



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 & Syllabus
(Batches admitted from the academic year 2017 - 2018)

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

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institution /College" means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- "Commission" means University Grants Commission.
- "AICTE" means All India Council for Technical Education.
- "University" the Jawaharlal Nehru Technological University, Hyderabad.
- "College" means Malla Reddy College of Engineering & Technology, Secunderabad unless indicated otherwise by the context.
- "Program" means:
 - Bachelor of Technology (B.Tech) degree program
 - UG Degree Program: B.Tech
- "Branch" means specialization in a program like B.Tech degree program in Electronics & Communication Engineering, B.Tech degree program in Computer Science and Engineering etc.
- "Course" or "Subject" means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester.
- T–Tutorial, P–Practical, D–Drawing, L–Theory, C–Credits

FOREWORD

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

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

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

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

“A thought beyond the horizons of success committed for educational excellence”

PRINCIPAL



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY **(Autonomous Institution – UGC, Govt. of India)**

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VISION

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

MISSION

- ❖ To become a model institution in the fields of Engineering, Technology and Management.
- ❖ To impart holistic education to the students to render them as industry ready engineers.
- ❖ To ensure synchronization of MRCET ideologies with challenging demands of International Pioneering Organizations.

QUALITY POLICY

- ❖ To implement best practices in Teaching and Learning process for both UG and PG courses meticulously.
- ❖ To provide state of art infrastructure and expertise to impart quality education.
- ❖ To groom the students to become intellectually creative and professionally competitive.
- ❖ To channelize the activities and tune them in heights of commitment and sincerity, the requisites to claim the never ending ladder of SUCCESS year after year.

For more information: www.mrcet.ac.in

COURSE STRUCTURE**I Year B. Tech (MECH) – I Semester**

S.NO	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX.MARKS	
						Int	Ext
1	R17A0001	ENGLISH	2		2	30	70
2	R17A0021	MATHEMATICS-I	4	1	4	30	70
3	R17A0011	ENGINEERING PHYSICS-I	2	1	2	30	70
4	R17A0014	ENVIRONMENTAL STUDIES	3		3	30	70
5	R17A0501	COMPUTER PROGRAMMING WITH C	3		3	30	70
6	R17A0301	ENGINEERING MECHANICS	4	1	4	30	70
7	R17A0581	COMPUTER PROGRAMMING LAB	-	3	2	25	50
8	R17A0084	IT WORKSHOP/ENGINEERING WORKSHOP	-	3	2	25	50
9	R17A0081	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I	-	3	2	25	50
*10	R17A0003	*HUMAN VALUES AND SOCIETAL PERSPECTIVES	2	-	-	50	-
		TOTAL	20	12	24	305	570

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

I Year B. Tech (MECH) – II Semester

S.NO	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX.MARKS	
						Int	Ext
1	R17A0002	PROFESSIONAL ENGLISH	2		2	30	70
2	R17A0022	MATHEMATICS-II	4	1	4	30	70
3	R17A0012	ENGINEERING PHYSICS-II	2	1	2	30	70
4	R17A0013	ENGINEERING CHEMISTRY	3		3	30	70
5	R17A0502	OBJECT ORIENTED PROGRAMMING THROUGH C++	3	1	3	30	70
6	R17A0302	ENGINEERING DRAWING	4	-3-	4	30	70
7	R17A0582	OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB	-	3	2	25	50
8	R17A0083	ENGINEERING PHYSICS/ENGINEERING CHEMISTRY LAB	-	3	2	25	50
9	R17A0082	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-II	-	3	2	25	50
		TOTAL	18	15	24	255	570

II Year B. Tech (ME) – I Semester (6 Core Subjects + 2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						Int	Ext
1	R17A0303	Engineering Thermodynamics	4	1	4	30	70
2	R17A0304	Material Science	3	-	3	30	70
3	R17A0206	Electrical and Electronics Engineering	3	-	3	30	70
4	R17A0305	Strength of Materials	4	1	4	30	70
5	R17A0306	Kinematics of Machinery	3	-	3	30	70
6	R17A0310	Machine Drawing	3	1	3	30	70
7	R17A0282	Electrical and Electronics Engineering Lab	-	3	2	25	50
8	R17A0381	Material Science and Strength of Materials Lab	-	3	2	25	50
*9	R17A0006	Gender Sensitization		3	-	50	-
Total			20	12	24	280	520

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

II Year B. Tech (ME) – II Semester (5 Core Subjects + 1 Open Elective + 2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						Int	Ext
1	R17A0307	Dynamics of Machinery	4	1	4	30	70
2	R17A0308	Thermal Engineering	4	1	4	30	70
3	R17A0309	Fluid Mechanics and Hydraulic Machinery	3	1	3	30	70
4	R17A0311	Production Technology	3	-	3	30	70
5	R17A0061	Managerial Economics and Financial Analysis	3	-	3	30	70
6	*****	Open Elective- I	3	-	3	30	70
7	R17A0382	Production Technology Lab	-	3	2	25	50
8	R17A0383	Fluid Mechanics and Hydraulic Machinery	-	3	2	25	50
9*	R17A0004 R17A0005	Foreign Language : French (or) Foreign Language : German	2			50	-
Total			22	9	24	280	520

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

II Year B. Tech (ME) – II Semester - Open Elective - I					
1	R17A0451	Digital Electronics	4	R17A0351	Elements of Mechanical Engineering
2	R17A0251	Elements of Electrical Engineering	5	R17A0352	Green Energy Systems
3	R17A0551	Data Base Systems	6	R17A0051	Intellectual Property Rights

III Year B. Tech (ME) – I Semester (4 Core Subjects+1 Core Elective+1 Open Elective+2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						Int	Ext
1	R17A0312	Advanced Thermal Engineering	4	1	4	30	70
2	R17A0313	Machine Design -I	4	1	4	30	70
3	R17A0314	Machine Tools	3	-	3	30	70
4	R17A0315	Metrology and Surface Engineering	3	-	3	30	70
5	**	Core Elective -I		-			
	R17A0316	Computer Integrated Manufacturing	3	-	3	30	70
	R17A0317	Innovation and Design Thinking					
R17A0318	Combustion Technology						
6	*****	Open Elective -II	3	-	3	30	70
7	R17A0385	Machine Tools and Metrology Lab	-	3	2	25	50
8	R17A0386	Thermal Engineering Lab	-	3	2	25	50
Total			20	8	24	230	520

III Year B. Tech (ME) – I Semester - Open Elective -II

1	R17A0452	Industrial Electronics	4	R17A1251	Introduction to scripting language
2	R17A0453	Communication Networks	5	R17A1252	Software Project Management
3	R17A0552	Introduction to JAVA Programming	6	R17A0353	Enterprise Resource Planning

III Year B. Tech (ME) – II Semester (4 Core Subjects+1 Core Elective+1 Open Elective+2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						Int	Ext
1	R17A0319	Machine Design -II	4	1	4	30	70
2	R17A0320	Finite Element Methods	3	1	3	30	70
3	R17A0321	Heat Transfer	3	1	3	30	70
4	R17A0322	CAD/CAM	4	-	4	30	70
5	**	Core Elective - II	3	-	3	30	70
	R17A0323	Automobile Engineering					
	R17A0324	Computational Fluid Dynamics					
	R17A0325	Composite Materials					
6	*****	Open Elective- III	3	-	3	30	70
7	R17A0387	Heat Transfer Lab	-	3	2	25	50
8	R17A0388	CAD/CAM Lab	-	3	2	25	50
9*	R17A0007	Technical Communication and Soft Skills	2	-	-	50	-
Total			22	9	24	280	520

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

III Year B. Tech (ME) – II Semester - Open Elective -III					
1	R17A0454	Robotics and Automation	4	R17A0553	Data Structures using python
2	R17A1253	Management Information	5	R17A0354	Nano Technology
3	R17A0520	Web Technologies	6	R17A0355	Total Quality Management
7	R17A0554	Python Programming			

IV Year B. Tech (ME) – I Semester (4 Core Subjects+2 Core Electives+2 Labs)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX. MARKS	
						Int	Ext
1	R17A0326	Power Plant Engineering	4	1	4	30	70
2	R17A0327	Automation And Control Engineering	3	1	3	30	70
3	R17A0328	Mechanical Measurements and Instrumentation	3	-	3	30	70
4	R17A0329	Production and Operations Management	4	-	4	30	70
5	**	Core Elective -III	3	-	3	30	70
	R17A0330	Smart Manufacturing Technology					
	R17A0331	Heating, Ventilation and Air Conditioning					
	R17A0332	Product Design and Development					
6	**	Core Elective- IV	3	-	3	30	70
	R17A0333	Operations Research					
	R17A0334	Mechanical Vibrations					
	R17A0335	Hydraulics and Pneumatics					
7	R17A0389	Automation and Control Engineering Lab	-	3	2	25	50
8	R17A0390	Mechanical Measurements and Instrumentation Lab	-	3	2	25	50
Total			20	8	24	230	520

IV Year B. Tech (ME) – II Semester (2 Core Electives + Project)

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX. MARKS	
						Int	Ext
1	**	Core Elective- V	3	1	3	30	70
	R17A0336	Industrial Engineering and Management					
	R17A0337	Maintenance and Safety Engineering					
	R17A0338	Non-Destructive Testing					
2	**	Core Elective -VI	3	1	3	30	70
	R17A0339	Renewable Energy Sources					
	R17A0340	Bio-Mass Engineering					
	R17A0341	Energy Conservation and Management					
3	R17A0392	Mini Project	-	-	4	-	100
4	R17A0393	Technical Seminar	-	6	2	50	-
5	R17A0394	Major Project	-	15	12	100	200
Total			6	23	24	210	440

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

I Year B. Tech MECH-I Sem

L T/P/D C

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(R17A0001) ENGLISH**INTRODUCTION:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking, and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc. However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.

OBJECTIVES:

- To provide amateur engineers with the critical faculties necessary in an academic environment, using the theoretical and practical components of English syllabus.
- To upgrade the capability of analyzing of texts from different periods and genres.
- To improve the language proficiency of the students in English with emphasis on LSRW skills to face complex engineering activities at work place.
- To understand the basics of grammar to speak correct English and communicate effectively both formally and informally.

SYLLABUS:**Listening Skills:****Objectives**

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions. Students should be given practice in listening to the sounds of the language to be able to recognize them, to distinguish between them to mark stress and recognize and use the right intonation in sentences.
 - Listening for general content
 - Listening to fill up information
 - Intensive listening
 - Listening for specific information

Speaking Skills:**Objectives**

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.
 - Oral practice
 - Describing objects/situations/people
 - Role play – Individual/Group activities (Using exercises from all the nine units of the prescribed text: Learning English: A Communicative Approach)
 - Just A Minute (JAM) Sessions.

Reading Skills:**Objectives**

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop 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
- Scanning the text
- Recognizing coherence/sequencing of sentences

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 writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.
 - Writing sentences
 - Use of appropriate vocabulary
 - Paragraph writing
 - Coherence and cohesiveness
 - Narration / description
 - Note Making
 - Formal and informal letter writing
 - Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following text and course content, is prescribed for this semester. Textbook titled “Epitome of Wisdom”, published by Maruthi Publications, Hyderabad.

Unit – I

Chapter entitled ‘Mokshagundam Visvesvaraya’ from *Epitome of Wisdom*
and

Listening – Conversations – introducing each other, talking about a course

Speaking – Jam sessions

Reading – The Palm Islands

Writing – Writing Paragraphs

Grammar – Conjunctions and Adverbs

Vocabulary – Prefixes and Suffixes

Unit – II

Chapter entitled “Three Days to See” from *Epitome of Wisdom*
and

Listening – Conversations – planning for an outing

Speaking – Telephone Etiquettes

Reading – Physically challenged athletes

Writing – Memo writing

Grammar – Modal Auxiliaries

Vocabulary – Synonyms & antonyms

Unit – III

Chapter entitled “The Road Not Taken” from *A Selection of Robert Frost’s Poems (Owl Book)*, by Holt Paperbacks: 2 Revised Edition. 2002.

and

Listening – News items

Speaking – Public speaking

Reading – ‘If’ poem

Writing – Letter writing – formal/informal

Grammar – Knowing with questions (Wh – questions,) Question tags

Vocabulary – Similes and Metaphors

Unit – IV

Chapter entitled “The Last Leaf” from *Epitome of Wisdom*
and

Listening – Speech on environmental conservation

Speaking – Group discussion

Reading – Choose how to start your day

Writing – Writing a narrative

Grammar – Prepositions

Vocabulary – Idioms and one-word substitutes

Unit –V5. Chapter entitled “The Convocation Speech” from *Epitome of Wisdom*
and

Listening – Speech on ‘How do you make a teacher great’?

Speaking –Role plays

Reading – What is meant by entrepreneurship?

Writing – Essay writing

Grammar – Active voice and Passive voice

Vocabulary – Phrasal verbs

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

REFERENCES:

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson.
6. Handbook of English Grammar & Usage, Mark Lester and Larry Beason, Tata Mc Graw – Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.

OUTCOMES:

- Acquire and apply the critical thought process effectively on complex engineering activities.
- Utilize the analytical capability to comprehend and design any text effortlessly.
- Imbibe the English proficiency to receive clear instructions, make notes and draft letters vividly.
- Identify the basic grammatical structures and its application accurately to communicate with society at large.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech MECH-I Sem

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(R17A0021) MATHEMATICS – I

Objectives:

To learn

- Concept of rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions if exist and concept of eigen values and eigen vectors of a matrix
- The mean value theorems and to understand the concepts geometrically , functions of several variables and optimization of these functions.
- Methods of solving the differential equations of first and higher order ,Newton’s law of cooling, Natural growth and decay, bending of beams etc.
- 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: Matrix Theory

Introduction to matrices- Rank of a matrix - Finding rank of a matrix by reducing to Echelon and Normal forms-Consistency of system of linear equations (homogeneous and non-homogeneous) using the rank of a matrix-Cayley - Hamilton Theorem (without proof) – Verification- finding inverse of a matrix and powers of a matrix by Cayley-Hamilton theorem-Linear dependence and Independence of Vectors- Eigen values and eigen vectors of a matrix-Properties of eigen values and eigen vectors of real and complex matrices-Diagonalization of a matrix.

UNIT – II: Differential Calculus

Mean Value Theorms: Rolle’s Theorem – Lagrange’s Mean Value Theorem – Cauchy’s mean value theorems with geometrical interpretations (all theorems without proof)- verification of the Theorems and testing the applicability of these theorems to the given function-Taylor’s series -Maclaurin’s series.

Functions of Several Variables: Jacobian-Functional dependence- Maxima and Minima of functions of two variables without constraints and with constraints - Method of Lagrange multipliers.

UNIT – III: Ordinary Differential Equations of First Order and Applications

Introduction to ordinary differential equation - Variable Separable form- Homogeneous-Non homogeneous- Exact-Non Exact-Linear and Bernoulli’s equations-Applications of first order differential equations – Newton’s Law of cooling- Law of natural growth and decay-Orthogonal trajectories.

UNIT - IV: Linear Differential Equations of Higher Order and Applications

Linear differential equations of second and higher order with constant coefficients- Non-homogeneous term of the type $f(x) = e^{ax}$, $\sin ax$, $\cos ax$, x^n , $e^{ax} V$ and $x^n V$ - Method of variation of parameters-Applications to bending of beams, Electrical circuits and simple harmonic motion.

UNIT – V: Vector Calculus

Introduction- Scalar point function and vector point function, 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. Mathematics – I, special Edition-MRCET, McGrahill Publishers,2017.
2. Engineering Mathematics – I by T.K.V Iyenger ,B.Krishna Gandhi and Others ,S Chand Publishers.

REFERENCES:

1. Engineering Mathematics by P. Sivaramakrishna Das, Pearson Publishers.
2. Advanced engineering Mathematics by Kreyszig, John Wiley & Sons Publishers.

OUTCOMES:

- After learning the contents the student is able to write the matrix representation of a set of linear equations and to analyze solutions of system of equations.
- The student will be able to understand the methods of differential calculus to optimize single and multivariable functions.
- The student is able to identify the type of differential equation and uses the right method to solve the differential equations. Also able to apply the theory of differential equations to the real world problems.
- The student will be able to evaluate multiple integrals(line, surface volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B. Tech MECH-I Sem

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(R17A0011) ENGINEERING PHYSICS-I

OBJECTIVES:

- The information in optics is required for engineering technology students to understand wave nature of light for applying accurate measurements by means of optical instruments.
- From the study of quantum and statistical aspects dual behavior of electron and solid state physics can be realized by the engineering students.
- The basic information regarding electrons and holes and their functioning in semiconductors is evident to the students. The semiconductor devices provide basic information for the present communication system

UNIT-I

OPTICS:

Interference-Coherence-Coherent sources, Constructive and destructive interference. Theory of interference fringes(Expression for band width). Interference in thin films by Reflected light, Newton's rings Experiment. Diffraction-Types of diffraction, Difference Between interference and diffraction, Fraunhofer's diffraction (Single Slit), Diffraction Grating, Polarization, Types of polarization, Double Refraction, Nicol Prism.

UNIT-II

LASERS:

Characteristics of lasers, Spontaneous and Stimulated emissions, Einstein's Coefficients, Population inversion, Meta stable state, pumping, lasing action, Construction and Working of Ruby Laser, Helium-Neon Laser, Semi conductor lasers, Applications of lasers.

FIBER OPTICS:

Construction and Working Principle of an optical fiber, Advantages of optical fibers, Numerical aperture and Acceptance angle, Types of Optical fibers - Mode and Propagation Through step and graded index fibers, Optical Fiber Communication System, Attenuation, Applications of optical fibers.

UNIT-III

PRINCIPLES OF QUANTUM MECHANICS:

Wave nature and particle nature-de Broglie's Hypothesis, GP Thomson's Experiment, Davisson and Germer's experiment, Matter Waves, Heisenberg's uncertainty principle, Physical significance of wave function, Schrodinger time-independent wave equation, Particle in One dimensional infinite potential box.

UNIT-IV

ELEMENTS OF STATISTICAL MECHANICS & BAND THEORY OF SOLIDS:

Micro and Macro states, Maxwell Boltzmann, Bose Einstein, Fermi Dirac Statistical Distributions (Qualitative), Density of States, Fermi Energy, Introduction to electron theory of metals, Bloch Theorem (Qualitative), Kronig Penny model(Qualitative), EK curve (Brillouin Zone)-Effective mass of electron, Origin of energy bands in solids, Classification of solids Conductors, semi conductors and insulators.

UNIT-V**SEMICONDUCTOR PHYSICS:**

Types of semi conductors, Carrier concentration and Fermi level of intrinsic and Extrinsic Semiconductors, Hall Effect and applications, Direct and indirect band gap of Semiconductors.

SEMICONDUCTOR DEVICES:

Formation of PN junction diode, Energy level diagram of PN junction diode. V-I Characteristics of PN junction diode- PN junction diode as LED and Solar cell.

TEXT BOOKS:

1. Engineering Physics - S Mani Naidu- Pearson Publishers.
2. A Text Book of Engineering Physics- P.G. Kshirsagar, Avadhanulu – S.Chand

REFERENCES:

1. Solid State Physics, Kittel- Wiley International.
2. Solid State Physics – AJ Dekker-Macmillan Publishers.
3. Engineering Physics, P.K. Palaniswamy, Scitech Publishers

MALLA REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY

I Year B.Tech. MECH-I Sem

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

(R17A0014) ENVIRONMENTAL STUDIES

Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

UNIT-I:

Introduction: Definition of Environment and multidisciplinary nature of environmental sciences.

Ecosystems: Definition, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles (Carbon, Nitrogen, Water cycle) Bioaccumulation and Biomagnification with examples.

UNIT-II:

Natural Resources: Classification of Resources: water resources:types: surface and ground water and over utilization effects of ground water. Dams: benefits and problems. Forest resources: functions, causes and effects of Deforestation, Energy resources: renewable and non-renewable energy sources, use of alternate energy resources.

UNIT-III:

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, sources, causes, effects and control measures **Water pollution:** Sources and types of pollution, causes and effects, water treatment methods. **Soil Pollution:** Sources and types, Impacts of modern agriculture. Solid waste management, e-Waste management.

Global Environmental Problems: Green house effect, Global warming, Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS).

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act 1986, Air act 1981, Forest conservation act 1980, Biomedical waste management and handling rules, International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol. EIA: EIA structure, methods of baseline data acquisition. Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept, threats and strategies of Sustainable Development, Environmental Education.

TEXT BOOKS:

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age international Publishers.
2. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
3. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHI Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin& Edward A.Keller, Wiley INDIA edition.
4. Principles of Environmental Science by William . P. Cunnningham& Mary Inn Cunnningham Tata McGRAW –Hill Publishing Company Ltd.
5. Environmental Studies by S. Rama Lakshmi & Purnima Smarath Kalyani Publishers.

OUTCOMES:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of Ecological principles and environmental regulations which in turn helps in sustainable development

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(R17A0501) COMPUTER PROGRAMMING WITH C

Objectives

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To learn to write programs (using structured programming approach) in C to solve problems.
- To introduce the students to basic data structures such as lists, stacks and queues.
- To make the student understand simple sorting and searching methods

UNIT-I

Introduction to Computing – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Life Cycle, Algorithm, Flowchart. Introduction to C – History of C, Features Of C, Structure Of C Program, Character Set, C Tokens-keywords, Identifiers, Constants, Data types, Variables, 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-II

Functions-Designing Structured Programs, Types of Functions- user defined functions, Standard Functions, Inter function communication, Categories of functions ,Parameter Passing techniques, Scope, Storage classes-auto, register, static, extern, Type qualifiers, Recursion- recursive functions, Preprocessor commands.

