. The concept of a Rank of the matrix and applying the concept to know the consistency and solving the system of linear equations.
2. The concept of Eigen values, Eigen vectors and Diagonalization.
3. The maxima and minima of functions of several variables.
4. The Applications of first order ordinary differential equations and methods to solve higher order differential equations.
5. The properties of Laplace Transform, Inverse Laplace Transform and Convolution theorem.

UNIT –I: Matrices

Introduction, Rank of a matrix - Echelon form, Normal form, Consistency of system of linear equations (Homogeneous and Non-Homogeneous)-Gauss-Siedel method, Linear dependence and independence of vectors, Eigen values and Eigen vectors and their properties (without proof), Cayley-Hamilton theorem (without proof), Diagonalization of a matrix.

UNIT –II: Multi Variable Calculus (Differentiation)

Functions of two variables, Limit, Continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobian-functional dependence and independence, Maxima and minima and saddle points, Method of Lagrange multipliers, Taylors theorem for two variables.

UNIT-III: 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, Equations not of first degree-Equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT –IV: Differential Equations of Higher Order

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, Equations reducible to linear ODE with constant coefficients-Cauchy's Euler equation and Legendre's 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 and divided by "t", Laplace transforms of derivatives and integrals of functions, Unit step function, Periodic function.

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

TEXT BOOKS:

1. Higher Engineering Mathematics by B V Ramana., Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics by R.K Jain & S R K Iyenger, Narosa Publishers.
2. Ordinary and Partial Differential Equations by M.D. Raisinghania, S.Chand Publishers
3. 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 solutions of the system of linear equations and find the Eigen values and Eigen vectors of a matrix, which are used to analyze the long-term behavior of any system.
2. Find the extreme values of functions of two variables with / without constraints.
3. Solve first order, first degree differential equations and their applications.
4. Form a differential equation for typical engineering problems and hence can solve those higher order differential equations.
5. Solve differential equations with initial conditions using Laplace Transformation.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

(R20A0012) ENGINEERING PHYSICS

COURSE OBJECTIVES:

1. To gain the knowledge on the basic concepts of oscillations exhibited by various systems in nature.
2. To Study the basic concepts of light through interference and diffraction.
3. To explore band structure of the solids and classification of materials.
4. To Compare dielectric and magnetic properties of the materials and enable them to design and apply in different fields.
5. To analyze the ordinary light with a laser light and realize the transfer of light through optical fibers.

UNIT – I: HARMONIC OSCILLATIONS

Introduction to harmonic oscillators, simple harmonic oscillator: equation of motion and its solution (complex exponential method), damped harmonic oscillator: equation of motion and its solution, over, critical and lightly-damped oscillators; energy decay in damped harmonic oscillator, Quality factor (qualitative), forced damped harmonic oscillator: equation of motion and its solution.

UNIT – II: WAVEOPTICS

Interference- Introduction, Superposition of waves, interference of light by division of wave front-interference of reflected light in thin films, interference of light by division of amplitude-Newton's rings, 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

Free electron theory (Classical & Quantum): Assumptions, Merits and drawbacks, 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

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 of ferro magnetism, Soft and hard magnetic materials.

UNIT-V: LASERS AND FIBER OPTICS:

LASERS: 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,CO_2 Laser, Applications of lasers.

Fiber Optics: Introduction to optical fiber, Construction and working principle of an Optical Fiber, Acceptance angle and Numerical aperture, Types of Optical fibers - Mode and Propagation through step and graded index fibers, Attenuation in optical fiber, Optical Fiber in Communication System, Applications of optical fibers

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, DhanpatRai 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. Design different devices to go to maximum accuracy in measuring the dimensions optically.
3. Find the importance of band structure of solids and their applications in various electronic devices.
4. Examine dielectric, magnetic properties of the materials and apply them in material technology.
5. Observe the properties of light and its engineering applications of laser in fiber optic communication systems.

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

(R20A0013) ADVANCED MATERIAL CHEMISTRY

COURSE OBJECTIVES:

The students will be able to

1. Apply the electrochemical principles for construction of batteries and fuel cells.
2. Analyze engineering problems related to corrosion and develop different corrosion control techniques.
3. Identify different types of polymers, composites and their applications in various engineering fields.
4. Gain knowledge on wide variety of advanced materials like nano and smart materials which have excellent engineering properties.
5. Explain the principles and applications of photochemistry in engineering field.

UNIT-I: Electrochemistry

Introduction-Electrochemical cells - electrode potentials, construction and working of a galvanic cell, EMF and its applications - potentiometric titration; Nernst equation and its applications; electrochemical series and its applications. Batteries-classification of batteries, primary cell - lithium cells; secondary cells - lead acid battery and lithium ion battery; Fuel cells - H_2-O_2fuel cell; applications and advantages of fuel cells.

UNIT-II: Corrosion

Introduction-Causes and effects of corrosion; Theories of corrosion- chemical (oxidation corrosion) and electrochemical corrosion, Corrosion control methods - cathodic protection - sacrificial anodic protection and impressed current cathodic protection; protective coatings-galvanizing and tinning, electroplating (Cu plating) and electroless plating (Ni plating) - advantages and applications of electroplating/electroless plating.

Unit III: Functional Materials

Polymers: Introduction-thermoplastic and thermosetting resins, preparation, properties and engineering applications of Polyvinylchloride (PVC), Teflon (PTFE), Polymethyl methacrylate (PMMA), Polycarbonate, Bakelite. Conducting polymers-classification of conducting polymers-conduction mechanism in polyacetylene and applications of conducting polymers.

Composite materials: Introduction-Fiber reinforced plastics (FRPs)-Glass fiber reinforced, Carbon fiber reinforced plastics and their applications.

Unit IV Advanced Materials

Nanomaterials: Introduction and classification of nanomaterials; preparation of nanomaterials - Sol-gel and Chemical vapour deposition method; applications of nanomaterials (industrial and medicinal). Carbon nanotubes (CNTs)-applications.

Smart materials: Introduction-types of smart materials-examples and applications of piezoelectric materials, shape memory alloys, magneto strictive materials and electro strictive materials.

Unit V Photochemistry

Introduction- Laws of photochemistry- Stark-Einstein law, Beer-Lambert's law, photochemical processes - Jablonsky diagram, applications of fluorescence, phosphorescence and photo sensitization.

Text Books:

1. Engineering Chemsitry by P.C. Jain & M. Jain: Dhanpat Rai Publishing Company (P) Ltd, New Delhi. 16thEdition.
2. Engineering Chemistry by Prasanta Rath, B. Rama Devi, C. H. Venkata Ramana Reddy, Subhendu Chakroborty,Cengage Learning Publication, India Private Limited, 2018.
3. Principles and Applications of Photochemistry by Brian Wardle Manchester Metropolitan University, Manchester, UK, A John Wiley & Sons, Ltd., Publication, 2009.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.

Reference Books:

1. Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
2. Engineering Chemistry, by S. S. Dara, S. Chand & Company Ltd, NewDelhi.
3. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8thedition (2006).
4. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & Company Ltd.,46th edition (2013).

COURSE OUTCOMES:

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

1. Relate the knowledge of operating principles of various types of electrochemical cells, including fuel cells and batteries, to optimize the need for sustainable development.
2. Analyze and develop technically sound, economic and sustainable solutions for complex engineering problems related to corrosion and its effects.
3. Identify, formulate and develop polymeric compounds used in various engineering materials for futuristic engineering applications.
4. Apply the knowledge of nanotechnology and smart materials to find solutions for various engineering problems.
5. Evaluate the photochemical and photo physical processes to reach substantiated conclusions in the technological arena.

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

(R20A0501) PROGRAMMING FOR PROBLEM SOLVING

COURSE OBJECTIVES:

1. To understand the use of computer system in problem solving.
2. Enable the student to build program logic with algorithms and flowcharts.
3. Explain the features and constructs of C programming such as data types, expressions
4. Loops, arrays, strings and pointers.
5. To learn how to write modular Programs using Functions.
6. Understand the use of Structures, Unions and Files.

UNIT - I

Introduction to Computing – Computer Systems, Computing Environments, Computer Languages, Algorithms and Flowcharts, Steps for Creating and Running programs.

Introduction to C – History of C, Features Of C, Structure of C Program, Character Set,

C Tokens-keywords, Identifiers, Constants, Data types, Variables.

UNIT-II

C Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversion

Statements- Selection Statements (Decision Making) – if and switch statements,

Repetition statements (Loops)-while, for, do-while statements, other statements related to looping –break, continue, goto.

UNIT – III

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

Arrays – Declaration and Initialization, Arrays with functions, Two dimensional arrays,

Multi-dimensional arrays.

UNIT-IV

Strings – Declaration and Initialization, String Input / Output functions, Arrays of strings,

String manipulation functions.

Pointers-Introduction, Definition and uses of pointers, Pointer variables, Pointer arithmetic, Pointers to Pointers, Pointers with Arrays, Pointers with Functions, Command line arguments.

Dynamic Memory Management functions: malloc (), calloc(), realloc() and free()

UNIT-V

Structures and Unions - Introduction, Declaration and Initialization, Structure within a structure, Array of Structures, Pointer to Structure, Unions.

Files – Concept of a file, Streams, Text files and Binary files, Opening and Closing files, File input / output functions.

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Mastering C, K.R.Venugopal, S R Prasad, Tata McGraw-Hill Education.

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 ,Yashwanth Kanethkar, 13th Edition, BPB Publications.

COURSE OUTCOMES:

At the end of the course the student will be able to

1. Understand a problem and build an algorithm/flowchart to solve it
2. Define variables and construct expressions using C language
3. Construct C programs using various conditional statements and loops
4. Develop efficient, modular programs using functions
5. Utilize arrays, structures and unions for storing and manipulating data.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. ME- I Sem **L/T/P/C**
-/-/3/1.5

(R20A0083) ENGINEERING PHYSICS LAB

COURSE OBJECTIVES:

Students can be able to,

1. Identify the specific types of elastic and electrical nature of materials in physics lab.
2. Observe concepts of magnetism in physics lab.
3. Analyze propagation of light in various optical devices practically.
4. Examine various opto electronic devices practically

LIST OF EXPERIMENTS:

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. LED -Characteristics of LED.
8. LCR Circuit- To determine quality factor and resonant frequency of LCR circuit.
9. Optical fiber: Evaluation of numerical aperture of optical fiber.
10. Optical fiber: To determine the bending losses of Optical fibers.

Reference practical physics books:

1. Practical physics by Dr. Aparna, Dr K.V Rao, V.G.S. Publications.
2. Engineering physics practical lab manual – MRCET.

COURSE OUTCOMES:

After completion of the course, students will be able

1 To measure the elastic constants of the given material of the wire and also determine the ac frequency of vibrating bar.
2 To determine the magnetic induction of a circular coil carrying current by applying the principles of terrestrial magnetism.
3 To frame relativistic ideas of light phenomenon
4 To achieve the analysis of V-I characteristics of opto electronic devices
5 To determine the numerical aperture of optical fiber.

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-/-/2/1

(R20A0084) ENGINEERING AND IT WORKSHOP

COURSE OBJECTIVES:

1 To Study of different hand operated power tools, uses and their demonstration.
2 To gain a good basic working knowledge required for the production of various engineering products.
3 To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4 To develop a right attitude, team working, precision and safety at work place.
5 To understand the construction, function, use and application of different working tools, equipment and machines.

TRADES FOR EXERCISES:

At least two exercises from each trade:

1. **Carpentry:**
   To prepare T-Lap Joint, Dovetail Joint.
   To prepare Mortise & Tenon Joint.
2. **Fitting:**
   To prepare V-Fit, Dovetail Fit & Semi-circular fit.
3. **Tin-Smithy:**
   To make Square Tin, Rectangular Tray & Conical Funnel.
4. **House-wiring:**
   Testing of Parallel & Series, Two-way Switch and Tube Light.
   Translation of any tested / designed and tested circuits on a PCB
5. **Soldering:**
   To solder two similar & dissimilar metals.
   To De-Solder two similar & dissimilar metals.

NOTE: Minimum ONE experiment need to be conducted in each trade.

Trades to demonstrate:

1. Plumbing
2. Foundry
3. Welding
4. Blacksmith
5. Metal cutting (Water Plasma)

NOTE: Minimum a total of 3 Trades to be demonstrated.

COURSE OUTCOMES:

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

1 Every student can study and practice on machine tools and their operations
2 Every Student will have hands-on practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
3 Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4 Apply basic electrical engineering knowledge for house wiring practice.
5 Student will be able to make various joints in the given object with the available work material.

Text Books:

1 Workshop Manual, P. Kannaiah and K. L. Narayana, 3rd Edition, Scitech,2015
2 Elements of Workshop Technology Vol.1 & 2, S. K. Hajra Choudhury, A. K. Hajra Choudhury and Nirjhar Roy, 13th Edition, Media Promoters & Publishers Pvt. Ltd., 2010.
3 Printed Circuit Boards - Design, Fabrication, Assembly and Testing, R. S. Khandpur, Tata McGraw-Hill Education, 2005.

IT WORKSHOP

COURSE OBJECTIVES:

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.

1 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.
2 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.
3 HTML introduction for creating static web pages.
4 HTML 5 Introduction and Features.
5 JavaScript Introduction and benefits with Html.
6 Linux programming Introduction to basic commands.

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 a malfunctioning 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, Web Servers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers and what is web servers and its architecture, 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.

WEB DESIGNING

Week 6: 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.

Week 7: HTML 5

Introduction to HTML 5 with new tags

A. Create an HTML 5 Template
B. Specify page title and Meta tags

Week 8: JAVASCRIPT

1. Create and Assign variables using JavaScript
2. Change style of an HTML elements using JavaScript.
3. Style your website using different types of CSS.

Week 9: BASIC COMMANDS OF LINUX PROGRAMMING

1. Installation of Unix/Linux operating system.
2. Study of logging/logout details.
3. Study of Unix/Linux general purpose utility command list obtained from (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands.
4. Study of vi editor.
5. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
6. Write a C program to find factorial of a given integer using script language.

TEXT BOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education
2. PC Hardware and A+ Handbook-Kate J.Chase PHI(Microsoft)
3. Web Development and Design Foundations with HTML 5, pearson Education
4. Web Design with HTML, CSS by Jon Duckett

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 are able to create a static webpage ‘s using HTML.
5. Students will be able to use new Features of HTML5 and design the Webpage.

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-/-/3/1.5

(R20A0581) PROGRAMMING FOR PROBLEM SOLVING LAB

COURSE OBJECTIVES:

1. Familiarity with the C programming environment.
2. Systematic introduction to programming constructs
3. Learning basic concepts of C through illustrative examples and small exercises
4. Understanding concept of Arrays, Strings and Structures with examples
5. Perform basic operations on Files.

Week1:

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

B. Write a program to calculate simple interest for a given P, T, and R (SI = P*T*R/100)

Week2:

A. Write a program to swap two variables values with and without using third variable

B. Write a program to take input of roll no and marks obtained by a student in 5 subjects each and display the roll no with percentage score secured.

Week3:

A. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400)

B. Write a program to read the values of coefficients a, b and c of a quadratic equation **$ax^2+bx+c=0$** and find roots of the equation

Week4:

A. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

B. Write a program to check whether input alphabet is vowel or not using switch statement.

Week5:

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

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

Week6:

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

B. Write a C program to check whether given number is Armstrong number or not.

Week7:

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

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

Week8:

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

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

Week9:

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

B. Write a C program to find the sum of all the elements in an array

Week10:

A. Write a program to search for a given element in an array using linear search
B. Write a C program to Sort the array in an Ascending order

Week11:

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.

Week12:

A. Write a program to copy one string to another string without using string handling function
B. Write a C program to determine whether the given string is palindrome or not.

Week13:

A. Write a program to swap values of two variables using pointer
B. Write a C program to find the sum of integer array elements using pointers. Create the array using dynamic memory allocation functions

Week14:

A. Write a C program to check whether given number is even or odd; number is given as input through command line
B. Write a C program to check whether a given number is prime or not; Accept the number as a command line argument

Week15:

A. Write a C program to Calculate Total and Percentage marks of a student using structure.
B. Write a C program to create an array of structures

Week16:

A. Write a C program showing basic file operations – open a file, read data from file, write data to a file, close a file.
B. Write a C program to copy contents of one file to another file

COURSE OUTCOMES:

After completion of the course the student will be able to

1. Translate mathematical expressions to C notation using operators
2. Develop C programs using loops and nested loops
3. Construct custom functions for solving problems using modular approach
4. Solve problems related to arrays and strings
5. Use structures and unions for storing dissimilar data items.

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I Year B.Tech. ME- I Sem **L/T/P/C**
1/-/-/1

(R20A0014) FINANCIAL INSTITUTIONS, MARKETS AND SERVICES

COURSE OBJECTIVES:

On successful completion of this course, students will be able to:

1. To expose students towards a clear understanding of Financial Markets in India, their operations and relevant development.
2. To lay foundation and equip them with the knowledge of Financial Services, related institutions and their functions.
3. To provide awareness of operations of Financial Markets, Regulators and Shareholders
4. To provide knowledge in Innovations and technologies of Financial Instruments and Financial Services.
5. To allow them to understand Banking and Non-Banking Institutions operations and their services.

UNIT-I: INTRODUCTION

Financial System and Economic Development - Indicators of Financial Development - Concepts related to Financial Markets, Institutions and Services
Regulatory and Promotional Institutions: Functions and Roles of RBI, IRDA, SEBI.

UNIT II: COMMERCIAL BANKS

Functions of Commercial Banks. Performance and Competition of Public and Private Sector banks- NPA's Non-Banking Financial Institutions- Structure and Functions LIC - GIC & Mutual Funds.

