SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY::PUTTUR

(AUTONOMOUS)

BACHELOR OF TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

INDUCTION PROGRAMME

S.No	Course Name	Category	L-T-P-C
1	Physical Activities—Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation To All Branches—Career Options, Tools, Etc.,	MC	3-0-0-0
4	Orientation On Admitted Brach—Corresponding Labs, Tools and Platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assesment On Basic Aptitude and Mathematical Skills	MC	2-0-3-0
7	Remidical Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills—Focus on Listening, Speaking, Reading, Writing Skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

B.Tech - I Year I Semester

S. No	Course Code	Name of the Subject	L	T	P/Drg	C
1.	23HS0810	Communicative English	2	0	0	2
2.	23HS0803	Engineering Chemistry	3	0	0	3
3.	23HS0830	Linear Algebra & Calculus	3	0	0	3
4.	23CE0101	Basic Civil & Mechanical Engineering	3	0	0	3
5.	23CS0501	Introduction to Programming	3	0	0	3
6.	23HS0811	Communicative English Lab	0	0	2	1
7.	23HS0804	Engineering Chemistry Lab	0	0	2	1
8.	23ME0301	Engineering Workshop	0	0	3	1.5
9.	23CS0502	Computer Programming Lab	0	0	3	1.5
10.	23HS0813	Health and Wellness, Yoga and Sports	0	0	1	0.5
		Total	**14**	**0**	**11**	**19.5**

B.Tech - I Year II Semester

S. No	Course Code	Name of the Subject	L	T	P/Drg	C
1.	23HS0840	Engineering Physics	3	0	0	3
2.	23HS0831	Differential Equations & Vector Calculus	3	0	0	3
3.	23EE0201	Basic Electrical & Electronics Engineering	3	0	0	3
4.	23ME0302	Engineering Graphics	1	0	4	3
5.	23CS0503	IT Workshop	0	0	2	1
6.	23CE0102	Engineering Mechanics	3	0	0	3
7.	23HS0841	Engineering Physics Lab	0	0	2	1
8.	23EE0202	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9.	23CE0104	Engineering Mechanics Lab	0	0	3	1.5
10.	23HS0812	NSS/NCC/Scouts& Guides/Community Service	0	0	1	0.5
		Total	**13**	**0**	**15**	**20.5**

B.Tech - II Year I Semester

S. No	Course Code	Name of the Subject	L	T	P/Drg	C
1.	23HS0834	Transforms and Numerical Methods	3	0	0	3
2.	23HS0814	Universal Human Values– Understanding Harmony and Ethical human conduct	2	1	0	3
3.	23ME0303	Thermodynamics	2	0	0	2
4.	23ME0304	Mechanics of Solids	3	0	0	3
5.	23ME0305	Material Science and Metallurgy	3	0	0	3
6.	23ME0306	Mechanics of Solids and Materials Science Lab	0	0	3	1.5
7.	23ME0307	Computer-aided Machine Drawing	0	0	3	1.5
8.	23EC0406	Embedded Systems and IoT	0	0	2	1.0
9.	23CS0549	Python programming	0	1	2	2
10.	23HS0805	Environmental Science	2	0	0	0
		Contact Periods / Week	**15**	**2**	**10**	**20**

B.Tech – II Year II Semester

S. No	Course Code	Name of the Subject	L	T	P/Drg	C
1.	23HS0849	Industrial Management	2	0	0	2
2.	23HS0837	Complex Variables, Probability and Statistics	3	0	0	3
3.	23ME0308	Manufacturing processes	3	0	0	3
4.	23ME0309	Fluid Mechanics & Hydraulic Machines	3	0	0	3
5.	23ME0310	Theory of Machines	3	0	0	3
6.	23ME0311	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5
7.	23ME0312	Manufacturing processes Lab	0	0	3	1.5
8.	23HS0818	Soft Skills	0	1	2	2
9.	23HS0815	Design Thinking & Innovation	1	0	2	2
		Contact Periods / Week	**15**	**1**	**10**	**21**
Mandatory Community Service Project / Internship of 08 weeks duration during summer Vacation						

NOTE: L-Lecture, T- Tutorial, P-Practical, Drg-Drawing, C-Credit

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I B.Tech – I Sem.

L	T	P	C
2	0	0	2

(23HS0810) COMMUNICATIVE ENGLISH
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES

On successful completion of this course, student will be able to

1. *Understand the context, topic, and pieces of specific information from social or Transactional dialogues.*
2. *Apply grammatical structures to formulate sentences and correct word forms.*
3. *Analyze discourse markers to speak clearly on a specific topic in informal discussions.*
4. *Evaluate reading / listening texts and to write summaries based on global comprehension of these texts.*
5. *Create a coherent paragraph, essay and resume.*
6. *Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively.*

UNIT – I
Lesson: HUMAN VALUES: Gift of Magi **(Short Story)**

Listening:	Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking:	Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading:	Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing:	Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar:	Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary:	Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words

UNIT – II
Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking:	Discussion in pairs/small groups on specific topics followed by short

	structuretalks.
Reading:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary:	Homonyms, Homophones, Homographs.

UNIT – III
Lesson: BIOGRAPHY: Elon Musk

Listening:	Listening for global comprehension and summarizing what is listened to.
Speaking:	Discussing specific topics in pairs or small groups and reporting what is discussed
Reading:	Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing:	Summarizing, Note-making, paraphrasing
Grammar:	Verbs - tenses; subject-verb agreement; Compound words, Collocations
Vocabulary:	Compound words, Collocations

UNIT – IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening:	Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking:	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading:	Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing:	Letter Writing: Official Letters, Resumes
Grammar:	Reporting verbs, Direct & Indirect speech, Active & Passive Voice
Vocabulary:	Words often confused, Jargons

UNIT - V
Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening:	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking:	Formal oral presentations on topics from academic contexts
Reading:	Reading comprehension.
Writing:	Writing structured essays on specific topics.
Grammar:	Editing short texts –identifying and correcting common errors in grammar andusage (articles, prepositions, tenses, subject verb agreement)
Vocabulary:	Technical Jargons

TEXTBOOKS

1. Pathfinder: *Communicative English for Undergraduate Students*, 1st Edition, OrientBlack Swan, 2023 (Units 1,2 & 3)
2. *Empowering with Language* by Cengage Publications, 2023 (Units 4 & 5)

REFERENCES

1. Dubey, Sham Ji & Co. *English for Engineers*, Vikas Publishers, 2020
2. Bailey, Stephen. *Academic writing: A Handbook for International Students*. Routledge, 2014.
3. Murphy, Raymond. *English Grammar in Use*, Fourth Edition, Cambridge UniversityPress, 2019.
4. Lewis, Norman. *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary*. Anchor, 2014.