UNIT-III

Arrays – Declaration and Initialization, Arrays with functions , Array Applications, Two dimensional arrays, Multi dimensional arrays.

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

UNIT-IV

Pointers- Introduction, Definition and uses of pointers, address operator, Pointer variables, Pointer constants , void pointers, Pointer arithmetic, Pointers to Pointers, Pointers with Arrays, Pointers with Functions, Pointers to functions, Array of pointers, Pointers with Strings. Dynamic Memory Management functions: malloc(), calloc(), realloc() and free()

UNIT-V

Structures and Unions - Introduction, Declaration and Initialization, Structure within a structure, Operations on structures, Array of Structures, Pointer to Structures, Structures with Functions, Self referential structures, Typedef, enum, bitfields, Unions.

Files – Concept of a file, Streams, Text files and Binary files, Opening and Closing files, File input / output functions, File Status functions (Error handling), Positioning functions, Command line arguments.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Outcomes:

- Demonstrate the basic knowledge of computer hardware and Software.
- Ability to apply solving and logical skills to programming in C language and also in other languages.

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(R17A0301) ENGINEERING MECHANICS**Unit – I**

Introduction to Engineering Mechanics – Basic Concepts. **Resultants of Force System:** Parallelogram law – Forces and components- Resultant of coplanar Concurrent Forces – Components of forces in Space – Moment of Force - principle of moments – Coplanar Applications – Couples - Resultant of any Force System.

Unit – II

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

FRICTION: Introduction – Theory of Friction – Angle of friction - Laws of Friction – Static and Dynamic Frictions – Motion of Bodies: Wedge, Screw, Screw-jack, and Differential Screw-jack.

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 - Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses- Transfer Formula for Mass Moments of Inertia - 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– Kinematics of Rigid Body - Types of rigid body motion -Angular motion - Fixed Axis Rotation

Kinetics of particles: Translation -Analysis as a Particle and Analysis as a Rigid Body in Translation – Equations of plane motion - Angular motion - Fixed Axis Rotation – Rolling 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 Durgaiyah/ Universities Press
3. Engineering Mechanics, Umesh Regl / Tayal.
4. Engineering Mechanics / KL Kumar / Tata McGraw Hill.
5. Engineering Mechanics / Irving Shames / Prentice Hall

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(R17A0581) COMPUTER PROGRAMMING LAB**Objectives:**

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.
- Concept of Array and pointers dealing with memory management.
- Structures and unions through which derived data types can be formed
- File Handling for permanent storage of data or record.
- Programming using gcc compiler in Linux.

Week 1:

- a) Write a C program to find sum and average of three numbers.
- b) Write a C program to find the sum of individual digits of a given positive integer.
- c) Write a C program to generate the first n terms of the Fibonacci sequence.

Week 2:

- a) Write a C program to generate prime numbers between 1 to n.
- b) Write a C program to Check whether given number is Armstrong Number or Not.
- c) Write a C program to evaluate algebraic expression $(ax+b)/(ax-b)$.

Week 3:

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

Week 4:

- a) Write a C program to find the roots of a quadratic equation.
- b) Write a C program perform arithmetic operations using switch statement.

Week 5:

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

Week 6:

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

Week 7:

- a) Write a C program to find both the largest and smallest number in a list of integers.
- b) Write a C Program to Sort the Array in an Ascending Order
- c) Write a C Program to find whether given matrix is symmetric or not.

Week 8:

Revision of programs

Week 9:

- a) Write a C program to perform addition of two matrices.
- b) Write a C program that uses functions to perform Multiplication of Two Matrices.

Week 10:

- a) Write a C program to use function to insert a sub-string in to given main string from a given position.
- b) Write a C program that uses functions to delete n Characters from a given position in a given string.

Week 11:

- a) Write a C program using user defined functions to determine whether the given string is palindrome or not.
- b) Write a C program that displays the position or index in the main string S where the sub string T begins, or - 1 if S doesn't contain T.

Week 12:

- a) Write C program to count the number of lines, words and characters in a given text.
- b) Write a C program to find the length of the string using Pointer.

Week 13:

- a) Write a C program to Display array elements using calloc() function.
- b) Write a C Program to Calculate Total and Percentage marks of a student using structure.

Week 14:

- a) Write a C program that uses functions and structures to perform the following operations:
 - i) Reading a complex number
 - ii) Writing a complex number
 - iii) Addition of two complex numbers
 - iv) Multiplication of two complex numbers
- b) Write a C program to display the contents of a file.

Week 15:

- a) Write a C program to copy the contents of one file to another.
- b) Write a C program to merge two files into a third file.
- c) Write a C program to reverse the first n characters in a file.

Week 16:

Revision Of Programs

TEXT BOOKS

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

Outcomes:

- Acquire knowledge about the basic concept of writing a program.
- Understand the Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Learn how to use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Understand the Role of Functions involving the idea of modularity.
- Understand the Concept of Array and pointers dealing with memory management.
- Learn Structures and unions through which derived data types can be formed
- Learn File Handling for permanent storage of data or record.

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(R17A0084) IT WORKSHOP LAB / ENGINEERING WORKSHOP

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 and Productivity tools including Word, Excel and Power Point.

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:

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

Week 3:

- a) Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals
- b) 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.

INTERNET & WEB BROWSERS

Week 4:

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

MS OFFICE

Week 5:

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

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

ENGINEERING WORKSHOP

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

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

2. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing
2. Machine Shop
3. Welding
4. Foundry
5. Metal Cutting (Water Plasma)

TEXT BOOK:

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

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(R17A0081) 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.

Objectives:

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

Syllabus: English Language Communication Skills Lab has two parts:

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

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

UNIT –I

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

ICS Lab: Ice-Breaking activity - JAM session

UNIT –II

CALL Lab: Pronunciation: Past Tense Markers and Plural Markers, Mispronounced sounds, Silent letters

ICS Lab: Situational Dialogues/Role Plays – Informal

UNIT -III

CALL Lab: Syllable and Syllabification

ICS Lab: Situational Dialogues/Role Plays – Formal

WORKSHEETS FOR LETTER WRITING

ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

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

System Requirement (Hardware component):

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

- i) P –IV Processor
 - a)Speed –2.8 GHZ
 - b)RAM –512 MB Minimum
 - c)HardDisk –80 GB
- ii) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab :

A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:

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

OUTCOMES:

- Learning with precision through computer-assisted individualized and independent language learning to work independently in engineering set up.
- Improved conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
- 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.
- Imbibing appropriate use of language in situations to work as an individual and as a leader in diverse teams

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(R17A0003) HUMAN VALUES AND SOCIETAL PERSPECTIVES

(MANDATORY COURSE)

Objective: This introductory course input is intended

- To help the students appreciate the essential complementarity between 'VALUES' and skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- 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 form the basis of value based living in a natural way.
- 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 of Value Education:

Understanding the need, basic guidelines, content and process for value Education. Animal consciousness vs Human consciousness, Self Exploration -What is it? Its content and process; 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

Understand 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 does, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I' . 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-astitva 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 Co-existence: 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-astiva) 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 Societal Perspectives: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis of Humanistic Education, Humanistic Constitution and Humanistic Universal Order.

TEXT BOOKS

1. R R Gaur, R Sangal, G P BAgaria, 2009 A Foundation Course in Human Values and Professional Ethics.
2. Prof.KV Subba Raju, 2013, Success secrets for Engineering students , Smart student Publications, 3rd Edition.

REFERENCE BOOKS

1. Ivan Ilich, 1974, Energy & Equity, The Trinity press, Worcester and Harpercollins, USA.
2. E.F. Schumacher, 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 Sansathan Amarkantak.
4. Sussan George, 1976, How the other Half Dies, Penguin press Reprin ted 1986, 1991
5. PL Dhar, RR 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. Done Ila H.Meadows, Dennis L. Meadows, Jorgen Randers, Willian A. Behrens III, 1972, Limits to Growth – Club of Rome’s report Universe Books.
9. E.G Seebauer & Robert L. Beery, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan , S Natrajan & V.S Senthil kuma, Engineering Ethichs (including Human 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. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story

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(R17A0002) PROFESSIONAL ENGLISH

INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking, and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc. However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.

OBJECTIVES:

- Provide amateur engineers with the critical faculties necessary in an academic environment, using the theoretical and practical components of English syllabus.
- Upgrade the capability of analyzing of texts from different periods and genres.
- Improve the language proficiency of the students in English with emphasis on LSRW skills to face complex engineering activities at work place.
- Understand the basics of grammar to speak correct English and communicate effectively both formally and informally.

SYLLABUS:

Listening Skills:

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions. Students should be given practice in listening to the sounds of the language to be able to recognize them, to distinguish between them to mark stress and recognize and use the right intonation in sentences.
 - Listening for general content
 - Listening to fill up information
 - Intensive listening
 - Listening for specific information

Speaking Skills:**Objectives**

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.
 - Oral practice
 - Describing objects/situations/people
 - Role play – Individual/Group activities (Using exercises from all the nine units of the prescribed text: Learning English: A Communicative Approach)
 - Just A Minute (JAM) Sessions.

Reading Skills:**Objectives**

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop 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
- Scanning the text
- Recognizing coherence/sequencing of sentences

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 writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.
 - Writing sentences
 - Use of appropriate vocabulary
 - Paragraph writing
 - Coherence and cohesiveness
 - Narration / description
 - Note Making
 - Formal and informal letter writing
 - Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following text and course content is prescribed.

Text book entitled “Skills Annexe: Functional English for Success”, published by Orient Black Swan, Hyderabad.

UNIT-I

Chapter entitled “Of parents and children” from “*The essays of Francis Bacon*”, paperback-Import, 11 Oct 2008.

and

Listening – Listening for the theme and gist

Speaking – Describing situations and objects

Reading – Why pure science in India lags behind? – By P Rajendran

Writing – Note-taking and Note-making

Grammar – Nouns and Articles

Vocabulary – Homonyms, Homographs, Homophones

Unit –II

Chapter entitled “Sachin Tendulkar” from *Skills Annexe -Functional English for Success*,

and

Listening – listening for opinions

Speaking – Project Oral Presentations

Reading – Benefits of physical activity

Writing – Report writing

Grammar – Common Errors

Vocabulary –Technical Vocabulary

Unit –III

Job applications: Cover letter & Curriculum vitae

and

Listening – listening for main and sub-points

Speaking –Giving directions and instructions

Reading – Editorial letters from newspapers

Writing –Formal letter writing

Grammar – Tenses

Vocabulary – Collocations

Unit – IV

Chapter entitled “Human Values and Professional Ethics” from *Skills Annexe -Functional English for Success*

and

Listening – Listening for details

Speaking – Talking about hypothetical situations

Reading – What I Cherish Most

Writing – E-mail writing

Grammar – Types of verbs: Transitive, Intransitive, Ergative, finite and non – finite

Vocabulary – Commonly confused words

Unit – V

Chapter entitled “The fringe benefits of failure and the importance of imagination” a speech by J.K. Rowlings

and

Listening – listening for information

Speaking – Oral Presentations

Reading – The one thing every business executive must understand about social media

Writing –Picture composition

Grammar – Concord

Vocabulary –Commonly misspelt Words

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

REFERENCES:

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson.
6. Handbook of English Grammar & Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.

OUTCOMES:

- Acquire and apply the critical thought process effectively on complex engineering activities.
- Utilize the analytical capability to comprehend and design any text effortlessly.
- Imbibe the English proficiency to receive clear instructions, make notes and draft letters vividly.
- Identify the basic grammatical structures and its application accurately to communicate with society at large.

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(R17A0022) MATHEMATICS – II

Objectives

- 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.
- The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data and also used to find the roots of an equation and to solve differential equations.
- In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very required. Indeed, any periodic and non periodic function can be best analyzed in one way by Fourier series method.
- 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.
- Properties of Laplace Transform, Inverse Laplace Transform and Convolution theorem

UNIT – I: Solution of Algebraic, Transcendental Equations and Interpolation

Solution of Algebraic and Transcendental Equations: Introduction – Graphical interpretation of solution of equations. The Bisection Method – Regula-Falsi Method – The Iteration Method – Newton-Raphson Method.

Interpolation: Introduction-Errors in polynomial interpolation-Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton’s formulae for interpolation – Central difference interpolation Formulae – Gauss Central Difference Formulae – Interpolation with unevenly spaced points-Lagrange’s Interpolation formula.

UNIT – II: Numerical techniques

Numerical integration: Generalized Quadrature-Trapezoidal rule, Simpson’s $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor’s series method – Picard’s Method of successive Approximation- single step methods-Euler’s Method-Euler’s modified method, Runge-Kutta Methods.

Curve fitting: Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

UNIT – III: Fourier series

Definition of periodic function. Fourier expansion of periodic functions in a given interval of length 2π . Determination of Fourier coefficients – Fourier series of even and odd functions – Half-range Fourier sine and cosine expansions-Fourier series in an arbitrary interval .

UNIT-IV: Partial differential equations

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

UNIT – V Laplace Transforms and Applications

Definition of Laplace transform- Domain of the function and Kernel for the Laplace transforms- Existence of Laplace transform- Laplace transform of standard functions- first shifting Theorem,-Laplace transform of functions when they are multiplied or divided by "t"- Laplace transforms of derivatives and integrals of functions – Unit step function – second shifting theorem – Dirac's delta function- Periodic function – Inverse Laplace transform by Partial fractions-Inverse Laplace transforms of functions when they are multiplied or divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions- Convolution theorem –Solving ordinary differential equations by Laplace transforms.

TEXT BOOKS:

1. Mathematics-II , Special Edition- MRCET, Mc Graw Hill Publishers,2017.
2. Mathematical Methods by T.K.V Iyenger ,B.Krishna Gandhi and Others ,S Chand.

REFERENCES:

1. Introductory Methods by Numerical Analysis by S.S. Sastry, PHI Learning Pvt. Ltd.
2. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons Publishers.

Outcomes:

- From a given discrete data, one will be able to predict the value of the data at an intermediate point and by curve fitting, one can find the most appropriate formula for a guesses relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation and decision making.
- The student will be able to find a root of a given equation and will be able to find a numerical solution for a given differential equation. Helps in describing the system by an ODE, if possible. Also, suggests to find the solution as a first approximation.
- One will be able to find the expansion of a given function by Fourier series.
- One will be able to find a corresponding Partial Differential Equation for an unknown function with many independent variables and to find their solution.
- The student is able to solve certain differential equations using Laplace Transform. Also able to transform functions on time domain to frequency domain using Laplace transforms

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(R17A0012)ENGINEERING PHYSICS-II

OBJECTIVES:

- To understand the basics of bonding in solids, crystal structures and characterization techniques.
- To make the students aware of X-ray diffraction and different techniques of it.
- To understand the behavior of dielectric materials, magnetic materials and nano materials.

UNIT-I

BONDING IN SOLIDS:

Types of bonds - Primary, Secondary, Forces between atoms, Expression for cohesive energy between two atoms.

CRYSTALLOGRAPHY:

Space lattice, Basis, Unit cell, lattice parameters, Crystal systems, Bravais lattices, Atomic number, coordination number, packing factor of SC,BCC,FCC crystals, Crystal planes and directions - Miller indices. Expression for inter planar distance in cubic crystal, Structure of NaCl and Diamond.

UNIT- II

X-RAY DIFFRACTION:

Bragg's law, Experimental techniques -Laue's method, powder method, Applications of x-ray diffraction.

DEFECTS IN CRYSTALS:

Classification of crystal defects, Point defects-Vacancies & Interstitials, Concentrations of Schottky and Frenkel defects, Line defects- edge dislocation and screw dislocation, Burger's vector.

UNIT-III

DIELECTRIC PROPERTIES:

Electric dipole, Dipole moment, Polarization vector (P), Displacement vector (D), Dielectric constant (K), Electric susceptibility (χ), Types of polarizations-Expression for Electronic and Ionic polarization, Internal fields in dielectrics, Classius Mosotti relation, Piezo electricity and Ferro electricity, Applications of dielectric materials.

UNIT-IV

MAGNETIC PROPERTIES:

Magnetic permeability, Field intensity, Magnetic field induction, Magnetization, Magnetic susceptibility, Origin of Magnetic moment - Bhor magneton, Classification of magnetic materials-Dia, Para and Ferro, Ferri and Anti ferro magnetic materials, Explanation of Hysteresis loop on the basis of domain theory of ferromagnetism. Soft and hard magnetic materials.

SUPER CONDUCTIVITY:

Super conductivity, Properties of super conductors, Meissner effect, Types –I Type-II super conductors, Applications of super conductors.

UNIT-V**NANO SCIENCE & NANO TECHNOLOGY:**

Nano scale, Types of Nano materials, Surface to volume ratio and Quantum confinement, Bottom up Fabrication- Sol gel ,Top down Fabrication- Physical Vapour Deposition, Characterisation of Nano particles –TEM and SEM, Applications of Nano materials.

TEXT BOOKS:

1. Engineering Physics - S Mani Naidu- Pearson Publishers.
2. A Text Book of Engineering Physics- P.G. Kshirsagar, Avadhanulu – S.Chand

REFERENCES:

1. Solid State Physics, Kittel- Wiley International.
2. Solid State Physics – AJ DekKer-Macmillan Publishers.
3. Engineering Physics, P.K. Palaniswamy, Scitech Publishers

OUTCOMES:

- The students would be able to learn the fundamental concepts on behavior of crystalline solids.
- The student will be able to think about the applications of dielectric, magnetic and nano materials.
- Finally Engineering physics course helps the student to develop problem solving skills and analytical skills.

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(R17A0013)ENGINEERING CHEMISTRY

Objectives

- To impart the basic concepts and ideas in chemistry, to develop scientific attitudes and enable the students to correlate the concepts of chemistry with the core programmes.
- Electrochemistry unit give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems. Fuel cells which are the alternate energy sources for generating electrical energy on spot and portable applications.
- Understand various techniques involved in polymerization and application of polymer technology in the area of various engineering fields and manufacturing process of important metallurgical materials.

UNIT I: Electrochemistry:

Conductance - Specific, Equivalent, Molar conductance and their unit, Applications of Conductance-Conductometric titrations (Acid base and Precipitation titrations); EMF-electrode and electrode potentials; Nernst equation and its applications; Electrochemical cells-Galvanic cell (Daniel cell) and Concentration cell (electrolytic concentration cell); Types of Electrodes—(construction and functioning of Calomel, Quinhydrone and Glass electrodes); determination of P^H using glass electrode; Potentiometric titrations (Acid Base and Redox titrations); electrochemical series and its applications; Numerical problems on conductance.

Batteries: Primary (Lithium cells) and Secondary cells (Lead-Acid cell and Ni-Cd cell); **Fuel cells** - Hydrogen -Oxygen fuel cell and Methanol-Oxygen fuel cell - construction, functioning, advantages and applications.

Unit II: Corrosion and its Control:

Causes and effects of corrosion; Theories of corrosion – Chemical corrosion (oxidation corrosion) & Electrochemical corrosion (mechanism of evolution of Hydrogen and Absorption of oxygen); Galvanic corrosion; Factors affecting rate of corrosion – Nature of metal (position of metal in galvanic series, overvoltage, relative areas of anodic and cathodic parts, purity of metal and passivity) and Nature of environment (temperature, humidity and pH effect)

Corrosion control methods: Cathodic protection (Sacrificial Anodic and Impressed Current Cathodic protection). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (galvanization & tinning), cladding, electroplating (Cu plating) and Electroless plating (Ni plating) – advantages and applications of electroplating/electroless plating.

UNIT- III: Engineering Materials Polymers:

Classification of Polymers, Types of Polymerization (Chain growth, Step growth & Zeigler Natta) **Plastics:** Thermoplastic & Thermosetting resins, Preparation, properties, engineering applications of PVC, Teflon and Bakelite. **Fibers-** Characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fiber Reinforced Plastics (FRP) – applications. **Rubbers**–Natural rubber and its vulcanization; **Elastomers**–Buna-S and Butyl

rubber; **Conducting polymers:** Polyacetylene-Mechanism of conduction, doping; applications of conducting polymers; **Bio-degradable Polymers:** preparation and applications of Poly vinylacetate and Poly lactic acid.

Lubricants: Characteristics of a good lubricant; Classification with examples; properties of lubricants: viscosity, cloud point, pour point, flash and fire point.

Refractories: Classification of refractories with examples, characteristics of a good refractory and applications of refractories.

Nanomaterials: Introduction and applications of nanomaterials.

UNIT IV: Water and its Treatment:

Hardness of Water: Causes of hardness, types of hardness, units of hardness; determination of hardness of water by EDTA method - numerical problems. Boiler troubles – Scales & Sludges, Priming, Foaming, and Caustic Embrittlement; Treatment of boiler feed water – Internal treatment (Phosphate, Colloidal and Calgon conditioning); External treatment–Zeolite process and Ion exchange process; **Potable Water**-Its Specifications–Disinfection of water by ozonisation, chlorination (break point chlorination and its significance); Reverse Osmosis.

UNIT V: Fuels:

Characteristics of a good fuel, Classification – Solid fuels: Coal – analysis of coal - proximate and ultimate analysis and their significance, Liquid fuels – petroleum and its refining; cracking – Fixed bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol- Fischer-Tropsch's process: Gaseous fuels - constituents, characteristics and applications of Natural gas, LPG and CNG; Calorific value of fuel – HCV, LCV; Determination of calorific value by Junker's gas calorimeter.