UNIT-III: FINANCIAL AND SECURITIES MARKETS

Structure and Functions of Call Money Market. Government Securities Market: T-bills Market - Commercial Bills Market. Securities Market: Organization and Structure - Listing -Trading and Settlement.

UNIT-IV: ASSET/FUND BASED FINANCIAL SERVICES

Lease Finance - Hire Purchase Finance- Bills Discounting - Housing Finance - Venture Capital Financing. Fee-based Advisory Services: Stock Broking - Credit Rating Agencies.

UNIT-V: INVESTMENT BANKING

Introduction, Functions and activities, underwriting, bankers to an issue, debenture trustees, portfolio managers.

REFERENCE BOOKS:

1. L. M. Bhole, Financial Institutions and Markets, TMH.
2. M. Y. Khan, Financial Services, TMH.
3. Vasant Desai: Financial Markets and Financial Services, Himalaya.
4. Justin Paul and Padmalatha Suresh: Management of Banking and Financial Services, Pearson.
5. Gomez, Financial Markets, Institutions and Financial Services, PHI.

COURSE OUTCOMES:

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

1. Differentiate between various biotic and abiotic components of ecosystem.
2. Describe the various types of natural resources.
3. Examine the problems associated with waste management.
4. Evaluate the causes, and apply control measures of various types of environmental pollutions.
5. Develop technologies on the basis of ecological principles on environment which in turn helps in sustainable development.

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I Year B.Tech. ME- II Sem **L/T/P/C**
2/-/-/2

(R20A0002) 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.

UNIT-I

Listening	-	Listening for General Details.
Speaking	-	Description of Pictures, Places, Objects and Persons
Extract	-	The summary of Asimov's *Nightfall*
Grammar	-	If clauses
Vocabulary	-	Technical Vocabulary
Writing	-	Paragraph Writing

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

Unit –II

Listening	-	Listening for Specific Details
Speaking	-	Oral presentations
Extract	-	A literary analysis of Asimov's *Nightfall*
Grammar	-	Transformation of Sentences
Vocabulary	-	Idioms
Writing	-	Abstract Writing

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

Unit –III

Listening - Listening for Gist
Speaking - Mock Interviews
Extract - Character sketches of Asimov's *Nightfall's* - protagonists and antagonists - Dr. Susan Calvin, Mike Donovan, Stephen Byerley, Francis Quinn
Grammar - Transitive and Intransitive Verbs
Vocabulary - Standard Abbreviations (Mini Project)
Writing - Job Application – Cover letter

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

Unit – IV

Listening - Listening for Vocabulary
Speaking - Telephonic Expressions
Extract - Theme of Asimov's *Nightfall*
Grammar - Auxiliary verbs, Degrees of Comparison
Vocabulary - Word Analogy
Writing - Job Application - Resume

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

Unit – V

Listening - Critical Listening (for attitude and Opinion)
Speaking - Group discussion
Extract - Asimov's *Nightfall*: A Science Fiction
Grammar - Common Errors, Prepositions
Vocabulary - Homonyms, homophones and homographs
Writing - Report Writing

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

* Isaac Asimov's *Nightfall* for intensive and extensive reading
* Exercises apart from the text book shall also be referred for classroom tasks.

REFERENCE BOOKS:

1. Nightfall, Isaac Asimov; Robert Silverberg, 1990
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Remedial English Grammar. F.T. Wood. Macmillan.2007
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES:

Students will be able to:

1. Analyze and interpret a diverse range of engineering concepts through the synthesis of information
2. Understand the impact of professional engineering solutions is societal contexts and demonstrate its knowledge
3. Achieve communicative ability in their personal and professional relations with clarity of speech and creativity in content
4. Function effectively as an individual and a team; and would be able to prepare themselves to be market ready
5. Comprehend and write effective reports and design documentation, manage projects and make effective presentations.

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I Year B.Tech. ME- II Sem **L/T/P/C**
3/1/-/4

(R20A0022) 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, also used to find the roots of an equation and to solve differential equations.
2. The objective of interpolation is to find an unknown function which approximates the given data points and the objective of curve fitting is to find the relation between the variables x and y from given data and such relationships which exactly pass through the data (or) approximately satisfy the data under the condition of sum of least squares of errors.
3. PDE aims at forming a function with many variables and also their solution methods, Method of separation of variables technique is learnt to solve typical second order PDE.
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: 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 equation (Heat equation).

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. Green's theorem, Stoke's theorem and Gauss's Divergence theorems (Statement & their Verification).

Text Books:

1. Higher Engineering Mathematics by B V Ramana., Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Mathematical Methods by S.R. K Iyenger, R.K.Jain, Narosa Publishers.

Reference Books:

1. Elementary Numerical Analysis by Atkinson-Han, Wiley Student Edition.
2. Advanced Engineering Mathematics by Michael Greenberg –Pearson publishers.
3. Introductory Methods of Numerical Analysis by S.S. Sastry, PHI

COURSE OUTCOMES:

After learning the concepts of this paper, the student will be able to independently

1. Find the roots of algebraic, non-algebraic equations and predict the value at an intermediate point from a given discrete data.
2. Find the most appropriate relation of the data variables using curve fitting and this method of data analysis helps engineers to understand the system for better interpretation and decision making.
3. Solve first order linear and non-linear partial differential equations which are very important in engineering field.
4. Evaluate multiple integrals; hence this concept can be used to evaluate Volumes and Areas of an object.
5. Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

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3/-/-/3

(R20A0261) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course Objectives:

1. To introduce the concept of electrical circuits and electrical machines.
2. To introduce the concepts of diodes & transistors.
3. To impart the knowledge of various configurations, characteristics and applications.

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 mesh analysis.
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 going through this course, the student will be able to

1. Analyze and solve electrical circuits using network laws and theorems.
2. Identify and characterize diodes and various types of transistors.
3. Understand the principle of operation of DC Machines and Transformers

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I Year B.Tech. ME- II Sem **L/T/P/C**
2/-/2/3

(R20A0301) 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 and Draw the 3D views using CAD.

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Drawing/Graphics – Various Drawing Instruments – 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 of orthographic 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.

REFERENCE BOOKS:

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

COURSE OUTCOMES:

1. Gets 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 draw the 3D views using CAD software.
5. To convert and draw the given orthographic view to isometric view using CAD software and vice versa.

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(R20A0502) PYTHON PROGRAMMING

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 Programming Language: Introduction to Python Language and installation, overview on python interpreters, working with python, Numeric Data Types: int, float, Boolean, complex and string and its operations, Standard Data Types: List, tuples, set and Dictionaries, Data Type conversions, commenting in python.

UNIT II

Variables and Operators: Understanding Python variables, Multiple variable declarations, Python basic statements, Python basic operators: Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators, Precedence of operators, Expressions.

UNIT III

Control Flow and Loops: Conditional (if), alternative (if-else), chained conditional (if- elif - else), Loops: For loop using ranges, string, Use of while loops in python, Loop manipulation using pass, continue and break

UNIT IV

Functions: Defining Your Own Functions, Calling Functions, passing parameters and arguments, Python Function 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. Powerful Lambda functions in python.

UNIT V

I/O and Error Handling in Python: Introduction, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods introduction to Errors and Exceptions, Handling IO Exceptions, Run Time Errors, Handling Multiple Exceptions.

Introduction to Data Structures: What are Data structures, Types of Data structures, Introduction to Stacks and Queues.

TEXT BOOKS

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

REFERENCE BOOKS:

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

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

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(R20A0081) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The Language Lab focuses on the production and practice of sounds of the English language and familiarizes the students with its use in everyday situations and contexts.

COURSE OBJECTIVES:

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation, ample speaking opportunities are provided.
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussions and public speaking

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

UNIT –II

CALL Lab: Pronunciation: Past Tense Markers and Plural Markers

ICS Lab: Situational Dialogues/Role Plays-–Greetings - Taking Leave – Introducing Oneself and Others - Requests and Seeking Permissions

UNIT–III

CALL Lab: Syllable and Syllabification

ICS Lab: Communication at Workplace- Situational Dialogues/Role Plays – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice

UNIT –IV

CALL Lab: Word Stress and Intonation

ICS Lab: Information transfer – from visual to verbal - maps, charts, tables and graphs

UNIT –V

CALL Lab: Errors in Pronunciation- Accent - the Influence of Mother Tongue (MTI)

ICS Lab: Making a Short Speech - Extempore

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:
   a. P –IV Processor
      i. Speed –2.8 GHZ
      ii. RAM –512 MB Minimum
      iii. Hard Disk –80 GB
   b. 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.

COURSE OUTCOMES:

After completion of the course the students will be able to:

1. Learn with precision through computer-assisted individualized and independent language learning to work independently in an engineering set-up.
2. Improve conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
3. Acquire accuracy in pronunciation and restoring Standard English thereby crafting better command in English language so that the students have a cutting edge over others in society.
4. Imbibe appropriate use of language in situations where one works as an individual and as a leader/team player.
5. Display professional behaviors and body language.

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(R20A0289) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

COURSE OBJECTIVES:

1. To analyze the given network by applying various network theorems.

2. To expose the students to the operation of dc generator.

3. To expose the students to the operation of dc motor and transformer.

4. To understand the characteristics of Diodes, Rectifiers and BJT.

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

7. PN Junction diode characteristics.

8. Zener diode characteristics.

9. Half wave rectifier with and without filter.

10. Full wave rectifier with and without filter.

11. Transistor CB Characteristics (Input And Output)

12. 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. Acknowledge the principle of operation, characteristics and performance of electrical machines.

3. Explain the operation and characteristics of Diodes, BJT and Rectifiers.

4. Acquire skills in using electrical measuring devices.

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(R20A0582) PYTHON PROGRAMMING LAB

COURSE OBJECTIVES:

1. Syntax and Semantics and create Functions in Python.
2. Different data types Lists, Dictionaries in Python.
3. how to execute the programs using loops and control statements
4. Decision Making and Functions in Python
5. Files and exception Handling in Python

Week 1:

A. Write python program to print Hello World
B. Write a python program to get string, int, float input from user
C. Write a python program to add 2 numbers

Week 2:

A. Create a list and perform the following methods
    1) insert ()
    2) remove ()
    3) append ()
    4) len ()
    5) pop ()
    6) clear ()
B. Write a python program to find the length of list?
C. Write a python program to find the smallest and largest number in the list?

Week 3:

A. Create a tuple and perform the following methods
    1) Add items
    2) Len ()
    3) check for item in tuple
    4) Access items
B. Write a python program using the following methods: 1) count 2) index
C. Write a python program using “+” and “*” operations which resulting a new tuple?

Week 4:

A. Create a dictionary and apply the following methods
    1) Print the dictionary items
    2) access items
    3) use get ()
    4) change values
    5) use len ()
B. Write a python code to convert list of tuples into dictionaries?

C. Write python program to store data in list, tuple, set, dictionary and then try to print them.

Week 5:

A. Write a python program to perform arithmetic, assignment, logical and comparison operators?
B. Write a Python program to add two positive integers without using the '+' operator. (use bitwise operator)
C. Write a Python program to perform the basic four operators (+, -, *, /)

Week 6:

A. Write a simple python program to declare a variable in different possible ways?
B. Write a python program to show precedence of operators using the expression: z = (v+w) * x / y
C. Write a python program to check whether the values of a list exist or not (use membership operator) and also perform identity operation?

Week 7:

A. Write a python program to print a number is positive/negative using if-else.
B. Write a python program to find largest number among three numbers.
C. Write a python Program to read a number and display corresponding day using if_elif_else?
D. Write a python program to print list of numbers using range and for loop

Week 8:

A. Write a python code to print the sum of natural numbers using while loop?
B. Write a python program to print the factorial of given number?
C. Write a python program to find the sum of all numbers stored in a list using for loop?

Week 9:

A. Write a Python function that takes two lists and returns True if they are equal otherwise false
B. Write python program in which a function is defined and calling that function prints Hello World
C. Write python program in which a function (with single string parameter) is defined and calling that function prints the string parameters given to function.
D. Write a python program using with any one of python function argument?

Week 10:

A. Write a program to double a given number and add two numbers using lambda ()?
B. Write a program for filter () to filter only even numbers from a given list.
C. Write a program for map () function to double all the items in the list?
D. Write a program to find sum of the numbers for the elements of the list by using reduce ()?

Week 11:

A. Write a python program to open and write “hello world” into a file?
B. Write a python program to write the content “hi python programming” for the existing file.

C. Write a python program to read the content of a file?

Week 12:

A. write a program to implement stack using array.

B. write a program to implement Queue using array.

TEXT BOOKS:

1. R. Nageswara Rao, “Core Python Programming”, dreamtech
2. Allen B. Downey , “ Think Python: How to Think Like a Computer Scientist”, Second Edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016.

COURSE OUTCOMES:

After completion of the course, Students will be able to**:**

1. Evaluate Problem solving and programming capability
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
3. Implement conditional and loop for python programs
4. Express different Decision-Making statements and Functions
5. Understand and summarize different File handling operations and exceptions

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(R20A0003) HUMAN VALUES AND PROFESSIONAL ETHICS

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 behavior and mutually enriching interaction with Nature.

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 (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - 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 ek Parichay, 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 (including Humna 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. The students will develop harmony at all levels.
3. The students can have satisfying human behavior throughout their life.

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(R20A0303) ENGINEERING MECHANICS

COURSE OBJECTIVES:

1. To understand the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium.
2. Perform analysis of bodies lying on rough surfaces. To understand the concept of analysis of trusses using method of joints and method of sections.
3. Locate the centroid of a simple figure and composite figures.
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. To understand kinetics and kinematics of particles motion of rigid bodies.

UNIT I

Resultants of Force System: Introduction, 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 (from basic principles) – 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 of inertia - Moments of Inertia for Composite areas.

Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment 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'Alemberts Principle 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
3. Engineering Mechanics / S.S. Bhavikati & K.G. Rajasekharappa

REFERENCES:

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

COURSE OUTCOMES:

1. Gain the knowledge on the concepts of force and moment also apply the knowledge on drawing free body diagrams in problem solving.
2. Students able to do analysis of trusses using method of joints and method of sections.
3. Students are capable of finding centroid and Centre of gravity of simple and composite Figures.
4. Students are capable of finding centroid and moment of inertia, mass moment of Inertia of simple and composite figures.
5. Students able to understand the motion of a particle in a straight line and apply concepts of D'Alembert's principle in particle motion.

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(R20A0304) ENGINEERING THERMODYNAMICS

COURSE OBJECTIVES:

1. To understand the concepts of energy transformation, conversion of heat into work.
2. To acquire knowledge about the fundamentals of thermodynamic laws, the concept of entropy, and principles.
3. To understand how the change of state results in a process.
4. To understand the various gas laws, psychrometric properties and chart.
5. To learn the importance of thermodynamic cycles, and the derivation of efficiency.

UNIT-I

Basics of thermodynamics: 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

Entropy: 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

Properties of 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 fraction 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. Analyze the work and heat interactions associated with a prescribed process path and to perform a analysis of a flow system.
2. Quantify the irreversibility associated with each possibility and choose an optimal cycle.
3. Able to analyze Mollier chart, and to find the quality of steam.
4. Able to analyze psychrometric chart, to estimate thermodynamic properties such as WBT, DBT, RH, etc.
5. Analyze the thermodynamic cycles and evaluate performance parameters.

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(R20A0305) FLUID MECHANICS & HYDRAULIC MACHINERY

COURSE OBJECTIVES:

1. To give insight knowledge on fluid statics.
2. To gain knowledge on fluid kinematics and dynamics.
3. To give basic understanding of boundary layer concept and analyze different types of losses and measurement of flow.
4. To become familiar about different types of turbines & able to analyze their performance characteristics of various turbines.
5. To be able to understand the working of power absorbing devices like pumps & able to analyze their performance characteristics.

UNIT-I:

Fluid Statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity, capillarity, 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 ir-rotational 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, Venturi meter 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 – manometric 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. Students will gain the knowledge on fluid mechanics fundamentals like fluid statics.
2. Student will have basic idea on fluid dynamics and kinematics which are used in real working environment.
3. Student will study the fundamental of boundary layer concepts and its applications.
4. Student will understand the principles of turbo machinery and measure the performance of different types of turbines.
5. Student will calculate the performance of different types of pumps.

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(R20A0306) METALLURGY & MATERIAL SCIENCE

COURSE OBJECTIVES:

1. To understand the basic structure, properties of metals, mechanism of crystallization and imperfections in crystals.
2. To study the importance of binary phase diagrams.
3. To acquire knowledge on properties and structure of ferrous and nonferrous alloys and to select suitable materials for various engineering applications.
4. To learn various methods of heat treatment processes.
5. To gain knowledge on advanced materials and concepts of metallurgy.

UNIT I

Structure of Metals: Bonds in Solids – Metallic bond - crystallization of metals, imperfections, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT II

Equilibrium Diagrams

Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state, allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of binary phase diagram of Fe-Fe3C.

UNIT III

Cast Iron & Steel: Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron, Spheroidal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Had field manganese steels, tool and die steels.

Nonferrous metals & Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT IV

Heat treatment of Alloys: Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Harden ability, surface - hardening methods, Age hardening

Ceramic Materials: Crystalline ceramics, glasses, cermets.

UNIT V

Composite Materials: Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal – matrix composites and Carbon– Carbon composites.

Metallurgy: Steel Making - Introduction, Methods of steelmaking – crucible process, Bessemer converter process, Open Hearth Process, Introduction to Powder metallurgy.

TEXT BOOKS:

1. Kodgire, Material Science and Metallurgy, 42nd edition Everest Publishing House2017.
2. Donald R.Askeland, Essential of Materials Science and Engineering. Thomson Publications 2014.
3. V.Raghavan, Material Science and Engineering, Prentice –Hall of India Pvt. Ltd., 2007
4. Sidney H. Avner, Introduction to physical metallurgy, Tata Mc-Graw-Hill, Inc. 1997.