WEB RESOURCES:

 GRAMMAR

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

 VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

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I B.Tech – I Sem.

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3	0	0	3

(23HS0803) ENGINEERING CHEMISTRY
(Common to Civil and Mechanical Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course to

1. Familiarize engineering chemistry and its applications
2. Impart the concept of soft and hard waters, softening methods of hard water
3. Train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.

COURSE OUTCOMES

After the completion of the course student should be able to

1 Develop the understanding of Technology involved in improving quality of water for its industrial use.
2. Understand functioning of electrochemical energy systems, assess the reaction mechanism in Batteries, Fuel cells and Principles of corrosion and corrosion control.
3. Impart knowledge on the essential aspects of Principles and comprehend idea about the synthesis and engineering applications of polymers.
4. Understand the various types of fuels and combustion. Explain Calorific values, octane number, refining of petroleum and cracking of oils.
5. Analyse and Demonstrate the concepts of cement, refractories, lubricants , Composites and their applications of modern engineering materials in real world.
6. Summarize the concepts of colloids, micelle and nanomaterials.

UNIT- I Water Technology
Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming**,** scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and Electrodialysis.

UNIT- II Electrochemistry and Applications
Electrodes –electrochemical cell, Nernst equation, cell potential calculations.
Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts,the principle and working of hydrogen-oxygen Fuel cell.
Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical

corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT III   Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization. Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of polystyrene. PVC Nylon 6,6 and Bakelite.

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers

Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

UNIT- IV   Modern Engineering Materials

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Portland Cement, constituents, Setting and Hardening of cement.

UNIT V   Surface Chemistry and Nanomaterials

Introduction to surface chemistry, colloids, Nanometals and Nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

TEXTBOOKS

1. Jain and Jain, *Engineering Chemistry,* 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' *Physical Chemistry*, 10/e, Oxford University Press, 2010.

REFERENCES

1. H.F.W. Taylor, *Cement Chemistry*, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, *Introduction to Colloids and Surface Chemistry*, Butterworth-Heineman, 1992.
3. Fred W. Billmayer Jr, *Textbook of Polymer Science*, 3rd Edition

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I B.Tech – I Sem.

L	T	P	C
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(23HS0830) LINEAR ALGEBRA & CALCULUS
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

Equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

1. *Develop and use of matrix algebra techniques that are needed by engineers for practical applications.*
2. *Identify different matric techniques to find the inverse and powers of the matrics*
3. *Understanding the concepts of continuity and differentiability of functions defined on intervals*
4. *Estimate the series expansions of algebraic and transcendental functions*
5. *Analyse the functions of several variables which is useful in optimization*
6. *Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.*

UNIT I Matrices
Rank of a matrix by echelon form, normal form. Cauchy - Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT II Eigenvalues, Eigenvectors and Orthogonal Transformation Eigenvalues
Eigenvectors and their properties, Diagonalization of a matrix, Cayley - Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III Calculus

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT IV Partial differentiation and Applications (Multi variable calculus)

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobian, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT V Multiple Integrals (Multi variable Calculus)

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXTBOOKS

1. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 44th Edition, 2017.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 10th Edition, 2018.

REFERENCES

1. George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus,* Pearson Publishers, 14th Edition 2018.
2. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, Alpha Science International Ltd., 5th Edition (9th reprint), 2021.
3. Glyn James, *Advanced Modern Engineering Mathematics,* Pearson publishers, 5th Edition, 2018.
4. Micheael Greenberg, *Advanced Engineering Mathematics*, Pearson publishers, 9th edition
5. H. K Das, Er. Rajnish Verma, *Higher Engineering Mathematics*, S. Chand Publications, 2014, Third Edition (Reprint 2021)

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I B.Tech – I Sem.

L	T	P	C
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(23CE0101) BASIC CIVIL & MECHANICAL ENGINEERING
(Common to All Branches of Engineering)

PART A: BASIC CIVIL ENGINEERING

COURSE OBJECTIVES

The objectives of this course is to

1. Get familiarized with the scope and importance of Civil Engineering sub-divisions.

2. Introduce the preliminary concepts of surveying.

3. Acquire preliminary knowledge on Transportation and its importance in nation's economy.

4. Get familiarized with the importance of quality, conveyance and storage of water

5. Introduction to basic civil engineering materials and construction techniques.

COURSE OUTCOMES

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

1. Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

2. Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

3. Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation and understand the process of water storage and its supply to the public.

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering, Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

UNIT II

Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.

UNIT III

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.

Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

TEXTBOOKS

1. M.S.Palanisamy, *Basic Civil Engineering*, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. S.S. Bhavikatti, *Introduction to Civil Engineering*, New Age International Publishers.First Edition, 2022.
3. Satheesh Gopi, *Basic Civil Engineering,* Pearson Publications, First Edition.2009.

REFERENCES

1. S.K. Duggal, *Surveying, Vol- I and Vol-II,* Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Santosh Kumar Garg, *Hydrology and Water Resources Engineering,* Khanna Publishers, Delhi. 2016
3. Santosh Kumar Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, Delhi 38th Edition, 2023.
4. S.K.Khanna, C.E.G. Justo and Veeraraghavan, *Highway Engineering,* Nemchand and Brothers Publications 10th Edition, 2019.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course is to

1. *Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.*
2. *Explain different engineering materials and different manufacturing processes.*
3. *Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.*

COURSE OUTCOMES:
After the completion of the course student should be able to

1. *Understand the role of mechanical engineering and materials in the manufacturing and automotive industries*
2. *Explain the basics of manufacturing processes and thermal engineering and its applications.*
3. *Describe the working of different power plants. Mechanical power transmission systems and the applications of robotics in industrial sector.*

UNIT I
Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT II
Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT III
Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.
Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.
Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(**Note:** The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

TEXTBOOKS
1. V.Ganesan, *Internal Combustion Engines*, Tata McGraw Hill publications (India) Pvt. Ltd.
2. G. Shanmugam and M.S.Palanisamy, *Basic Civil and the Mechanical Engineering*, TataMcGraw Hill publications (India) Pvt. Ltd.
3. Jonathan Wicker and Kemper Lewis, *An introduction to Mechanical Engineering,* Cengagelearning India Pvt. Ltd.

REFERENCES
1. Appuu Kuttan KK, *Robotics*, I.K. International Publishing House Pvt. Ltd. Volume-I
2. L. Jyothish Kumar, Pulak M Pandey,*3D printing & Additive Manufacturing Technology*, Springer publications
3. Mahesh M Rathore, *Thermal Engineering*, Tata McGraw Hill publications (India) Pvt. Ltd.
4. S.S. Rattan, *A Tear book of Theory of Machines* Tata McGraw Hill Publications, (India) Pvt. Ltd.