TEXT BOOKS:

1. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company 14th Edition (2013)
2. Engineering Chemistry by B. Rama Devi, Ch. Venkataramana Reddy and R.P. Mani, CENGAGE learning (2016)

REFERENCE BOOKS

1. Engineering Chemistry by M. Thirumala Chary and E. Laxminarayana, Scitech publications (2016).
2. Engineering Chemistry by Bharathi Kumari and Jyotsna Cherukuri, VGS Techno Series (2016).

Outcomes:

- Familiarize the student with the fundamentals of the treatment technologies and the considerations for its design and implementation in water treatment plants.
- Understand the operating principles of various types of electrochemical cells, including fuel cells and batteries.
- Analyze and develop a technically sound, economic and sustainable solution to corrosion problems related to engineering service.
- Be able to apply core concepts in Materials Science to solve engineering problems

- To learn about types of fuels and their characteristics, and combustion systems with emphasis on engineering applications.
- Recently modern materials synthesized find applications in industry and creating instruments for solving problems of electronics, telecommunications, health care, agriculture, and technology etc., In order to emphasize the above the topics like composite materials, polymers, conducting polymers and nanomaterials have been incorporated in the curriculum.

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(R17A0502)OBJECT ORIENTED PROGRAMMING THROUGH C++

Objectives

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

Unit-I: Concepts of Object Oriented programming:

Object oriented paradigm - differences between Object Oriented Programming and Procedure oriented programming, Basic concepts of Object Oriented Programming , Encapsulation, Inheritance and Polymorphism. Benefits of OOP. Structure of a C++ program, namespace, Data types, identifiers, variables, constants, enum, operators, typecasting, control structures & loops.

Unit-II: Functions, Classes and Objects:

Introduction of Classes, Class Definition, Defining a Members, Objects, Access Control, Class Scope, Scope Resolution Operator, Inline functions, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Default Arguments, Friend Functions

Unit-III: Constructors, Destructors, Inheritance:

Introduction to Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic initialization of Objects, Copy Constructors, Dynamic Constructors, Destructors.

Inheritance: Introduction to inheritance, Defining Derived Classes, Single Inheritance, Multiple Inheritance, Multi-Level Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Constructors in Derived Classes.

Unit-IV: Pointers, Virtual Functions and Polymorphism:

Introduction, Memory Management, new Operator and delete Operator, Pointers to Objects, this Pointer, Pointers to Derived Classes, Polymorphism, compile time polymorphism, Run time polymorphism, Virtual Functions, Pure Virtual Functions, Abstract Classes, Virtual Base Classes, Virtual Destructors. Function Overloading, Operator overloading, Rules for Operator overloading, overloading of binary and unary operators .

Unit-V: Templates and Exception handling:

Introduction, Class Templates, Class Templates with Multiple Parameters, Function Templates, Function Templates with Multiple Parameters, Member Function Templates.

Exception handling:

Basics of Exception Handling, Types of exceptions, Exception Handling Mechanism, Throwing and Catching Mechanism, Rethrowing an Exception, Specifying Exceptions

TEXT BOOKS:

1. Object Oriented Programming, Special Edition- MRCET, Mc Graw Hill Publishers,2017.
2. Object Oriented Programming with C++ by Balagurusamy.

REFERENCES:

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

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(R17A0302) ENGINEERING DRAWING**UNIT – I**

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

- Polygons – Construction of regular polygons (General Method only)
- Conic Sections (General Method only- Eccentricity Method)
- Cycloid, Epicycloid and Hypocycloid
- 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

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

REFERENCES

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

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(R17A0582)OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB

Objectives:

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

Week 1:

Basic C++ Programs

Week2:

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

Week 3:

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

Week 4:

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

Week 5

- a) Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.
- b) Program to illustrate default constructor, parameterized constructor and copy constructors
- c) Write a Program to Implement a Class STUDENT having Following Members:

Member	Description
Data members	
Sname	Name of the student
Marks array	Marks of the student
Total	Total marks obtained
Tmax	Total maximum marks
Member functions	
Member	Description
assign()	Assign Initial Values
compute()	to Compute Total, Average
display()	to Display the Data.

Week 6:

- a) Write a Program to Demonstrate the i)Operator Overloading.ii) Function Overloading.
- b) Write a Program to Demonstrate Friend Function and Friend Class.

Week 7:

- a) Write a Program to Access Members of a STUDENT Class Using Pointer to Object Members.
- b) Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.

Week 8:

Revision laboratory

Week 9

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

- a) Reading a matrix. b) Addition of matrices. c) Printing a matrix.
- d) Subtraction of matrices. e) Multiplication of matrices

Week 10

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

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

Week 11

- a.)Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
- b) Write a Program to Invoking Derived Class Member Through Base Class Pointer.

Week 12

- a) Write a Template Based Program to Sort the Given List of Elements.
- b) Write a C++ program that uses function templates to find the largest and smallest number in a list of integers and to sort a list of numbers in ascending order.

Week 13

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

Week 14

Revision

TEXT BOOKS:

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

REFERENCES:

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

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(R17A0083) ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB**ENGINEERING PHYSICS LAB****(Any EIGHT experiments compulsory)****OBJECTIVES**

- The students are exposed to various experimental skills which is very essential for an Engineering student.
- The experiments are selected from various areas of physics like physical optics, Lasers, Fiber optics, Sound, Mechanics, Electricity & Magnetism and Basic Electronics.
- The students are exposed to various tools like Screw gauge, Vernier calipers, and physics.

OUTCOMES

- The student learns the concept of error and its analysis and try formulate new solutions to problems related to engineering physical balance, Spectrometer and Microscope.
- The student develops experimental skills to design new experiments in Engineering that accelerates development of society considering the public health and safety of society.
- Comprehension power of the engineering student increases with exposure to these experiments that helps them to compare the theory and correlate with experiment.
- This course on physics lab is designed with 12 experiments in an academic year. It is common to all branches of Engineering in B.Tech 1st year.

LIST OF EXPERIMENTS: (Any Eight experiments compulsory)

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

ENGINEERING CHEMISTRY LAB

List of Experiments (Any Eight experiments compulsory)

OBJECTIVES

This course on chemistry lab is designed with 12 experiments in an academic year. It is common to all branches of Engineering in 1st B.Tech.

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

- Provide the students with a solid foundation in chemistry laboratory required to solve engineering problems.
- Practical implementation of fundamental concepts.

OUTCOMES

- Students are able to estimate the total hardness and alkalinity present in a sample of water.
- Ability to select lubricants for various purposes.
- Ability to determine the surface tension of a given liquid.
- Ability to prepare advanced polymer materials.
- Ability to know the strength of an acid by conductometric and potentiometric method.
- Ability to find the Fe^{+2} and Mn^{+2} present in unknown substances/ ores using titrimetric and instrumental methods.

List of Experiments

Titrimetry:

1. Estimation of hardness of water by EDTA method.
2. Estimation of alkalinity of water.

Mineral analysis:

3. Estimation of manganese dioxide in pyrolusite.

Instrumental Methods:

Colorimetry:

4. Determination of ferrous iron in cement by colorimetric method

Conductometry:

5. Conductometric titration of strong acid vs strong base.
6. Conductometric titration of mixture of acids vs strong base.

Potentiometry:

7. Titration of strong acid vs strong base by Potentiometry.
8. Titration of weak acid vs strong base by Potentiometry.

Preparation:

9. Preparation of Phenol Formaldehyde Resin(Bakelite)-Demonstration
10. Preparation of Aspirin.

Physical properties:

11. Determination of Viscosity of sample oil by Redwood Viscometer.
12. Determination of Surface Tension of a given liquid by Stalagmometer

TEXT BOOKS:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Inorganic quantitative analysis, Vogel.

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R. N. Goyal and HarmendraGoel, Ane Books Private Ltd.,
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

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(R17A0082) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II

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.

Objectives:

- To make students acquire language skills at their own pace with the usage of authentic learning environment through different media, e-materials and language lab.
- To make learners acquire listening and speaking skills in both formal and informal contexts through diverse interactive sessions and computer aided multi-media training.
- To impart nuances of linguistics to help novices to resolve mother tongue interference by ensuring precision in pronunciation to benefit Standard English.
- To help develop the students communication skills by familiarizing them with different strategies to suit academic as well as workplace contexts.

Syllabus: English Language Communication Skills Lab shall have 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

Exercise –IV

CALL Lab: Word Accent – Rules of Stress and Stress shift

ICS Lab: Describing Object, Places, Persons, Events and Experiences.

Exercise –V

CALL Lab: Intonation

ICS Lab: Etiquette – Professional and telephone

Exercise –VI

CALL Lab: Neutralization of Mother Tongue Influence

ICS Lab: Oral Presentations (Team or Individual)

PROJECTS

PROJECTS

Students have to choose one of the following projects for their External Examinations, and submit before the end of the semester. This project carries 10 marks in the Lab External Examinations.

1. **Conduct interview using interrogative sentences.**

Students should interview any teacher, or HOD, or Principal, record their responses and submit the project with those questions and answers. The questions asked should not be less than ten.

2. Project on differences between group discussion and debate.

Students are supposed to do research on the differences between GD and debate and submit a project on it. There should be a minimum of ten points with detailed explanation. Students can use pictures as well.

3. Book Review

Choose any fiction of your choice and write a book review on the following parameters.

- Characterization, plot, theme, message

Please note that the review is not the summary of the story. The project should not be less than 250 words.

4. Idioms and Phrasal Verbs

Collect at least ten idioms and ten phrasal verbs and concoct a story using those expressions. Word limit is 250.

5. Project on Kinesics

Students are expected to read and research on body language and their implications. You have to make a list of at least ten body movements with pictures and explain them properly.

6. UK and US vocabulary

Find words that are used differently in UK and US English. Make separate lists for different spellings and different pronunciations. The project can answer one or more of the following questions:

- Which pronunciation do you think are Indians following?
- Which one is your choice? Which one do you feel comfortable in speaking?
- Are we Indians influenced by both UK and US English? How can you prove it?

7. Magazine Article Review

Pick a magazine article with a social relevance, which has around 2500 words. Write a review of 250 words as a project. Make sure you voice your opinion in the review.

8. Career Guidance Project

Browse the net and gather information on any professional competitive exam of your choice, like UPSC or GRE. Prepare and present a paper on the scope and relevance of the exam of your choice. The paper should have a minimum of 300-400 words. Students are expected to answer the questions asked by the audience after the paper presentation.

9. Mother Tongue Influence

Choose a particular paragraph of 250 words and ask five of your friends, from different states, to read that. One has to record their accent and pronunciation to check the difference. Make a list of ten words that each one pronounces differently. Find out the reasons behind the differences in pronunciations.

Also, mention the correct pronunciation in your project with transcription.

10. Correction of Letter Writing: Language, Sentences, Spelling, Tone and Format

Teacher will distribute a set of five letters with errors in spelling, tone, grammar and sentence construction. Give the correct form of the letters as the project

ELCS LAB:**3. Computer Assisted Language Learning (CALL) Lab:**

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

System Requirement (Hardware component):

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

- i) P –IV Processor
 - a)Speed –2.8 GHZ
 - b)RAM –512 MB Minimum
 - c)HardDisk –80 GB
- ii) Headphones of High quality

4. 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.

REFERENCES:

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
4. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
6. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
7. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
8. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi: Foundation
9. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan
10. Spoken English(CIEFL) in 3 volumes with 6 cassettes, OUP.
11. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
12. A textbook of English Phonetics for Indian Students by T. Balasubramanian (Macmillan)

DISTRIBUTION AND WEIGHTAGE OF MARKS**English Language Laboratory Practical Examination:**

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab

Test(s). The year-end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the other institution.

OUTCOMES:

- Learning with precision through computer-assisted individualized and independent language learning to work independently in engineering set up.
- Improved conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
- 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.
- Imbibing appropriate use of language in situations to work as an individual and as a leader in diverse teams

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(R17A0303) ENGINEERING THERMODYNAMICS

Objectives:

- To understand the concepts of Energy in general and Heat and Work in particular
- To understand the fundamentals of quantification and grade of energy.
- To apply the concepts of thermodynamics to basic energy systems.

UNIT-I

INTRODUCTION:

Basic Concepts : System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition, Types, Work and Heat, Point and Path function. Zeroth Law of Thermodynamics – Concept of quality of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale – PMM I - Joule's Experiments – First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation.

UNIT-II

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

UNIT-III

Pure Substances : p-V-T- surfaces, T-S and h-s diagrams, Mollier Charts, Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation Property tables. 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 – Compressibility charts – variable specific Heats – Gas Tables.

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 const. And Molecular Internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases and Vapour, 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, Carrier's Equation – Psychrometric chart.

UNI-V

Power Cycles : Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericsson Cycle, Lenoir Cycle – Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles. Refrigeration Cycles : Brayton and Rankine cycles – Performance Evaluation – combined cycles, Bell Coleman cycle, Vapour compression cycle-performance Evaluation.

TEXT BOOKS:

1. Engineering Thermodynamics, Special Edition. MRCET, McGrawHill 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 – Yunus Cengel & Boles /TMH
3. An introduction to Thermodynamics / YVC Rao / New Age
4. Engineering Thermodynamics – K. Ramakrishna / Anuradha Publisher

OUTCOMES:

- Learner should be able to demonstrate understanding of basic concepts of thermodynamics.
- To differentiate between quality and quantity of energy, heat and work, enthalpy and entropy, etc.
- To Analyze basic power cycles, Apply the laws of thermodynamics to various real life systems

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(R17A0304) MATERIAL SCIENCE

Objectives:

- To understand various mechanical properties of materials.
- To understand how and why the properties of materials are controlled by its structure at the microscopic and macroscopic levels.
- To understand how and why the structure and composition of a material may be controlled by processing.

UNIT-I

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

UNIT-II

Structure of Metals and Alloys - Imperfection in crystals – Point defects – Dislocations – Slip plane – Movement of dislocations – Planar defects and grain boundaries – solid solutions – Hume Rothery rule – Phase diagram – Lever rule – Gibb’s phase rule – Phase diagram for binary alloys – Eutectic – Peritectic – Eutectoid – Zone refining.

UNIT-III

Heat Treatment Methods: Annealing, hardening, tempering, normalizing, surface hardening
Ferrous and Non Ferrous Alloys: Allotropy and phase change of pure iron – Classification of steels and cast iron – iron – carbon equilibrium diagram – Microstructure of iron and steel - Ferrous alloys and their applications –Heat treatment - Factors affecting conductivity of a metal – Electrical Resistivity in alloys – Thermal conductivity of metals and alloys – Silver, Copper and aluminum – High Resistivity alloys – nichrome, manganin, constantan and kanthal and their composition and applications – Super hard materials - Tungsten carbide and Boron nitrides.

UNIT-IV

Ceramic and Composite Materials : Advanced Ceramic Materials - Crystal Structures - Silicate Ceramics - Glasses – Glass Ceramics – Functional properties and applications of ceramic materials – Classification of composites - Fiber reinforced materials – Law of mixtures – Continuous fibers – discontinuous fibers – Particle-reinforced materials – Cermets – Dispersion strengthened materials – Laminates - Application of composites in electrical and mechanical components – nuclear industry.

UNIT-V

Polymer Materials: Classification of polymer – Mechanisms of polymerisation - Some commercially important individual polymer – Thermoplastics - Elastomers – Thermosets – Engineering plastics - Liquid crystal polymers - Conductive polymers – High Performance fibers - Biomedical applications – Photonic polymers.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

OUTCOMES:

- Acquire knowledge and hands-on competence in applying the concepts of material science in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering.
- Identify, analysis, and solve mechanical engineering problems useful to the society

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(R17A0206) ELECTRICAL AND ELECTRONICS ENGINEERING

Objectives:

- This course introduces the concepts of electrical DC and AC circuits, basic law's of electricity, instruments to measure the electrical quantities, different methods
- To solve the electrical networks, construction operational features of energy conversion devices i.e. DC and AC machines, transformers.
- It also emphasis on basics of electronics, semiconductor devices and their characteristics and operational features.

UNIT-I

Electrical Circuits: Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, Capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

Instruments: Basic Principle of indicating instruments, Permanent magnet moving coil and moving iron instruments.

UNIT-II

DC Machines: Principle of operation and operation of DC Generator, EMF equation, Types, Losses and efficiency, Magnetization and load characteristics of DC generators. DC Motors-Types, Characteristics, Losses and efficiency, Swinburne's Test, 3-Point starter, Speed control of DC shunt motor-Flux and armature voltage control methods.

UNIT-III

Transformers: Principle of operation of single phase transformers, EMF equation, Equivalent circuit, Losses, OC and SC tests, Efficiency and regulation.

AC Machines: Principle of operation of induction motor, slip-torque characteristics, Applications. Principle of operation of alternators, Regulation by synchronous impedance method.

UNIT-IV

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

Transistors: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

UNIT-V

Cathode Ray Oscilloscope: Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

TEXT BOOKS:

1. Basic Electrical Engineering, Abhijit Chakrabarthy, Sudiptanath, Chandrakumar Chanda, Tata- McGraw-Hill.
2. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
3. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, Tata McGraw- Hill companies.

REFERENCE BOOKS:

1. Basic Electrical Engineering, T.K.Nagasarkar and M.S. Sukhija, Oxford University Press.
2. Basic Electrical Engineering by D.P.Kothari, I.J. Nagrath, McGraw-Hill.
3. Millman's Electronic Devices and Circuits, J. Millman, C.C.Halkias, and Satyabrata Jit, Tata McGraw-Hill companies.

OUTCOMES:

- After going through this course the student gets a thorough knowledge on basic electrical circuits, parameters, electromechanical energy conversion, construction and operational characteristics of DC and AC machines
- The constructional features and operation of measuring instruments like voltmeter, ammeter, wattmeter etc., different semiconductor devices, operation of diodes and transistors, their voltage-current characteristics, realization of various electronic circuits with the various semiconductor devices, and cathode ray oscilloscope,
- With which he/she can able to apply the above conceptual things to real-world electrical, electronic problems and applications.

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(R17A0305) STRENGTH OF MATERIALS

Objectives:

- The objective of this subject is to provide the basic concepts of mechanical behavior of the different materials
- Student able to know about different loads.
- Student able to learn about different stresses and strains.

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 – Relation between S.F., B.M and rate of loading at a section of a beam.

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,Angle and Channel sections – Design of simple beam sections.

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

UNIT-IV

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 & tension coefficient methods.

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. Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

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 shaft s

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 – Riveted boiler shells – Thin spherical shells.

TEXT BOOKS:

1. Strength of materials by Bhavikatti, Lakshmi publications.
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 R.K. Bansal ,Laxmi Publications 2010.
3. Mechanics of Structures Vol-III, by S.B.Junnarkar.

OUTCOMES:

- The student shall be able utilize the mechanics of solids in day –to -day life for design
- simple structures and for other limited applications
- Student gets the exposure of SFD and BMD.

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(R17A0306) KINEMATICS OF MACHINERY

Objectives:

- Understand the fundamentals of the theory of kinematics and dynamics of machines.
- Understand techniques for studying motion of machines and their components.
- Use computer software packages in modern design of machines.

UNIT-I

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

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

UNIT-II

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

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

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

UNIT-III

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

Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider - Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

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

UNIT-IV

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

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

UNIT-V

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

Gear Trains: Introduction - Train value - Types - Simple and reverted wheel train Epicycle gear Train. Methods of finding train value or velocity ratio - Epicycle gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

OUTCOMES:

- Distinguish kinematic and kinetic motion. Identify the basic relations between distance, time velocity, and acceleration. Apply vector mechanics as a tool for solving kinematic problems. Create a schematic drawing of a real-world mechanism.
- Determine the degrees-of-freedom (mobility) of a mechanism. Use graphical and analytic methods to study the motion of a planar mechanism. Use computer software to study the motion of a mechanism. Design basic gear trains. Design basic cam systems.
- This course contributes to the assessment of the following program (student) outcomes: an ability to apply knowledge of mathematics, science and engineering an ability to identify, formulate, and solve engineering problems

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(R17A0310) MACHINE DRAWING

Objectives:

- To visualize an object and convert it into a drawing,
- To gain knowledge of conventional representation of various machining and mechanical details as per IS,
- To become conversant with 2-D and 3-D drafting

Machine Drawing Conventions:

Need for drawing conventions – introduction to IS conventions

- a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- b) Types of sections-selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- d) Title boxes, their size, location and details – common abbreviations and their liberal usage.
- e) Types of drawings – working drawings for machine parts.
- f) Sections and development of solids.

I. Drawing of Machine Elements and simple parts

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

- a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
- b) Keys, cottered joints and knuckle joint.
- c) Riveted joints for plates
- d) shaft coupling, spigot and socket pipe joint.
- e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

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

- a) Engine parts – stuffing box, cross heads, Eccentric, Petrol Engine connecting rod.
- b) Other machine parts- Screw jack, Machine Vice, Plummer block, Tailstock.
- c) Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock.

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

TEXT BOOKS:

1. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers
2. Machine Drawing – Dhawan, S.Chand Publications
3. Machine Drawing By Siddeswar & Kanna

REFERENCE BOOKS:

1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing – Rajput

OUTCOMES:

- Student will be able to Visualize and prepare detail drawing of a given object,
- Draw details and assembly of mechanical systems, Read and interpret a given drawing
- Create 2-D and 3-D models using any standard CAD software with manufacturing considerations.