REFERENCES:

1. Sidney H. Avener, Introduction to Physical Metallurgy, TMH
2. William and collister, Materials Science and Engineering, wiley pub. 2014.
3. V. Raghavan, Material scienceand engineering, PH Pub. 2015.
4. R.K.Rajput, Engineering materials and metallurgy. S.Chand & Co. 2006.
5. O.P. Khanna, Material Science and Metallurgy. Dhanpatrai Pub. 2014

COURSE OUTCOMES:

1. Understand the mechanism of crystallization, methods of determining grain size and factors affecting the solid solubility.
2. Use the phase diagrams of binary systems and iron-carbide diagram to select the material composition.
3. Understand the structure and properties of various cast irons, steels and nonferrous alloys.
4. Apply the various heat treatment processes, TTT diagram, surface hardening methods & coatings depending on material requirements.
5. Understand the importance of ceramics, composites and concepts of metallurgy

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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(R20A0307) COMPUTER AIDED MACHINE DESIGN

COURSE OBJECTIVES:

1. To familiarize with the standard conventions for different materials and machine parts in working drawings.
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 make part drawings including sectional views for various machine elements.
5. To prepare assembly drawings given the details of part drawings.

Part A: Drawing of Machine Elements and simple parts

1. Selection of Views, additional views for the following machine elements and parts with every drawing proportion.
2. Popular forms of Screw threads, bolts, nuts, studbolts, tapbolts, setscrews.
3. Keys, cottered joints and knuckle joint.
4. Rivetted joints for plates
5. Solid Journal Bearing

Part B: Assembly Drawings

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

1. Steam engine parts– Stuffing box, Crosshead, Eccentric.
2. Machine parts-Screw jack, Petrol engine connecting rod
3. Valves-Spring loaded safety valve.

NOTE:

1. Firstangleprojectiontobeadopted.Thestudentshouldbeabletoprovideworkingdrawingsofactualparts.
2. Part A need to be done by using AUTOCAD and Part B need to bedone by using Creo.

TEXT BOOKS:

1. Machine Drawing –K.L.Narayana, P.Kannaiah&K.VenkataReddy / New Age/ Publishers
2. Machine Drawing with Auto CAD / Goutham Pohit, Goutam Ghosh / Pearson
3. Machine Drawing / N.D. Bhatt / Charotar

REFERENCE BOOKS:

1. Machine Drawing by / Bhattacharyya / Oxford
2. Machine Drawing / Ajeet Singh / Mc Graw Hill
3. Machine Drawing –P.S.Gill.

COURSE OUTCOMES:

1. Preparation of engineering and working drawings with dimensions and bill of material during design and development. Developing assembly drawings using part drawings of machine components.
2. Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
3. Making part drawings including sectional views for various machine elements.
4. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
5. Title boxes, their size, location and details - common abbreviations and their liberal usage. Types of drawings – working drawings for machine parts.

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3/-/-/3

(R20A0308) THEORY OF MACHINES

Course Objectives:

1. To impart knowledge on various types of links and synthesis.
2. To impart skills to analyse the position, velocity and acceleration of mechanisms and Steering Gear Mechanisms
3. To study about gyroscope and its effects during precession motion of moving vehicles and turning moment diagrams.
4. To understand the working principles of different type brakes and clutches.
5. To familiarize higher pairs like cams and principles of cams design and governors.

UNIT-I

Introduction of Mechanisms and Machines:

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, inversions of quadric cycle, chain, single and double slider crank chains.

UNIT-II

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.

Steering Gear Mechanisms: Conditions for correct steering Davis Steering gear Mechanism, Ackerman's steering gear mechanism.

UNIT–III

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

Turning moment Diagrams: Single cylinder double acting steam engine, Four Stroke Cycle Internal Combustion Engine, Multi-cylinder Engine, and Flywheel.

UNIT–IV

Friction and Friction Drives: Introduction to friction, Laws of friction, Coefficient of friction, Inclined plane, Pivot and Collars, Friction clutches-centrifugal clutch.

Brakes: Types of brakes, Block and Shoe brakes, Internal expanding shoe brake, Braking effect in vehicle.

UNIT–V

Cams: Types of cams, Types of followers, Follower displacement programming, Derivatives of follower Motion, Layout of cam profiles-knife edge and roller follower.

Governors: introduction, Watt Governor, Porter Governor.

TEXT BOOKS:

1. Rattan S.S, “Theory of Machines” Tata McGraw-Hill Publishing Company Ltd., New Delhi, and 2nd edition -2005.
2. Sadhu Singh, “Theory of Machines,” Pearson Education (Singapore) Pvt. Ltd., Indian Branch, New
Delhi, 2ND Edi. 2006.
3. Jagadish Lal, ‘Theory of Machine’, Dhanpat Rai Publications, New Delhi..

REFERENCE BOOKS:

1. Shigley. J. V. and Uickers, J.J., “Theory of Machines & Mechanisms” OXFORD University press.2004
3. “Theory of Machines -I”, by A.S.Ravindra, Sudha Publications, Revised 5th Edi. 2004

Course Outcomes:

1. Understand the principles of kinematic pairs, chains and their classification, DOF and inversions.
2. Analyze the planar mechanisms for position, velocity and acceleration and steering gear mechanism.
3. Knowledge acquired about Gyroscope and its precession motion and turning moment diagrams.
4. Acquire the knowledge on different type brakes and clutches.
5. Understand the concept of Design cams and followers for specified motion profiles and governors.

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II Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0381) 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 cd, cc, cv 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: Minimum a total of 8 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.

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(R20A0382) COMPUTER AIDED MACHINE DESIGN & DYNAMICS LAB

COURSE OBJECTIVES:

1. Understand the fundamentals of the theory of dynamics of machines.
2. Understand techniques for studying motion of machines and their components.
3. Analyze the motions of mechanisms, design mechanisms to have given motions, and analyze forces in machines.
4. To understand the gyroscopic effect for different motions.
5. To develop a model of mechanical design elements

LIST OF EXPERIMENTS:

Cycle 1:

1. Determination of torsional natural frequency of single rotor system (Undamped natural frequencies).
2. Determination of torsional natural frequency of double rotor system (Undamped natural frequencies).
3. Todeterminethetimeperiod,amplitudeandfrequencyofdampedfreelongitudinalvibrations ofsingledegreespring mass systems
4. To determine the gyroscopic effect for different types of motions
5. Static balancing using steel balls
6. Determination of the magnitude and orientation of the balancing mass in dynamic balancing.

Cycle 2:

7. Design of Couplings
8. Design of Springs
9. Design of Clutches& Brakes
10. Design of Helical Gear
11. Design of Journal Bearings
12. Assembly Drawings of Screw Jack and Connecting Rod.

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

COURSE OUTCOMES:

1. Student able to understand the concept of static and dynamic balancing
2. Student should able to find the natural frequency of damped and undamped vibratory system
3. Evaluation of gyroscopic couple for different motions.
4. Student should able design different components using software
5. Student should able to design Assembly of components using software.

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(R20A0008) GLOBAL EDUCATION & PROFESSIONAL CAREER

INTRODUCTION

In every era of human life, studying abroad has allowed one to experience another part of oneself in a different setting. Additionally, if all that hurry is geared towards success in one's career, international education will most definitely be worth one's time. It is not only an expedition of self-discovery but also an investment in one's resume.

The world, today, is redefining knowledge and great leadership to encompass critical values that are key to meeting modern career challenges. To meet the current requirements, a study delineating Global Education is of utmost importance towards prospective growth.

COURSE OBJECTIVES:

1. To assist students to understand the broad scope of engineering.
2. To equip the students to study the academic subjects with better perspective of the expectations of the international standards
3. To familiarize students with the financial requirements and ways to receive monetary aid
4. To enable students' understanding of the various admission tests
5. To acquaint them with their own skill set and train the students towards skills development

Unit 1

Importance and relevance of Engineering in today's and futuristic contexts.
The jobs that will thrive in the market in the coming decades. For eg., Robot Manufacturer &service Management, Big Data & AI Scientists, Artificial Bodies Manufacturer, Gene Designers, etc

Unit 2

Countries and their entry requirements
Non-immigrant student visas, Work Permit visas

Unit 3

Admission tests to colleges and universities world-over
PSAT, SAT, TOEFL, AP, IELTS…

Unit 4

Financial capacity requirements
Scholarships, Full scholarships, merit scholarships, on-campus jobs

Unit 5

Skills Mapping
Match one's skills with jobs, Skills development

COURSE OUTCOMES

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

1. Comprehend the usage of engineering in various fields and disciplines.
2. Identify the right college and country to pursue higher education.
3. Prepare themselves for the skill-oriented academics and prospective growth.
4. Plan for their future education with the precise financial management.
5. Discover and discuss their skill set and the jobs that map their skills.

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(R20A0309) APPLIED THERMODYNAMICS

COURSE OBJECTIVES:

1. To have Knowledge in steam power plants and their components, performance and analysis of Steam Turbines, Gas Turbines.
2. To understand Steam nozzles, Steam Condensers and their performances in Industries.
3. The purpose of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behavior of various systems.
4. Evaluate the performance of critical components and accessories steam and gas power plants.
5. To understand the concept of jet propulsion, Rockets and their propellants.

UNIT-I

Basic Concepts: Rankine cycle – Schematic layout, 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. Describe knowledge of Rankine cycle and heat equation in different processes, and improving efficiency techniques.
2. Demonstrate knowledge of ability to identify & apply fundamentals to solve problems involving nozzles and turbines, jet propulsion systems and rockets.
3. Design nozzles, turbines and condensers with desired needs within realistic constraints related thermal fields like different types of power plants etc.
4. Explore their knowledge & ability to design the constructional features of various types of boilers in various fields of energy transfer equipments and to understand the velocity triangles in Steam Turbines & Reaction Turbines
5. Knowledge of impact of engineering solutions on the society and also on contemporary issues related to different types of steam cycles and propulsion systems.

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(R20A0310) 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 under different types of loads.
3. To understand the behavior of beams subjected to shear loads.
4. To understand slope and deflection of beams under different loading.
5. To understand the concept of torsion.

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: $T/J=q/r=N\theta/L$-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 different 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.

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(R20A0311) DATA STRUCTURES USING PYTHON

COURSE OBJECTIVES:

This course will enable students to

1. Implement Object Oriented Programming concepts in Python.
2. Understand Lists, Dictionaries and Regular expressions in Python.
3. Understanding how searching and sorting is performed in Python.
4. Understanding how linear and non-linear data structures works.
5. To learn the fundamentals of writing Python scripts.

UNIT I

Oops Concepts- class, object, constructors, types of variables, types of methods. **Inheritance:** single, multiple, multi-level, hierarchical, hybrid, **Polymorphism:** with functions and objects, with class methods, with inheritance,**Abstraction:** abstract classes.

UNIT II

Data Structures – Definition,Linear Data Structures,Non-Linear Data Structures

Python Specific Data Structures: List,Tuples, Set, Dictionaries, Comprehensions and its Types,Strings,slicing.

UNIT III

Arrays - Overview, Types of Arrays, Operations on Arrays, Arrays vs List.
Searching -Linear Search and Binary Search.

Sorting - Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.

UNIT IV

Linked Lists – Implementation of Singly Linked Lists, Doubly Linked Lists.
Stacks - Overview of Stack, Implementation of Stack (List & Linked list).
Queues:Overview of Queue, Implementation of Queue(List & Linked list).

UNIT V

Graphs -Introduction, Directed vs Undirected Graphs, Weighted vs Unweighted Graphs, Representations, Breadth First Search, Depth First Search.
Trees - Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications. Tree Traversals, Binary Search Trees: Introduction, Implementation, AVL Trees: Introduction, Rotations.

TEXT BOOKS

1. Data structures and algorithms in python by Michael T. Goodrich
2. Data Structures and Algorithmic Thinking with Python by NarasimhaKarumanchi

REFERENCE BOOKS:

1. Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.
2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.
3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller and David L. Ranum.
4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press

COURSE OUTCOMES:

The students should be able to:

1. Examine Python syntax and semantics and apply Python flow control and functions.
2. Create, run and manipulate Python Programs using core data structures like Lists,
3. Apply Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Master object-oriented programming to create an entire python project using objectsand classes

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(R20A0312) MANUFACTURING PROCESSES

COURSE OBJECTIVES:

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

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, 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.

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.

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

UNIT-V:

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

Additive Manufacturing Techniques: Photo polymerization, Stereo lithography, Powder Bed Fusion, Selective Laser Sintering, Fused Deposition Modeling, 3D Printing, Laminated Object Manufacturing.

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.

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(R20A0024) PROBABILITY AND STATISTICS

COURSE OBJECTIVES:

1. To identify a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.
2. To learn important probability distributions like: in the discrete case, study of the Binomial and the Poisson Distributions and in the continuous case the Normal Distributions.
3. To build the linear relationship between two variables and also to predict how a dependent variable change based on adjustments to an independent variable.
4. To interpret the types of sampling, sampling distribution of means and variance, Estimations of statistical parameters.
5. To give comprehensive knowledge of probability theory to make inferences about a population from large and small samples.

UNIT – I: Random Variables

Single Random Variables -Discrete and Continuous, Probability distribution function, Probability mass and density functions, mathematical expectation and variance.

Multiple Random variables: Discrete and Continuous, Joint probability distribution, Marginal probability density functions, conditional probability distribution function and density functions.

UNIT-II: Probability Distributions

Binomial distribution – properties, mean, variance and recurrence formula for Binomial distribution, Poisson distribution – Poisson distribution as Limiting case of Binomial distribution, properties, mean variance and recurrence formula for Poisson distribution, Normal distribution – mean, variance, median, mode and characteristics of Normal distribution.

UNIT -III: Correlation and Regression

Correlation -Coefficient of correlation, Rank correlation, Regression- Regression coefficients, Lines of regression.

Multiple correlation and regression- Coefficient of multiple Correlation, multiple regression, multiple linear regression equations.

UNIT –IV: Sampling and Testing of Hypothesis for Large Samples

Sampling: Definitions - 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.

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

Unit-V: Testing of Hypothesis for Small Samples

Small samples: Test for single mean, difference of means, paired t-test, 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, 7th Edition,2016.
2. Fundamentals of Mathematical Statistics by SC Gupta and V.K.Kapoor
3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 35th Edition,2000.

REFERENCES BOOKS:

1. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M.Ross.
2. Probability and Statistics for Engineers by Dr. J. Ravichandran

COURSE OUTCOMES:

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

1. Evaluate randomness in certain realistic situation which can be either discrete or continuous type and compute statistical constants of these random variables.
2. Provide very good insight which is essential for industrial applications by learning probability distributions.
3. Higher up thinking skills to make objective, data-driven decisions by using correlation and regression.
4. Assess the importance of sampling distribution of a given statistic of a random sample.
5. Analyze and interpret statistical inference using samples of a given size which is taken from a population.

OPEN ELECTIVE - I

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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

OPEN ELECTIVE – I
(R20A1251) WEB DESIGNING TOOLS

COURSE OBJECTIVES:

1. To learn the basics of web & html programming
2. To learn about CSS and its style
3. To learn about Java Scripting & Dynamic Html
4. To learn about web server software AJAX
5. To learn about PHP

Unit I

Web Basics- Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser, HTML-Introduction HTML-Basic Formatting Tags, HTML- Grouping Using Div Span, HTML-Lists, HTML-Images, HTML-Hyperlink, HTML-Table, HTML-Iframe, HTML – Form HTML – Headers, HTML-Miscellaneous using tool Dreamweaver/ Visual studio

Unit II

CSS –Introduction, Syntax, CSS-Selectors, CSS-Color Background Cursor, CSS-Text Fonts, CSS-Lists Tables, CSS -Box Model, CSS-Display Positioning, CSS Floats. Using tool using tool Dreamweaver/ Visual studio, Net Bean

Unit III

Introduction of Java Script, JavaScript characteristics, Objects in Java Script, Dynamic HTML with Java Script. XML Http Request- Introduction, XML Http Request, The XML Http Request Object, Events for the XML Http Request Object, Request Object for XML Http Request, Response Object for XML Http Request. Using tool using tool Visual studio, Net Bean & Eclipse

Unit IV

AJAX Introduction- Introduction, AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax, CSS to Define Look and Feel, Understand the XML Mark-up, XML Http Request. AJAX using XML and XML Http Request- Introduction, Ajax Using XML and XML Http Request, Accessing, Creating and Modifying XML Nodes, Loading XML Data into an HTML Page, Receiving XML Responses, Handling Response XML. Using tool using tool Visual studio, Net Bean & Eclipse

Unit V

PHP Introduction- PHP Introduction, Structure of PHP, PHP Functions, AJAX with PHP, PHP Code and the Complete AJAX Example. AJAX with Database- Introduction, AJAX Database, Working of

AJAX with PHP, Ajax PHP Database Form, AJAX PHP MySQL Select Query. Using tool using tool Visual studio, Net Bean & Eclipse.

TEXT BOOKS:

1. Web Programming, Building Internet Applications, CHRIS BATES II Edition, Wiley Dreamtech.
2. Programming world wide web, SEBESTA,PEARSON.