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L	T	P	C
3	0	0	3

(23CS0501) INTRODUCTION TO PROGRAMMING
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *To introduce students to the fundamentals of computer programming.*
2. *To provide hands-on experience with coding and debugging.*
3. *To foster logical thinking and problem-solving skills using programming.*
4. *To familiarize students with programming concepts such as data types, control structures, functions, and arrays.*
5. *To encourage collaborative learning and teamwork in coding projects.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand basics of computers, the concept of algorithm and algorithmic thinking.*
2. *Analyse a problem and develop an algorithm using control structures & arrays*
3. *Analyse a problem and develop an algorithm to solve it using strings*
4. *Understand and implement the problems using pointers*
5. *Apply modular approach for solving the problem*
6. *Design and implement problem-solving using structures, unions and files.*

UNIT - I

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT - II

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, dowhile) Break and Continue.

UNIT - III

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT - IV
Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT - V
Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling.

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS
1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language, 2nd edition, 2015*.
2. Pradip Dey Manas Ghosh" Programming in C "First edition, Oxford University Press, 2018.

REFERENCES
1. Balagurusamy, E, *Computing fundamentals and C Programming*, McGraw-Hill Education, 2019.
2. Rema Theraja, *Programming in C*, Oxford, 2016, 2nd edition
3. Forouzan, Gilberg, Prasad, *C Programming, A Problem Solving Approach*, CENGAGE, 3rd edition

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L	T	P	C
0	0	2	1

(23HS0811) COMMUNICATIVE ENGLISH LAB
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES

After the completion of the course student should be able to

1. *Understand the different aspects of the English language proficiency with emphasison LSRW skills.*
2. *Apply communication skills through various language learning activities.*
3. *Analyze the English speech sounds, stress, rhythm, intonation and syllable divisionfor   better listening and speaking comprehension.*
4 *Evaluate and exhibit professionalism in participating in debates and group discussions.*
5 *Become active participants in the learning process and acquire proficiency in spoken English.*
6. *Speak with clarity and confidence thereby enhances employability skills*

LIST OF TOPICS:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

SUGGESTED SOFTWARE:

- Walden Infotech
- Young India Films

REFERENCES

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press.2018.
2. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India,2016
3. Hewing's, Martin. Cambridge *Academic English* (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English*, (2nd Ed), Kindle, 2013

WEB RESOURCES

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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(AUTONOMOUS)

I B.Tech – I Sem.

L	T	P	C
0	0	2	1

(23HS0804) ENGINEERING CHEMISTRY LAB
(Common to CE, ME)

COURSE OBJECTIVES

The objectives of this course is

1. To verify the fundamental concepts with experiments

COURSE OUTCOMES

After the completion of the course student should be able to

1. *Estimate the ions present in domestic/industry waste water.*

2. Calculate strength of acid in Pb-Acid battery.

3. Prepare advanced polymer materials.

4. Determine the physical properties like surface tension, adsorption and viscosity.

5. Estimate the Iron and Calcium in cement.

6. Calculate the hardness of water.

LIST OF EXPERIMENTS:
1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method
3. Determination of Strength of an acid in Pb-Acid battery
4. Preparation of a polymer (Bakelite)
5. Determination of percentage of Iron in Cement sample by colorimetry
6. Estimation of Calcium in port land Cement
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter

REFERENCES
- "Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publicationsby J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

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I B.Tech – I Sem.

L	T	P	C
0	0	3	1.5

(23ME0301) ENGINEERING WORKSHOP
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

1. *Familiarize with the different types of wood and carpentry joints.*
2. *Develop Tapered Tray and Conical funnel using sheet metal.*
3. *Acquire practical knowledge on different types of fittings.*
4. *Provides hands-on training in the trades of House-Wiring .*
5. *Overview of metal cutting processes, foundry, Welding and plumbing, is provided through live demonstrations.*
6. *Acquire practical skills by performing the experiments in different shops of workshop.*

COURSE OUTCOMES

On successful completion of the course, the students will be able to

1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understands about Fitting and their types.*
4. *Explain the method of preparation of various House-Wiring .*
5. *Apply basic techniques in foundry, Welding and plumbing.*
6. *Estimate the amount of material required for various models.*

SYLLABUS

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in woodworking and make following joints.
   a) Half – Lap joint   b) Mortise and Tenon joint   c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metalworking, Developments of following sheet metal job from GI sheets.
   a) Tapered tray   b) Conical funnel   c) Elbow pipe   d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit   b) Dovetail fit   c) Semi-circular fit   d) Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series   b) Two-way switch   c) Godown lighting
   d) Tube light   e) Three phase motor   f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe jointswith coupling for same diameter and with reducer for different diameters

TEXTBOOKS

1. Felix W.; *Basic Workshop Technology: Manufacturing Process*, Independently Published,2019.
2. Bruce J. Black *Workshop Processes, Practices and Materials*, Routledge publishers, 5th Edn. 2015.
3. B.S. Raghuwanshi, *A Course in Workshop Technology Vol I. & II,* Dhanpath Rai & Co., 2015 & 2017.

REFERENCES

1. S. K. Hajra Choudhury & Others, *Elements of Workshop Technology, Vol. I*, Media Promoters and Publishers, Mumbai., 14th edition,2007
2. H. S. Bawa, *Workshop Practice*, Tata-McGraw Hill, 2004.
3. Soni P.M. & Upadhyay P.A.; Atul Prakashan, *Wiring Estimating, Costing and Contracting;* 2021-22.

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I B.Tech – I Sem.

L	T	P	C
0	0	3	1.5

(23CS0502) COMPUTER PROGRAMMING LAB
(Common to All Engineering Branches)

COURSE OBJECTIVES
The objectives of this course
1. *The course aims to give students hands – on experience and train them on the concepts of the C- programming language.*

COURSE OUTCOMES (COs)
1. *Read, understand, and trace the execution of programs written in C language.*
2. *Select the right control structure for solving the problem.*
3. *Develop C programs which utilize memory efficiently using programming constructs like pointers.*
4. *Develop Debug and Execute programs to demonstrate the applications of arrays in C.*
5. *Develop Debug and Execute programs to demonstrate the applications of functions in C.*
6. *Implement the C programs using File handling Concepts.*

UNIT I
WEEK 1 - Objective: Getting familiar with the programming environment on the computer and writing the first program.
Suggested Experiments/Activities:
Tutorial 1: Problem-solving using Computers.
Lab1: Familiarization with programming environment
   i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
   ii) Exposure to Turbo C, gcc
   iii) Writing simple programs using printf(), scanf()