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(R17A0282) ELECTRICAL AND ELECTRONICS ENGINEERING LAB**Objectives:**

- Student able to understanding of basic analog circuit designs Objective
- understanding of amplifiers
- Transistor biasing

SECTION-A: ELECTRICAL ENGINEERING

1. Magnetization characteristics of D.C. shunt generator.
2. Speed control of DC shunt motor.
3. Swinburne's test on DC shunt machine.
4. Brake test on DC shunt motor.
5. OC and SC tests on Single-phase transformer.
6. Brake test on 3-phase induction motor.
7. Regulation of an alternator by synchronous impedance method.

SECTION-B: ELECTRONICS ENGINEERING

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

Note: Total 10 experiments are to be conducted.

OUTCOMES:

- Students can simulate building and test basic analog circuit Assignments that demonstrate accomplishment of this outcome: 1) Lab Exercises and Assignments Objective 2) An understanding of amplifiers
- Students can simulate building and test amplifier circuits Assignments that demonstrate accomplishment of this outcome: 1) Lab Exercises and Assignments

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(R17A0381) MATERIAL SCIENCE AND STRENGTH OF MATERIALS LAB**Objectives:**

- This course deals with composition of metals, mechanical properties depending upon their micro structure
- Heat treatment methods and their effect on micro structure of materials.
- Able to know about Micro Structure of pure metals

(A) METALLURGY LAB:

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

(B) MECHANICS OF SOLIDS LAB :

1. Direct tension test
2. Bending test on
 - a) Simple supported
3. Torsion test
4. Hardness test
 - a) Brinells hardness test
 - b) Rockwell hardness test
5. Test on springs
6. Compression test on cube
7. Impact test

Note: Total 10 experiments are to be conducted.

OUTCOMES:

- Students can understand micro structures of different material
- Different heat treatment methods, change of mechanical properties based on micro structure of methods.
- Iron carbon equilibrium diagrams.

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(R17A0006) GENDER SENSITIZATION

(An Activity – based Course)

Objectives:

- To develop students sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

UNIT –I

UNDERSTANDING GENDER:

Gender: Why should we study it? (*Towards a world of Equals: Unit – 1*)

Socialization: Making women, making men (*Towards a World of Equals: Unit – 2*)

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Just Relationships: Being Together and Equals (*Towards a World of Equals: Unit – 12*)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Further Reading: Rosa Parks – The Brave Heart.

UNIT –II

GENDER AND BIOLOGY:

Missing Women: Sex Selection and its Consequences (*Towards a World of Equals: Unit – 4*)

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (*Towards a World of Equals: Unit – 10*)

Two or Many? Struggles with Discrimination.

Additional Reading: Our Bodies, Our Health (*Towards a World of Equals: Unit – 13*)

UNIT –III

GENDER AND LABOUR:

Housework: the Invisible Labor (*Towards a World of Equals: Unit – 3*)

“My Mother doesn’t Work”. *Share the Load*.

Women’s Work: Its Politics and Economics (*Towards a World of Equals: Unit – 7*)

Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work

UNIT –IV

ISSUES OF VIOLENCE:

Sexual Harassment: Say No! (*Towards a World of Equals: Unit – 6*)

Sexual Harassment, not Eve – teasing – Coping with Everyday Harassment – Further Reading: “Chupulu”.

Domestic Violence: Speaking Out (*Towards a World of Equals: Unit – 8*)

Is Home a Safe Place? – When Women Unite [Film]. Rebuilding Lives. Further Reading. New Forums for justice.

Thinking about Sexual Violence (Towards a World of Equals: Unit – 11)

Blaming the Victim – “! Fought for my Life” – Further Reading. The Caste Face of Violence.

UNIT – V

GENDERS STUDIES:

Knowledge: Through the Lens of Gender (Towards a World of Equals: Unit – 5)

Point of View. Gender and the Structure of Knowledge. Further Reading. Unacknowledged Women Artists of Telangana

Whose History? Questions for Historians and Others (Towards a World of Equals: Unit – 9)

Reclaiming a Past. Writing other Histories. Further Reading. Missing Pages from Telangana History.

Essential Reading: All the Units in the Text books, “Towards a World of Equals: A Bilingual Textbook on Gender” Written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.

Note: Since it is Interdisciplinary Course, resource Persons can be drawn from the fields of English Literature of Sociology or Political Science or any other qualified faculty who has expertise in this field.

REFERENCE BOOKS:

1. Sen, Amartya. “More than Once Million Women are Missing”. New York Review of Books 37.20 (20 December 1990). Print. `We Were Making History.....’ Life Stories of Women in the Telangana People`s Struggle. New Delhi : Kali for Women, 1989.
2. Tripti Lahiri. “By the Numbers: Where India Women Work.” Women`s Studies Journal (14 November 2012) Available online at: <http://blogs.wsj.com/India/real-time/2012/11/14/by-the-numbers-where-Indian-women-works/>
3. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada <http://harpercollins.co.in/BookDetail.asp?BookCode=3732>
4. Vimala “Vantilu (The Kitchen)”. Omen Writing in India: 600BC to the Present, Volume II The 20th Century. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 599-601.
5. Shatrughna, Veena et al. Women`s Work and its Impact on Child Health and Nutrition, Hyderabad, National Institute of Nutrition, India Council of Medical Research 1993.
6. Stress Shakti Sanghatana. “We Were Making History....’Life Stories of Women in the Telangana People`s Struggle. New Delhi:Kali of Women, 1989.
7. Menon, Nivedita. Seeing Like a Feminist. New Delhi. Zubaan-Penguin Books, 2012.
8. Jayaprabha, A. “Chupulu (Stares)”. Women Writing in India: 600BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.

9. Javeed, Shayam and Anupam Manuhaar. "Women and Wage Discrimination in India: A Critical Analysis". International Journal of Humanities and Social Science Invention 2, 4(2013).
10. Gautam, Liela and Gita Ramaswamy. "A 'Conversation' between a Daughter and Mother". Broadsheet on Contemporary Politics. Special Issue on Sexuality and Harassment: Gender Politics on Campus Today. Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad: Anveshi research Center for Women's Studies, 2014.
11. Abdulali Sohaila. " I Fought For My Life...and Won." Available online at: <http://www.thealternative.in/lifestyle/i-fought-for-my-life-and-won-sohaila-abdulali/>
12. Jeganathan Pradeep, Partha Chatterjee (Ed). "Community, Gender and Violence Subaltern Studies XI". Permanent Black and Ravi Dayal Publishers, New Delhi, 2000
13. K. Kapadia. The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India. London: Zed Books, 2002.
14. S. Benhabib. Situating the self: Gender, Community, and Postmodernism in Contemporary Ethics, London: Routledge, 1992.
15. Virginia Woolf A Room of One's Oxford: Black Swan. 1992.
16. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a Human Face, Karachi: Oxford University Press, 1997.

OUTCOMES:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labor and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

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II Year B. Tech, ME-II Sem

L	T/P/D	C
4	1	4

(R17A0307) DYNAMICS OF MACHINERY

Objectives:

- The objective of this subject is to provide basic concepts of links and their relative motion and forces in different mechanisms.
- Able to learn about Static and Dynamic Force Analysis of Planar Mechanisms.
- Able to learn about Clutches ,Brakes and Dynamometers .

UNIT-I

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

UNIT-II

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

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

UNIT-III

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

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

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

UNIT-IV

Balancing: Balancing of rotating masses Single and multiple – single and different planes. Balancing of Reciprocating Masses- Primary, Secondary, and higher balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – examination of ‘V’ multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing.

Vibration: Free Vibration of mass attached to vertical spring – Simple problems on forced damped vibration, Vibration Isolation & Transmissibility Whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems.

UNIT–V

Governors : Watt, Porter and Proell governors. Spring loaded governors – Hartnell and hartung with auxili ary springs. Sensitiveness, isochronism and hunting.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

OUTCOMES:

- The student will learn about the kinematics and dynamic analysis of machine elements
- Student gets the exposure of linkages, cams, and gears, within the general machine design context
- Student gets the exposure of different governors.

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L	T/P/D	C
4	1	4

(R17A0308) THERMAL ENGINEERING

Objectives:

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

UNIT-I

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

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

UNIT-II

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

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

UNIT-III

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

UNIT-IV

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

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

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

UNIT-V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

OUTCOMES:

- To be able to recognize main and supplementary elements of SI and CI engines and define operational principles. To be able to describe the most important combustion concepts and problems in concern with SI engines and CI engines.
- To be able to analyze energy distribution in an internal combustion engine. Develop problem solving skills through the application of thermodynamics. Solve problems associated with Rotodynamic compressors.
- Solve problems associated with reciprocating compressors and expanders and internal combustion engines .To understand the velocity triangles in compressors.

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II Year B. Tech, ME-II Sem

L	T/P/D	C
3	1	3

(R17A0309) FLUID MECHANICS AND HYDRAULIC MACHINERY

Objectives:

- To understand fluid statics and fluid dynamics.
- To understand application of mass, momentum and energy equation in fluid flow.
- To learn various flow measurement techniques.

UNIT-I

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

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

UNIT-II

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 Closed conduit flow: Reynold’s experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter.

UNIT-III

Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes. **Hydraulic Turbines :** Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –

UNIT-IV

Draft tube theory Sfunctions and efficiency. Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT-V

Centrifugal Pumps : Classification, working, work done – manometric head- losses and efficiencies specific speed- pumps in series and parallel-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).

OUTCOMES:

- Student will be able to understand properties of fluids and classification of flows.
- Formulate and solve equations of the control volume for fluid flow systems, calculate resistance to flow of incompressible fluids through closed conduits and over surfaces.
- Apply fundamentals of compressible fluid flows to relevant systems.

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II Year B. Tech, ME-II Sem

L	T/P/D	C
3	-	3

(R17A0311) PRODUCTION TECHNOLOGY

Objectives:

- To understand various manufacturing processes & its classifications.
- To understand various Casting processes. To understand various welding processes.
- To understand various metal removal process. To appreciate the capabilities, advantages and the limitations of the processes.

UNIT-I

Casting: Steps involved in making a casting– Types of patterns - Patterns and Pattern making Materials used for patterns, pattern allowances and their Construction, Principles of Gating, Gating ratio and design of Gating systems , Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, special casting processes a) Centrifugal b) Die c) Investment. Methods of Melting: Crucible melting and cupola operation, steelmaking processes.

UNIT-II

Welding: A) Classification of welding process types of welds and welded joints and their characteristics, design of welded joints, Gas welding, ARC welding, Forge welding, resistance welding, Thermit welding and Plasma (Air and water) welding. B) Cutting of Metals: Oxy – Acetylene Gascutting, water plasma. Cutting of ferrous, non-ferrous metals Inert Gas welding, TIG & MIG welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – destructive nondestructive testing of welds.

UNIT-III

Hot working & cold working : Strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements, plastic blow and injection moulding.

UNIT-IV

Stamping, forming and other cold working processes: Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning.

UNIT-V

Extrusion of Metals : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion. Forging processes: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects.

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

OUTCOMES:

- Acquire knowledge and hands-on competence in applying the concepts of manufacturing science in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Work effectively with engineering and science teams as well as with multidisciplinary designs. Skillfully use modern engineering tools and techniques for mechanical engineering design, analysis and application

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II Year B. Tech, ME-II Sem

L	T/P/D	C
3	0	3

(R17A0061) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Objectives:

- To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations that are needed for sound economic decision making.
- The main purpose is to provide inputs on an overall analysis of an individual firm namely demand and supply, production function, cost analysis, markets etc.
- To understand and analyse the financial formats of the organisation for smooth running of the business.

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

Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - 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 Organisation, 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

OUTCOMES:

- Students should be able to understand the basic economic principles, forecast demand and supply.
- Students should be able to estimate cost and understand market structure.
- Students should be able to know pricing practices and able to interpret the financial results of the organization.

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L	P	C
0	3	2

(R17A0382) PRODUCTION TECHNOLOGY LAB**Objectives:**

- Student Get Exposed to Different Types of Patterns in a Foundry Shop
- Students will do lap joint & but joint experiments in welding
- To learn the operation of hydraulic press

List of Experiments**1. METAL CASTING LAB :**

- 1.1. Pattern Design and making - for one casting drawing.
- 1.2. Sand properties testing - Exercise -for strengths, and permeability – 1
- 1.3. Moulding Melting and Casting - 1 Exercise

2. WELDING LAB:

- 2.1 ARC Welding Lap & Butt Joint - 2 Exercises
- 2.2 Spot Welding - 1 Exercise
- 2.3. TIG Welding - 1 Exercise
- 2.4. Plasma welding and Brazing - 2 Exercises
(Water Plasma Device)

3. MECHANICAL PRESS WORKING :

- 3.1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
- 3.2. Hydraulic Press: Deep drawing and extrusion operation.

4. PROCESSING OF PLASTICS

- 4.1. Injection Moulding
- 4.2. Blow Moulding

Note: Total 10 experiments are to be conducted.

OUTCOMES:

- Students Will get expertise in Plasma Arc Welding
- To learn and do various experiments in polymer processing machines
- Will get exposure to spot welding and their applications

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II Year B. Tech ME - II Sem

L	P	C
0	3	2

(R17A0383) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**Objectives:**

- Student able to learn about different measuring devices, working Principles and their performances
- To calculate c_d , c_c , c_v and Coefficient of impact of various hydraulic systems
- Student able to learn about different characteristics of Turbines.

List of Experiments

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

Note: Total 10 experiments are to be conducted.

OUTCOMES:

- Students exposure to study various operating characteristics of Centrifugal pump and Reciprocating pump.
- Students exposure to study various operating characteristics of Kaplan, Francis and Pelton Wheel Turbines.
- Get Exposure to verification of Bernoulli's Theorem.

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L	T/P/D	C
2	0	0

FOREIGN LANGUAGE-FRENCH (R17A0004)

INTRODUCTION:

Au vu de l'importance croissante des langues étrangères comme outil de communication dans certains pays du globe, le français a été identifié comme l'une des langues les plus sollicitées après l'anglais. De ce fait, tout en insistant sur la formation en compétences communicatives, le programme a été élaboré pour développer des aptitudes linguistiques et communicatives des étudiants ingénieurs. Le cours de français, sera centré sur les compétences orales de base.

OBJECTIVES:

- To improve the basic speaking skills of the French language.
- To hone the basic sentence constructions in day to day expressions for communication in their work place.

SYLLABUS

UNITE - I:

• Objectif communicatifs (LSRW)

-Se présenter / Présenter quelqu'un - Entrer en contact – Saluer – Epeler - poser des questions - comprendre et remplir un formulaire

• Grammaire

- Les formules de politesse
- L'alphabet
- Les nombres de 1 à 30
- Le verbe "être" et "avoir" au présent de l'indicatif

• Vocabulaire

- Les professions
- Les nationalités

UNITE - II:

• Objectif communicatifs (LSRW)

Parler de sa famille – décrire quelqu'un – exprimer ses goûts et les préférences – écrire et comprendre un message court – compter jusqu'à 100 – exprimer la possession – exprimer la négation

• Grammaire

- Les articles
- Les verbes en –er- au présent
- Les noms (genre et nombre)
- Les adjectifs possessifs

- Les adjectifs qualificatifs
- « Qu'est ce que c'est ? » / « Qui est ce ? »/ « c'est... »
- La négation

- **Vocabulaire**

- La famille
- Les vêtements
- Les couleurs
- Les nombres de 1 à 100
- La salle de classe

UNITE – III

- **Objectif communicatifs (LSRW)**

Parler de ses activités quotidiennes – se situer dans le temps – demander et indiquer la date et l'heure – parler des sports et des loisirs – exprimer la fréquence.

- **Grammaire**

- L'expression du temps (l'heure)
- Les verbes en –ir- au présent
- Les verbes faire, aller, prendre, venir,
- Les adverbes
- Les verbes pronominaux

- **Vocabulaire**

- Les jours et les mois de l'année
- La vie quotidienne
- Les sports
- Les loisirs

UNITE – IV

- **Objectif communicatifs (LSRW)**

Exprimer la quantité – demander et donner le prix- exprimer la nécessité, la volonté et la capacité – comparer (adjectif) – s'exprimer au restaurant / dans les magasins

- **Grammaire**

- Pouvoir, vouloir, il faut
- Exprimer la capacité / la possibilité
- Exprimer la volonté / le désir
- Le futur proche

- **Vocabulaire**

- La nourriture
- Les repas
- Les fruits et légumes
- Les parties du corps

UNITE – V**• Objectif communicatifs (LSRW)**

Exprimer l'interdiction et l'obligation- décrire un appartement – parler du temps qu'il fait / demander le temps qu'il fait – demander l'opinion – donner son avis – exprimer son accord ou son désaccord

• Grammaire

- Les adjectifs démonstratifs
- Les prépositions
- Le verbe ' devoir ' et ' falloir ' au présent
- « Il y a » et « Depuis »

• Vocabulaire

- Les saisons
- Les vacances
- La ville
- Le logement

REFERENCE BOOKS:

1. Apprenons le Français 1& 2, New Saraswati House, 2015 |
2. A propos, A1, Langers International, 2010
3. Easy French Step-by-step by Myrna Bell Rochester-
4. Ultimate French Beginner-Intermediate (Coursebook) By Livid Language
5. À L'Aventure: An Introduction to French Language and Francophone Cultures By Evelyne Charvier-Berman, Anne C. Cummings.

OUTCOMES

- The student will be in a position to speak in French, Which is the second most widely learned foreign language after English, and the ninth most widely spoken language in the world. French is also the only language, alongside English, that is taught in every country in the world.
- The Student will get the ability to speak French is an advantage on the international job market
- Students with a good level of French are eligible for French government scholarships to enroll in postgraduate courses in France in any discipline and qualify for internationally recognized French degrees.

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L	T/P/D	C
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(R17A0005) FOREIGN LANGUAGES: GERMAN**OBJECTIVES:**

1. To familiarize the students with a modern foreign language.
2. To familiarize the students with the sounds of German and their symbols.
3. To familiarize students with German for basic communication and functions in everyday situations.
4. To familiarize students with the basic of writing simple, direct sentences and short compositions.

SYLLABUS:**UNIT I**

Current trends in German orthography, German grammar and lexical units, discourse models, oral and written.

UNIT- II

Communication patterns, prose passages, etc.

UNIT- III

Communication skills in everyday situations

UNIT-IV

Training in creative writing in German.

UNIT- V

Training in creative speaking in German.

TEXT BOOKS

1. Lernziel Deutsch

Reference books:

1. Themen
2. Tangram
3. Sprachkurs Deutsch
4. Schulz-Griesbach

Outcomes

1. Students familiarize with a modern foreign language – German
2. The students with German get acquainted for basic communication in everyday situations.
3. Students will know with the basics of writing simple direct sentences and short compositions.
4. Students get to know the basics of German language to communicate in the work place when they find the necessity.

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L	T/P/D	C
3	-	3

(R17A0451) DIGITAL ELECTRONICS (OPEN ELECTIVE-I)

OBJECTIVES:

The main objectives of the course are:

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

UNIT I

BINARY SYSTEMS AND LOGIC GATES:

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

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

UNIT II

MINIMIZATION TECHNIQUES:

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

UNIT III

COMBINATIONAL CIRCUITS:

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

UNIT IV

SEQUENTIAL CIRCUITS:

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

UNIT V**MEMORY DEVICES:**

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

OUTCOMES:

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

1. Analyse different methods used for simplification of Boolean expressions
2. Design and implement Combinational and Sequential circuits.
3. Design and implement Synchronous and Asynchronous Sequential Circuits.

TEXT BOOK:

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

REFERENCES:

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

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

II Year B. Tech, ME-II Sem

L	T/P/D	C
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(R17A0251) ELEMENTS OF ELECTRICAL ENGINEERING (OPEN ELECTIVE-I)

OBJECTIVES:

1. To introduce the fundamental concepts of electromechanical energy conversion .
2. To familiarize the students with the principle of operation, constructional features and operational characteristics of various types of Motors used in the engineering and consumer Industry

UNIT – I

Electromechanical Energy Conversion: Electromechanical Energy conversion – forces and torque in magnetic field systems – energy balance – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – multi excited magnetic field systems.

UNIT – II

D.C. Generators & Motors :

D.C. Generators – Principle of operation – Action of commutator – constructional features – armature windings — simplex and multiplex windings – use of laminated armature – E. M.F Equation

D.C. Motors: Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation. Speed control of DC Motors: Armature voltage and field flux control methods. Ward-Leonard system. – protective devices.

UNIT – III:

Single Phase Transformers:

Single phase transformers-principle of operation-constructional details- types-emf equation-equivalent circuit – operation on no load and on load-phasor diagrams –losses- minimization of hysteresis and eddy current losses-efficiency-all day efficiency-regulation-effect of variations of frequency and supply voltage on iron losses.

UNIT – IV:

Polyphase Induction Motors & Their Speed control

Polyphase induction motors:construction details of cage and wound rotor machines-production of a rotating magnetic field – principle of operation – rotor emf and rotor frequency –Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation – expressions for maximum torque and starting torque – torque slip characteristic – double cage and deep bar rotors

Speed control: change of frequency; change of poles and methods of consequent poles; cascade connection. injection of an emf into rotor circuit (qualitative treatment only)- induction generator-principle of operation

UNIT – V:

Single Phase Motors & Special Machines: Single phase Motors: Single phase induction motor – Constructional features-Double revolving field theory Equivalent circuit - split-phase motors - Capacitor start Capacitor run motors. Principles of A.C. Series motor-Universal motor, Stepper motor shaded pole motor, Reluctance Motors, Brushless DC motors (Qualitative Treatment only).