REFERENCE BOOKS:

1. Internet and World Wide Web – How to program, Dietel and Nieto PHI/Pearson
2. Ajax: The Complete Reference By Thomas Powell
3. PHP: The Complete reference-steven Holzner Tata McGraw-Hill.
4. An Introduction to web Design and Programming –Wang-Thomson
5. Web Warrior Guide to Web Programming -Bai/Ekedaw-Thomas
6. Beginning Web Programming-Jon Duckett WROX

COURSE OUTCOMES:

1. Ability to learn to web application.
2. To develop a own style sheet
3. Ability to create a own java scripting web application.
4. Ability to create a own web design using of AJAX
5. Ability to create a own web design using of PHP

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OPEN ELECTIVE – I
(R20A0551) INTRODUCTION TO DBMS

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

Database: Purpose of Database Systems, 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. Views, Triggers.

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 BOOKS:

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.

REFERENCE BOOKS:

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. Peterrob, Carlos Coronel, —Database Systems – Design, Implementation, and Management‖, 9th Edition, Thomson Learning, 2009.

COURSE OUTCOMES:

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

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OPEN ELECTIVE – I
(R20A0351) INTELLECTUAL PROPERTY RIGHTS

COURSE OBJECTIVES:

1. To learn the basics, role, issues and agreement on trade aspects of IPR
2. To know the Parties to IP Rights
3. To learn how to ensure the value of IP
4. To learn about how to manage IP rights
5. To learn the remedies and IPR evaluation

UNIT I

Introduction: Intellectual property rights basics, the role and value of IP in international commerce, Issues affecting IP internationally. Agreement on trade related aspects of Intellectual Property Rights. (TRIPS) - Agreement on TRIPS and India.

Unit-II

Parties to IP Rights: Owner, customer, authorized user, licensee, attorney, protection of the weak and strong, finalizing ownership and use rights.

Unit-III

Ensuring the value of IP: Ensuring the value of IP at creation stage, after creation stage, precise contractual protection of IP rights. Key issues related to IP internationally. IP rights in international forums. Fundamentals in Country legal systems, generalities. Validity of IP rights locally: specifics.

Unit-IV

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, work made for hire agreement - Protecting IP Rights: non-disclosure agreement, cease and desist letter, settlement memorandum. Transferring IP Rights: assignment contract, license agreement, deed of assignment or license agreement, addendum to unrecorded assignment or license.

Unit-V

Remedies and IPR Evaluation - GATT - WTO - Role of WTO in solving IPR issues.

TEXT BOOKS:

1. A short course in International Intellectual Property Rights – Karla C. Shippey, World Trade Press – 2nd Edition.
2. Intellectual Property Rights – Heritage, Science, & Society under international treaties – A. Subbian, - Deep & Deep Publications – New Delhi.

REFERENCES BOOKS:

1. Intellectual Property Rights: N K Acharya: ISBN: 9381849309
2. Intellectual Property Rights: C B Raju: ISBN-8183870341
3. Intellectual Property: Examples and Explanation – Stephen M McJohn, 2/e, ISBN-13: 978-0735556652
4. Intellectual Property Rights in the Global Economy – Keith E Maskus, PIIE, ISBN paper 0- 88132-282-2

COURSE OUTCOMES

1. Understand the basics, role, issues and agreement on trade aspects of IPR
2. Understand and identifying the Parties to IP Rights
3. Learn how to ensure the value of IP
4. Understand about how to manage IP rights
5. Learn the remedies and IPR evaluation

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OPEN ELECTIVE – I
(R20A0051) ENTERPRISE RESOURCE PLANNING

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 learn about the post implementation of ERP
5. To evaluate the current and future trends in 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. Understand the basics of ERP
2. Understand the key implementation of ERP
3. Learn the business modules of ERP
4. Learn about the post implementation of ERP
5. Evaluating the current and future trends in ERP

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OPEN ELECTIVE – I
(R20A0451) BASICS OF COMPUTER ORGANIZATION

COURSE OBJECTIVES:

1. To understand basic components and operations in a system
2. To understand the execution of an instruction in a computer.
3. To acquire the knowledge to design of CPU.
4. To explore the memory organization.
5. To explore I/O organization and parallel processing in depth.

UNIT I

Basic Structure of Computers: Computer Types, Functional Units, Computer Registers, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers. **Data Representation**: Fixed Point Representation, Floating – Point Representation.
Register Transfer Language and Micro Operations: RTL- Register transfers, Bus and Memory Transfers. **Micro operations:** Arithmetic, Logic, Shift micro operations, Arithmetic logic shift unit.

UNIT-II

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms. Error detection and Correction Codes
Basic Computer Organization and Design: Instruction codes, Timing and Control, Computer Instructions: Memory Reference Instructions, Register Transfer Instructions, Input– Output Instructions, Instruction cycle. Interrupt and Interrupt cycle, Complete Computer Description

UNIT III

Central Processing Unit organization: General Register Organization, Stack organization**,** Instruction formats, Addressing Modes, Data Transfer and Manipulation, Program Control, **CISC** and **RISC** processors.
Control Unit Design: Control Memory, Address sequencing, Design of CU: Micro Programmed Control, Hardware Control, Micro Program example. **Case Study-** Introduction to x86 architecture.

UNIT IV

Memory Organization: Memory Hierarchy, Memory Interleaving, **Main Memory-**RAM and ROM chips, **Associative Memory**-Hardware Organization, Match logic. Mapping functions- Associate, Direct, Set Associative Mapping. **Cache Memory**: Hit Ratio, Cache Coherence, Cache writes policies. **Auxiliary memory:** Magnetic Disks, Magnetic Tapes Optical devices, Page Replacement Algorithms.

UNIT V

Input –Output Organization: Peripheral Devices, Input-Output Subsystems, I/O Device Interface, I/O Processor, I/O Transfers–Program Controlled, Interrupt Driven, and DMA, Interrupts and Exceptions. I/O Device Interfaces – SCII, USB.

Pipelining and Vector Processing: Basic Concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards. Vector Processing: Applications, an Example for Vector Processing.

TEXT BOOKS:

1. Computer System Architecture‖ by M. Morris Mano, 3rd Edition.
2. Computer Organization and Design: The Hardware/Software Interface‖, 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
3. Computer Organization and Embedded Systems‖, 6th Edition by CarlHamacher, McGraw Hill Higher Education.

REFERENCE BOOKS:

1. Computer Architecture and Organization‖, 3rd Edition by John P. Hayes,WCB / McGraw-Hill
2. Computer Organization and Architecture: Designing for Performance‖, 10th Edition by William Stallings, Pearson Education.
3. Computer System Design and Architecture‖, 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

COURSE OUTCOMES:

1. Able to understand functional components and micro operations in a computer.
2. Able to understand arithmetic operations and computer instructions.
3. Able to understand CPU organization and design of control unit.
4. Able to understand the Memory organization.
5. Able to understand I/O Transfer and Parallel Processing.

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(R20A0383) MATERIALS TESTING & MANUFACTURING PROCESSES LAB

COURSE OBJECTIVES:

1. To understand the composition and metallurgical properties of metals based on their microstructures.
2. To understand the mechanical properties of a material.
3. To know about the casting of different materials.
4. To study and practice different joining & forming processes.
5. To understand the drawing operation for different materials.

LIST OF EXPERIMENTS:

1. To the study of Microstructure of Ferrous Materials.
2. To the study of Microstructure of Non-Ferrous Materials.
3. To determine the Tensile Strength & Impact strength of a material using UTM.
4. To study the Vickers and Rockwell hardness of a specimen.
5. To prepare a pattern for designing a sand mould.
6. To prepare joints using arc, spot and Plasma Welding.
7. To perform joining and cutting using gas welding.
8. To perform blanking and piercing operation.
9. To prepare a product using Injection moulding/ blow moulding machine.
10. To manufacture components using 3D printing.

NOTE: Minimum a total of 8 experiments are to be conducted

COURSE OUTCOMES:

1. Students will be able to understand the micro structures of different materials.
2. The student will be able to understand mechanical properties of materials.
3. Students will be able deliver the concepts casting of metals.
4. Students can prepare a joint using various welding operations.
5. Students will be able to learn the molding process of plastic materials.

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(R20A0384) DATA STRUCTURES USING PYTHON LAB

COURSE OBJECTIVES:

1. Syntax and Semantics and create Functions in Python.
2. Different data types Lists, Dictionaries in Python.
3. how to execute the programs using loops and control statements
4. Decision Making and Functions in Python
5. Files and exception Handling in Python

Week 1:

A. Write python program to print Hello World
B. Write a python program to get string, int, float input from user
C. Write a python program to add 2 numbers

Week 2:

A. Create a list and perform the following methods
   1) insert() 2) remove() 3) append() 4) len() 5) pop() 6) clear()
B. Write a python program to find the length of list?
C. Write a python program to find the smallest and largest number in the list?

Week 3:

A. Create a tuple and perform the following methods
   1) Add items 2) len() 3) check for item in tuple 4)Access iems
B. Write a python program using the following methods: 1) count 2) index
C. Write a python program using “+” and “*” operations which resulting a new tuple?

Week 4:

A. Create a dictionary and apply the following methods
   1) Print the dictionary items 2) access items 3) use get() 4)change values 5) use len()
B. Write a python code to convert list of tuples into dictionaries?
C. Write python program to store data in list, tuple, set, dictionary and then try to print them.

Week 5:

A. Write a python program to perform arithmetic, assignment, logical and comparison operators?
B. Write a Python program to add two positive integers without using the '+' operator. (use bitwise operator)
C. Write a Python program to perform the basic four operators (+, -, *, /)

Week 6:

A. Write a simple python program to declare a variable in different possible ways?
B. Write a python program to show precedence of operators using the expression: z = (v+w) * x / y
C. Write a python program to check whether the values of a list exist or not (use membership operator) and also perform identity operation?

Week 7:

A. Write a python program to print a number is positive/negative using if-else.
B. Write a python program to find largest number among three numbers.
C. Write a python Program to read a number and display corresponding day using if_elif_else?
D. Write a python program to print list of numbers using range and for loop

Week 8:

A. Write a python code to print the sum of natural numbers using while loop?
B. Write a python program to print the factorial of given number?
C. Write a python program to find the sum of all numbers stored in a list using for loop?

Week 9:

A. Write a Python function that takes two lists and returns True if they are equal otherwise false
B. Write python program in which a function is defined and calling that function prints Hello World
C. Write python program in which a function (with single string parameter) is defined and calling that function prints the string parameters given to function.
D. Write a python program using with any one of python function argument?

Week 10:

A. Write a program to double a given number and add two numbers using lambda ()?
B. Write a program for filter () to filter only even numbers from a given list.
C. Write a program for map () function to double all the items in the list?
D. Write a program to find sum of the numbers for the elements of the list by using reduce ()?

Week 11:

A. Write a python program to open and write “hello world” into a file?
B. Write a python program to write the content “hi python programming” for the existing file.
C. Write a python program to read the content of a file?

Week 12:

A. write a program to implement stack using array.
B. write a program to implement Queue using array.

TEXT BOOKS:

1. R. Nageswara Rao, “Core Python Programming”, dreamtech
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, Second Edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016.

COURSE OUTCOMES:

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

1. Evaluate Problem solving and programming capability
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
3. Implement conditional and loop for python programs
4. Express different Decision-Making statements and Functions
5. Understand and summarize different File handling operations and exceptions

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(R20A0005) GERMAN LANGUAGE
(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 with the vocabulary to create new sentences, sentence pattern, correct pronunciation.
2. To make the students an efficient German language speaker.
3. To focus on basic linguistic and communicative structures of the German language.

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 easy learning GERMAN dictionary
2. Hallo deutsch – Parul sharma
3. Studio D A1 – Hermann
4. So geht das – New Saraswati book house
5. Practice German language for beginners – Dominic
6. German Made easy – Diego Agundez

COURSE OUTCOMES

After completion of the course, 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.

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(R20A0313) COMPUTER INTEGRATED MANUFACTURING TECHNOLOGIES

Course Objectives

- Learn about the geometry of metal cutting theory, mechanism of chip formation and mechanics of orthogonal cutting and merchant's force diagram.
- Gain the knowledge and features, working principles and applications of lathe, shaper, slotter, milling, drilling, and machines.
- Learn about the grinding & finishing operations.
- Learn about the ways to reduce the surface roughness by using different.
- To understand CNC programming concepts.

UNIT – I

Metal cutting theory: Elements of cutting process – Geometry of single point tool and angles, chip formation and types of chips, Merchant Circle Diagram, built up edge and its effects- chip breakers. Mechanics of orthogonal cutting, cutting forces – cutting speeds, feed, depth of cut, tool life, coolants, machinability. 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, Drilling and Boring: -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

MILLING MACHINES: Introduction – principle of working – specifications – milling methods – classification of Milling Machines – principle features of horizontal, vertical and universal Milling Machine, machining operations, types of cutters – geometry of milling cutters, accessories to milling machines – cutting speed and feed – machining time calculations.

Unit - IV

Grinding Operations: Introduction – theory of grinding – classification of grinding machines cylindrical and surface grinding machines- tool and cutter grinding machines- different types of abrasives- bonds, specification and selection of a grinding wheel-lapping, Honing & Broaching operations- comparison to grinding.

Unit – V

Computer Numerical Control: Elements of NC system, NC part Programming, classifications, Post Processor, CNC, DNC and adaptive control systems.

TEXT BOOKS

1. CAD/CAM Principles and Applications, P.N.Rao, TMH.
2. Workshop Technology – B.S.Raghu Vamshi – Vol II, Dhanpatrai publications.
3. Manufacturing Technology by P.N.Rao, Volume II, McGraw Hill.
4. A text book of machine tools & tool design – PC Sharma.
5. Production Technology by R.K. Jain and S.C. Gupta, Khanna Publications.

REFERENCES

1. Principles of Computer Aided Design and Manufacturing, FaridAmirouche, Pearson
2. Machine Tools – C Elanchezhian and M. Vijayan, Anuradha Publications

Course Outcomes:

- Understand the fundamentals of metal cutting, chip formation, cutting forces involved in orthogonal metal cutting, and different cutting forces will be learned.
- Analyze the classification of lathe, shaper, planer, slotter, milling, drilling, and machines.
- Evaluate the surface finishing operations with abrasive processes such as grinding and broaching machines, types and working principle.
- Apply Computer aided process planning, CNC part programming.

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III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0314) THERMAL ENGINEERING

COURSE OBJECTIVES:

1. Student will learn applications and the principles of thermodynamics to components and systems.
2. Student will understand the thermodynamic principles which govern the behavior of various Engines.
3. Student have knowledge of methods of analysis and design of complicated thermodynamic systems
4. Student will acquire knowledge about thermodynamic analysis for compressors.
5. Student will obtain knowledge on various types of compressors and its functions.

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, under cooling, 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:

1. Graduate will recognize and recall the importance of thermodynamic analysis for improvement of efficiency.
2. Graduate will understand the working principles of SI and CI Engines.
3. Student will be able to do thermodynamic analysis for various powers and efficiencies of IC Engines.
4. Student will evaluate the thermodynamic analysis and various efficiencies of Compressors.

Student will develop the skill required in solving problems related to Compressors and do the thermodynamic analysis.

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(R20A0061) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES:

1. To create the evolution and basic principles of managerial economics and to understand the concept of demand, its significance, forecasting and elasticity of demand.
2. To understand analysis of cost and production in the process of utility creation.
3. To understand the concept of market, types of markets and how firms determine price output determination under different markets.
4. To understand the theory of capital and its significance, accounting principles, and various formats for preparation of final accounts.
5. To analyze various capital budgeting methods to take decision making towards projects and investments.

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.

UNIT-II

Production & Cost Analysis: Production Function- Iso cost 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) - Managerial Significance.

UNIT-III

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Objectives and Policies of Pricing- Methods of Pricing. Business: Features of different forms of Business Organization, Changing Business Environment in Post-liberalization scenario.

UNIT-IV

Introduction to Capital and Financial Accounting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance – Trading forecast, Capital Budget, Cash Budget. Accounting Definition, Concepts and Conventions

(GAAP), Formats for preparation of Trial Balance and Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet).

UNIT-V

Investment Decision: Features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios.

TEXTBOOKS:

1. A.R.Aryasri, Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age International Publishers, Hyderabad 2013
3. M. Kasi Reddy & Sarawathi, Managerial Economics and Financial Analysis, PHI, New Delhi, 2010.

REFERENCE BOOKS:

1. S.N.Maheswari & S. K. Maheswari, Financial Accounting, Vikas, 2012.
2. D.N. Dwivedi, Managerial Economics, Vikas, 2012.
3. Justin Paul, Leena, Sebastian, Managerial Economics, Cengage, 2012

COURSE OUTCOMES:

1. To understand fundamental concepts of economics and enables students how these concepts are utilized in business management.
2. Evaluates students to understand the production, technical relationship in factors of production, its process and impact of various costs on production.
3. To understand students to know types of markets and how firms determine their production levels in different competitive situations.
4. It remembers students to understand how business will maintain accounting books and financial position of the business in the market.
5. To understand Students should be able that how to take better decisions towards investment proposals.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0315) DESIGN OF MACHINE ELEMENTS
(Professional Elective I)

COURSE OBJECTIVES:

1. To apply the various design procedures, principles and various stresses in the design of machine elements. To apply different materials of construction and their properties and factors determining the selection of material for various applications.
2. To develop good and careful problem formulation and solution skills for designing selected machine components and systems
3. To learn the design of temporary and Permanent Joints.
4. To learn the design Procedure for the different Shafts under loading condition, able to know various shafts coupling.
5. To apply the design procedure of support rotating element.

UNIT I

Fundamentals of design and Stresses in Machine Members: General considerations in the design of Engineering Materials and their properties – selection – Manufacturing consideration in design. BIS codes of steel. 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 – preferred numbers. The concept of stiffness in tension, bending, torsion and combined situations.