WEEK 2 - Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.
Suggested Experiments /Activities:
Tutorial 2: Problem-solving using Algorithms and Flow charts.
Lab 1: Converting algorithms/flow charts into C Source code. Developing the algorithms/flowcharts for the following sample programs
   i) Sum and average of 3 numbers
   ii) Conversion of Fahrenheit to Celsius and vice versa
   iii) Simple interest calculation

WEEK 3 - Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:
Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions.
   i)   Finding the square root of a given number
   ii) Finding compound interest
   iii) Area of a triangle using heron's formulae
   iv) Distance travelled by an object

UNIT II
WEEK 4 - Objective: Explore the full scope of expressions, type-compatibility of variables &
constants and operators used in the expression and how operator precedence works.
Suggested Experiments/Activities:
Tutorial 4: Operators and the precedence and as associativity:
Lab 4: Simple computational problems using the operator' precedence and associativity
   i)   Evaluate the following expressions. a. A+B*C+(D*E) + F*G b. A/B*C-B+A*D/3 c.
            A+++B---A d. J= (i++) + (++i)
   ii) Find the maximum of three numbers using conditional operator
   iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5 - Objective: Explore the full scope of different variants of "if construct" namely if-
else, nullelse, if-else if*-else, switch and nested-if including in what scenario each one of them
can be used and how to use them. Explore all relational and logical operators while writing
conditionals for "if construct".
Suggested Experiments/Activities:
Tutorial 5: Branching and logical expressions:
Lab 5: Problems involving if-then-else structures.
   i)   Write a C program to find the max and min of four numbers using if-else.
   ii) Write a C program to generate electricity bill.
   iii) Find the roots of the quadratic equation.
   iv) Write a C program to simulate a calculator using switch case.
   v)   Write a C program to find the given year is a leap year or not.

WEEK 6 - Objective: Explore the full scope of iterative constructs namely while loop, do-
while loop and for loop in addition to structured jump constructs like break and continue
including when each of these statements is more appropriate to use.
Suggested Experiments/Activities:
Tutorial 6: Loops, while and for loops
Lab 6: Iterative problems e.g., the sum of series
   i)   Find the factorial of given number using any loop.
   ii) Find the given number is a prime or not.
   iii) Compute sine and cos series
   iv) Checking a number palindrome
   v)   Construct a pyramid of numbers.

UNIT III

WEEK 7 - Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7: 1D Array manipulation, linear search

   i) Find the min and max of a 1-D integer array.
   ii) Perform linear search on1D array.
   iii) The reverse of a 1D integer array
   iv) Find 2's complement of the given binary number.
   v) Eliminate duplicate elements in an array.

WEEK 8 - Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

   i) Addition of two matrices
   ii) Multiplication two matrices
   iii) Sort array elements using bubble sort
   iv) Concatenate two strings without built-in functions
   v) Reverse a string using built-in and without built-in string functions

UNIT IV

WEEK 9 - Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereferences.

   i) Write a C program to find the sum of a 1D array using malloc()
   ii) Write a C program to find the total, average of n students using structures
   iii) Enter n students data using calloc() and display failed students list
   iv) Read student name and marks from the command line and display the student details along with the total.
   v) Write a C program to implement realloc()

WEEK 10 - Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists
Lab10: Bitfields, linked lists Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields
   i)   Create and display a singly linked list using self-referential structure.
   ii)   Demonstrate the differences between structures and unions using a C program.
   iii) Write a C program to shift/rotate using bitfields.
   iv)   Write a C program to copy one structure variable to another structure of the same type.

UNIT V
WEEK 11 - Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration.
Suggested Experiments/Activities:
Tutorial 11: Functions, call by value, scope and extent.
Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.
   i)   Write a C function to calculate NCR value.
   ii)   Write a C function to find the length of a string.
   iii) Write a C function to transpose of a matrix.
   iv)   Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12 - Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.
Suggested Experiments/Activities:
Tutorial 12: Recursion, the structure of recursive calls
Lab 12: Recursive functions
   i)   Write a recursive function to generate Fibonacci series.
   ii)   Write a recursive function to find the LCM of two numbers.
   iii) Write a recursive function to find the factorial of a number.
   iv)   Write a C Program to implement Ackermann function using recursion.
   v)   Write a recursive function to find the sum of series.

WEEK 13 - Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers
Suggested Experiments/Activities:
Tutorial 13: Call by reference, dangling pointers
Lab 13: Simple functions using Call by reference, Dangling pointers.
   i)   Write a C program to swap two numbers using call by reference.
   ii)   Demonstrate Dangling pointer problem using a C program.
   iii) Write a C program to copy one string into another using pointer.
   iv)   Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK 14 - Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

- **i)** Write a C program to write and read text into a file.
- **ii)** Write a C program to write and read text into a binary file using fread() and fwrite()
- **iii)** Copy the contents of one file to another file.
- **iv)** Write a C program to merge two files into the third file using command-line arguments.
- **v)** Find no. of lines, words and characters in a file
- **vi)** Write a C program to print last n characters of a given file.

TEXTBOOKS

1. Ajay Mittal, *Programming in C: A practical approach*, Pearson.
2. Byron Gottfried, *Schaum' s Outline of Programming with C*, McGraw Hill

REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, PrenticeHall of India
2. Forouzan, Gilberg, Prasad, *C Programming, A Problem-Solving Approach,* CENGAGE

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I B.Tech – I Sem.

L	T	P	C
0	0	1	0.5

(23HS0813) HEALTH AND WELLNESS, YOGA AND SPORTS LAB
(Common to All Engineering Branches)

COURSE OBJECTIVES:

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

COURSE OUTCOMES:

After completion of the course the student will be able to

1.Understand the importance of yoga and sports for Physical fitness and sound health

2. Demonstrate an understanding of health-related fitness components.

3. Compare and contrast various activities that help enhance their health.

4. Assess current personal fitness levels.

5. Develop Positive Personality.

6. Apply various activities for holistic development.

UNIT I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

   i)   Organizing health awareness programmes in community
   ii) Preparation of health profile
   iii) Preparation of chart for balance diet for all age groups

UNIT II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

  Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT III
Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:
  i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
      Practicing general and specific warm up, aerobics
  ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCES
  1. Gordon Edlin, Eric Golanty. *Health and Wellness*, 14th Edn. Jones & Bartlett Learning,2022
  2. T.K.V.Desikachar. *The Heart of Yoga: Developing a Personal Practice*
  3. Archie J.Bahm. *Yoga Sutras of Patanjali*, Jain Publishing Company, 1993
  4. Wiseman, John Lofty, SAS *Survival Handbook: The Ultimate Guide to Surviving Anywhere* Third Edition, William Morrow Paperbacks, 2014
  5. The Sports Rules Book/ *Human Kinetics with Thomas Hanlon.* -- 3rd ed. Human Kinetics, Inc.2014

General Guidelines:
  1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
  2. Institutes must provide field/facility and offer the minimum of five choices of as manyas Games/Sports.
  3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:
  • Evaluated for a total of 100 marks.
  • A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
  • A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject

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I B.Tech – II Sem.