Text Books:

1. Electrical Machines, P.S. Bimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.
3. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.

Reference Books:

1. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
2. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
3. Electric machinery – A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies, 5th edition.
4. Theory of Alternating Current Machinery- by Langsdorf, Tata McGraw-Hill Companies, 2nd edition

OUTCOMES:

At the end of the course the student will

1. Have a clear understanding of the materials used and features in the construction of the electrical machines like transformers, DC and AC motors and special purpose motors.
2. Acquire a basic knowledge on the principle of operation of all these machines
3. Have a basic knowledge on the Torque speed relations and the effect of load torque on their performance.
4. Will have fundamental concept on the speed control of the various types of motors.

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(R17A0551) DATA BASE SYSTEMS (OPEN ELECTIVE -I)

L	T/P/D	C
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Objectives:

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

UNIT I: INTRODUCTION

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

UNIT II: DATABASE DESIGN

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

UNIT III: STRUCTURED QUERY LANGUAGE

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

UNIT IV - DEPENDENCIES AND NORMAL FORMS

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

UNIT V:

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

TEXT BOOK:

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

REFERENCES:

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

Outcomes:

- Demonstrate the basic elements of a relational database management system
- Ability to identify the data models for relevant problems
- Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data

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II Year B. Tech, ME-II Sem

	L	T/P/D	C
(R17A0351)ELEMENTS OF MECHANICAL ENGINEERING (OPEN ELECTIVE -I)	3	-	3

Objectives:

- To give an insight to students about the behaviour of materials under external forces.
- The concept of stress, strain, elasticity etc. as applied to various structures under loading are included.
- The student able to learn about concept of fluids , turbines and engines .

UNIT – I

Stresses and strains: kinds of – stress-strains, elasticity and plasticity, Hooks law, stress – strain diagrams, modules of elasticity, Poisson’s ratio, linear and volumetric strain, relation between E, N, and K, bars of uniform strength, compound bars and temperature stresses.

UNIT – II

Engineering Materials and Joining Processes:

Engineering Materials: Types and applications of nonferrous metals and alloys

Composites: Introduction, Definition, Classification and applications (Air Craft and Automobiles)

Soldering, Brazing and Welding:

Definitions, Classification and method of soldering, Brazing and welding. Difference between Soldering, Brazing and Welding. Description of electric Arc Welding and Oxy-Acetylene Welding

UNIT – III

Properties of Fluid : Stream line , streak line , path line , continuity equation pipes are in series, pipes are in parallel, HGL, TGL , Bernoullis equation .

Hydraulic pumps and turbines: working principles and velocity diagrams.

UNIT – IV

Internal combustion engines: classification of IC engines, basic engine components and nomenclature, working principle of engines, Four strokes and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

UNIT - V

Belts - Ropes and chain: belt and rope drives, velocity ratio, slip, length of belt , open belt and cross belt drives, ratio of friction tensions, centrifugal tension in a belt, power transmitted by belts and ropes, initial tensions in the belt, simple problems.

Gear trains: classification of gears, gear trains velocity ratio, simple, compound –reverted and epicyclic gear trains.

TEXT BOOKS:

1. Strength of Materials, R.K. Bansal, S.Chand Publications
2. Thermal Engineering, Ballaney,P.L., Khanna Publishers, 2003 .
3. Theory of Machines , S.S. Rattan , Tata McGraw Hill.
4. Fluid Mechanics and Hydraulic Machinery R.K. Bansal .

REFERENCE BOOKS:

1. Thermal Engineering, R.K. Rajput , Laxmi Publications .
2. Theory of Machines, R.S. Khurmi, S. Chand Publications.
3. Fluid Mechanics and Hydraulic Machinery, Modi & Seth.
4. Manufacturing Technology, P.N.Rao.

OUTCOMES:

- The student would be exposed to basic mechanical engineering machinery.
- The student learned about mechanical components.
- Student understand about engines and turbines .

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(R17A0352) GREEN ENERGY SYSTEMS (OPEN ELECTIVE -I)

Objectives:

- The course aims to highlight the significance of alternative sources of energy.
- Green energy systems and processes and provides the theory and working principles of probable sources of renewable and green energy systems that are environmental friendly.

UNIT-I

Introduction:

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

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 technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

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

UNIT – III

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

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

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

UNIT –IV

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

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

UNIT-V

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

TEXT BOOKS:

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

REFERENCES:

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

Outcome:

- The student shall understand the principles and working of solar, wind, biomass, geo thermal, ocean energies .
- Green energy systems and appreciate their significance in view of their importance in the current scenario and their potential future applications.

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3	0	3

(R17A0051) INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE -I)

Course Aim:

- The objective of this course is to provide the knowledge on International IPR's and to make students efficient to take decisions in Global Corporate.

Learning Outcome:

- It allows students how to prepare and protect the Inventions , start up ideas and rights of patents and copy rights etc.,
- This subject brings awareness to the students the basic legal aspects at present following at Global level.

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.

REFERENCES:

- A short course in International Intellectual Property Rights – Karla C. Shippey, World Trade Press – 2nd Edition.
- Intellectual Property Rights – Heritage, Science, & Society under international treaties – A. Subbian, - Deep & Deep Publications – New Delhi.
- Intellectual Property Rights: N K Acharya: ISBN: 9381849309
- Intellectual Property Rights: C B Raju : ISBN-8183870341
- Intellectual Property : Examples and Explanation – Stephen M Mcjohn, 2.e, ISBN-13:978-0735556652
- Intellectual Property Rights in the Global Economy – Keith E Maskus, PIIE, ISBN paper 0-88132-282-2

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(R17A0312) ADVANCED THERMAL ENGINEERING

Objectives:

- Applications and the principles of thermodynamics to components and systems.
- The purpose of this course is to enable the student to gain an understanding of how thermodynamic principles govern the behavior of various systems
- Student have knowledge of methods of analysis and design of complicated thermodynamic systems

UNIT-I

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

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

UNIT-II

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

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

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

OUTCOMES:

- To be able to recognize main and supplementary elements of turbines and define operational principles.
- To be able to describe the most important combustion concepts and problems in concern to power plants.
- To be able to analyze energy distribution in turbines ,nozzles and condensers
- Develop problem solving skills through the application of thermodynamics.
- To understand the velocity triangles and boilers concepts in a lucid manner.

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(R17A0313) MACHINE DESIGN-I

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

Objectives:

- To apply the general design procedures and principles 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.
- To evaluate stresses under different loading conditions.
- To apply the design procedure of different fasteners, joints, shafts and couplings.

UNIT – I

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

DESIGN FOR STATIC STRENGTH: Simple stresses – Combined stresses – Torsional and Bending stresses – Impact stresses – Stress strain relation – Various theories of failure – Factor of safety – Design for strength and rigidity – preferred numbers. The concept of stiffness in tension, bending, torsion and combined situations.

UNIT – II

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

UNIT – III

RIVETED, WELDED AND BOLTED JOINTS:

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

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

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

UNIT – IV

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

UNIT – V

SHAFTS : Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads – Shaft sizes – BIS code. Use of internal and external circlips, Gaskets and seals (stationary&rotary).

SHAFT COUPLINGS : Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings – Flange coupling (Modified).

TEXT BOOKS:

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

OUTCOMES:

- The student acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure.
- Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading.
- Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element.

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(R17A0314) MACHINE TOOLS

Objectives:

- To introduce students to the basic concepts of Manufacturing via shaping, forming, machining and assembly. To develop a knowledge of appropriate parameters to be used for various machining operations.
- To make students aware of the necessity to manage manufacturing processes and systems for the best use of material and human resources with particular emphasis on product safety and environmental considerations.

UNIT-I

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

UNIT-II

Lathe Machine: Principle of working, specification of lathe and types of lathes, operations of lathe and work holding and tool holding devices.CNC Machine Elements- Machine structure- Tooling for CNC Machines-Interchangeable tooling system and qualified tools, coolant fed tooling system, quick change tooling system, automatic head changers.

UNIT-III

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

UNIT-IV

CNC Milling Machine: Principles of working – classifications of CNC milling machines– operations-milling cutters. Grinding machines–classifications–Different types of abrasives and bonds and selection of a grinding wheel.

UNIT-V

Modern Machining Processes:

Need for Non-Traditional machining methods, Types-AJM, WJM, ECM, EDM, USM. Material Removal Rate (MRR), Selections of tools and dielectric fluid, process variables .Plasma Machining and its applications. Applications and limitations.

TEXT BOOKS:

1. Production Technology by R.K. Jain and S.C. Gupta, Khanna Publications
2. Production Technology by H.M.T. (Hindustan Machine Tools).hand book
3. Production Technology by P.C .Sharma, S Chand publication
4. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH Publishers

REFERENCE BOOKS:

1. Machine Tools – C Elanchezhian and M. Vijayan, Anuradha Publications
2. Workshop Technology – B.S.Raghu Vamshi – Vol II, Dhanpatrai publications
3. Manufacturing Technology by P.N.Rao, Volume II, McGraw Hill
4. Advanced machining processes/ VK Jain/ Allied publishers.

OUTCOMES:

- To analyze various machining processes and calculate relevant quantities such as velocities, forces and powers.
- Identify and explain the function of the basic components of a machine tool.
- Understand the procedures and techniques involved for the manufacturing of components, and keep up to date with innovation through literature search.

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(R17A0315) METROLOGY AND SURFACE ENGINEERING

Objectives:

- The objective of this subject is to provide basic concepts of measuring devices in the manufacturing process.
- Student able to learn Linear Measurements.
- Student able to learn Optical Measuring Instruments.

UNIT-I

Systems of Limits and Fits: Introduction, normal size, tolerance limits, deviations, allowance, fits and their types – unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Indian standard Institution system – British standard system, International Standard system for plain ad screwed work.

UNIT-II

Linear Measurement: Length standard, line and end standard, slip gauges – calibration of the slip gauges, Dial indicator, micrometers.

Measurement of Angles and Tapers: Different methods – Bevel protractor – angle slip gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.

Limit Gauges: Taylors principle – Design of go and No go gauges, plug ring, snap, gap, taper, profile and position gauges.

UNIT-III

Optical Measuring Instruments: Tool maker's microscope and its uses – collimators, optical projector – optical flats and their uses, interferometer.

Flat Surface Measurement: Measurement of flat surfaces – instruments used – straight edges – surface plates – optical flat and auto collimator.

UNIT-IV

Surface Roughness Measurement : Differences between surface roughness and surface waviness-Numerical assessment of surface finish – CLA,R, R.M.S Values – Rz values, Rz value, Methods of measurement of surface finish-profilograph. Talysurf, ISI symbols for indication of surface finish.

UNIT-V

Measurement through Comparators: Comparators – Mechanical, Electrical and Electronic Comparators, pneumatic comparators and their uses in mass production.

Screw Thread Measurement: Element of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch, profile thread gauges.

Coordinate Measuring Machines: Types of CMM, Role of CMM, and Applications of CMM.

TEXT BOOKS:

1. Engineering Metrology / I C Gupta./ Danpath Rai
2. Engineering Metrology / R.K. Jain / Khanna Publishers
3. Handbook of Tribology: Materials, Coating, and Surface Treatments/ Bharat Bhushan and B.K.Gupta.

REFERENCE BOOKS:

1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology 4e / Connie Dotson / Thomson
3. Surface Engineering for corrosion and wear resistance / JR Davis/ Woodhead Publishers.

OUTCOMES:

- The students shall be able to know how to make use of measuring devices effectively.
- Student gets the exposure Machine Tool Alignment Tests.
- Student gets the exposure Measurement through Comparators.

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(R17A0316) COMPUTER INTEGRATED MANUFACTURING (CORE ELECTIVE – I)

OBJECTIVES:

- This course will enable the student
- To gain knowledge about the basic fundamental of CAD.
- To gain knowledge on how computers are integrated at various levels of planning and
- Manufacturing understand computer aided planning and control and computer monitoring.

UNIT – I

Computer-Aided Programming: General information, APT programming, Examples Apt programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors .Introduction to CAD/CAM software, Automatic Tool Path generation.

UNIT - II

Tooling for CNC Machines: Interchangeable tooling system, preset and qualified tools, coolant fed tooling system, modular featuring, quick change tooling system, automatic head changers. DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages and disadvantages of DNC, adaptive control with optimization, Adaptive control with constrains, Adaptive control of machining processes like turning, grinding.

UNIT - III

Post Processors for CNC: Introduction to Post Processors: The necessity of a Post Processor, the general structure of a Post Processor, the functions of a Post Processor, DAPP — based-Post Processor: Communication channels and major variables in the DAPP — based Post Processor, th creation of a DAPP — Based Post Processor.

UNIT – IV

Micro Controllers: Introduction, Hardware components, I/O pins, ports, external memory: counters, timers and serial data I/O interrupts. Selection of Micro Controllers Embedded Controllers, Applications and Programming of Micro Controllers. Programming Logic Controllers (PLC' s): Introduction, Hardware components of PLC, System, basic structure, principle of operations, Programming mnemonics timers, Internal relays and counters, Applications of PLC's in CNC Machines.

UNIT - V

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

TEXT BOOKS

1. Computer Control of Manufacturing Systems / Yoram Koren / Mc Graw Hill. 1983.
2. Computer Aided Design Manufacturing - K. Lalit Narayan, K. Mallikarjuna Rao and M.M.M. Sarcar, PHI, 2008.
3. CAD/CAM Principles and Applications, P.N.Rao, TMH

REFERENCES

1. CAD / CAM Theory and Practice,/ Ibrahim Zeid, TMH
2. CAD / CAM / CIM, Radhakrishnan and Subramanian, New Age
3. Principles of Computer Aided Design and Manufacturing, Farid Amirouche, Pearson
4. Computer Numerical Control Concepts and programming, Warren S Seames, Thomson.

OUTCOMES:

- Acquire knowledge on components of computer integrated manufacturing.
- Students should be able to understand business functions those influence design of a particular product.
- Students should be able to know function of computer in design and manufacturing.

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(R17A0317) INNOVATION AND DESIGN THINKING (CORE ELECTIVE – I)

OBJECTIVES:

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

- Understand the conceptual development techniques to find solution for a critical design issue.
- Understand Principles to translate the conceptual ideas to engineering design.
- Understand Principles of Design for Manufacturing and Assembly.

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. Genrich Altshuller, 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.

OUTCOMES

- The importance of design in innovation.
- Design tools and processes can generate innovative new ideas.
- Design and design thinking to innovative in areas such as engineering, software development and business operations.
- 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.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-I Sem

L	T/P/D	C
3	0	3

(R17A0318) COMBUSTION TECHNOLOGY (CORE ELECTIVE – I)

Objectives:

- The course is intended to provide students with knowledge of fuel quantity and engine technology effects on emissions.
- Understand the combustion phenomena.
- Understand the concept of laminar and turbulent flame propagation and different methods to reduce air pollution.

UNIT-I

Solid Fuel: Classification of fuel, Origin, Composition, Characteristics and analysis of coal washing & storage of coal, Physical & chemical processing of coal, Various classification systems of coal briquetting, Carbonization, Gasification of coal. **Liquid Fuel:** Origin, Composition and classification, Properties, Chemical processing – Cracking, Reforming, Polymerization, Alkylation and Isomerization. **Gaseous Fuel:** Classification of gaseous fuel, Natural gas, LPG, Refinery gas, Producer gas, Water gas.

UNIT-II

Fuel Combustion Calculation: Fundamentals of various combustion calculations with numerical examples.

UNIT-III

Combustion Process: General Principles of combustion, Flame, Draught, Limits of Inflammability, Types of combustion Process- Surface, Submerged, Pulsating, Slow combustion.

UNIT-IV

Energy Conservation: Energy consumption pattern in various sectors, various ways of energy conservation in various process industries including petroleum.

UNIT-V

Non – Conventional Energy Technologies: General principles with applications and technology of Biomass Energy, Solar Energy, Geothermal Energy, Wind Energy, Nuclear Energy, Hydal, Tidal and Ocean Energy.

TEXT BOOKS:

1. Fuel combustion Energy Technology by S.N. Saha , Dhanpat Rai Publication Co. Pvt. Ltd. New Delhi
2. Combustion Engineering by A. K. Sarkar, New Age International
3. Lean Combustion: Technology and Control 1st Edition by Derek Dunn-Rankin.

REFERENCE BOOKS:

1. Green Energy Technology by Maria Carvalho
2. Fundamentals of Combustion Processes (Mechanical Engineering Series) by Karen verson
3. Fundamentals of Combustion Processes Authors: McAllister, Sara, Chen, Jyh-Yuan, Fernandez-Pello, A. craloeo

OUTCOMES:

- Upon completion of the subject, students will be able to have the knowledge of fuel thermo-chemistry and fuel quality effects on emissions, engine technologies, engine combustion-related emissions and control technologies.
- Extend their knowledge of fuels and engines to different situations of engineering context and professional practice.
- Demonstrate how to design burners and assess their performance.

OPEN ELECTIVES II

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III Year B.Tech. I Sem

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

**OPEN ELECTIVE II
(R17A0452) INDUSTRIAL ELECTRONICS**

COURSE OBJECTIVES:

1. To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
2. To understand the characteristics of AC to DC converters.
3. To understand about the practical applications Electronics in industries.

UNIT I

Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

UNIT II

Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor- α , Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

UNIT III

AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period .Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

UNIT IV

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding. **Induction heating:** Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating. **Dielectric heating:** Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

UNIT V :

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection,

Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasonic waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

TEXT BOOKS:

1. G. K. Mithal, "Industrial Electronics", Khanna Publishers, Delhi, 2000.
2. J.Gnanavadeivel, R.Dhanasekaran, P.Maruthupandi, "Industrial Electronics", Anuradha Publications, 2011.

REFERENCE BOOKS:

1. F. D. Petruzulla, "Industrial Electronics", McGraw Hill, Singapore, 1996.
2. M. H. Rashid, "power Electronics Circuits, Devices and Application", PHI, 3rd edition, 2004.
3. G. M. Chute and R. D. Chute, "Electronics in Industry", McGraw Hill Ltd, Tokyo, 1995.

COURSE OUTCOMES

After completion of the course the students will be able to

1. Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
2. Understand the characteristics of AC to DC converters.
3. Understand about the practical applications Electronics in industries.

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

**OPEN ELECTIVE II
(R17A0453) COMMUNICATION NETWORKS**

COURSE OBJECTIVES

1. To understand the concept of computer communication.
2. To learn about the networking concept, layered protocols.
3. To understand various communications concepts.
4. To get the knowledge of various networking equipment.

UNIT – I: Overview of Computer Communications and Networking: Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability and Security, Network Standards, The Telephone System and Data Communications.

UNIT – II: Essential Terms and Concepts: Computer Applications and application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes, analog and Digital Communications , Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.

UNIT – III: Analog and Digital Communication Concepts: Representing data as analog signals, representing data as digital signals, data rate and bandwidth reduction, Digital Carrier Systems.

UNIT – IV: Physical and Data Link Layer Concepts: The Physical and Electrical Characteristics of wire, copper media, fiber optic media, Wireless communications. Introduction to data link layer, logical link control and medium access control sub-layers.

UNIT – V: Network Hardware Components: Introduction to Connectors, Transreceivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, Switches vs Routers.

TEXT BOOKS:

1. Computer Communications and Networking Technologies, Michel A.Gallo and William H.Hancock, Thomson Brooks/Cole.
2. Data Communications and Networking – Behrouz A Forouzan, Fourth Edition, McGraw Hill Education, 2006.

REFERENCE BOOKS:

1. Principles of Computer Networks and Communications, M Barry Dumas, Morris Schwartz, Pearson.
2. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose, K W Ross, 3rd Edition, Pearson Education.

COURSE OUTCOMES

1. The student can get the knowledge of networking of computers, data transmission between computers.
2. Will have the exposure about the various communication concepts.
3. Will get awareness about the structure and equipment of computer network structures.

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III Year B.Tech. I Sem

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

OPEN ELECTIVE II

(R17A0552) INTRODUCTION TO JAVA PROGRAMMING

COURSE OBJECTIVES:

This subject aims to introduce students to the Java programming language. Upon successful completion of this subject, students should be able

- 1) to create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism;
- 2) use data types, arrays and strings;
- 3) implement error-handling techniques using exception handling,
- 4) create and event-driven GUI using AWT components.

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, BufferedReader class, Scanner class, StringTokenizer class, inner class.

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

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

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

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

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

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

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

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

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

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

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

Layout Manager – Layout manager types: border, grid and flow.

Swing – Introduction, limitations of AWT, Swing vs AWT.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

COURSE OUTCOMES:

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

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

OPEN ELECTIVE II

(R17A0551) INTRODUCTION TO SCRIPTING LANGUAGE

COURSE OBJECTIVES:

- 1) Learning the basics of scripting languages like PERL, JAVASCRIPT, PYTHON
- 2) Understanding the requirements and uses of Scripting.
- 3) In-depth knowledge of programming features of Perl and Python.
- 4) Knowing the implementation model for scripting and design of applications.

UNIT I

Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT II

HTML: HTML basics, Elements, Attributes and Tags, Basic Tags, Advanced Tags, Frames, Images.

Cascading style sheets: Adding CSS, CSS and page layout.

JavaScript: Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects.