UNIT II

Strength of Machine Elements: 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

Fasteners (Temporary and Permanent Joints): Riveted joints- Methods of failure of riveted joints-strength equations-efficiency of riveted joints - eccentrically loaded riveted joints - Welded joints - Design of fillet welds-axial loads-circular fillet welds under bending, torsion- Welded joints under eccentric loading - bolted joints, Knuckle joints - Cotter joints.

UNIT IV

Designs of Keys, Shaft and Shaft Couplings: Design of solid and hollow shafts based on strength, rigidity– Keys, keyways and splines - Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings – Flange coupling (Modified).

UNIT 5

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.

TEXT BOOKS:

1. Machine Design by R.S Khurmi and J.K.Gupta, S.Chand Publishers, 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 Publisher.
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:

1. Student acquires the knowledge about design procedure, material selection, and influence of steady and variable stresses in machine component design.
2. Acquire the Knowledge on various stresses and theories of failures.
3. Understand the concept of joints.
4. Able to understand the design Procedure for the different Shafts and shaft couplings.
5. Able to understand suitable bearings and its constituents from manufacturers catalogues under given loading conditions

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

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0316) POWER PLANT ENGINEERING
(Professional Elective I)

Course Objectives:

1. To create awareness about various sources of energy, working of thermal power plants and combustion process
2. To understand how Diesel and gas power plants are functioning.
3. To understand how power is achieved from renewable sources of energy and functions of hydro-electric powerplants.
4. Able to learn about Nuclear powerplants.
5. To apply the concepts of economics in powerplants

UNIT I

COAL BASED THERMAL POWER PLANTS Rankine cycle – improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II

DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS Otto, Diesel, Dual & Brayton Cycle–Analysis & Optimization. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT III

NUCLEAR POWER PLANTS Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), Canada Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT IV

POWER FROM RENEWABLE ENERGY Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V

ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TEXT BOOKS:

1. A Course in Power Plant Engineering:/Arora and S.Domkundwar /Dhanpat Rai Publisher
2. Power Plant Engineering / P.C.Sharma / S.K.KatariaPublisher
3. A Text Book of Power Plant Engineering / R.K.Rajput / LaxmiPublications

REFERENCE BOOKS:

1.Power Plant Engineering/ P.K.Nag II Edition /TMHPublishers
2. An Introduction to Power Plant Technology / G.D. Rai/KhannaPublishers
3. Power plant Engg /Elanchezhian/I.K. InternationalPublishers

Course Outcomes:

1. Enable students to understand about the coal handling and ash handling systems in thermal powerplants
2. To understand various gas power cycles and combined power cycles
3. To interpret Nuclear power station and various safety measures to be followed
4. To illustrate the students to get the exposure of different renewable energy resources
5. To execute and exemplify economics of power plants and waste disposal methods in Nuclear powerplants

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0317) NANOMATERIALS
(Professional Elective I)

Unit I

Introduction to Nano Materials

Nano materials: Introduction of nano materials; preparation of nano materials -Sol-gel and Chemical vapour deposition method; Carbon nanotubes (CNTs). Fundamentals of Nano materials: Central importance of nanoscale morphology - small things making big differences, clusters and magic numbers, nanoscale architecture. Recent developments, challenges and future prospects of nano materials.

Unit – II

Size and shape dependent properties of nano materials

Size and shape dependent properties, Melting points and lattice constants, Surface Tension, density of states, Wettability - Specific Surface Area and Pore – Composite Structure - Mechanical properties, Optical properties: Surface plasmon resonance in metal nano particles and quantum size effect in in Semi conductors, Electrical conductivity: Surface scattering, change of electronic structure, quantum transport, effect of microstructure, Magnetic properties: Ferroelectrics, dielectrics and super paramagnetism,

UNIT – III

Classification of nano materials

Classification based on the dimensionality, Zero-dimensional nanostructures: metal, semiconductor and oxide nano particles. One-dimensional nanostructures: nano wires and nano rods, Two-dimensional nanostructures: Thin films, Three-dimensional nanomaterials, Special Nano materials: Carbon fullerenes and carbon nano tubes, micro and mesoporous materials, core-shell structures, organic-inorganic hybrids

UNIT–IV

Applications of Nano materials: Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nano sensors, Nano catalysts, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defence and Space Applications. applications of nano materials (industrial and medicinal).

UNIT–V

Tools to Characterize Nano materials: 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), Nano indentation. DLVO Theory, steric stabilization and electro steric stabilization, nucleation and growth of nuclei, critical radius, homogenous and heterogeneous nucleation. Surface science for nano materials, surface energy, stabilization mechanisms, electrostatic - Nernst Equation, electric double layer, Debye-Huckel Screening strength.

References/compulsory reading

1. G. Cao and Y.Wang, Nanostructures and Nanomaterials, 2nd Ed., Imperial College Press, 2004.
2. R. Kelsall , I.Hamley and M. Geoghegan, Nanoscale Science and Technology, Wiley,2005.

3. K. J Klabunde, R. M. Richards, Nanoscale Materials in Chemistry, 2nd Ed., Wiley,2009.

4. T. Pradeep, A text book of Nano Science and Technology, Tata McGraw-Hill Education, 2012.

5. G. Schmidt, Nanoparticles: from Theory to applications, Wiley-VCH, 2004 Supplementary/

Suggested reading

1. Murty, B. S., P. Shankar, Baldev Raj, B. B. Rath, and James Murday. Textbook of Nano Science and nanotechnology. Springer Science & Business Media, 2013
2. Robert K, Ian H, Mark G, Nanoscale Science and Technology, John Wiley & sons
Ltd.,2005.

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III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0318) DESIGN OF HYDRAULIC AND PNEUMATIC SYSTEMS
(Professional Elective II)

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.

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 AND TECHNOLOGY

III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0319) INDUSTRIAL ROBOTICS
(Professional Elective II)

COURSE OBJECTIVES:

The general objectives of the course are to enable the students to

1. Understand the components and their working principles of a robotic system.
2. Learn forward kinematics, inverse kinematics of manipulators.
3. Learn Differential Kinematics and dynamic modeling of manipulators.
4. Design the motion for articulated systems and understand the different types of actuators and sensors required for specific applications
5. Learn robot programming and industrial application of robots.

UNIT -I

Robot Fundamentals: Definitions, History of robots, Laws of Robotics, Robot Specification, Anatomy of a Robot, Robot classifications, Function line diagram representation of robot arms, common types of arms, Robot end effectors- Types, Tools as end effectors, Considerations in gripper selection and design.

UNIT -II

Motion Analysis: Basic rotation matrices – Composite rotation matrices –Euler Angles – Equivalent Angle and Axis – Homogeneous transformation – Problems.

Manipulator Kinematics: D-H notations - Joint coordinates and world coordinates - Forward and inverse kinematics – problems.

UNIT -III

Differential Kinematics: Differential Kinematics of planar and spherical manipulators - Jacobians – problems.

Robot Dynamics: Lagrange – Euler formulations – Newton-Euler formulations – Problems on planar two link manipulators.

UNIT –IV

Trajectory Planning: General considerations in path description and generation, Joint space schemes, Cartesian space schemes, 4-3-4 & trapezoidal velocity strategy for robots.

Robot Actuators and Sensors: Internal and external sensors, Position- potentiometric, Optical sensors, Encoders - absolute, incremental, Touch and slip sensors, Velocity and acceleration sensors,

Proximity sensors, Force and torque sensors. Actuators- Hydraulic, Pneumatic and Electrical, Comparison of actuating systems and their relative merits and demerits.

UNIT -V

Robot Programming: Methods of robot programming- Textual and Lead through, WAIT, SIGNAL and DELAY commands, Capabilities and limitations of lead through programming, Robot language structure, Motion, sensor and end effectors commands, Programming examples.

Robot application in Manufacturing- Material Transfer- Material handling, loading and unloading, Processing - spot and continuous arc welding and spray painting, Assembly and Inspection.

TEXT BOOKS:

1. Industrial Robotics- Groover M P et al, Pearson Education.
2. Robotics and Control- Mittal R K &Nagrath I J, TMH.

REFERENCE BOOKS:

1. Robotics Technology and Flexible Automation- S.R.Deb, TMH.
2. Robotic Engineering- Richard D. Klafter, PHI.

COURSE OUTCOMES

At the end of the course the students shall be able to

1. To learn about knowledge for the design of robotics.
2. Calculate the forward kinematics and inverse kinematics of serial and parallel robots
3. Calculate the Jacobian for serial and parallel robot.
4. Be able to do the path planning for a robotic system and identify different types of actuators and sensors required for specific applications
5. Develop programming principles, languages for a robot control system and Discuss various applications of industrial robot systems

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0319) MECHANICAL VIBRATIONS
(Professional Elective II)

COURSE OBJECTIVES:

1. Able to 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; forced vibrations 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 and forced vibrations; Un-damped vibration absorbers.

UNIT-III

Multi degree freedom systems: Matrix formulation, stiffness and flexibility influence coefficients; 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 and Holzer'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:

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

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 ELECTIVE II

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A1252) MANAGEMENT INFORMATION SYSTEMS
OPEN ELECTIVE – II

COURSE OBJECTIVES:

1. To understand the importance of MIS, structure and types of MIS
2. To learn business applications of Information Systems
3. To learn about the Management of Information Systems
4. To learn how to build Information Systems
5. To know about Cyber crime

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, and Design Methods. Detailed system design.

UNIT-V:

Introduction to Cyber Crime: Cyber Crime Definition and origin of the word, cybercrime and information security, cyber criminals. Classification of cyber criminals-Legal Perspectives-Indian Perspectives-Cybercrimes and ndian ITA 2000, Global perspective on cybercrime-Cybercrime era.(Refer : Nina Godbole et al)

TEXT BOOK

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

REFERENCE:

1. Nina Godbole & Sunit Belapure " 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 OUTCOMES:

1. Understand the importance of MIS, structure and types of MIS
2. Understand business applications of Information Systems
3. Learning about the Management of Information Systems
4. Learning about how to build Information Systems
5. Knowing about Cyber crime

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III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0552) 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. To know about Applets and Event Handling
5. Create and event-driven GUI using AWT components.

UNIT I

OOP Concepts: Data abstraction, encapsulation, inheritance, Polymorphism, classes and objects, Procedural and object-oriented programming paradigms.

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, Buffered Reader class, Scanner class, String Tokenizer 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, and 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.NageswaraRao.

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, UniversitiesPress.

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 awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.
4. Be able to make use of members of classes found in the Java API.
5. Demonstrate the ability to employ various types of constructs and a hierarchy of Java classes to provide solution to a given set of requirements.

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III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A1253) SOFTWARE PROJECT MANAGEMENT
OPEN ELECTIVE – II

COURSE OBJECTIVES:

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. To understand the specific roles within a software organization as related to project and process management
2. To understand the basic infrastructure competences (e.g., process modeling and measurement)
3. To understand the basic steps of project planning, project management, quality assurance, and process management and their relationships
4. To understand the Flow Process and Check points of the process.
5. To understand Project Organizations and Responsibilities

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, Iteration workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cocomo Cost Estimation model.

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: Seven Core 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 toD

COURSE OUTCOMES:

At the end of the course, the student shall be able to:

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
4. Understanding the Flow Process and Check points of the process.
5. Understanding the Project Organizations and Responsibilities

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(R20A0452) INTERNET OF THINGS AND ITS APPLICATIONS
OPEN ELECTIVE – II

COURSE OBJECTIVES:

1. To study the fundamentals about IoT
2. To study about IoT Access technologies
3. To study the design methodology and different IoT hardware platforms.
4. To study the basics of IoT Data Analytics and supporting services.
5. To study about various IoT case studies and industrial applications.

UNITI: 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 equipment's, Industry 4.0 concepts.

TEXT BOOKS:

1. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton andJerome 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, Raj Kamal, McGrawHill, Higher Education

REFERENCE BOOKS:

1. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit2).
2. "From Machine-to-Machine to the Internet of Things – Introduction to a New Ageof Intelligence", Jan Ho¨ ller, Vlasios Tsiatsis, 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.

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(R20A0553) OPERATING SYSTEM CONCEPTS
OPEN ELECTIVE – II

COURSE OBJECTIVES:

1. To understand the basic concepts and functions of operating systems.
2. To understand Processes and Threads
3. To understand the concept of Deadlocks.
4. To analyze various memory management schemes.
5. To understand I/O management and File system

UNIT-I

Introduction: Concept of Operating Systems, OS Services, Structure of an Operating Systems
Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching
Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of Multithreads.

UNIT-II

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR
Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion. Classical IPC Problems: Reader‘s & Writer Problem, Dinning Philosopher Problem, The Producer/Consumer Problem, Semaphores, Monitors.

UNIT-III

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation; **Paging**: Principle of operation – Page allocation – Hardware support for

paging, protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory, Page fault , Demand paging; **Page Replacement algorithms:** Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT-IV

File Management: Concept of File, Access methods, File types, File operation, File System structure, Allocation methods (contiguous, linked, indexed), Directory structure, directory implementation (linear list, hash table), efficiency and performance.

UNIT-V

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.
Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

TEXT BOOKS:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin,Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

REFERENCE BOOKS:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice- Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

COURSE OUTCOMES:

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

1. Create processes and threads.
2. Implement algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. 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. Analyze various disk scheduling schemes

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(R20A0066) PUBLIC POLICY & GOVERNANCE
(Open Elective II)

Course objectives:

- To make the students understand in-depth analysis of public policy and to solve its ills prevailing in the society.
- To provide an opportunity for the students to learn the basic areas of public policy analysis, implementation and evaluation.
- To make understand the process and various approaches in public policy making
- To understand the theories and issues of social coordination and the nature of all patterns of rule.
- To make the students understand the techniques of governance and emerging trends in public and private governance its policy-making and implementation.

Unit-I

Introduction of Public Policy: Definition, Nature, Scope and Importance of Public Policy, Evolution of Public Policy and Policy Sciences, Public Policy and Public Administration. **Approaches to Public Policy Analysis:** The Process Approach, The Logical Positivist Approach, The Phenomenological Approach, The Participatory Approach and Normative Approach

Unit-II

Theories and Process of Public Policy Making: Theories and Models of Policy Making, Perspectives of Policy Making Process, Institutions of Policy Making.

Unit-III

Policy Implementation and Evaluation: Concept of Policy Implementation, Techniques of Policy Implementation, Concept of Policy Evaluation, Constraints of Public Policy Evaluation

Unit-IV

Introduction of Governance: Definitions, Issues and Controversies, Reinventing Government, Reforming Institutions: The State, Market and Public domain. **State and Governance:** Origin and types of State, Democratic State and Democratic Administration, Neo-Liberalism and Rolling Back State and Governance as Government.

Unit-V

Citizen and Techniques of Governance: Rule of Law and Human Rights, Accountability, Participation, Representation. **Techniques of Governance**: Openness and Transparency, Citizen Charter, Social Audit. **Emerging Trends in Public and Private Governance:** An Overview, Market, Civil Society, Information and Communication Technology.

Text and Reference books

1. Introduction to Public Policy- Charles Wheelan, Naked Economics 2010.
2. Birkland Thomas A., (2005), An Introduction to The Policy Process: Theories, Concepts, And Models of Public Policy Making, Armonk; M.E. Sharpe.
3. Anderson J.E., (2006) Public Policy-Making: An Introduction, Boston, Houghton
4. Bardach, Eugene (1977), The Implementation Game: What Happens After a Bill Becomes a Law, Cambridge, MA: MIT.
5. Bell, S., and Hind moor, A. (2009) Rethinking Governance: The Centrality of the State in Modern Society, Cambridge: Cambridge University Bell, Stephen and Andrew Hind moor.
6. Joyee M. Mitchell & William C. Mitchell, Political Analysis & Public Policy: An Introduction to Political Science, Thomson Press Limited, New Delhi, 1972.
7. R.K. Sapru, Public Policy, Art and Craft of policy Analysis, PHI learning private limited, New Delhi, 2011.

8. Brian W. Hogwood & Lewis A. Gunn, Policy Analysis for the Real world, Oxford University, Press, 1986.

Course outcomes

After completion of the course, student will be able to

1. Understand public policy analysis and they will be able to understand policy evaluation and implementation.
2. Understand the public policy and governance on the largest gamut of its canvas.
3. Students will understand the what are emerging trends in public and private governance and various theories in public policy making
4. Understands various concepts, and techniques of governance and its policy-making decisions

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III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0385) COMPUTER INTEGRATED MANUFACTURING TECHNOLOGIES LAB

COURSE OBJECTIVES:

1. To learn about Turning, Cutting, etc. works on lathe machine
2. To understand the working principles of various machines viz lathe, Drilling, milling, shaping.
3. To learn about Mechanical parameter measuring systems and different alignment techniques.
4. To understand the usage of CNC in Lathe and Milling machines.
5. To learn the measurement of the Angle and taper's by Bevel protractor, Sine bar, etc.

CYCLE-1

1. Introduction of general-purpose machines -Lathe, drilling machine, Milling machine, Shaper, Planning machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder.
2. To perform Step turning and taper turning, Thread cutting and knurling on lathe machine
3. To perform Drilling & Tapping operations.
4. To perform Slotting & Milling operations.
5. Generate CNC Lathe part program for Turning, Facing, Chamfering, Grooving, Step turning, Taper turning, Circular interpolation etc
6. Generate CNC Mill Part programming for Point to point motions, Line motions, Circular interpolation, Contour motion, Pocket milling- circular, rectangular, Mirror commands etc
7. To learn about Canned Cycles for Drilling, Peck drilling, Boring, Tapping, Turning, Facing, Taper turning Thread cutting etc

Note: Total 6 experiments are to be conducted.

CYCLE-2

1. To measure lengths, heights, diameters by Vernier calipers micrometers etc.
2. To measure bores by internal micrometers and dial bore indicators.
3. To learn about the use of gear teeth, Vernier calipers and checking the Chordal Addendum and Chordal AND Height of spur gear.
4. To learn about Machine tool "Alignment of test on the lathe.