L	T	P	C
3	0	0	3

(23HS0840) ENGINEERING PHYSICS
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

COURSE OUTCOMES

On successful completion of this course, student will be able to

1. *Analyze the intensity variation of light due to polarization, interference and diffraction.*
2. *Familiarize with the basics of crystals and their structures.*
3. *Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.*
4. *Summarize various types of polarization of dielectrics and classify the magnetic materials.*
5. *Explain the basic concepts of Quantum Mechanics and the band theory of solids.*
6. *Identify the type of semiconductor using Hall effect.*

UNIT – I Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT – II

Crystallography and X-ray diffraction Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

UNIT – III

Dielectric and Magnetic Materials Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti- ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT – IV

Quantum Mechanics and Free electron Theory Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. **Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT - V

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic **semiconductors:** Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic **semiconductors:** density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

TEXTBOOKS

1. M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, *A Text book of Engineering Physics,* S. Chand Publications, 11th Edition 2019.
2. D.K.Bhattacharya and Poonam Tandon, *Engineering Physics -,* Oxford press (2015)

REFERENCES

1. B.K. Pandey and S. Chaturvedi, *Engineering Physics,* Cengage Learning 2021.
2. Shatendra Sharma, Jyotsna Sharma, *Engineering Physics,* Pearson Education, 2018.
3 Sanjay D. Jain, D. Sahasrabudhe and Girish,. *Engineering Physics* - University Press. 2010
4. M.R. Srinivasan, *Engineering Physics*, New Age international publishers (2009).

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html

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I B.Tech – II Sem.

L	T	P	C
3	0	0	3

(23HS0831) DIFFERENTIAL EQUATIONS & VECTOR CALCULUS
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

1. *Enlighten the learners in the concept of differential equations and multivariable calculus.*
2. *Furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.*

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

1. *Solve the differential equations related to various engineering fields.*
2. *Create basic application problems described by second order linear differential equations with constant coefficients.*
3. *Understand basic properties of standard partial differential equations.*
4. *Identify solution methods for partial differential equations that model physical processes.*
5. *Interpret the physical meaning of different operators such as gradient, curl and divergence.*
6. *Estimate the work done against a field, circulation and flux using vector calculus.*

UNIT I Differential equations of first order and first degree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducibleto exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT II Linear differential equations of higher order (Constant Coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral with R.H.S term of the types e^{ax} ,sinax, cosax, polynomials in x^n ,e^{ax} V(x), Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion**.**

UNIT III Partial Differential Equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT IV Vector differentiation

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions-Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V Vector integration

LWithoutegral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

TEXTBOOKS

1. B. S. Grewal, *Higher Engineering Mathematics,* Khanna Publishers, 2017, 44th Edition

2. Erwin Kreyszig, *Advanced Engineering Mathematics,* John Wiley & Sons, 2018, 10th Edition.

REFERENCES

1. George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus*, Pearson Publishers, 2018, 14th Edition.

2. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Jones and Bartlett, 2018.

3. Glyn James, *Advanced Modern Engineering Mathematics*, Pearson publishers, 5th Edition.2018,

4. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics,* Alpha Science International Ltd., 5th Edition (9th reprint), 2021

5. B. V. Ramana, *Higher Engineering Mathematics,* McGraw Hill Education, 2017

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L	T	P	C
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(23EE0201) BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Common to All Engineering Branches)

COURSE OBJECTIVES

To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.*
2. *Understand the problem-solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations*
3. *Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.*
4. *Demonstrate the characteristics by analyzing the behaviour of electronic devices.*
5. *Develop applications using electronic devices.*
6. *Understand the number systems, codes, Boolean algebra, logic gates, and functioning of logic circuits.*

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT II Machines and Measuring Instruments
Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines. Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT III Energy Resources, Electricity Bill & Safety Measures
Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.
Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.
Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

TEXTBOOKS
1. D. C. Kulshreshtha, *Basic Electrical Engineering*, Tata McGraw Hill, 2019, First Edition
2. P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, *Power System Engineering,* Dhanpat Rai & Co, 2013
3. Rajendra Prasad, *Fundamentals of Electrical Engineering,* PHI publishers, , Third Edition, 2014

REFERENCES
1. D. P. Kothari and I. J. Nagrath,Basic Electrical Engineering, Mc Graw Hill, Fourth Edition 2019,
2. V.K. Mehtha, *Principles of Power Systems,* S.Chand Technical Publishers, 2020
3. T. K. Nagsarkar and M. S. Sukhija,*Basic Electrical Engineering,* Oxford University Press, 2017
4. S. K. Bhatacharya, *Basic Electrical and Electronics Engineering,* Person Publications, Second Edition. 2018,

WEB RESOURCES
1. https://nptel.ac.in/courses/108105053 2. https://nptel.ac.in/courses/108108076

PART B: BASIC ELECTRONICS ENGINEERING

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

TEXTBOOKS

1. R. L. Boylestad & Louis Nashlesky, *Electronic Devices & Circuit Theory*, Pearson Education, 2021.
2. R. P. Jain, *Modern Digital Electronics,* Tata Mc Graw Hill, 4th Edition, 2009

REFERENCES

1. R. S. Sedha, *A Textbook of Electronic Devices and Circuits*, S. Chand & Co, 2010.
2. Santiram Kal, *Basic Electronics- Devices, Circuits and IT Fundamentals,* Prentice Hall, India, 2002.
3. R. T. Paynter, *Introductory Electronic Devices & Circuits – Conventional Flow Version,* Pearson Education,2009.

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I B.Tech – II Sem.

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(23ME0302) ENGINEERING GRAPHICS
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

1. *Enable the students with various concepts like dimensioning, conventions andstandards related to Engineering Drawing*
2. *Impart knowledge on the projection of points, lines and plane surfaces*
3. *Improve the visualization skills for better understanding of projection of solids*
4. *Develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.*
5. *Make the students understand the viewing perception of a solid object in Isometric and Perspective projections.*

COURSE OUTCOMES

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

1. *Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.*
2. *Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.*
3. *Understand and draw projection of solids in various positions in first quadrant.*
4. *Elucidate the basic principles of sections of solids and true shapes*
5. *Explain principles behind development of surfaces.*
6. *Prepare isometric and perspective sections of simple solids.*

UNIT I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales.