UNIT III

JavaScript programming of reactive web pages elements: Events, Event handlers, multiple windows and Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms.

Introduction to Python Programming: History of Python, Need of Python Programming, Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation, Types - Integers, Strings, Booleans.

UNIT IV

Operators and Expressions: Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences.

UNIT V

Control Flow - if, if-else, for, while, break, continue, pass

Functions - Defining Functions, Calling Functions, Passing Arguments, Default Arguments, Variable-length arguments, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Development of sample scripts and web applications.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Learning Python, Mark Lutz, Orielly
3. Web Programming, building internet applications, Chris Bates 2nd Edition, WILEY
4. Beginning JavaScript with Dom scripting and AJAX, Russ Ferguson, Christian Heilmann, Apress.
5. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.

REFERENCES:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware(Addison Wesley) Pearson Education.
2. Programming Python, M.Lutz, SPD.
3. Core Python Programming, Chun, Pearson Education.
4. Guide to Programming with Python, M.Dawson, Cengage Learning.
5. Perl by Example, E.Quigley, Pearson Education.
6. Programming Perl, Larry Wall, T.Christiansen and J.Orwant, O'Reilly, SPD.

COURSE OUTCOMES:

1. Analyze the differences between typical scripting languages and application programming languages.
2. Application of knowledge of scripting languages to design programs for simple applications.
3. Create software systems using scripting languages, including Perl and Python.

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III Year B.Tech. I Sem

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

OPEN ELECTIVE II

(R17A0353) 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 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, 2nd edition, 2006.
3. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001.

Course Outcomes:

- 1) To know the strategic importance of Enterprise Resource Planning
- 2) To Understand and implement ERP in various Sectors.

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III Year B. Tech ME - I Sem

L	P	C
0	3	2

(R17A0385) MACHINE TOOLS AND METROLOGY LAB

Objectives:

- To understand the working principles of various machines viz lathe , Drilling, milling, shaping.
- Student able to learn about Mechanical parameter measuring systems.
- Student able to learn about different alignment techniques.

PART A: MACHINE TOOLS

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. Step turning and taper turning on lathe machine
3. Thread cutting and knurling on -lathe machine.
4. Drilling and Tapping
5. Shaping and Planning
6. Slotting
7. Milling
8. Cylindrical Surface Grinding
9. Grinding of Tool angles.

PART B: METROLOGY

1. Measurement of lengths, heights, diameters by Vernier calipers micrometers etc.
2. Measurement of bores by internal micrometers and dial bore indicators.
3. Use of gear teeth, Vernier calipers and checking the Chordal Addendum and Chordal Height of spur gear.
4. Machine tool "Alignment of test on the lathe.
5. Machine tool alignment test on milling machine.
6. Tool maker's microscope and its application
7. Angle and taper measurements by Bevel protractor, Sine bars, etc.
8. Use of spirit level in finding the flatness of surface plate.
9. Thread measurement by Two wire/ Three wire method or Tool makers microscope.

Note: Total 10 experiments are to be conducted.

OUT COMES:

- Various job Operation on machine tools.
- Exposure to various measuring systems.
- To know about various grinding and shaping machines.

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech ME - I Sem

L	P	C
0	3	2

(R17A0386) THERMAL ENGINEERING LAB

Objectives:

- Student able to learn about the valve timing and port timing diagrams.
- Student able to learn about the working principles of Two Stroke and Four Stroke engines and their performances.
- Student able to learn about different characteristics IC Engine.

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. Dis-assembly / 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.

OUTCOMES:

- Students get exposure to different types of engine power and efficiency calculations
- Students get exposure to study of various operating characteristics of two stroke and four stroke I.C Engines.
- Students get exposure of boilers, mountings and accessories.

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III Year B. Tech, ME-II Sem

L	T/P/D	C
4	1	4

(R17A0319) MACHINE DESIGN–II

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

Objectives:

- To gain knowledge about designing the commonly used important machine members such as bearings, engine parts, springs, belts, gears etc.
- To design the components using the data available in design data books.

UNIT–I

BEARINGS: Types of Journal bearings – Lubrication – Bearing Modulus – Full and partial bearings – Clearance ratio – Heat dissipation of bearings, bearing materials – journal bearing design – Ball and roller bearings – Static loading of ball & roller bearings, Bearing life.

UNIT–II

ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – Pistons, Forces acting on piston – Construction, Design and proportions of piston.

UNIT–III

POWER TRANSMISSION SYSTEMS AND PULLEYS : Transmission of power by Belt and Rope drives, Transmission efficiencies, Belts – Flat and V types .

MECHANICAL SPRINGS: Stresses and deflections of helical springs – Extension and compression springs – Design of springs for fatigue loading – natural frequency of helical springs – Energy storage capacity – helical torsion springs .

UNIT–IV

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

UNIT–V

DESIGN OF POWER SCREWS: Design of screw, Square ACME , Buttress screws, compound screw, 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 Publishers
2. Machine Design Data Book by P.S.G. College of Technology
3. Machine Design by Pandya and Shah, Chortar Publications.
4. Machine Design / R.N. Norton
5. Mechanical Engineering Design / JE Shigley.

OUTCOMES:

- To apply the design principles for the design of various engine parts
- Estimate the life of rolling element bearings and their selection for given service conditions.
- Acquaintance with design of the components as per the standard, recommended procedures which is essential in design and development of machinery in industry.

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III Year B. Tech, ME-II Sem

L	T/P/D	C
3	1	3

(R17A0320) FINITE ELEMENT METHODS

Objectives:

- It covers the fundamental and theoretical concepts beginning with a review of differential equations, boundary conditions, integral forms, interpolation, parametric geometry, numerical integration, and matrix algebra.
- Able to apply in engineering applications like field analysis, stress analysis and vibrations are introduced. Time dependent problems are also treated.
- Students are also introduced, by means of selected tutorials, to the commercial finite element system Solid Works which is similar to one they could be expected to use upon graduation. Graduate students will also be introduced to the more powerful (and difficult to use) ANSYS system.

UNIT-I

Introduction to Finite Element Method for solving field problems. Stress and Equilibrium. Strain – Displacement relations. Stress – strain relations.

One Dimensional problem: Finite element modeling, local coordinates and shape functions. Potential Energy approach, Assembly of Global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions and its applications.

UNIT-II

Analysis of Trusses: Stiffness matrix for plane truss element, Stress calculations and problems.

Finite element modelling of two dimensional stress analyses with CST element and treatment of boundary conditions. Convergence requirements

UNIT-III

Finite element modeling of axi-symmetric solids subjected to axisymmetric loading with triangular elements. Two dimensional four node isoparametric elements and numerical integration.

UNIT-IV

Heat transfer analysis: One dimensional steady state analysis composite wall. One dimensional fin analysis and two dimensional analysis of thin plate.

BEAMS: Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses.

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. Overview of commercial softwares like Ansys, Abaqus etc.

TEXT BOOKS:

1. Introduction to Finite Elements in Engineering / Chandruputla, Ashok and Belegundu /Prentice – Hall.
2. Introduction to Finite Element Analysis by S.Md.Jalaluddin, Anuradha Publishers.
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhurst, Douglas E. Smith and Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.

REFERENCE BOOKS:

1. An introduction to Finite Element Method / JN Reddy / Me Graw Hill
2. The Finite Element Methods in Engineering / SS Rao / Pergamon.
3. Finite Element Method and applications/R.D.Cook/WILEY publications

OUTCOMES:

- Upon completion of the course students should be able to correlate a differential equation and its equivalent integral form.
- Understand parametric interpolation and parametric geometry enforce essential boundary conditions to a matrix system
- Able to exploit symmetry and apply FE for stress analysis and heat transfer
- Differentiate the type of analysis and able to find the characteristics of dynamic system
- Graduate students to know the more powerful and difficult to use Ansys system.

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III Year B. Tech, ME-II Sem

L	T/P/D	C
3	1	3

(R17A0321) HEAT TRANSFER

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

Objectives:

- Provide knowledge about Heat transfer through conduction, convection and radiation.
- Learn different modes of Heat Transfer.
- Understand and apply the dimensional analysis.
- Develop the empirical relations for fluid flow heat transfer.

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

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

UNIT- V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

OUTCOMES:

- Understand how heat and energy is transferred between the elements of a system for different configurations.
- Solve problems involving one or more modes of heat transfer.
- Student gets the exposure to different modes of Heat Transfer.
- Design the extended surfaces like fins for better heat transfer

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

III Year B. Tech, ME-II Sem

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(R17A0322) CAD/CAM**Objectives:**

- To provide an overview of how computers are being used in design, development of manufacturing plans and manufacture
- To get effective knowledge on the usage of mathematical equations in model development through the computer.
- To understand different functions of computers in design and manufacturing.
- To understand the need for integration of CAD and CAM
- Study of different types of production, Knowledge of group technology (GT).
- Detailed study of Computer Aided Quality Control.

UNIT-I

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

Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, clipping.

UNIT-II

Geometric modeling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT-III

Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT-IV

Group Technology: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT-V

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, noncontact inspection methods-optical, noncontact inspection methods-nonoptical, computer aided testing, integration of CAQC with CAD/CAM.

Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, human labor in the manufacturing systems, CIMS benefits.

TEXT BOOKS:

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH Publishers
2. CAD / CAM /A Zimmers & P.Groover/PE/PHI Publishers
3. Automation, Production systems & Computer integrated Manufacturing/ Groover/ Pearson Education

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

OUTCOMES:

- Understand the applications of computer in the design and manufacturing.
- Understand and develop the Mathematical representations of curves used in geometric construction.
- Understand the concept and working principle of NC, CNC, and DNC and can develop a program using G and M codes.
- Make use of GT, FMS and CAPP concepts and are able to apply these concepts in bringing the benefits of mass production in real working environment.
- Plan the computer integrated production planning in working environment and able to analyze the quality of a product through computer aided quality control

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L	T/P/D	C
3	0	3

(R17A0323) AUTOMOBILE ENGINEERING (CORE ELECTIVE – II)

Objectives:

- The objective of this subject is to provide knowledge about various systems involved in automobile engine.
- Able to learn about different components of IC Engines.
- Different automobile engine systems line diagrams.

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.

TEXT BOOKS:

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.

REFERENCE BOOKS:

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.

OUTCOMES:

- The Automotive Engineering program aims to provide practice-oriented education based on the latest scientific results and methods.
- Which enable students to work independently as automotive engineers.
- Enables to face increasing challenges and standards of global markets.

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(R17A0324) COMPUTATIONAL FLUID DYNAMICS (CORE ELECTIVE – II)

Objectives:

To enable the students to

- Provide with sufficient background to understand the mathematical representation of the governing equations of fluid flow and heat transfer.
- Solve one and two-dimensional ordinary and partial differential equations using traditional CFD tools.
- Understand the various discretization techniques.
- Understand the turbulence models and grid generation techniques.
- How to apply explicit, implicit and semi-implicit methods of finite differencing.
- To help the students solve fluid flow field using some popular CFD techniques

UNIT-I

Governing Equations and Boundary Conditions: Basics of computational fluid dynamics – Governing equations of fluid dynamics – Continuity, Momentum and Energy equations – Chemical species transport – Physical boundary conditions – Time-averaged equations for Turbulent Flow – Turbulent–Kinetic Energy Equations – Mathematical behaviour of PDEs on CFD – Elliptic, Parabolic and Hyperbolic equations.

UNIT-II

Finite Difference and Finite Volume Methods for Diffusion: Derivation of finite difference equations – Simple Methods – General Methods for first and second order accuracy – Finite volume formulation for steady state One, Two and Three -dimensional diffusion problems – Parabolic equations – Explicit and Implicit schemes – Example problems on elliptic and parabolic equations – Use of Finite Difference and Finite Volume methods.

UNIT-II

Finite Volume Method for Convection Diffusion: Steady one-dimensional convection and diffusion – Central, upwind differencing schemes properties of discretization schemes – Conservativeness, Boundedness, Transportiveness, Hybrid, Power-law, QUICK Schemes.

UNIT-IV

Flow Field Analysis: Finite volume methods -Representation of the pressure gradient term and continuity equation – Staggered grid – Momentum equations – Pressure and Velocity corrections – Pressure Correction equation, SIMPLE algorithm and its variants – PISO Algorithms.

UNIT-V

Turbulence Models and Mesh Generation: Turbulence models, mixing length model, Two equation (k- ϵ) models – High and low Reynolds number models – Structured Grid generation – Unstructured Grid generation – Mesh refinement – Adaptive mesh – Software tools.

TEXT BOOKS:

1. Versteeg, H.K., and Malalasekera, W., “An Introduction to Computational Fluid Dynamics: The finite volume Method”, Pearson Education Ltd. Second Edition, 2007.
2. Ghoshdastidar, P.S., “Computer Simulation of flow and heat transfer”, Tata McGraw Hill Publishing Company Ltd., 1998.
2. Patankar, S.V. “Numerical Heat Transfer and Fluid Flow”, Hemisphere Publishing Corporation, 2004. AULibrary.com 99.

REFERENCE BOOKS:

1. J.D. Anderson, Jr., (2000), Computational Fluid Dynamics – The basics with applications, McGraw-Hill, Inc.
2. Muralidhar, K., and Sundararajan, T., “Computational Fluid Flow and Heat Transfer”, Narosa Publishing House, New Delhi, 1995.
3. Prodip Niyogi, Chakrabarty, S.K., Laha, M.K. “Introduction to Computational Fluid Dynamics”, Pearson Education, 2005.

OUTCOMES:

- Demonstrate & explain geometrical model of a fluid flow.
- Describe specific boundary conditions and solution parameters.
- Analyze the results and draw the appropriate inferences.
- Solve fluid flow fields using CFD methods
- Model fluid flow problems and heat transfer.

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(R17A0325) COMPOSITE MATERIALS (CORE ELECTIVE – II)

Objectives:

- To be familiar with classification and characteristics of composite material and their applications.
- To gain the knowledge about manufacturing methods of composites .
- To know the testing methods related to composite materials.

UNIT-I

Introduction: Definitions, Composites, Reinforcements and matrices, Types of reinforcements, Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Applications of metal, ceramic and polymer matrix composites.

UNIT-II

Manufacturing methods: Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength.

UNIT-III

Mechanical Properties -Stiffness and Strength: Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements –Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

UNIT-IV

Laminates: Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Plate Stiffness and Compliance, Computation of Stresses, Types of Laminates -, Symmetric Laminates, Anti-symmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Cross-ply Laminate, Angle-ply Laminate. Orthotropic Laminate, Laminate Moduli, Hygrothermal Stresses.

UNIT-V

Joining Methods and Failure Theories : Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures.

TEXT BOOKS:

1. K.K. Chawla, (1998), Composite Materials, Springer-Verlag, New York
2. B.T. Astrom, (1997), Manufacturing of Polymer Composites, Chapman & Hall
3. Composite materials by J.N.Reddy

REFERENCE BOOKS:

1. Stuart M Lee, J. Ian Gray, Miltz, (1989), Reference Book for Composites Technology, CRC press
2. Frank L Matthews and R D Rawlings, (2006), Composite Materials: Engineering and Science, Taylor and Francis.
3. D. Hull and T.W. Clyne, (1996), Introduction to Composite Materials, Cambridge University Press
4. Analysis and Performance of Fiber Composites by Bhagwan D. Agarwal
5. Mechanics of Composite Materials by Autar K. Kaw

OUTCOMES :

- To provide knowledge on characteristics of composites
- To get knowledge on manufacturing and testing methods and mechanical behavior of composites.
- To get the exposure of different materials.



OPEN ELECTIVES III

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**OPEN ELECTIVE III
(R17A0454) ROBOTICS & AUTOMATION**

COURSE OBJECTIVES:

1. This introductory course is valuable for students who wish to learn about robotics through a study of industrial robot systems analysis and design.
2. This course is suited to students from engineering and science backgrounds that wish to broaden their knowledge through working on a subject that integrates multi-disciplinary technologies.

UNIT – I

Introduction & Basic Definitions: History of robots-robot anatomy, Coordinate Systems, Human arm Characteristics, Cartesian, Cylindrical, Polar, coordinate frames, mapping transform.

UNIT – II

Kinematics – Inverse Kinematics: Kinematics, Mechanical structure and notations, description of links and joints, Denavit Hatenberg notation, manipulator transformation matrix, examples inverse kinematics.

UNIT – III

Differential Motion – Statics – Dynamic Modeling: Velocity Propagation along links, manipulator Jacobian – Jacobian singularities – Lagrange Euler formulation Newton Euler formulation basics of trajectory planning.

UNIT – IV

Robot Systems : Actuators Sensors and Vision: Hydraulic and Electrical Systems Including Pumps, valves, solenoids, cylinders, stepper motors, Encoders and AC Motors Range and use of sensors, Micro switches, Resistance Transducers, Piezo-electric, Infrared and Lasers Applications of Sensors : Reed Switches, Ultrasonic, Barcode Readers and RFID – Fundamentals of Robotic vision.

UNIT – V

Robots and Applications: Industrial Applications – Processing applications – Assembly applications, Inspection applications, Non Industrial applications.

TEXTBOOKS

1. Robotics and Control: R.K. Mittal and I.J. Nagarath, TMH 2003.
2. Introduction to Robotics – P.J. Mckerrow, ISBN: 0201182408

REFERENCES

1. Robotics – K.S. Fu, R.C. Gonzalez and C.S.G. Lee, 2008, TMH.
2. Introduction to Robotics – S. Nikv, 2001, Prentice Hall,
3. Mechatronics and Robotics: Design & Applications – A. Mutanbara, 1999, CRC Press.

COURSE OUTCOMES:

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

1. Describe the various elements that make an industrial robot system
2. Discuss various applications of industrial robot systems
3. Analyze robot manipulators in terms of their kinematics, kinetics, and control
4. Model robot manipulators and analyze their performance, through running simulations using
a MATLAB-based Robot Toolbox
5. Select an appropriate robotic system for a given application and discuss the limitations of such a system
6. Program and control an industrial robot system that performs a specific task.

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3	-/-/-	3

OPEN ELECTIVE III

(R17A1253)MANAGEMENT INFORMATION SYSTEMS

Course Objective:

- To understand the competitive advantage of using information systems in the organization for the needful assistance in decision making and management.
- To learn how to plan for information systems & implementation
- To study about security aspects of information systems

Unit-I:

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

Case Study: MIS at any business establishment.

Unit-II:

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

Case Study: Knowledge Management Systems at an Enterprise.

Unit-III:

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

Effectiveness of MIS: A Case Study.

Unit-IV:

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

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

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

Unit-V:

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

TEXT BOOK

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

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. Magento for Ecommerce (B2B Commerce) - <https://magento.com/>
8. Adempiere – ERP : <http://www.adempiere.net/web/guest/welcome>
9. Analytica – DSS - <http://www.lumina.com>
10. OpenRules – Business Rules and Decision Management system - <http://openrules.com/>

Course Outcome:

- a) Ability to apply Concepts & applications of Management Information Systems.
- b) Ability to perform Information Systems Planning & Implementations.
- c) Ability to adapt Cyber crime and information security procedures.

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**OPEN ELECTIVE III
(R17A0520) WEB TECHNOLOGIES**

COURSE OBJECTIVES:

- Giving the students the insights of the Internet programming and how to design and implement complete applications over the web.
- It covers the notions of Web servers and Web Application Servers, Design Methodologies with concentration on Object-Oriented concepts, Client-Side
- Programming, Server-Side Programming, Active Server Pages, Database Connectivity to web applications, Adding Dynamic content to web applications,
- Programming Common Gateway Interfaces, Programming the User Interface for the web applications.

UNIT I:

Web Basics and Overview: Introduction to Internet, World Wide Web, Web Browsers, URL, MIME, HTTP, Web Programmers Tool box.

HTML Common tags: List, Tables, images, forms, frames, Cascading Style Sheets (CSS) & its Types. Introduction to Java Script, Declaring variables, functions, Event handlers (onclick, onsubmit, etc.,) and Form Validation.

UNIT II:

Introduction to XML: Document type definition, XML Schemas, Presenting XML , Introduction to XHTML, Using XML Processors: DOM and SAX.

PHP: Declaring Variables, Data types, Operators, Control structures, Functions.

UNIT III:

Web Servers and Servlets: Introduction to Servlets, Lifecycle of a Servlet, JSDK, Deploying Servlet, The Servlet API, The javax. Servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Cookies and Session Tracking.

UNIT IV:

Database Access: Database Programming using JDBC, JDBC drivers, Studying Javax.sql.* package, Connecting to database in PHP, Execute Simple Queries, Accessing a Database from a Servlet. Introduction to struts frame works.

UNIT V:

JSP Application Development: The Anatomy of a JSP Page, JSP Processing. JSP Application Design and JSP Environment, JSP Declarations, Directives, Expressions, Scripting Elements, implicit objects. **Java Beans:** Introduction to Beans, Deploying java Beans in a JSP page.

TEXT BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNITs 1, 2)
2. Core SERVLETS AND JAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson (UNITs 3, 4, 5)

REFERENCE BOOKS:

1. Programming world wide web-Sebesta, Pearson Education, 2007.
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/ Pearson Education Asia.
3. Jakarta Struts Cookbook, Bill Siggelkow, S P D O' Reilly for chap 8.
4. March's beginning JAVA JDK 5, Murach, SPD
5. An Introduction to WEB Design and Programming – Wang-Thomson
6. PHP: The Complete Reference Steven Holzner Tata McGraw-Hill.