5. To learn about Machine tool alignment test on milling machine.
6. To study about the Tool makers microscope and its application
7. To Study the Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. To learn Use of spirit level in finding the flatness of surface plate.
9. To study the Thread measurement by Two wire/ Three wire method or Tool makers microscope.

Note: Total 7 experiments are to be conducted

COURSE OUTCOMES:

Students get exposure to

1. Demonstrate knowledge of different machine tools used in machine shops.
2. Perform step, taper turning, knurling and threading operations on lathe.
3. Practical exposure on Flat Surface machining, Shaping, Slotting, Milling and grinding operations.
4. Apply the procedures to measure length, width, depth, bore diameters, external tapers, tool angles, and surface roughness by using different instruments.
5. Develop programs on CNC lathe and Milling machines.

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III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0386) THERMAL ENGINEERING AND 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 (SI and CI) 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 the working and performance of reciprocating air compressor
5. To Study the 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 the 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: Total 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

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(R20A0391) Application Development – I

1. Introduction

a. Introduction to Mobile Computing
b. Introduction to
c. Android Development Environment

2. Factors in Developing Mobile Applications

a. Mobile Software Engineering
b. Frameworks and Tools
c. Generic UI Development
d. Android User

3. Location

a. Mobility and Location Based Services
b. Android.

4. Security and Hacking (as time allows)

a. Active Transactions
b. More on Security
c. Hacking Android

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III Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0007) CONSTITUTION OF INDIA

INTRODUCTION

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest courts in the world".

This course "Indian Constitution" has been designed to develop understanding of the Indian Constitution among the students.

COURSE OBJECTIVES:

1. To enrich the students' understanding of the constitution's origin and its power
2. To facilitate students to analyze the political principles
3. To assist the students to be aware of their fundamental rights and duties
4. To enable learning about the federal structure Parliamentary form of government
5. To be acquainted with the historical perspectives of the constitutional amendments

UNIT –I

Meaning of constitution law and constitutionalism - Historical perspective of the constitution of India - Salient features and characteristics of the constitution of India

UNIT –II

Scheme of fundamental rights - The scheme of the fundamental duties and its legal status The Directive Principles of State Policy-its importance and implementation

UNIT–III

Federal structure and distribution of legislative and financial powers between the Union and the States, Parliamentary Form of Government in India-the constitution powers and status of the president of India, Amendment of the Constitutional Powers and Procedure

UNIT –IV

The historical perspectives of the constitutional amendments in India., Emergency provisions: National Emergency, President Rule, Financial Emergency, Local self-government-Constitutional scheme in India

UNIT –V

Scheme of fundamental Right to Equality - Scheme of fundamental Right to certain Freedom under Article 19 - Scope of the Right to Life and Personal Liberty under Article 21

COURSE OUTCOMES:

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

1. Improve their knowledge about Indian constitution
2. Value their identity and exercise their fundamental rights
3. Comprehend how differently government bodies function
4. Define their rights as voters of the country
5. Analyze the constitution and become responsible citizens

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(R20A0321) 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. Student can learn types of convection and dimensional analysis.
3. Student can learn phases of heat transfer
4. Student able to learn about heat exchanger performance.
5. Student able to learn different laws of Radiation and its applications.

UNIT-I

Introduction: Basic modes of heat transfer - General discussion about applications of heat transfer – Fourier Heat transfer equation General heat conduction equation in Cartesian, Cylindrical and Spherical coordinate systems. Steady state one dimensional heat conduction solutions for plain and composite slabs and cylinders - Critical thickness of insulation.

UNIT-II

Heat conduction through extended surfaces (Fins) -Long Fin, Fin with insulated tip and Short Fin - Fin effectiveness and efficiency.

Unsteady state Heat Transfer-Conduction: One Dimensional Transient Conduction Heat Transfer - Lumped system analysis, and solutions by use of Heisler charts.

UNIT-III

Convection: Dimensional analysis - Buckingham π theorem - Application of dimensional analysis to free and forced convection problems- Dimensionless numbers and Empirical correlations.

Free and Forced convection:

Continuity, momentum and energy equations - Boundary layer theory concept - Approximate solution of the boundary layer equations - Laminar and turbulent heat transfer correlation

UNIT- IV

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

UNIT-V

Boiling and Condensation: Different regimes of boiling- Pool, Nucleate, Transition and Film boiling. Condensation: Film wise and drop wise condensation - Nusselt's theory of condensation on a vertical plate.

Radiation Heat Transfer: Emission characteristics and laws of Black body radiation- Laws of Kirchhoff, Planck, Wien, Stefan Boltzmann – concepts of shape factor – 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 Yunus A Cengel.
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. To solve the heat transfer rate in convection for various geometric surfaces.
3. To evaluate the heat transfer rate in phase change process,
4. To design heat exchange equipment based on the need that fit to application.
5. To learn about the radiation and its use in real life.

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(R20A0566) ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

COURSE OBJECTIVES:

1. To train the students to understand different types of AI agents.
2. To understand various AI search algorithms.
3. Fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation.
4. To introduce the basic concepts and techniques of machine learning and the need for Machine learning techniques for real world problem
5. To provide understanding of various Machine learning algorithms and the way to evaluate the performance of ML algorithms

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, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

UNIT - II:

Advanced Search: Constructing Search Trees, Stochastic Search, AO* 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:

Machine-Learning : Introduction. Machine Learning Systems, Forms of Learning: Supervised and Unsupervised Learning, reinforcement – theory of learning – feasibility of learning – Data Preparation– training versus testing and split.

UNIT - IV:

Supervised Learning:

Regression: Linear Regression, multi linear regression, Polynomial Regression, logistic regression, Non-linear Regression, Model evaluation methods. **Classification:** – support vector machines (SVM) , Naïve Bayes classification

UNIT - V:

Unsupervised learning

Nearest neighbor models – K-means – clustering around medoids – silhouettes – hierarchical clustering – k-d trees ,Clustering trees – learning ordered rule lists – learning unordered rule .

Reinforcement learning- Example: Getting Lost -State and Action Spaces

TEXT BOOKS:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, PrenticeHall, 2010.
2. MACHINE LEARNING An Algorithmic Perspective 2nd Edition,Stephen Marsland,2015, by Taylor & Francis Group, LLC
3.Introduction to Machine Learning ,The Wikipedia Guide

REFERENCES:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009. 2. George F. Luger,
2. Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.
3. Introduction to Machine Learning, Second Edition, Ethem Alpaydın, the MIT Press, Cambridge, Massachusetts, London, England.
4. Machine Learning , Tom M. Mitchell, McGraw-Hill Science, ISBN: 0070428077
5. Understanding Machine Learning:From Theory to Algorithms, c 2014 by ShaiShalev-Shwartz and Shai Ben-David, Published 2014 by Cambridge University Press.

COURSE OUTCOMES:

1. Understand the informed and uninformed problem types and apply search strategies to solve them.
2. Apply difficult real life problems in a state space representation so as to solve those using AI techniques like searching and game playing.
3. Apply machine learning techniques in the design of computer systems
4. To differentiate between various categories of ML algorithms
5. Design and make modifications to existing machine learning algorithms to suit an

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(R20A0322) DESIGN OF TRANSMISSION SYSTEMS
(Professional Elective III)

***Note:** Design data books are permitted

COURSE OBJECTIVES:

1. To gain knowledge on the principles and procedure for the design of Mechanical power Transmission components or flexible elements.
2. To design the engine parts like piston, connecting rod and analyze design procedure different loading conditions.
3. To design of elastic object that stores mechanical energy.
4. To apply principles of design and analyze the forces in mechanical power transmission elements such gears (spur & Helical Gears).
5. Implement basic principles for the design of power screws.

UNIT-I

Design of Flexible Elements: Design of Transmission of power by Belt and Rope drives, Transmission efficiencies, Belts – Flat and V Types.

UNIT-II

Design of I.C 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

Mechanical Energy storing Elements : Introduction-Types of springs - terms used in springs-spring material Stresses in Helical Springs of Circular Wire - Deflection of Helical Springs of Circular Wire - Eccentric Loading of Springs - Buckling of Compression Springs - Energy Stored in Helical Springs of Circular Wire - Stress and Deflection in Helical Springs of Non-circular Wire - Helical Springs Subjected to Fatigue Loading - Springs in Series and Parallel - Helical Torsion Springs - Design of Leaf Springs.

UNIT-IV

Spur and Helical Gears: Spur gears & Helical gears- important Design parameters – Design of gears using AGMA procedure involving Lewis and Buckingham equations-Check for wear.

UNIT-V

Power Screw drives and their efficiency: Design of screw - Square ACME - Buttress screws - compound screw-design of screw jack - differential screw.

TEXT BOOKS:

1. Machine Design by R.S Khurmi and J.K.Gupta, S.Chand Publishers, 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 Publisher.
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:

1. Acquires the knowledge on belts, ropes.
2. Calculate the design parameter for energy storage element and engine components, connecting rod and piston
3. To understand the design and forces acting on gears
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

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(R20A0323) UNCONVETIONAL MACHINING PROCESSES
(Professional Elective III)

Course Objectives:

1. To understand the need and importance of nontraditional machining methods.
2. To know the basic principle, equipment, process variables and mechanics of metal removal in abrasive jet machining and water jet machining.
3. To study the fundamentals of tool design, surface finishing and metal removal rate of electro chemical grinding, electro chemical machining and electro chemical honing.
4. To understand principles of operation, types of electrodes and process parameters and machine tool selection in EDM and Electric discharge grinding and wire cut process.
5. To know the basics of Electron Beam Machining and comparison of thermal and non-thermal processes.

UNIT I: INTRODUCTION AND MECHANICAL ENERGY BASED PROCESSES

Unconventional machining Process – Need – classification – merits, demerits and applications. Abrasive Jet Machining – Water Jet Machining – Abrasive Water Jet Machining - Ultrasonic Machining. (AJM, WJM, AWJM and USM). Working Principles – equipment used – Process parameters – MRR- Applications.

UNIT II: THERMAL AND ELECTRICAL ENERGY BASED PROCESSES

Electric Discharge Machining (EDM) – Wire cut EDM – Working Principle-equipments-Process Parameters-Surface Finish and MRR- electrode / Tool – Power and control Circuits-Tool Wear – Dielectric – Flushing –— Applications. Laser Beam machining and drilling, (LBM), plasma, Arc machining (PAM) Principles – Equipment –Types - Beam control techniques – Applications.

UNIT III: CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES

Chemical machining and Electro-Chemical machining (CHM and ECM)- Etchants – Maskant - techniques of applying maskants - Process Parameters – Surface finish and MRR-Applications. Principles of ECM- equipments-Surface Roughness and MRR Electrical circuit-Process Parameters- ECG and ECH - Applications.

UNIT IV: ADVANCED NANO FINISHING PROCESSES

Abrasive flow machining, chemo-mechanical polishing, magnetic abrasive finishing, magneto rheological finishing, magneto rheological abrasive flow finishing their working principles, equipments, effect of process parameters, applications, advantages and limitations.

UNIT V: RECENT TRENDS IN NON-TRADITIONAL MACHINING PROCESSES

Recent developments in non-traditional machining processes, their working principles, equipments, effect of process parameters, applications, advantages and limitations. Comparison of Traditional and non-traditional machining processes.

Course Out comes:

1. Understand the knowledge on need for unconventional machining process and can perform experiments on USM process and are able to apply these concepts in academic research.

2. Learn the working of AJM, WAJM and WJM, can perform experiments on those processes and are able to apply these concepts in academic research.

3. Understand the fundamental concepts of CM, ECM, EDM process and can perform experiments on those processes and are able to apply these concepts in academic research.

4. Selection of machining process for various work materials

5. Apply suitable machining process for the typical component.

TEXT BOOK:

1.Advanced machining processes - VK Jain, Allied publishers.

2.Modern Machining Process - Pandey P.C. and Shah H.S., TMH.

REFERENCES:

1.New Technology - Bhattacharya A, The Institution of Engineers, India 1984.
2.Unconventional Machining Processes - C. Elanchezhian,B. Vijaya Ramnath and M Vijayan, Anuradha Publications, 2005.
3. Unconventional Manufacturing Processes – M.K. Singh, New Age International Publishers.

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(R20A0324) INDUSTRIAL ENGINEERING
(Professional Elective III)

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: Introduction - Definition and Scope of Industrial Engineering, Role of an Industrial Engineer in Industry,Functions of Industrial Engineering Department and Its Organization, Qualities of an Industrial Engineer, Principles of Industrial Engineering, System and Review of Growth and Development of Industrial Engineering and Scientific Management.

Unit II: Plant Layout and Material Handling - Different Types of Layouts Viz. Product, Process and Combination Layouts, Introduction to Layouts Based on GT, JIT and Cellular Manufacturing Systems, Development of Plant Layout, Types of Material Handling Equipments, Relationship of Material Handling with Plant Layouts.

Unit III: Work Study - Use and Applications, Techniques, Human Factors in the Application of Work Study,Method Study Objectives, Basic Procedure, Various Charting Techniques, Use of Photographic Techniques, SIMO Charts, Principles of Motion Economy, Work Measurement Techniques, Time Study, Work Sampling, Predetermined Motion Time Standards (PMTS), Analytical Estimation.

Unit IV: Production Planning and Control – Functions, Forecasting Techniques, Product Design, Process Planning, Machine Loading and Scheduling, Dispatching, Progress Reporting, Corrective Action.
Inventory Control - Different Costs, Determining Economic Order Quantity, Quantity Discounts, Re-order Level,Re-order Cycle Systems, ABC, VED, FSN Models.

Unit V: Quality Control - Meaning of Quality and Quality Control, Quality of Design, Quality of Conformance and Quality of Performance, Functions of Quality Control, Introduction to Statistical Quality Control-Control Charts and Sampling Plans.

Recommended Books:

1. Khanna, O.P. - Industrial Engineering and Management, Khanna Publishers, New delhi.
2. Dalela, S. and Mansuor Ali - Industrial Engineering and Management systems, Standard Distributors and Publishers, New Delhi.
3. Ralph, M. B. - Motions and Time Standards, John Wiley, New York.
4. ILO - Introduction to Work Study, International Labor Office , Geneva.
5. Jain, K.C. and Agarwal, L. N. – Production Planning Control & Industrial Management, Khanna Publishers, New Delhi.

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 HR.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ME- II Sem **L/T/P/C**
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(R20A0325) SMART MANUFACTURING TECHNOLOGIES
(Professional Elective IV)

COURSE OBJECTIVES:

1. To present a problem oriented in depth knowledge of Smart Manufacturing.
2. The objective of this course is to learn the statistics and optimization methodologies in smart manufacturing systems.
3. The students will know how to apply artificial intelligence (AI) and data mining (DM) techniques to solve the real problems in shop-floor level or capacity planning problems.
4. Evaluation criteria and industry benchmarks for determining where and how smart manufacturing processes can benefit your organization.
5. Detailed understanding of how sensors, automation and data science are transforming individual processes and improving operational performance throughout the manufacturing enterprise.

UNIT-I

Introduction to smart Manufacturing: What is “smart manufacturing” really and how does it differ from conventional/legacy manufacturing-Smart Manufacturing Processes- Three Dimensions: (1) Demand Driven and Integrated Supply Chains (2) Dynamically Optimized Manufacturing Enterprises (plant + enterprise operations) (3) Real Time, Sustainable Resource Management (intelligent energy demand management, production energy optimization and reduction of GHG)

UNIT-II

Smart Design & Fabrication: Smart Design/Fabrication - Digital Tools, Product Representation and Exchange Technologies and Standards, Agile (Additive) Manufacturing Systems and Standards. Mass Customization, Smart Machine Tools, Robotics and Automation (perception, manipulation, mobility, autonomy), Smart Perception – Sensor networks and Devices.

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

UNIT-III

Machine Learning: Machine Learning - Concept of Artificial Intelligence, Conceptual Learning, Artificial Neural Networks-Biological Neuron, Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

UNIT-IV

Automated Process Planning: Variant Approach, Generative Approach, Expert Systems for Process Planning, Feature Recognition, Phases of Process planning. Knowledge Based System for Equipment Selection (KBSES) - Manufacturing system design. Equipment Selection Problem, Modeling the Manufacturing Equipment Selection Problem, Problem Solving approach in KBSES, Structure of the KRSES.

UNIT-V

Group Technology: Models and Algorithms Visual Method, Coding Method, Cluster Analysis Method, Matrix Formation - Similarity Coefficient Method, Sorting-based Algorithms, Bond Energy Algorithm, Cost Based method, Cluster Identification Method, Extended CI Method. Knowledge Based Group Technology - Group Technology in Automated Manufacturing System. Structure of Knowledge based system for group technology (KBSCIT) — Data Base, Knowledge Base, Clustering Algorithm.

TEXT BOOKS:

1. Intelligent Manufacturing Systems/ Andrew Kusiak/Prentice Hall.
2. Artificial Neural Networks/ Yagna Narayana/PHI/2006
3. Automation, Production Systems and CIM/Groover M.P./PHI/2007
4. McEwen and H. Cassimally, Designing the Internet of Things, 1st edition,Wiley, 2013, ISBN-10: 111843062X.
5. Vengurlekar and P. Bagal, Database Cloud Storage: The Essential Guide toOracle Automatic Storage Management, 1st edition, McGraw-Hill Education.