UNIT II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.
Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III
Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in **simple positions:** Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT IV
Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.
Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT V
Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

TEXTBOOK
1. N. D. Bhatt, *Engineering Drawing,* Charotar Publishing House, 2016.
2. K.L. Narayana and P. Kannaiah, *Engineering Drawing*, Tata McGraw Hill, 2013.
3. Dhananjay Jolhe, *Engineering Drawing with an Introduction to AutoCAD,* TataMcGraw Hill, 2017.

REFERENCES

1. M.B.Shah and B.C. Rana, *Engineering Drawing*, Pearson Education Inc,2009.

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I B.Tech – II Sem.

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(23CS0503) IT WORKSHOP
(Common to All branches of Engineering)

COURSE OBJECTIVES

*Th*e objectives of this course to

1. *Introduce the internal parts of a computer, peripherals, I/O ports, connecting cables*
2. *Demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS*
3. *Teach basic command line interface commands on Linux.*
4. *Teach the usage of Internet for productivity and self-paced life-long learning*
5. *Introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Perform Hardware troubleshooting.*
2. *Understand Hardware components and inter dependencies.*
3. *Safeguard computer systems from viruses/worms.*
4. *Document/ Presentation preparation.*
5. *Perform calculations using spread sheets.*
6. *Understand and Analyse the concepts of Prompt Engineering, Language Translation and Creative Writing using AI Tools*

PC Hardware & Software Installation

Task 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 and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using La TeX and Word to create a 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 both La TeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – Chat GPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCES

1. Vikas Gupta, *Comdex Information Technology course tool kit*, WILEY Dream tech, 2003.
2. Cheryl A Schmidt, *The Complete Computer upgrade and repair book*, WILEY Dream tech, 2013, 3rd edition
3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. Kate J. Chase, *PC Hardware - A Handbook*, PHI (Microsoft)
5. Leslie Lamport, *LaTeX Companion*, PHI/Pearson.
6. David Anfins on and Ken Quamme, *IT Essentials PC Hardware and Software Companion Guide*, – CISCO Press, Pearson Education, 3rd edition
7. Patrick Regan, *IT Essentials PC Hardware and Software Labs and Study Guide*, CISCO Press, Pearson Education, 3rd edition

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I B.Tech – II Sem.

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(23CE0102) ENGINEERING MECHANICS
(Common to Civil & Mechanical Engineering Branches)

COURSE OBJECTIVES

The objectives of this course to

1. *Get familiarized with different types of force systems.*
2. *Draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.*
3. *Teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.*
4. *Apply the Work-Energy method to particle motion.*
5. *Understand the kinematics and kinetics of translational and rotational motion of rigid bodies.*

COURSE OUTCOMES

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

1. *Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.*
2. *Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.*
3. *Calculate the centroid, center of gravity geometrical laminas & shapes*
4. *Determine the moment of inertial for objects of different geometry*
5. *Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.*
6. *Solve the problems involving the translational and rotational motion of rigid bodies.*

UNIT I

Introduction to Engineering Mechanics– Basic Concepts. Scope and Applications
Systems of Forces: Coplanar Concurrent Forces– Components in Space–Resultant–Momentof Force and its Application –Couples and Resultant of Force Systems.
Friction: Introduction**,** limiting friction and impending motion, Coulomb's laws of dry friction,coefficient of friction, Cone of Static friction.

UNIT II
Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples

UNIT III
Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures.
Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems.

Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, 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 IV
Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

UNIT V
 Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

TEXTBOOKS
1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., *Engineering Mechanics,* McGraw Hill Education 2017. 5th Edition.
2. P.C.Dumir- S.Sengupta and Srinivas V Veeravalli , *Engineering Mechanics,* Universitypress. First Edition,.2020.
3. S.S Bhavikatti, *A Textbook of Engineering Mechanics,* New age international Publications, 4th Edition. 2018

REFERENCES
1. Rogers and M A. Nelson., *Engineering Mechanics, Statics and Dynamics,* McGraw HillEducation. First Edition, 2017.
2. I.H. Shames., *Engineering Mechanics, Statics and Dynamics,* PHI, 4th Edition, 2002.
3. J. L. Meriam and L.G. Kraige*., Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics,* 12
4. Basudev Battachatia, *Introduction to Statics and Dynamics,* Oxford University Press,Second Edition, 2014.
5. Hibbeler R.C., *Engineering Mechanics: Statics and Dynamics,* Pearson Education, Inc.,New Delhi, 14th Edition, 2022.

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I B.Tech – II Sem.

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(23HS0841) ENGINEERING PHYSICS LAB
(Common to All Branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

COURSE OUTCOMES

After the completion of the course student should be able to

1. Operate optical instruments like travelling microscope and spectrometer.

2. Estimate the wavelengths of different colours using diffraction grating.

3. Plot the intensity of the magnetic field of circular coil carrying current with distance.

4. Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

5. Calculate the band gap of a given semiconductor

6. Identify the type of semiconductor using Hall effect.

LIST OF EXPERIMENTS

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum usingdiffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee'sMethod.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.

15. Determination of rigidity modulus of the material of the given wire using Torsionalpendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCES

- A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

WEB RESOURCES

- www.vlab.co.in
- https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

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I B.Tech – II Sem.

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(23EE0202) ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP
(Common to All Engineering Branches)

COURSE OBJECTIVES

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

COURSE OUTCOMES

1. *Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.* usage *of electronic measuring instruments.*
2. *Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.*
3. *Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.*
4. *Demonstrate knowledge of different electronic devices and measuring instruments.*
5. *Plot and discuss the characteristics and applications of various electron devices.*
6. *Verify the functions of logic gates and flip-flops.*

ACTIVITIES:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set,wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be usedby the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by thestudents.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.

   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL

2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

REFERENCES

1. D. C. Kulshreshtha, *Basic Electrical Engineering,* Tata McGraw Hill, 2019, First Edition
2. P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, *Power System Engineering,* Dhanpat Rai & Co, 2013
3. Rajendra Prasad, *Fundamentals of Electrical Engineering,* PHI publishers, Third Edition, 2014.

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters,AC Voltmeters, CROs, all the required active devices.

REFERENCES

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, PearsonEducation, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version,Pearson Education,2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software

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I B.Tech – II Sem.