OUTCOMES:

- Understand the insights of the Internet programming and how to design and implement complete applications over the web.
- Understands the notions of Web servers and Web Application Servers, Design Methodologies with concentration on Object-Oriented concepts, Client-Side
- Understand Programming, Server-Side Programming, Active Server Pages, Database Connectivity to web applications, Adding Dynamic content to web applications,
- Understand Programming Common Gateway Interfaces, Programming the User Interface for the web applications.

OPEN ELECTIVE III
(R17A0553) DATA STRUCTURES USING PYTHON

OBJECTIVES:

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

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

OUTCOMES:

Upon completion of the course, students will be able to

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

TEXT BOOKS

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

REFERENCE BOOKS:

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

**OPEN ELECTIVE III
(R17A0554) PYTHON PROGRAMMING**

III Year B. Tech IT -II Sem

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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 DATA, EXPRESSIONS, STATEMENTS

Introduction to Python and installation , data types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments.

UNIT II

CONTROL FLOW, LOOPS

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue.

UNIT III

FUNCTIONS, ARRAYS

Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module;
python arrays, Access the Elements of an Array, array methods.

UNIT IV

LISTS, TUPLES, DICTIONARIES

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension;

UNIT V

FILES, MODULES, PACKAGES

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules.

OUTCOMES:

Upon completion of the course, students will be able to

- 1) Read, write, execute by hand simple Python programs.
- 2) Structure simple Python programs for solving problems.

- 3) Decompose a Python program into functions.
- 4) Represent compound data using Python lists, tuples, dictionaries.
- 5) Read and write data from/to files in Python Programs

TEXT BOOKS

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

REFERENCE BOOKS:

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

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OPEN ELECTIVE III

(R15A0354) NANO TECHNOLOGY

OBJECTIVES:

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

UNIT-I

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

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

UNIT-II

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

Electrical properties: Switching glasses with nanoparticles, Electronic conduction with nanoparticles.

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

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

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

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

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

TEXT BOOKS:

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

REFERENCES BOOKS:

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

OUTCOMES:

- 1) Will familiarize about the science of Nano Technology.
- 2) Will demonstrate the preparation of Nano Technology.
- 3) Will develop knowledge in characteristic Nano Technology & Nano Materials.

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**OPEN ELECTIVE III
(R17A0355) TOTAL QUALITY MANAGEMENT**

OBJECTIVES:

- To facilitate the understanding of Quality Management principles and process.
- To understand Customer focus, Employee focus and their involvement and Supplier Management.

UNIT – I

Introduction, The concept of TQM, Quality and Business performance, attitude, and involvement of top management, communication, culture and management systems. Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs. Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling.

UNIT -II

Customer Focus and Satisfaction: internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer – Supplier relationships. Bench Marking: Evolution of Bench Marking, meaning of bench marking, benefits of bench marketing, the bench marking procedure, pitfalls of bench marketing.

UNIT- III

Organizing for TQM: The systems approach, organizing for quality implementation, making the transition from a traditional to a TQM organization, Quality Circles, seven Tools of TQM: Stratification, check sheet, Scatter diagram, Kepner &Tregoe Methodology.

UNIT- IV

The Cost of Quality: Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost information, Accounting Systems and Quality Management.

UNIT –V

ISO9000: Universal Standards of Quality: ISO around the world, The ISO9000 ANSI/ASQC Q-90. Series Standards, benefits of ISO9000 certification, the third party audit, Documentation ISO9000 and services, the cost of certification implementing the system.

TEXT BOOK:

- Total Quality Management / Joel E. Ross/Taylor and Francis Limited
- Total Quality Management/P. N. Mukherjee/PHI

REFERENCE BOOKS:

- Beyond TQM / Robert L.Flood
- Total quality management by Paneer Selvam
- Statistical Quality Control / E.L. Grant.
- Total Quality Management:A Practical Approach/H. Lal
- Quality Management/Kanishka Bedi/Oxford University Press/2011
- Total Engineering Quality Management/Sunil Sharma/Macmillan

OUTCOMES:

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
- To give the students an overview of TQM, various Quality aspects and importance of Top Management Commitment in any organization for maintaining product / services quality.

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L	P	C
0	3	2

(R17A0387) HEAT TRANSFER LAB**Objectives :**

- Student able to learn about various modes of heat transfer in Composite walls and Powders
- Learn heat exchanger principles
- Student know about different modes of heat transfer.

LIST OF EXPERIMENTS:

1. Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere
4. Thermal Conductivity of given metal rod.
5. Heat transfer in pin-fin.
6. Experiment on Transient Heat conduction.
7. Heat transfer in forced convection apparatus.
8. Heat transfer in natural convection.
9. Parallel and counter flow heat exchanger.
10. Emissive apparatus.
11. Stefan Boltzman Apparatus.
12. Critical Heat flux apparatus.
13. Study of heat pipe and its demonstration.

Note: Total 10 experiments are to be conducted.

OUTCOMES :

Students get exposure to

- Thermal Conductivity measurement, Convection measurement.
- Determination of effectiveness of heat exchangers .
- Student get the exposures of conduction and convection methods.

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L	P	C
0	3	2

(R17A0388) COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING LAB

Objectives:

The students will learn to:

- Explain basic concepts of CIM systems
- Develop machining programs for CNC equipment
- Develop PLC-based control systems for manufacturing cells

LIST OF EXPERIMENTS:

- 1) Determination of deflection and stresses in 2D and 3D trusses and beams.
- 2) Determination of deflections component and principal and Von-mises stresses in .plane stress, plane strain and Axisymmetric components.
- 3) Determination of stresses in 3D and shell structures (at least one example in each . case)
- 4) Estimation of natural frequencies and mode shapes, Harmonic response of 2D beam.
- 5) Steady state heat transfer Analysis of plane and Axisymmetric components.
- 6) Development of process sheets for various components based on tooling Machines.
- 7) Development of manufacturing and tool management systems.
- 8) Study of various post processors used in NC Machines.
- 9) Development of NC code for free form and sculptured surfaces using CAM packages.
- 10) Machining of simple components on NC lathe by transferring NC Code / from a CAM package.

Any Three Software Packages from the following:

Use of Auto CAD, Micro Station, CATIA, Pro-E, I-DEAS, ANSYS, NISA, CAEFEM, Gibbs CAM, Master CAM etc.

Open source Softwares :

MAT LAB, NASTRON, HYPERMESH, PATRAN

OUTCOMES:

This course primarily contributes to Mechanical Engineering program outcomes:

- An ability to apply knowledge of mathematics, science, and engineering
- An ability to design a system, component, or process to meet desired needs within realistic constraints.
- Economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

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L	P	C
0	3	2

(R17A0007) TECHNICAL COMMUNICATION AND SOFT SKILLS

Objectives:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to approach academic subjects more professionally using the theoretical and practical components of the English syllabus.
- To develop the professional skills and communication skills in formal and informal situations and hone the required professional ethics.

UNIT-I

Advanced Grammar : Study of advanced grammar ,transformation of sentences, tenses, concord, voices, correction of sentences.

UNIT-II

Principles of effective writing : Technical writing, Writing drafts and revising, Collaborative Writing, technical writing style and language, editing strategies to achieve appropriate technical style.

UNIT-III

Professional Communication: Extempore, Group discussion ,oral presentation, interviews, Graphic presentation, presentation aids, rapid reading, writing reports,e-mail writing, Official notes, business letters, memos, minutes of meetings.

UNIT-IV

Self Development and Assessment: Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, self esteem.

UNIT-V

Ethics: Business ethics, , Personality Development in social and office settings, netiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Complex problem solving, Creativity, leadership skills ,cubicle Etiquettes, team building.

TEXT BOOKS:

1. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. . NewYork, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843) .
3. Shiv Khera, You can win , Macmillan Books,New York , 2003.

4. Raman Sharma , Technical Communications , Oxford Publication , London, 2004.
5. Meenakshi Raman , Prakash Singh , Business Communication , Oxford Publication, New Delhi 2012.

REFERENCE BOOKS:

1. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
2. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
3. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

OUTCOMES:

- The student will become proficient in LSRW skills.
- They develop formal LSRW skills approach to different situations.
- They hone professional ethics and learn to be proficient formally

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L	T/P/D	C
4	1	4

(R17A0326) POWER PLANT ENGINEERING

Objectives:

- To create awareness about working and availability of product/system as and when required and
- Working to its fullest capacity & efficiency to the satisfaction of the end user.
- Able to learn about different power plants.

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 & Optimisation. 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.Kataria Publisher
3. A Text Book of Power Plant Engineering / R.K.Rajput / Laxmi Publications

REFERENCE BOOKS:

1. Power Plant Engineering/ P.K.Nag II Edition /TMH Publishers
2. An Introduction to Power Plant Technology / G.D. Rai/Khanna Publishers
3. Power plant Engg /Elanchezhian/I.K. International Publishers

OUTCOMES:

- Students learn about the failures, maintainability and availability of the intended products/systems and services
- Students get the exposure of different pollution standards.
- Students get the exposure of different power distribution techniques.

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L	T/P/D	C
3	1	3

(R17A0327) AUTOMATION AND CONTROL ENGINEERING**Objectives:**

- To perform one or more processing operations
- To perform a sequence of automated assembly operations.
- FMS-a highly automated machine cell that produces parts
- To learn the different system controls and process controls in Automation

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.

OUTCOMES:

- The importance of automation in industries.
- Understand the different types of automation and strategies.
- To know the types of controls and its importance.

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L	T/P/D	C
3	0	3

(R17A0328) MECHANICAL MEASUREMENTS AND INSTRUMENTATION

Objectives:

- To impart knowledge of architecture of the measurement system.
- To deliver working principle of mechanical measurement system.
- To study concept of mathematical modeling of the control system. To analyse control system under different time domain

UNIT –I

Definition – Basic principles of measurement – Measurement systems, generalized configuration and functional descriptions of measuring instruments – examples. Dynamic performance characteristics – sources of error, Classification and elimination of error.

Measurement of Displacement: Theory and construction of various transducers to measure displacement – Piezo electric, Inductive, capacitance, resistance, ionization and Photo electric transducers, Calibration procedures.

UNIT –II

Measurement of Temperature: Classification – Ranges – Various Principles of measurement – Expansion, Electrical Resistance – Thermistor – Thermocouple – Pyrometers – Temperature Indicators.

Measurement of Pressure: Units – classification – different principles used. Manometers, Piston, Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement – Thermal conductivity gauges – ionization pressure gauges, McLeod pressure gauge.

Measurement of Level: Direct method – Indirect methods – capacitive, ultrasonic, magnetic, cryogenic fuel level indicators – Bubbler level indicators.

UNIT –III

Flow Measurement: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot – wire anemometer, Laser Doppler Anemometer (LDA).

Measurement of Speed: Mechanical Tachometers – Electrical tachometers – Stroboscope, Noncontact type of tachometer

Measurement of Acceleration and Vibration: Different simple instruments – Principles of Seismic instruments – Vibrometer and accelerometer using this principle.

UNIT –IV

Stress Strain Measurements: Various types of stress and strain measurements – electrical strain gauge – gauge factor – method of usage of resistance strain gauge for bending compressive and tensile strains – usage for measuring torque, Strain gauge Rosettes.

Measurement of Humidity – Moisture content of gases, sling psychrometer, Absorption psychrometer, Dew point meter.

UNIT –V

Measurement of Force, Torque And Power- Elastic force meters, load cells, Torsion meters, Dynamometers.

Elements of Control Systems: Introduction, Importance – Classification – Open and closed systems Servomechanisms– Examples with block diagrams–Temperature, speed & position control systems.

TEXT BOOKS:

1. Mechanical Measurements / Beck With, Marangoni, Linehar/ PHI Publisher
2. Measurement Systems: Applications & design / D.S Kumar/McGraw Hill Publishers
3. Mechanical Measurements /Shawney/McGraw Hill Publishers

REFERENCE BOOKS:

1. Experimental Methods for Engineers / Holman/ McGraw-Hill Education
2. Mechanical and Industrial Measurements / R.K. Jain/ Khanna Publishers.
3. Instrumentation and Mechanical Measurements / A.K. Tayal / Galgotia Publications.

OUTCOMES:

- Learner should be able to Identify and select proper measuring instrument for specific application Illustrate working principle of measuring instruments.
- Explain calibration methodology and error analysis related to measuring instruments
- Mathematically model and analyze.

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L	T/P/D	C
4	0	4

(R17A0329) PRODUCTION AND OPERATIONS MANAGEMENT

Objectives:

- To provide a comprehensive exposure to Production and operations management and its significance in Industries.
- To acquaint students with various activities of Production and operations management and to give insight into the ongoing & futuristic trends in the control of inventory.
- To appraise about need and benefits of functions related to products and processes.

UNIT-I

Introduction to Operations Management:

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 ,life cycle management - Inter Relationship between product life cycle and process life cycle.

UNIT-II

Scheduling and control of production operations:

Aggregate planning, MPS, Operations scheduling, Product sequencing: Sequencing of products in multi- product multi-stage situations - Plant Capacity and Line Balancing. Plant layout -different types of layouts. Location and the factors influencing location. Maintenance Management: Objectives – Failure Concept, Reliability, Preventive and Breakdown maintenance, Replacement policies

UNIT-III

Forecasting: Importance of forecasting – Types of forecasting, their uses – General principles of forecasting – Forecasting techniques – qualitative methods and quantitative methods.

UNIT-IV

Resource requirement planning: Resource requirement planning, material requirement planning-manufacturing resource planning-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 and design of handling system-types of material handling equipment-material handling and plant lay out-evaluation of materials handling performance-safety in material handling.

TEXT BOOKS:

1. Aswathappa K. and Sridhara Bhat, “Production and Operations Management”, 2010, HPH.
2. Mahadevan. B, “Operations Management”, 2010, Pearson Education.
3. Paneer Selvam - Production and Operations Management , PHI 2006

REFERENCE BOOKS:

1. Buffa E, Modern Production and Operations Management , John wiley 2007
2. Chary SN, Production and Operations Management , TMH,2009
3. P Rama Murthy -Production and Operations Management , New Age International ,2005

OUTCOMES:

- The student will be able to Illustrate production planning functions and manage manufacturing functions in a better way.
- Develop competency in scheduling and sequencing in manufacturing operations and effect affordable manufacturing lead time.
- Manage and control inventory with cost effectiveness. Get conversant with various documents procedural aspects and preparation of orders for various manufacturing methods.

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L	T/P/D	C
3	0	3

(R17A0330) SMART MANUFACTURING TECHNOLOGY (CORE ELECTIVE–III)

Objectives:

The objective of this course is to learn the statistics and optimization methodologies in smart manufacturing systems. 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.

UNIT I:

Computer Integrated Manufacturing Systems Structure and functional areas of CIM system, - CAD, CAPP, CAM, CAQC, ASRS. Advantages of CIM. Manufacturing Communication Systems - MAP/TOP, OSI Model, Data Redundancy, Top- down and Bottom-up Approach, Volume of Information. Intelligent Manufacturing System Components, System Architecture and Data Flow, System Operation.

UNIT II

Components of Knowledge Based Systems - Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Inference Engine, Knowledge Acquisition.

UNIT III

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

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.

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L	T/P/D	C
3	-	3

(R17A0331) HEATING VENTILATION AND AIR CONDITIONING (CORE ELECTIVE -III)

Objectives:

- The course aims to emphasize the importance of heating and ventilation systems.
- This program includes heating, ventilation and air conditioning. Through problem solving, inquiry and analysis skills gained while in the HVAC program, students are prepared to become industry leaders. Upon satisfactory completion, the student is prepared to understand theory, working principles and load calculation of air conditioning systems.

UNIT I

INTRODUCTION TO HVAC: Fundamentals-Modes of Heat Transfer-Sensible Heat and Latent Heat-**Basic Components of Air-Conditioning and Refrigeration machines**-Basic Refrigeration System or Vapor Compression Cycle-Pressure – Enthalpy Chart-Function & Types of Compressor-Function & Types of Condenser-Function & Types of Expansion Valves, Function & Types of Evaporator-Accessories used in the System-Refrigerant and Brines

UNIT II

CLASSIFICATION OF AIR-CONDITIONING SYSTEM: **Window A/C**-Working of Window A/C with Line Diagrams-**Split A/C**-Types - Working of Split A/C with Line Diagrams-**Ductable Split A/C**-Working of Ductable Split A/C with Line Diagrams-Variable Refrigerant Volume (VRV)/ Variable Refrigerant Flow (VRF)-**Ductable Package A/C**-Working of Ductable Package A/C with Line Diagrams

UNIT III

STUDY OF PSYCHROMETRIC CHARTS: Dry Bulb Temperature-Wet Bulb Temperature-Dew Point Temperature-Relative Humidity-Humidity Ratio-Processes, Heating, Cooling, Cooling and Dehumidification, Heating and Humidification

UNIT IV

LOAD CALCULATION:Survey of Building-Cooling Load Steps-Finding Temperature difference (ΔT)- Wall, Glass, Roof, partition-Finding 'U' Factor-Wall, Glass, Roof, Partition-Finding Ventilation requirement for IAQ-Load Calculations (Manually using E-20 form)- ESHF, ADP & Air Flow Rate (CFM) Calculation

UNIT V

STATIC PRESSURE CALCULATION: Selection of Motor HP-Selection Fan/Blower RPM-**Hydronic System**-Classification of Water Piping-Pipe sizing for chill water system-Fittings used in the HVAC Piping System-Valves used in the HVAC Piping System-Function of Valves-Openings for CHW Pipes passing through Wall-Sectional drawing @ CHW Pipe supports-Pump Head Calculation-Selection of Pump

REFERENCES:

1. HVAC Fundamentals Volume-I / James E. Brumbou / Audel / 4 Edition
2. Fundamentals of HVAC Systems / Robert Mcdowall / Academic Press / 2007
3. Home Heating & Air Conditioning systems / James Kittle / MGH
4. HVAC Fundamentals / Samuel C. Sugarman / Fairmont Press / 2005.
5. R&AC Hand Book by ISHRAE
6. Ventilation Systems: Design and Performance/ Hazim B. Awbi. / Routledge / 2007.
7. Portable Ventilation Systems Hand Book / Neil McManus / CRC Press / 2000.
8. Design of Industrial Ventilation Systems / John L Alden / Industrial Press / 5 Edition.
9. Industrial Ventilation Applications / ISHRAE Hand Book / 2009.
10. HVAC Hand book / ISHRAE.

OUTCOMES:

- The student shall understand the principles and working HVAC systems
- To be able to study and analyze psychrometric chart in refrigeration systems. Develop problem solving skills through the application of thermodynamics.
- With the help of psychrometric chart student solve problems associated with heating and cooling systems.

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L	T/P/D	C
3	0	3

**(R15A0332) PRODUCT DESIGN AND DEVELOPMENT
(CORE ELECTIVE–III)****Objectives:**

The course aims at providing the basic concepts of product design, product features and its architecture so that student can have a basic knowledge in the common features a product has and how to incorporate them suitably in product.

UNIT-I

Introduction: Design theory, design materials, human factors in design, man-machine system, applied ergonomics, characteristics of successful product development, challenges to product development. Development process and product planning: Generic development process, Concept development, product development process flows, product planning process, identify customer needs.

UNIT-II

Product specifications and concept generation: Product specification, steps to establish the target specifications, Concept generation, five step concept generation method, concept selection, concept screening, concept testing, product architecture.

UNIT-III

Product design methods: Creative and rational, clarifying objectives - the objective tree method, establishing functions- the function analysis method, setting requirements – the performance specification method, determining characteristics – the QFD method, generating alternatives – morphological chart method, evaluating alternatives – the weighted objective method, improving details – the value engineering method and design strategies.

UNIT-IV

Design for manufacture: Estimating manufacturing cost, reducing component, assembly and support costs, design for assembly, design for disassembly, design for environment, design for graphics and packaging, effective prototyping – principle and planning.

UNIT-V

Fundamentals of PLM: Product data or Product information, Product lifecycle management concept, Information models and product structures-Information model, the product information (data) model, the product model, Reasons for the deployment of PLM systems.
Enterprise solution with PLM: Use of product lifecycle management systems in different organization verticals, Product development and engineering, Impact of Manufacturing with PLM Challenges of product management in the engineering and manufacturing industry, Life cycle thinking, and value added services and after sales.

TEXT BOOKS:

- 1) K.T. Ulrich and S.D. Eppinger, "Product design and development", Tata McGraw Hill
- 2) Chitale & Gupta, "Product Development", Tata McGraw Hill
- 3) Monks, J. G., "Operations Management", McGraw Hill, 1997.

REFERENCE BOOKS:

- 1) George Dietor, A material and Processing approach, McGraw Hill.
- 2) Kemneth Crow,"Concurrent Engg./Integrated Product Development", DRM Associates,26/3, Via Olivera, Palos Verdes, CA 90274(310) 377-569, Workshop Book. Stephen Rosenthal, "Effective Product Design and Development", Business One Orwin, Homewood, 1992, ISBN 1-55623-603-4.
- 3) Staurt Pugh,"Tool Design – Integrated Methods for Successful Product Engineering", Addison Wesley Publishing, New york, NY.

OUTCOMES:

The student will be able to design some products for the given set of applications; also the knowledge gained through prototyping technology will help the student to make a prototype of a problem and hence product design and development can be achieved.

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L	T/P/D	C
3	0	3

(R17A0333) OPERATIONS RESEARCH (CORE ELECTIVE-IV)

Objectives:

- To familiarize the students with the use of practice oriented mathematical applications for optimization functions in an organization.
- To familiarize the students with various tools of optimization, probability, statistics and simulation,
- To applicable in particular scenarios in industry for better management of various resources.