REFERENCE BOOKS:

1. Neural networks: A comprehensive foundation/ Simon Hhaykin/ PHI.
2. Artificial neural networks/ B.Vegnanarayana/PHI
3. Neural networks in Computer intelligence/ Li Min Fu/ TMH/2003
4. Neural networks/ James A Freeman David M S kapura/ Pearson education/2004
5. Introduction to Artificial Neural Systems/Jacek M. Zurada/JAICO Publishing House Ed.2006.
6. Kuniavsky, Smart Things: Ubiquitous Computing User Experience Design, 1st
7. edition, Morgan Kaufmann, 2010, ISBN-10: 0123748992.

COURSE OUTCOMES:

1. The student can identify different areas of Smart Manufacturing.
2. Students should be able to understand basic Components of Knowledge Based Systems.
3. Understand the Concept of Artificial Intelligence.
4. Students should be able to understand Automated Process Planning.
5. Students should be able to understand about grouping the parts.

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(R20A0326) AUTOMOBILE ENGINEERING
(Professional Elective IV)

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–II

ENGINE AUXILIARY SYSTEMS: Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and 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–III

TRANSMISSION 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–IV

STEERING, 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–V

ALTERNATIVE 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.

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3/-/-/3

(R20A0327) TRIBOLOGY
(Professional Elective IV)

COURSE OBJECTIVES

1. To provide the knowledge and importance of Tribology in Design, friction, wear and lubrication aspects of machine components.
2. To select proper grade lubricant for specific application.
3. To understand the principles of lubrication, lubrication regimes, theories of hydrodynamic and the advanced lubrication techniques.
4. To introduce the concept of surface engineering and its importance in tribology.
5. To understand the behavior of Tribological components.

Unit-I

Introduction to tribology: Historical background, practical importance, and subsequent use in the field. Lubricants: Types and specific field of applications. Properties of lubricants- viscosity- its measurement- effect of temperature and pressure on viscosity- lubrication types- standard grades of lubricants, and selection of lubricants.

Unit-II

Friction and Wear: Friction theories - Surface contaminants - Frictional heating - Effect of sliding speed on friction. Classification of wear - Mechanisms of wear - Quantitative laws of wear - Wear resistance materials. Classification and mechanisms of wear- delamination theory- debris analysis- testing methods and standards- Related case studies.

Unit-III

Hydrodynamic journal bearings: Fundamentals of fluid formation – Reynold's equation; Hydrodynamic journal bearings – Sommer field number - performance parameters – optimum bearing with maximum load capacity – Friction – Heat generated and Heat dissipated. Hydrodynamic thrust bearings; Raimondi and Boyd solution for hydrodynamic thrust bearings - fixed tilting pads, single and multiple pad bearings - optimum condition with largest minimum film thickness.

Unit-IV

Hydrostatic Lubrication & Plane slider bearings: Introduction to hydrostatic lubrication, hydrostatic step bearings- load carrying capacity and oil flow through the hydrostatic step bearing- numerical examples. Pressure distribution- Load carrying capacity- coefficient of friction- frictional resistance in a fixed/pivoted shoe bearing-center of pressure- numerical examples.

Unit-V

Surface Topography: Surface characterization - Apparent and real area of contact - Derivation of average Reynolds equation for partially lubricated surface - Effect of surface roughness on journal bearings.

TEXTBOOKS:

1. ”Introduction to Tribology”, B. Bhushan, John Wiley & Sons, Inc., New York, 2002
2. “Engineering Tribology”, PrasantaSahoo, PHI Learning Private Ltd, New Delhi, 2011.
3. “Engineering Tribology”, J. A. Williams, Oxford Univ. Press, 2005.

REFERENCES:

1. “Introduction to Tribology in bearings”, B. C. Majumdar, Wheeler Publishing.
2. “Tribology, Friction and Wear of Engineering Material”, I. M.Hutchings, Edward Arnold, London, 1992.
3. “Engineering Tribology”, G. W. Stachowiak and A. W. Batchelor, Butterworth-Heinemann, 1992.
4. “Friction and Wear of Materials”, Ernest Rabinowicz, John Wiley & sons, 1995.
5. “Basic Lubrication Theory”, A. Cameron, Ellis Hardwoods Ltd., UK.

COURSE OUTCOMES:

After studying this course, students will be able to:

1. Understand the fundamentals of tribology and associated parameters.
2. Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.
3. Analyze the requirements and design hydrodynamic journal and plane slider bearings for a given application.
4. Select proper bearing materials and lubricants for a given tribological application.
5. Apply the principles of surface engineering for different applications of tribology.

OPEN ELECTIVE III

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

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(R20A0453) ROBOTICS AND AUTOMATION
(Open Elective III)

COURSE OBJECTIVES

1. To study overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
2. To study in detail about Robotics and sensors.
3. To study about AVR RISC Microcontroller architecture in detail.
4. To study about ARM Processor in detail.
5. To study about Artificial Intelligence in Robotics.

UNIT -I

Introduction to Embedded System Design, Categories of ES, Overview of Embedded System Architecture, Recent Trends in Embedded Systems, Hardware Architecture of Embedded System, Real-time Embedded Systems and Robots, Robots and Robotics, Microprocessors and Microcontrollers, Microcontroller or Embedded Controller

UNIT - II

Robotics: Classification of Robots, Degree of freedom, Kinematics; Multidisciplinary approach: Motors-DC motors, Stepper Motors, Servo Motors; Power Transmission-Type of Gears, Gear Assembly, CAM follower, Sensors, Open loop and Closed-loop Controls, Artificial Intelligence.

UNIT- III

The AVR RISC microcontroller architecture: Introduction, AVR family architecture, register file, the ALU, memory access and instruction execution, I/O memory, EEPROM, I/O ports, timers, UART, Interrupt structure.

UNIT-IV

ARM Processor: Fundamentals, Registers, current program status register, pipeline concept, Interrupt and the vector table.

UNIT V

AI IN ROBOTICS: Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.

TEXT BOOKS:

1. Subrata Ghoshal, "Embedded Systems & Robots", Cengage Learning
2. Stuart Russell, Peter Norvig, “Artificial Intelligence: A modern approch”, Pearson Education, India2003.
3. ARM System Developer’s Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

REFERENCE BOOKS:

1. M.A. Mazidi, J.G. Mazidi, R.D. Mckinlay, "8051 Microcontroller and Embedded Systems", Pearson.
2. Dr. K.V.K. Prasad, "Embedded/Real-Time Systems: Concepts Design & Programming", Dreamtech
3. Microcontrollers and applications, Ajay V Deshmukh , TMGH,2005

COURSE OUTCOMES:

At the end of the course, the students will be able to

1. Understand the overview of Embedded Systems, Robots, Microprocessors & Microcontrollers.
2. Understand in detail about Robotics and sensors.
3. Understand AVR RISC Microcontroller architecture in detail.
4. Understand about ARM Processor in detail.
5. Understand about Artificial Intelligence in Robotics.

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(R20A1254) BIG DATA ARCHITECTURE
(Open Elective III)

COURSE OBJECTIVES

1. To introduce the terminology, technology and its applications
2. To introduce the concept of Analytics and Visualization
3. To demonstrate the Big Data Architecture and its components, tools
4. To introduce Apache Spark
5. To introduce Technology Landscape using NoSQL

UNIT I

Big Data Introduction: Classification of Digital Data, Structured and Unstructured Data, Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data, Why Big Data - Traditional Business Intelligence versus Big Data, Importance of Big Data.

UNIT II

Big Data Architecture Introduction: Big Data Architecture- Definition, Why Big Data Architecture. Evolution of Big Data Architecture, Market Trends, Big Data Architecture and Its Sources, Big Data Architecture Use Cases.

UNIT-III

Big Data architecture components: Data ingestion, Data storage, Data Computing, Data Analysis, Data Visualization. Understanding the Lambda architecture, HBase, Spark Libraries, Spark Streaming.

UNIT IV

Introducing Apache Spark: Introduction to Spark, Spark Architecture and its components, Features of Spark, Spark vs Hadoop, Challenges of Spark.

UNIT V

Introduction to Technology Landscape: NoSQL, Comparison of SQL and NoSQL, Hadoop - RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

TEXT BOOKS:

1. Tom White — Hadoop: The Definitive Guide‖ Third Edit on, O'reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCE BOOKS:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis‖, Springer, 2007.
2. Jay Liebowitz, —Big Data and Business Analytics‖ Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, —Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop‖, McGraw-Hill/Osborne Media (2013), Oracle press.
4. Glen J. Myat, —Making Sense of Data‖, John Wiley & Sons, 2007
5. Pete Warden, —Big Data Glossary‖, O'Reily, 2011.
6. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
7. ArvindSathi, —BigDataAnalytics: Disruptive Technologies for Changing the Game‖, MC Press, 2012
8. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Identify Big Data and its Business Implications.
2. Categorize and summarize Big Data and its importance.
3. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce in big data analytics
4. Compare various file systems and use an appropriate file system for storing different types of data.
5. Connect to web data sources for data gathering, Integrate data sources with Hadoop components to process streaming data.

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3/-/-/3

(R20A0554) INFORMATION SECURITY
(Open Elective III)

COURSE OBJECTIVES

1. To understand the basic concepts of cybercrimes.
2. To study different attacks in cybercrimes.
3. To understand different tools and methods used in cybercrime.
4. To study cyber security challenges and implications.
5. To know about Cyber Security.

UNIT I

Introduction to Cybercrime: Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

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, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

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.

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

REFERENCE BOOKS:

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

COURSE OUTCOMES:

Student will be able to

1. Understand basic concepts of Cyber Crimes.
2. Ability to identify the attacks in Cyber Crimes
3. Able to specify the suitable methods used in Cyber Crime
4. Ability to face cyber security challenges
5. Understand Cyber Security

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III Year B.Tech. ME- II Sem **L/T/P/C**
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(R20A0555) CLOUD COMPUTING FUNDAMENTALS
(Open Elective III)

COURSE OBJECTIVES

1. To learn various system models for Distributed and Cloud Computing.
2. To understand about Virtual machines, Its Structure and mechanisms.
3. To learn Cloud Computing Paradigm.
4. To introduce the various levels of services that can be achieved by cloud.
5. To describe the security aspects in cloud.

UNIT- I

Systems Modeling: System Models for Distributed and Cloud Computing- Cloud Computing in a Nutshell, Layers and Types of Clouds, Desired Features of a Cloud, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks

UNIT- II

Virtualization: Virtual machines, Implementation Levels of Virtualization -Virtualization Structures/Tools and Mechanisms-Virtualization of CPU, Memory, and I/O Devices

UNIT- III

Foundations: Introduction to Cloud Computing- Migrating into a Cloud-The Enterprise Cloud Computing Paradigm.

UNIT- IV

Infrastructure as a Service (IAAS) & Platform (PAAS): Virtual machines provisioning and Migration services-On the Management of Virtual machines for Cloud Infrastructures-Aneka— Integration of Private and Public Clouds

UNIT- V

Software as a Service (SAAS) &Data Security in the Cloud: Google App Engine, An Introduction to the idea of Data Security- The Current State of Data Security in the Cloud-Cloud Computing and Data Security Risk- Cloud Computing and Identity.

TEXT BOOKS:

1. Distributed and Cloud Computing, Kaittwang Geoffrey C.Fox and Jack J Dongrra, Elsevier India 2012.
2. Mastering Cloud Computing- Raj Kumar Buyya, Christian Vecchiola and S.TanuraiSelvi, TMH, 2012.
3. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.

REFERENCE BOOKS:

1. Cloud Computing, John W. Ritting House and James F Ramsome, CRC Press, 2012.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2012.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for n-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

COURSE OUTCOMES:

1. Understanding various system models for Distributed and Cloud Computing.
2. Understanding about Virtual machines, Its Structure and mechanisms.
3. Learning Cloud Computing Paradigm.
4. Understanding the various levels of services that can be achieved by cloud.
5. Learning about security aspects in cloud.

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(R20A0352) DESIGN THINKING
(Open Elective III)

COURSE OBJECTIVES:

1. To understand the engineering design process and identification of customer need.
2. To understand innovative problem solving concepts.
3. To understand the principles of Design for Manufacturing and FMEA.
4. To know about the design for assembly principles.
5. To know about the concepts of 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.

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3/-/-/3

(R20A0065) BUSINESS ANALYTICS
(Open Elective III)

Course Aim/s:

- To help students in understanding how the managers use business analytics for managerial decision making.

Learning Outcome/s:

- The students will be familiar with the practices of analyzing and reporting the businessdata useful for the insights of business growth and development.

Unit-I: Understanding Business Analytics

Introduction: Meaning of Analytics - Evolution of Analytics - Need of Analytics - Business Analysis vs. Business Analytics - Categorization of Analytical Models - Data Scientist vs. Data Engineer vs. Business Analyst - Business Analytics in Practice - Types of Data - Role of Business Analyst.

Unit-II: Dealing with Data and Data Science

Data: Data Collection - Data Management - Big Data Management - Organization/Sources of Data - Importance of Data Quality - Dealing with Missing or Incomplete Data - Data Visualization - Data Classification.

Data Science Project Life Cycle: Business Requirement - Data Acquisition - Data Preparation

- Hypothesis and Modeling - Evaluation and Interpretation - Deployment - Operations - Optimization - Applications for Data Science

Unit-III: Data Mining and Machine Learning

Data Mining: The Origins of Data Mining - Data Mining Tasks - OLAP and Multidimensional Data Analysis - Basic Concept of Association Analysis and Cluster Analysis.

Machine Learning: History and Evolution - AI Evolution - Statistics vs. Data Mining vs. Data Analytics vs. Data Science - Supervised Learning - Unsupervised Learning - Reinforcement Learning - Frameworks for Building Machine Learning Systems.

Unit-IV: Applications of Business Analytics

Overview of Business Analytics Applications: Financial Analytics - Marketing Analytics - HR Analytics - Supply Chain Analytics - Retail Industry - Sales Analytics - Web & Social Media Analytics - Healthcare Analytics - Energy Analytics - Transportation Analytics - Lending Analytics - Sports Analytics - Future of Business Analytics.

Unit-V: Ethical, Legal and Organizational Issues

Issues & Challenges: Business Analytics Implementation Challenges - Privacy andAnonymizaiton - Hacking and Insider Threats - Making Customer Comfortable.

REFERENCES:

- James R Evans, Business Analytics, Global Edition, Pearson Education
- U Dinesh Kumar, Business Analytics, Wiley India Pvt. Ltd., New Delhi
- Ger Koole, An Introduction to Business Analytics, Lulu.com, 2019
- J.D. Camm, J.J. Cochran, M. J. Fry, J.W. Ohlmann, D.R. Anderson, D.J. Sweeney, T. A.Williams - *Essentials of Business Analytics*, 2e; Cengage Learning.
- Vipin Kumar, Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, PearsonEducation India
- Bhimasankaram Pochiraju, Sridhar Seshadri, Essentials of Business Analytics: An Introduction to the Methodology and its Application, Springer

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III Year B.Tech. ME- II Sem **L/T/P/C**
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(R20A0387) HEAT TRANSFER LAB

COURSE OBJECTIVES

1. Student to learn how to find efficiency of the fin experimentally by pin fin apparatus.
2. Student can learn how to find overall heat transfer co-efficient experimentally by composite wall apparatus.
3. Student to perform how to find heat transfer rate experimentally by logged pipe, concentric sphere, forced, free and condensation apparatus.
4.
5.
6. Student to learn how to find effectiveness of heat exchanger experimentally by heat exchanger apparatus.
7. Student to understand how to find critical heat flux, emissivity and Stefan Boltzmann constant experimentally by critical heat flux, emissivity and Stefan Boltzmann apparatus

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 Boltzmann apparatus.
12. Critical Heat flux apparatus.
13. Study of heat pipe and its demonstration.
14. Condensation apparatus.

Note: Total 10 experiments are to be conducted.

COURSE OUTCOMES:

1. Student able to evaluate efficiency of the fin experimentally by pin fin apparatus.
2. Student can learn how to find overall heat transfer co-efficient experimentally by composite wall apparatus.
3. Student able to learn how to find heat transfer rate experimentally by logged pipe, concentric sphere, forced, free and condensation apparatus.
4. Student able to evaluate effectiveness of heat exchanger experimentally by heat exchanger apparatus.

5. Student able to learn how to find critical heat flux, emissivity and Stefan Boltzmann constant experimentally by critical heat flux, emissivity and Stefan Boltzmann apparatus.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

III Year B.Tech. ME- II Sem **L/T/P/C**
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(R20A0580) ARTIFICIAL INTELLIGENCE & MACHINE LEARNING LAB

LAB OBJECTIVES:

1. Familiarity with the Prolog programming environment.
2. To introduce students to the basic concepts and techniques of Machine Learning.
3. To implement classification and clustering methods.
4. To become familiar with Dimensionality reduction Techniques.
5. Learning basic concepts of Prolog through illustrative examples and small exercises &Understanding list data structure in Prolog.

STUDY OF PROLOG; WRITE THE FOLLOWING PROGRAMS USING PROLOG/PYTHON

week-1. Write a program to implement all set operations(Union, Intersection, Complement etc)
week-2.Implementation of DFS for water jug problem using PROLOG
week-3. Implementation of BFS for tic-tac-toe problem using PROLOG
week-4. Solve 8-puzzle problem using best first search
week-5. Write a program to solve 8 queens problem
week-6. Implementation of Hill-climbing to solve 8- Puzzle Problem

MACHINE LEARNING

WEEK-1
Data Extraction, Wrangling
1. Loading different types of dataset in Python
2. Arranging the data

WEEK-2
Data Visualization
1. Handling missing values
2. Plotting the graphs

WEEK-3
Supervised Learning
Implementation of Linear Regression

WEEK-4
Implementation of K-nearest Neighbor

WEEK-5
Unsupervised Learning
Implementing K-means Clustering

WEEK-6
Unsupervised Learning
Implementing Hierarchical Clustering

LAB OUTCOMES:
1. Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,)

2. Understand the fundamentals of knowledge representation, inference using AI tools..
3. Solve the problems using various machine learning techniques
4. Design application using machine learning techniques

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(R20A0392) APPLICATION DEVELOPMENT II

1.Installation of Xcode studio.