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(23CE0104) ENGINEERING MECHANICS LAB
(For Mechanical Engineering)

COURSE OBJECTIVES

The objectives of this course
1. *Verify the Law of Parallelogram and Triangle of Forces.*
2. *Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.*
3. *Analyse the system of Pulleys and Moment of Inertia of Compound Pendulum and Flywheel.*

COURSE OUTCOMES (COs)

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

1. *Verify the Law of Parallelogram Forces and Law of Triangle of Forces.*
2. *Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.*
3. *Verify Law of Polygon of forces and Law of Moment using force polygon and bell crank lever.*
4. *Determine the Centre of gravity and Moment of Inertia of different configurations.*
5. *Verify the equilibrium conditions of a rigid body under the action of different force systems.*
6. *Determine the acceleration due to gravity using a compound pendulum*

Students have to perform any 10 of the following Experiments:

List of Experiments: Verification of Law of Parallelogram of Forces.

1. Verification of Law of Triangle of Forces.
2. Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.
3. Determination of coefficient of Static and Rolling Frictions
4. Determination of Centre of Gravity of different shaped Plane Lamina.
5. Verification of the conditions of equilibrium of a rigid body under the action of coplanar non- concurrent, parallel force system with the help of a simply supported beam.
6. Study of the systems of pulleys and draw the free body diagram of the system.
7. Determine the acceleration due to gravity using a compound pendulum.
8. Determine the Moment of Inertia of the compound pendulum about an axis

perpendicular tothe plane of oscillation and passing through its centre of mass.

9. Determine the Moment of Inertia of a Flywheel.
10. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

REFERENCES

1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., *Engineering Mechanics*, 5th Edition, McGraw Hill Education.
2. Hibbeler R.C., *Engineering Mechanics: Statics and Dynamics,* 14th Edition, Pearson Education,Inc., New Delhi, 2022

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I B.Tech – II Sem.

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(23HS0812) NSS/NCC/SCOUTS & GUIDES/ COMMUNITY SERVICE
(Common to All Branches of Engineering)

COURSE OBJECTIVES:

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Understand the importance of discipline, character and service motto.*
2. *Solve some societal issues by applying acquired knowledge, facts, and techniques.*
3. *Explore human relationships by analyzing social problems.*
4. *Determine to extend their help for the fellow beings and downtrodden people.*
5. *Develop leadership skills and civic responsibilities.*
6. *Focus on awareness programmes that build community service*

UNIT I Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personaltalents and skills

ii) Conducting orientations programs for the students –future plans-activities-releasingroad map etc.

iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.

iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II Nature & CareActivities:

i) Best out of waste competition.

ii) Poster and signs making competition to spread environmental awareness.

iii) Recycling and environmental pollution article writing competition.

iv) Organising Zero-waste day.

v) Digital Environmental awareness activity via various social media platforms.

vi) Virtual demonstration of different eco-friendly approaches for sustainable living.

vii) Write a summary on any book related to environmental issues.

UNIT III Community ServiceActivities:
i) Conducting One Day Special Camp in a village contacting village-area leaders- Surveyin the village, identification of problems- helping them to solve via media- authorities-experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
v) Any other programmes in collaboration with local charities, NGOs etc.

REFERENCES
1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme* Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering",McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to EnvironmentalEngineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:
1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:
- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

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II B.Tech – I Sem.

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(23HS0834) NUMERICAL METHODS & TRANSFORM TECHNIQUES
(Common to All Branches of Engineering)

COURSE OBJECTIVES:

1. *To acquaint the student with mathematical tools needed in evaluating Transform techniques.*
2. *Can find a close numerical value for the are under a curve or the total value of a function when regular analytical methods can't be used*
3. *To predict the unknown values for any geographical related data points such as noise level, rainfall, elevation, and so on.*
4. *To describe the ideas of Fourier and Laplace Transforms and indicate their applications in the fields such as application of PDE, digital Signal Processing, Image Processing, Theory of wave equations, Differential Equations and many others.*
5. *Approximate the derivative of a function that is difficult to compute analytically.*

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

1. *Apply numerical methods to solve algebraic and transcendental equations*
2. *Derive interpolating polynomials using interpolation formulae*
3. *Solve differential and integral equations numerically*
4. *Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.*
5. *Understand the use of Laplace transform in system modeling, digital signal processing, process control, solving Boundary Value Problems.*
6. *Apply Fourier series and Fourier transform in communication theory and signal analysis, image processing and filters, data processing and analysis, solving partial differential equations for problems on gravity.*

UNIT I
Solution of Algebraic & Transcendental Equations
Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method
System of Algebraic equations: Jacobi and Gauss Siedal method.

UNIT II
Interpolation
Finite differences- Newton's forward and backward interpolation formulae – Lagrange's formulae.
Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

UNIT III
Solution of Initial value problems to Ordinary differential equations
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

UNIT IV
Laplace Transforms
Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem transforms of derivatives and integrals – Unit step function – Second shifting theorem– Convolution theorem (without proofs)– Laplace transform of Periodic function.

UNIT V
Fourier series and Fourier transforms
Fourier series: Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series -Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions
Fourier transforms: Fourier integral theorem – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem (without proofs).

TEXTBOOKS:

1. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley &Sons, 2018, 10th Edition.
2. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021 5th Edition(9th reprint).
3. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publications,2014, Third Edition (Reprint 2021)
4. Alan Jeffrey, Advanced Engineering Mathematics, Elsevier

ONLINE LEARNING RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview
3. http://nptel.ac.in/courses/111105090

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
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II B.Tech – I Sem.

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2	1	0	3

(23HS0814) UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY
AND **ETHICAL HUMAN CONDUCT**
(Common to All Branches of Engineering)

COURSE OBJECTIVES:

1. *To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.*
2. *To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.*
3. *To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutuallyenriching interaction with Nature.*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Define the terms like Natural Acceptance, Happiness and Prosperity*
2. *Identify one's self, and one's surroundings (family, society nature)*
3. *Apply what they have learnt to their own self in different day-to-day settings inreal life (L3)*
4. *Relate human values with human relationship and human society*
5. *Justify the need for universal human values and harmonious existence*
6. *Develop as socially and ecologically responsible engineers*

Course Topics
The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.
The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I   Introduction to Value Education (6 lectures and 3 tutorials for practicesession)

Lecture 1: Right Understanding, Relationship and Physical Facility (HolisticDevelopment and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: self-exploration as the Process for Value Education

Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II   Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and thebody.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self andbody.

Lecture 9: The body as an Instrument of the selfLecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the selfLecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III   Harmony in the Family and Society (6 lectures and 3 tutorials for practicesession)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV   Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment amongthe Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence

UNIT V   Implications of the Holistic Understanding – a Look at Professional Ethics (6lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution

andUniversal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value EducationPS1 Sharing about Oneself PS2 Exploring Human ConsciousnessPS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the selfPS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and SocietyPS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:
Textbook and Teachers Manual

a. The Textbook

R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and ProfessionalEthics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria,Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCE BOOKS
1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.