UNIT-I**Introduction:** Development – Definition-Operation Research models– applications.**Resource Allocation:** Linear Programming Problem Formulation – Graphical solution – Simplex method –Artificial variables techniques -Big-M method**UNIT-II****Transportation Problem:** Formulation – Optimal solution, unbalanced transportation problem –Degeneracy.**Assignment problem** – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.**UNIT-III****Theory of Games:** Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.**UNIT-IV****Replacement Analysis:** Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.**Inventory:** Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed**UNIT-V****Sequencing:** Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.**Simulation:** Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

TEXT BOOKS:

1. S.D.Sharma - Operations Research , Kedarnath, Ramnath 2015
2. Hiller & Libermann - Introduction to O.R , Mc Graw Hill 2011
3. Taha - Introduction to O.R , PHI 2010

REFERENCE BOOKS:

1. A.M.Natarajan, P.Balasubramani,A. Tamilarasi -Operations Research , Pearson . Education.
2. R.Pannerselvam - Operations Research ,PHI Publications 2006
3. J.K.Sharma- Operation Research, MacMilan 2010

OUTCOMES:

- Student will be able to illustrate the need to optimally utilize the resources in various types of industries.
- Apply and analyze mathematical optimization functions to various applications.
- Demonstrate cost effective strategies in various applications in industry.

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L	T/P/D	C
3	0	3

**(R17A0334) MECHANICAL VIBRATIONS
(CORE ELECTIVE-IV)****Objectives:**

- Fully understand and appreciate the importance of vibrations in mechanical design of machine parts
- Operate in different vibratory conditions.
- To know about different degrees of freedom.

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: Vibrometers, velocity meters & accelerometers.

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.

OUTCOMES:

- Ability to analyze the mechanical model of a linear vibratory system
- To get the exposure of its response.
- Know about different Vibrometers.

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L	T/P/D	C
3	0	3

(R17A0335) HYDRAULICS AND PNEUMATICS (CORE ELECTIVE-IV)

Objectives:

- To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries.
- To provide students with an understanding of the fluids and components utilized in modern industrial fluid power system.
- To develop a measurable degree of competence in the design, construction and operation of fluid power circuits

UNIT-I

Fluid Power Principles 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 – Principles of flow - Friction loss – Work, Power and Torque Problems, Sources of Hydraulic power : Pumping Theory – Pump Classification – Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criteria of Linear and Rotary – Fixed and Variable displacement pumps – Problems.

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 – Applications – Accessories : Reservoirs, Pressure Switches – Applications – Fluid Power ANSI Symbols – Problems.

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, Electro hydraulic circuits, 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 – Elements – Ladder diagram – Problems, Introduction to fluidics and pneumatic logic circuits.

UNIT-V

Trouble Shooting and Applications: Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Design of hydraulic circuits for Drilling,

Planning, Shaping, Surface grinding, Press and Forklift applications. Design of Pneumatic circuits for Pick and Place applications and tool handling in CNC Machine tools – Low cost Automation – Hydraulic and Pneumatic power packs.

TEXT BOOKS:

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

REFERENCES:

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

OUTCOMES:

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

- Identify hydraulic and pneumatic components and its symbol and usage.
- Ability to design hydraulic and pneumatic circuits.

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L	P	C
0	3	2

(R17A0389) AUTOMATION AND CONTROL ENGINEERING LAB**Objectives:**

- To learn the different system controls and process control in Automation
- This course develops the students approach to identify different Control system components like Hydraulic, Pneumatic, Electrical and Electronic.
- They should able to understand different auxiliary process components like feeders, etc
- To Learn the Different Controller Programming

Any 10 of the following experiments has to be performed

1. Pick and Place operation by using Robotic Arm Gripper
2. Experiment on Navigation of Mobile Robot
3. Demonstration on Obstacle Detection and Avoidance for Mobile Robots
4. Simulation of the Hydraulic circuit for Series & Parallel Cylinders Connection
5. Simulation of Meter-In and Meter-Out
6. Experiment on Control of a Single-Acting Hydraulic Cylinder
7. Experiment on Control of a Double-Acting Hydraulic Cylinder
8. Experiment on Controlling a Traffic Light System Using PLC/Arduino
9. Experiment on Water level control using PLC/ Arduino
10. Experiment on lift control using PLC/ Arduino
11. Experiment on speed control of stepper motor
12. Experiment on P+I controller
13. Experiment on P+D controller
14. Experiment on P+I+D controller

OUTCOMES:

- Students will be able to Identify open and closed loop control system
- Formulate mathematical model for physical systems.
- Simplify representation of complex systems using reduction techniques.
- The students will demonstrate working of different pneumatic circuits like Single acting cylinder, Double acting cylinder, hydraulic braking systems by using directional control valves
- Understand working of PLC, I/O modules of PLC, Programming languages and instructions of PLC, design PLC based application by proper selection and sizing criteria, developing GUI and ladder program.

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IV Year B. Tech ME - I Sem

L	P	C
0	3	2

(R17A0390) MECHANICAL MEASUREMENTS AND INSTRUMENTATION LAB**Objectives:**

- To prepare the students for successful career in industry and motivate for higher education.
- To provide strong foundation in basic science and mathematics necessary to formulate, solve and analyze Control and Instrumentation problems
- To provide strong foundation in circuit theory, control theory and signal processing concepts.
- To provide good knowledge of Instrumentation systems and their applications.
- To provide knowledge of advanced control theory and its applications to engineering problems.
- Student able to 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.

OUTCOMES:

- At the end of the course, the student will be able to characterize and calibrate measuring devices.
- Identify and analyze errors in measurement.
- Analyze measured data using regression analysis.
- Calibration of Pressure Gauges, temperature, LVDT, capacitive transducer, rotameter.

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IV Year B. Tech, ME-II Sem

L	T/P/D	C
3	1	3

(R17A0336) INDUSTRIAL ENGINEERING AND MANAGEMENT (CORE ELECTIVE – V)

Objectives:

- The objective of this subject is to provide knowledge of Planning and control of Industrial and service oriented.
- Student able to learn about different organizational structures.
- Student able to learn about different work study techniques.

UNIT-I

Concepts of Management and Organisation – Functions of Management – Evolution of Management Thought , Taylor’s Scientific Management, Fayol’s Principles of Management, Douglas Mc-Gregor’s Theory X and Theory Y, Mayo’s Hawthorne Experiments, Hertzberg’s Two Factor Theory of Motivation, Maslow’s Hierarchy of Human Needs – Systems Approach to Management.

Designing Organisational Structures : Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

UNIT-II

Plant location: definition, factors affecting the plant location, comparison of rural and urban sites-methods for selection of plant- Matrix approach. Plant Layout – definition, objectives, types of production, types of plant layout – various data analyzing forms-travel chart.

Work Study: Definition, objectives, method study - definition, objectives, steps involved-various types of associated charts. Work measurement- definition, time study, Work Sampling – definition, steps involved, standard time calculations, differences with time study.

UNIT-III

Materials Management: Objectives, Inventory – functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory Control Systems-Continuous review system-periodical review system. Stores Management and Stores Records. Purchase management, functions of purchase of manager, associated forms.

TQM: Introduction to Total quality management, Gurus of TQM- Historic Review, Benefits of TQM- Leadership, Performance Measures-Basic concept-Strategy-Quality cost- Bench marking- reasons for bench marking-Process.

UNIT-IV

Introduction to PERT / CPM : Project management, Network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

UNIT-V

Inspection and quality control: Types of inspections - Statistical Quality Control-techniques-variables and attributes-assignable and non assignable causes- variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan- single sampling and double sampling plans-OC curves. Introduction to TQM-Quality Circles, ISO 9000 series procedures.

Introduction to Human Resource Management: Functions of HRM, Job Evaluation, different types of evaluation methods. Job description, Merit Rating.- difference with job evaluation, different methods of merit ratings and performance appraisal, wage incentives, different types of wage incentive schemes. Marketing, marketing vs selling, marketing mix, product life cycle.

TEXT BOOKS:

- 1) Amrine, Manufacturing Organization and Management, Pearson, 2nd Edition, 2004.
- 2) Industrial Engineering and Management O.P. Khanna Dhanpat Rai.
- 3) Industrial Engineering and Management by BUFFA .

REFERENCE BOOKS:

- 1) Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2005.
- 2) Phillip Kotler, Marketing Management, Pearson, 2004.
- 3) A.R.Aryasri, Management Science for JNTU (B.Tech), Tata McGraw-Hill, 2002.

OUTCOMES:

- Student should be able to understand the Planning, co-ordination between Production, Planning, and Designing.
- Organizational structure, Human resource planning and control systems in manufacturing and service.
- Student gets the exposure of Inspection and quality control techniques.

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IV Year B. Tech, ME-II Sem

L	T/P/D	C
3	1	3

(R17A0337) MAINTENANCE AND SAFETY ENGINEERING (CORE ELECTIVE–V)

Objectives:

- To ensure the desired plant availability at an optimum cost within the safety prescription.
- Student able to know about the objectives of maintenance.
- To minimize the total cost of unavailability and resources.

UNIT-I

Introduction to the Development of Industrial Safety and Management: History and development of Industrial safety: Implementation of factories act, Safety and productivity, Safety organizations. Safety committees and structure, Role of management and role of Govt. in industrial safety.

UNIT-II

Accident Preventions, Protective Equipments and the Acts: Personal protective equipment, Survey the plant for locations, Part of body to be protected, Education and training in safety, Prevention causes and cost of accident, Housekeeping, First aid, Firefighting equipment, Accident reporting, Investigations, Industrial psychology in accident prevention, Safety trials.

UNIT-III

Safety Acts: Features of Factory Act, Introduction of Explosive Act, Boiler Act, ESI Act, Workman's compensation Act, Industrial hygiene, Occupational safety, Diseases prevention, Ergonomics, Occupational diseases, stress, fatigue, health, safety and the physical environment, Engineering methods of controlling chemical hazards, safety and the physical environment, Control of industrial noise and protection against it, Code and regulations for worker safety and health.

UNIT-IV

Principles and Practices of Maintenance Planning: Basic Principles of maintenance planning – Objectives and principles of planned maintenance activity, Sound Maintenance systems – Reliability and machine availability, Equipment Life cycle, Measures for Maintenance Performance: Equipments breakdowns, Mean Time Between Failures and Repair, Factors of availability, Maintenance organization and economics.

UNIT-V**Maintenance Policies and Preventive Maintenance:**

Maintenance categories –Merits of each category – Preventive maintenance, Maintenance schedules: Repair cycle, Principles and methods of lubrication, Fault Tree Analysis, Total Productive Maintenance: Methodology and Implementation.

TEXT BOOKS:

- 1) Industrial Maintenance Management Srivastava, S.K. - S. Chand and Co.
- 2) Occupational Safety Management and Engineering Willie Hammer - Prentice Hall
- 3) Installation, Servicing and Maintenance Bhattacharya, S.N. - S. Chand and Co.

REFERENCE BOOKS:

- 1) Occupational Safety Management and Engineering Willie Hammer - Prentice Hall
- 2) Reliability, Maintenance and Safety Engineering by Dr. A.K.Guptha
- 3) A Textbook of Reliability and Maintenance Engineering by Alakesh Manna

OUTCOMES:

- Assemble, dismantle and align mechanisms in sequential order.
- Carry out plant maintenance using tri-bology, corrosion and preventive maintenance.
- Student gets the exposure of Maintenance Policies and Preventive Maintenance.

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L	T/P/D	C
3	1	3

**(R17A0338) NON DESTRUCTIVE TESTING
(OPEN ELECTIVE-V)****Objectives:**

- To study and understand the various Non-Destructive Evaluation and Testing methods, theory and their industrial applications.

UNIT I:

Overview of NDT: NDT Versus Mechanical testing, Overview of the Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterization. Relative merits and limitations, various physical characteristics of materials and their applications in NDT. Visual inspection – Unaided and aided.

UNIT II:

Surface NDE methods: Liquid Penetrant Testing – Principles, types and properties of liquid penetrants, developers, advantages and limitations of various methods, Testing Procedure, Interpretation of results. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetization methods, Interpretation and evaluation of test indications, Principles and methods of demagnetization, Residual magnetism.

UNIT III:

Thermography and Eddy Current Testing (ET): Thermography- Principles, Contact and non-contact inspection methods, Techniques for applying liquid crystals, Advantages and limitation – infrared radiation and infrared detectors, Instrumentations and methods, applications. Eddy Current Testing-Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Probes, Instrumentation, Types of arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.

UNIT IV:

Ultrasonic Testing (UT) and Acoustic Emission (AE): Ultrasonic Testing-Principle, Transducers, transmission and pulse-echo method, straight beam and angle beam, instrumentation, data representation, A/Scan, B-scan, C-scan. Phased Array Ultrasound, Time of Flight Diffraction. Acoustic Emission Technique –Principle, AE parameters, Applications.

UNIT V:

Radiography Testing (RT): Principle, interaction of X-Ray with matter, imaging, film and film less techniques, types and use of filters and screens, geometric factors, Inverse square, law, characteristics of films – graininess, density, speed, contrast, characteristic curves, Penetrometers, Exposure charts, Radiographic equivalence. Fluoroscopy- Xero-Radiography, Computed Radiography, Computed Tomography.

TEXT BOOKS:

- 1) Baldev Raj, T.Jayakumar, M.Thavasimuthu “Practical Non-Destructive Testing”, Narosa Publishing House, 2009.
- 2) Ravi Prakash, “Non-Destructive Testing Techniques”, 1st revised edition, New Age International Publishers, 2010

REFERENCE BOOKS:

- 1) ASM Metals Handbook, “Non-Destructive Evaluation and Quality Control”, American Society of Metals, Metals Park, Ohio, USA, 200, Volume-17.
- 2) Paul E Mix, “Introduction to Non-destructive testing: a training guide”, Wiley, 2nd Edition New Jersey, 2005
- 3) Charles, J. Hellier, “ Handbook of Nondestructive evaluation”, McGraw Hill, New York 2001.
- 4) ASNT, American Society for Non Destructive Testing, Columbus, Ohio, NDT Handbook, Vol. 1, Leak Testing, Vol. 2, Liquid Penetrant Testing, Vol. 3, Infrared and Thermal Testing Vol. 4, Radiographic Testing, Vol. 5, Electromagnetic Testing, Vol. 6, Acoustic Emission Testing, Vol. 7, Ultrasonic Testing.

OUTCOMES:

Upon completion of this course, the students can able to use the various Non-Destructive Testing and Testing methods understand for defects and characterization of industrial components

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L	T/P/D	C
3	1	3

(R17A0339) RENEWABLE ENERGY SOURCES (CORE ELECTIVE–VI)

Objectives:

- To explain concept of various forms of Non-renewable and renewable energy
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To analysis the environmental and cost economics of using renewable energy sources compared to fossil fuels.
- At the end of the course, the students are expected to identify the new methodologies / technologies for effective utilization of renewable energy sources

UNIT-I

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option. Environmental impact of solar power – Physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for 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, I.C. Engine operation, and economic aspects.

UNIT - IV

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India. OTEC: Principles, utilization, setting of OTEC plants, thermodynamic cycles. Tidal and Wave Energy: Potential and conversion techniques, mini-hydel power plants, their economics.

UNIT - V

Direct Energy Conversion: Need for DEC. Carnot cycle, limitations, Principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principle, faraday's laws, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

- Renewable Energy Sources I Twidell & Weir / Taylor and Francis / 2nd Special Indian Edition.
- Non- conventional Energy Sources / G.D. Rai / Dhanpat Rai and Sons.
- Renewable Energy Resources I Tiwari and Ghosal I Narosa.

REFERENCE BOOKS:

- Energy Resources Utilization and Technologies /Anjaneyulu & Francis/ BS Publications/2012.
- Principles of Solar Energy / Frank Krieth & John F Kreider / Hemisphere Publications.
- Non-Conventional Energy / Ashok V Desai I Wiley Eastern.
- Non-Conventional Energy Systems / K Mittal / Wheeler.
- Renewable Energy Technologies I Ramesh & Kumar / Narosa.

OUTCOMES:

- Understanding of commercial energy and renewable energy sources
- Knowledge in working principle of various energy systems
- Capability to do basic design of renewable energy systems
- Upon completion of this course, the students can able to identify the new methodologies / technologies for effective utilization of renewable energy sources.

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L	T/P/D	C
3	1	3

(R17A0340) BIO-MASS ENGINEERING (CORE ELECTIVE–VI)

Objectives:

- To have an exposure on the types of biomass, its surplus availability and characteristics. Analyze the technologies available for conversion of biomass to energy in terms of its technical competence and economic implications.

UNIT -I

Origin of Biomass: Resources - Classification and characteristics - Techniques for biomass assessment - Application of remote sensing in forest assessment - Biomass estimation.

UNIT -II

Thermochemical Conversion: Different processes - Direct combustion – Incineration – Pyrolysis - Gasification and liquefaction - Economics of thermochemical conversion.

UNIT -III

Biological Conversion: Biodegradation and biodegradability of substrate - Biochemistry and process parameters of biomethanation - Biogas digester types - Digester design and biogas utilization. Biomethanation Process - Economics of biogas plant with their environmental and social impacts - Bioconversion of substrates into alcohol - Methanol & ethanol Production - Organic acids – Solvents - Amino acids - Antibiotics etc.

UNIT-IV

Chemical Conversion: Hydrolysis & hydrogenation - Solvent extraction of hydrocarbons - Solvolysis of wood - Biocrude and biodiesel - Chemicals from biomass

UNIT -V

Power Generation: Utilisation of gasifier for electricity generation - Operation of spark ignition and compression ignition engine with wood gas – Methanol - ethanol & biogas - Biomass integrated gasification/combined cycles systems - Sustainable cofiring of biomass with coal - Biomass productivity - Energy plantation and power programme.

TEXTBOOKS:

1. Bio Energy Technology Thermodynamics and costs, David Boyles, Ellis Hoknood Chichester,1984.
2. Khandelwal KC, Mahdi SS, Biogas Technology – A Practical Handbook, Tata McGraw Hill, 1986.
3. Bio Energy for Rural Energisation, Mahaeswari, R.C. Concepts Publication,1997
4. Best Practises Manual for Biomass Briquetting, I R E D A, 1997.
5. The briquetting of Agricultural wastes for fuel, Eriksson S. and M. Prior, FAO Energy and Environment paper, 1990.

k. Thermochemical Characterization of Biomass, Iyer PVR , M N E S

REFERENCE BOOKS :

- a. Biotechnology and Alternative Technologies for Utilization of Biomass, Chakraverthy A
- b. Biogas Systems: Principles and Applications, Mital K.M
- c. Biomass Energy Systems, Venkata Ramana P and Srinivas S.N
- d. Gasification Technologies, A Primer for Engineers and Scientists Rezaian. J and N. P. Cheremisinoff.
- e. Biomass Gasification – Principles and Technology, Tom B Reed, Noyce Data Corporation, 1981.

OUTCOME:

Student gets A practical understanding on the various biomass energy conversion technologies and its relevance towards solving the present energy crisis.

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L	T/P/D	C
3	1	3

(R17A0341) ENERGY CONSERVATION AND MANAGEMENT (CORE ELECTIVE–VI)

Objectives:

- Understand and analyze the energy data of industries.
- Carryout energy accounting and balancing.
- Conduct energy audit and suggest methodologies for energy savings and utilize the available resources in optimal ways.

UNIT –I

Introduction: Energy – Power – Past & Present scenario of World; National Energy consumption Data – Environmental aspects associated with energy utilization –Energy Auditing: Need, Types, Methodology and Barriers. Role of Energy Managers. Instruments for energy auditing.

UNIT –II

Electrical Systems: Components of EB billing – HT and LT supply, Transformers, Cable Sizing, Concept of Capacitors, Power Factor Improvement, Harmonics, Electric Motors – Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types of lighting, Efficiency, LED Lighting and scope of Encon in Illumination.

UNIT –III

Thermal Systems: Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency computation and encon measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators & Refractories.

UNIT - IV:

Energy Conservation In Major Utilities: Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems – Cooling Towers – D.G. sets.

UNIT V:

Economics: Energy Economics – Discount Rate, Payback Period, Internal Rate of Return, Net Present Value, Life Cycle Costing –ESCO concept.

TEXT BOOKS:

- Energy Manager Training Manual (4 Volumes) available at www.energymanagertraining.com, a website administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India, 2004.

REFERENCES BOOKS :

- Witte. L.C., P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
- Callaghn, P.W. "Design and Management for Energy Conservation", Pergamon Press, Oxford, 1981.
- Dryden. I.G.C., "The Efficient Use of Energy" Butterworths, London, 1982
- Turner. W.C., "Energy Management Hand book", Wiley, New York, 1982.
- Murphy. W.R. and G. Mc KAY, "Energy Management", Butterworths, London 1987.

OUTCOMES:

Upon completion of this course, the students can able to analyze the energy data of industries.

- Can carry out energy accounting and balancing
- Can suggest methodologies for energy savings

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L	T/P/D	C
0	0	4

(R17A0392) MINI PROJECT

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IV Year B. Tech, ME-II Sem

L	T/P/D	C
0	6	2

(R17A0393) TECHNICAL SEMINAR

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IV Year B. Tech, ME-II Sem

L	T/P/D	C
0	15	12

(R17A0394) MAJOR PROJECT