2. Development Of Hello mrcet Application

3. Create an application that takes the name from a textbox and shows hello message along with the name entered in textbox, when the user clicks the OK button

4. Finding stationary objects with precision

5. Adjusting the Brightness and Contrast of an Image

6. Implementing proximity-based interactions between a phone and watch

7. Create an ios application using Fragments

8. Design an android application Using Radio buttons

9. Design an android application for menu.

10. Create a user registration application that stores the user details in a database table.

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III Year B.Tech. CSE- I Sem **L/T/P/C**
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(R20A0006) TECHNICAL COMMUNICATION AND SOFT SKILLS

INTRODUCTION:

'Technical Communication and Soft skills' focus on enhancing students' communication skills. Various technical writing styles and skills are developed. Students' placement needs met by giving them an exposure to group discussions and mock interviews. Soft skills such as building positiverelationships and teamwork are also emphasized.

The trainee hones these skills under the guidance ofthe instructor whose constant evaluation helps in the professional development of students. This course fulfils the need of the aspirants in acquiring and refining the skills required for placements and professional success.

COURSE OBJECTIVES:

1. To make the students recognize the role of technical English in their academic andprofessional fields
2. To improve language proficiency and to develop the required professional ethics
3. To equip students, organize, comprehend, write, and present, short and long forms of anytechnical work within the broad framework of the Scientific Method
4. To facilitate communication about projects and ideas throughout the industry and also tothe non-technical people
5. To display professional behaviors and body language

UNIT I – Effective Presentations

Just-a-Minute sessions, Formal versus informal communication, Non-verbal communication; Concord**:** Subject-verb agreement

UNIT 2 - Professional Communication

Role Plays, Persuasion techniques, Presentation aids, Body language, Importance of listening in effective communication; Email Writing, Business Letter Writing, Letters of complaint, enquiry, responses; Memo Writing; Transformation of Sentences

UNIT 3 – Career Planning

Oral Presentations, Techniques of Listening Skills, types of Group discussions; Etiquette, Protocol;Resume Writing, Cover letter, Writing a statement of purpose; Tenses

UNIT 4 - Technical Writing

Group Discussion, Principles of Effective Writing, Paragraph writing, Advanced Essay Writing, Expansion for or against the essay, Narrative essay, Descriptive essay; Technical Report Writing,Format &Style; Active & Passive Voice

UNIT 5 – Academic Writing

Mock Interview sessions, facing interviews; Correction of Sentences

REFERENCE BOOKS:

1. R.K. Narayan, The Guide, Viking Press, 1958
2. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. NewYork, 2004
3. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
4. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
5. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
6. Meenakshi Raman, Prakash Singh, Business communication, Oxford Publication, NewDelhi 2012.
7. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
8. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi2002.
9. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

COURSE OUTCOMES:

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

1. Understand information which assists in completion of the assigned job tasks moresuccessfully.
2. Communicate his ideas by writing projects, reports, instructions, diagrams and manyother forms of professional writing.
3. Adhere to ethical norms of scientific communication.
4. Strengthen their individual and collaborative work strategies.
   Successfully market themselves and sell themselves to the employer of their choice

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IV Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0328) CAD/CAM

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

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(R20A0329) MECHANICAL MEASUREMENTS & INSTRUMENTATION

Course Objectives:

1. To study concept of architecture of the measurement system.
2. To deliver working principle of mechanical measurement system.
3. To impart knowledge of mathematical modeling of the control system and control system under different time domain.
4. To analyze the stress and strain measurements and humidity measurements
5. To understand the Measurement of Force, Torque and Power Elements of Control Systems

UNIT–I **Definition**–Basic principles of measurement–Measurementsystems,generalizedconfigurationandfunctionaldescriptionsofmeasuringinstru ments–examples. Dynamic performance characteristics–sources oferror, Classification and elimination of error.

MeasurementofDisplacement: Theory andconstructionofvarioustransducerstomeasuredispla cement–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– methodofusageofresistancestraingaugeforbendingcompressiveandtensilest rains– 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.

TextB**ooks:**

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:

1. Learner should be able to Identify and select proper measuring instrument for specific application Illustrate working principle of measuring instruments**.**
2. Explain calibration methodology and error analysis related to measuring instruments
3. Mathematically model and analyze for different measuments.
4. Acquire knowledge in stress and strain measurements and Humidity measurement.
5. Identify, analysis, and solve mechanical engineering problems useful to the society

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IV Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0330) FINITE ELEMENT ANALYSIS

COURSE OBJECTIVES

The general objectives of the course are to enable the students to

1. Introduce basic concepts of finite element methods including domain discretization, polynomial interpolation and application of boundary conditions
2. Understand the theoretical basics of governing equations and convergence criteria of finite element method.
3. Develop of mathematical model for physical problems and concept of discretization of continuum.
4. To learn the application of FEM equations for Iso-Parametric and heat transfer problems And Discuss the accurate Finite Element Solutions for the various field problems
5. Use the commercial Finite Element packages to build Finite Element models and solve a selected range of engineering problems

UNIT-I

FUNDAMENTAL CONCEPTS & ONE-DIMENSIONAL PROBLEM: 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 modeling of axi-symmetric solids subjected to axi-symmetric loading with triangular elements.

UNIT-IV

Iso-Parametric Formulation: Concepts, sub parametric, super parametric elements, two dimensional four nodes iso-parametric elements, and numerical integration.

Heat Transfer Problems: One dimensional steady state analysis composite wall. One dimensional fin analysis and two dimensional 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.
5. K. J. Bathe, Finite element procedures. PHI.
6. SS Rao, The finite element method in engineering. Butterworth Heinemann.

COURSE OUTCOMES:

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

1. Describe the concept of FEM and difference between the FEM with other methods and problems based on 1-D bar elements and shape functions.
2. Derive elemental properties and shape functions for truss and beam elements and related problems.
3. Understand the concept deriving the elemental matrix and solving the basic problems of CST and axi-symmetric solids
4. Formulate FE characteristic equations for iso-parametric problems and Explore the concept of steady state heat transfer in fin and composite slab
5. Understand the concept of consistent and lumped mass models and solve the dynamic analysis of all types of elements.

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(R20A0331) REFRIGERATION & AIR CONDITIONING
(PROFESSIONAL ELECTIVE V)

Course Objectives

To apply the principles of Thermodynamics to analyze different types of refrigeration and air conditioning systems and to understand the functionality of the major components.

UNIT – I

Introduction to Refrigeration: – Necessity and applications – Unit of refrigeration and C.O.P. – Types of Ideal cycle of refrigeration.

Air Refrigeration: Bell Coleman cycle and Brayton Cycle, Open and Dense air systems – Actual air refrigeration system – Refrigeration needs of Air crafts- Air Systems-Application of air refrigeration system

UNIT – II

Vapour compression refrigeration – working principle and essential components of the plant – Simple Vapour compression refrigeration cycle – COP – Representation of cycle on T-S and p-h charts – effect of sub cooling and super heating – cycle analysis – Actual cycle Influence of various parameters on system performance – Use of p-h charts – Problems.

UNIT – III

System Components: Compressors – General classification – comparison – Advantages and Disadvantages. Condensers – classification – Working Principles. Evaporators – classification – WorkingPrinciples. Expansion devices – Types – Working Principles. Refrigerants – Desirable properties – Nomenclature - Global Warming.

UNIT – IV

Vapor Absorption System – description and working of NH3 –water system Li – Br system. Principle of operation Three Fluid absorption system, salient features.

Steam Jet Refrigeration System – Working Principle and Basic Components

UNIT – V

Psychometric Properties & Processes – Sensible and latentheat loads – Characterization – Need for Ventilation, Consideration of Infiltration – Load concepts of RSHF, ASHF, ESHF and ADP.

Introduction to Air Conditioning: Summer Air Conditioning, Winter Air Conditioning & Year Round Air Conditioning

Text Books

1. Refrigeration and Air conditioning / CP Arora / Mc Graw Hill
2. Refrigeration and Air-Conditioning / RC Aora / PHI

Reference Books

1. Principles of Refrigeration – Dossat / Pearson
2. Basic Refrigeration and Air-Conditioning / Ananthanarayanan / Mc Graw Hill

Course Outcomes

At the end of the course, the student should be able to Differentiate between different types of refrigeration systems with respect to application as well as conventional and unconventional refrigeration systems. Thermodynamically analyse refrigeration and air conditioning systems and evaluate performance parameters. Apply the principles of Psychometrics to design the air conditioning loads for the industrial applications.

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IV Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0332) RENEWABLE ENERGY SOURCES
(PROFESSIONAL ELECTIVE V)

COURSE OBJECTIVES:

1. To explain concept of various forms of principles of solar radiation.
2. To outline solar energy collection and solar energy storage and applications.
3. To explain the sources and potentials of wind energy and bio mass.
4. At the end of the course, the students are expected to understand geothermal energy.
5. This course aims to explain the concepts and principles of Direct Energy Conversion.

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 measuring 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: 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. Students will be able to understand the basics of solar energy radiation.
2. Students will gain knowledge in working principle of various solar energy collections, storage and applications.
3. Able to understand wind energy and bio energy principles.
4. Upon completion of this Course, the Students can learn geothermal energy technologies.
5. Students will learn Direct Energy Conversion principles.

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(R20A0333) OPERATIONS RESEARCH
(PROFESSIONAL ELECTIVE V)

COURSE OBJECTIVES

1. Define and formulate linear programming problems and appreciate their limitations.
2. Solve linear programming problems using appropriate techniques and optimization
3. Solvers interpret the results obtained and translate solutions into directives for action. 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 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 Operations Research, 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 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.
5. Use mathematical software to solve the proposed simulation models.

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(R20A0334) PRODUCTION AND OPERATIONS MANAGEMENT
(PROFESSIONAL ELECTIVE VI)

COURSE OBJECTIVES:

1. To create a comprehensive exposure to and 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: Importance of forecasting–Types of forecasting and its uses– General principles of forecasting– Forecasting techniques – qualitative methods and quantitive methods.

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 codification - 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. Rama Murty-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.

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IV Year B.Tech. ME- I Sem **L/T/P/C**
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(R20A0335) MAINTENANCE AND SAFETY ENGINEERING
(PROFESSIONAL ELECTIVE VI)

COURSE OBJECTIVES:

1. To ensure the desired plant availability at an optimum cost within the safety prescription.
2. Students should be able to know about the objectives of maintenance.
3. To minimize the total cost of unavailability and resources.
4. To study able to know safety acts and Environmental methods.
5. To able to discuss various maintenance polices and preventive acts.

UNIT-I

Introduction: Need for Maintenance, Facts and Figures, Modern Maintenance, Problem and Maintenance Strategy for the 21st Century, Engineering Maintenance Objectives and Maintenance in Equipment Life Cycle, Terms and Definitions. Maintenance Management and Control: Maintenance Manual, Maintenance, Facility Evaluation, Functions of Effective Maintenance Management, Maintenance Project Control Methods, Maintenance Management Control Indices

UNIT -II

Types Of Maintenance: Preventive Maintenance, Elements of Preventive, Maintenance Program, Establishing Preventive Maintenance Program PM Program Evaluation and Improvement, PM Measures, PM Models, Corrective Maintenance, Corrective Maintenance Types, Corrective Maintenance Steps and Downtime Components, Corrective Maintenance Measures, Corrective Maintenance Models.

UNIT: III

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.

UNIT: IV

Quality & Safety In Maintenance: Needs for Quality Maintenance Processes, Maintenance Work Quality, Use of Quality Control Charts in Maintenance Work Sampling, Post Maintenance Testing, Reasons for Safety Problems in Maintenance, Guidelines to Improve Safety in Maintenance Work, Safety Officer's Role in Maintenance Work, Protection of Maintenance Workers

Maintenance Costing: Reasons for Maintenance Costing, Maintenance Budget Preparation Methods and Steps, Maintenance Labor Cost Estimation, Material Cost Estimation, Equipment Life Cycle Maintenance Cost Estimation, Maintenance Cost Estimation Models.

UNIT: V

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.

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. Students can describe the various categories of maintenance.
2. Students can assemble, dismantle and align mechanisms in sequential order.
3. Students will be able to carry out plant maintenance using tribology, corrosion and preventive maintenance.
4. Student gets the exposure of Maintenance Policies and Preventive Maintenance.
5. Students can explain the repair methods of material handling equipment's.

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IV Year B.Tech. ME- I Sem **L/T/P/C**
3/-/-/3

(R20A0336) AUTOMATION AND CONTROL ENGINEERING
(PROFESSIONAL ELECTIVE VI)

COURSE OBJECTIVES

The general objectives of the course are to enable the students to

1. Understand the basics of automation and the need of Mechatronics systems
2. Learn the constructions and working principle of different types of sensors and transducers.
3. Understand the constructions and working principle of different types of Actuators and drive systems.
4. To impart knowledge on the control elements
5. 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

At the end of the course the students shall be able to

1. The importance of automation in industries and Identification of key elements of mechatronics system
2. Identify different types of sensors and transducers required for specific applications
3. handle different types of controller like Electronic, Pneumatic and Hydraulic, Mechanical actuators and drives for specific applications
4. Describe and analyze working principles of various types of motors, differences, characteristics and selection criteria, control methods.
5. Identify different types of process control required for specific applications

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(R20A0388) MECHANICAL MEASUREMENTS & 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.

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.

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(R20A0389) COMPUTER AIDED DESIGN AND SIMULATION LAB

COURSE OBJECTIVES:

1. To analyze the various mechanical components in both static conditions
2. To impart the students with necessary computer aided analysis skills.
3. To analyze the various mechanical components in the dynamic conditions.
4. Simulation of mechanical components by visualization software's.
5. To impart the knowledge on program-based simulation for solving the problems.

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. Static Structural analysis of composite material in Ansys Workbench
6. Conduction Thermal Analysis of Plate in Ansys Workbench
7. CFD Analysis of Double Pipe Counter Flow Heat Exchanger in Fluent
8. Calculation of losses in pipe using fluid flow analysis in Fluent
9. Multi-phase flow analysis in fluent
10. Determining density of air using Scilab
11. Reynolds number calculation using Scilab
12. Fluids in Motion Bernoulli equation: Pitot Static Tube calculation using Scilab

Note: At least 10 experiments are to be conducted.

Any Three Software Packages from the following:

Use of Auto CAD, CATIA, Creo, ANSYS, SCILAB, Open FOAM, Matlab, NISA, CAEFEM, etc.

Course Outcomes

1. Understand the various types analysis in Ansys.
2. Able to do the Simulation of mechanical components by visualization softwares
3. Understand the dynamic analysis of the various components and their properties.
4. Understand the concept of simulation using the program-based software.
5. Understand the solving and analyzing the mechanical components using empirical equations.

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(R20A0393) (MINI PROJECT)

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.

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(R20A0337) START-UP, INNOVATION & ENTREPRENEURSHIP

COURSE OBJECTIVES:

1. To understand the concept of innovation, new product development
2. To know the startup opportunities and startup equation
3. To understand new venture creation opportunities, its resources, and Requirements
4. To understand the Entrepreneurial Mindset and new trends in entrepreneurship
5. To understand the strategic perspectives in entrepreneurship

UNIT-I

Innovation Management: Concept of Innovation- Levels of Innovation- Incremental Vs Radical Innovation-Inbound and Outbound Ideation- Open and Other Innovative Ideation Methods-Theories of outsourcing New Product Development: Transaction Cost, Resource Based, Resource Dependence, Knowledge Based Theories.

UNIT-II

Startup opportunities: The New Industrial Revolution – The Big Idea- Generate Ideas with Brainstorming Business Startup - Ideation- Venture Choices - The Rise of The startup Economy -The Six Forces of Change- The Startup Equation

UNIT-III

Startup Capital Requirements and Legal Environment: Identifying Startup capital Resource Requirements - estimating Startup cash requirements - Develop financial assumptions- Constructing a Process Map - Positioning the venture in the value chain - Launch strategy to reduce risks- Startup financing metrics – **Business plan**-The Legal Environment- Approval for New Ventures- Taxes or duties payable for new ventures.

UNIT-IV

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship - Functions of Entrepreneurs – types of entrepreneurs -Approaches to entrepreneurship- Process approach- Role of entrepreneurship in economic development- Twenty first century trends in entrepreneurship.

UNIT-V

Strategic perspectives in entrepreneurship - Strategic planning - Strategic actions strategic positioning- Business stabilization - Building the adaptive firms - Understanding the growth stage – Internal growth strategies and external growth strategies, Unique managerial concern of growing ventures. Initiatives by the Government of India to promote entrepreneurship, Social and women entrepreneurship.

TEXT BOOKS:

REFERENCE BOOKS

1. Kathleen R Allen, Launching New Ventures, An Entrepreneurial Approach, Cengage Learning, 2016 Anjan Raichaudhuri, Managing New Ventures Concepts and Cases, Prentice Hall International, 2010.
2. Innovation Management, C.S.G. Krishnamacharyulu, R. Lalitha, Himalaya Publishing House, 2010.
3. S. R. Bhowmik & M. Bhowmik, Entrepreneurship, New Age International, 2007.
4. Stuart Read, Effectual Entrepreneurship, Routledge, 2013
5. Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012.
6. Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013

COURSE OUTCOMES:

Students will be able to understand the concept of innovation and new product development; startup opportunities and startup equation; new venture creation opportunities, its resources, and Requirements; the Entrepreneurial Mindset and new trends in entrepreneurship; strategic perspectives in entrepreneurship**.**

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(R20A0394) MAJOR PROJECT

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.