6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad

12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actionscommensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values. It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf

2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf

3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf

5. https://fdp-si.aicte-india.org/UHV-

II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf

6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3 - S2A%20Und%20Nature-Existence.pdf

7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf

8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385

9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

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(23ME0303) THERMODYNAMICS

COURSE OBJECTIVES:

The objectives of this course are

1. *Familiarize concepts of heat, work, energy and governing rules for conversion of one form to other.*
2. *Explain relationships between properties of matter and basic laws of thermodynamics.*
3. *Teach the concept of entropy for identifying the disorder and feasibility of a thermodynamic process.*
4. *Introduce the concept of available energy for maximum work conversion.*
5. *Provide fundamental concepts of Refrigeration and Psychrometry*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Explain the importance of thermodynamic properties related to conversion of heat energy into work.*
2. *Apply the Zeroeth and First Law of Thermodynamics*
3. *Understand the concept of Second Law of Thermodynamics and its corollaries*
4. *Interpret the basics of entropy and other thermodynamic behaviour of ideal gases*
5. *Analyze the Mollier charts, T-S and h-s diagrams, Steam calorimetry, Phase Transformations*
6. *Evaluate the COP of refrigerating systems and properties, processes of psychrometry and sensible and latent heat loads*

UNIT I Orientation

Introduction: Basic Concepts : System, boundary, Surrounding, control volume, 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

Unit -II

Energy in State and in Transition, Types, Work and Heat, Point and Path function. Zeroeth Law of Thermodynamics – PMM-I, Joule's Experiment – First law of Thermodynamics and applications. Limitations of the First Law – Enthalpy, Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance.

Unit - III

Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence / Corollaries, PMM-II, 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 - IV

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.

Unit – V

Introduction to Refrigeration: working of Air, Vapour compression, VCR system Components, COP Refrigerants.

Introduction to Air Conditioning: Psychrometric properties & processes – characterization of sensible and latent heat loads – load concepts of SHF.

Requirements of human comfort and concept of effective temperature- comfort chart – comfort air conditioning, and load calculations.

TEXT BOOKS:
1. P.K.Nag, *Engineering Thermodynamics*, 5/e, Tata McGraw Hill, 2013.
2. Claus Borgnakke Richard E. Sonntag, *Fundamentals of Thermodynamics*, 7/e, Wiley, 2009.

REFERENCES:

1. J.B. Jones, and R.E. Dugan, *Engineering Thermodynamics*, 1/e, Prentice Hall, 1995.
2. Y.A.Cengel & M.A.Boles ,*Thermodynamics – An Engineering Approach*, 7/e, McGraw Hill, 2010.
3. P.Chattopadhyay, *Engineering Thermodynamics*, 1/e, Oxford University Press, 2011.
4. CP Arora, *Refrigeration and Air-conditioning*, 4/e, McGraw Hill, 2021.

Online Learning Resources:
- https://www.edx.org/learn/thermodynamics.
- https://archive.nptel.ac.in/courses/112/106/112106310.
- https://www.youtube.com/watch?v=7NI5P4KqrAs&t=1s
- https://kp.kiit.ac.in/pdf_files/02/Study-Material_3rd-Semester_Winter_2021_Mechanical-Engg.-_Thermal-Engineering-1_Abhijit-Samant.pdf
- https://www.coursera.org/learn/thermodynamics-intro

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(23ME0304) MECHANICS OF SOLIDS

COURSE OBJECTIVES:

The objectives of the course are to

1. *Understand the behaviour of basic structural members subjected to uni axial and bi axial loads.*
2. *Apply the concept of stress and strain to analyse and design structural members and machine parts under axial, shear and bending loads, moment and torsional moment.*
3. *Students will learn all the methods to analyse beams, columns, frames for normal, shear, and torsion stresses and to solve deflection problems in preparation for the design of such structural components. Students are able to analyse beams and draw correct and complete shear and bending moment diagrams for beams.*
4. *Students attain a deeper understanding of the loads, stresses, and strains acting on a structure and their relations in the elastic behavior*
5. *Design and analysis of Industrial components like pressure vessels.*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Learn all the methods to analyze beams, columns, frames for normal, shear, and torsion stresses and to solve deflection problems in preparation for the design of such structural components*
2. *Analyse beams and draw correct and complete shear and bending moment diagrams for beams*
3. *Understand the bending moment relations for different cross sections to design simple beam sections.*
4. *Apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, and moments*
5. *Model & Analyze the behavior of basic structural members subjected to various loads*
6. *Design and analysis of Industrial components like pressure vessels*

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 – Bars of varying section – composite bars – Temperature stresses- Complex Stresses - Stresses on an inclined plane under different uniaxial and biaxial stress conditions - Principal planes and principal stresses - Mohr's circle - Relation between elastic constants, Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT–II
SHEAR FORCE AND BENDING MOMENT : 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 abeam.

UNIT–III
FLEXURAL STRESSES : Theory of simple bending, Derivation of bending equation, Determination of bending stresses – section modulus of rectangular, circular, I and T sections– Design of simple beam sections.

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

UNIT–IV
DEFLECTION OF BEAMS : Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, UDL and UVL. Mohr's theorem and Moment area method – application to simple cases.

TORSION: Introduction-Derivation- Torsion of Circular shafts- Pure Shear-Transmission of power by circular shafts, Shafts in series, Shafts in parallel.

UNIT– V
THIN AND THICK 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– Thin spherical shells. Wire wound thin cylinders. Lame's equation – cylinders subjected to inside & outside pressures – compound cylinders.

COLUMNS:

Buckling and Stability, Columns with Pinned ends, Columns with other support Conditions, Limitations of Euler's Formula, Rankine's Formula

TEXT BOOKS:

    1. GH Ryder, *Strength of materials*, Palgrave Macmillan publishers India Ltd, 1961.

    2. B.C. Punmia, *Strength of materials*, 10/e, Lakshmi publications Pvt.Ltd, New Delhi, 2018.

REFERENCES:

    1. Gere & Timoshenko, *Mechanics of materials*, 2/e, CBS publications, 2004.

2. U.C. Jindal, *Strength of Materials*, 2/e, Pearson Education, 2017.

3. Timoshenko, *Strength of Materials Part – I& II*, 3/e, CBS Publishers, 2004.

4. Andrew Pytel and Ferdinand L. Singer, *Strength of Materials*, 4/e, Longman
   Pulications, 1990.
5. Popov, *Mechanics of Solids*, 2/e, New Pearson Education, 2015.

Online Learning Resources:
- https://onlinecourses.nptel.ac.in/noc19_ce18/preview.
- https://youtube/iY_ypychVNY?si=310htc4ksTQJ8Fv6.
- https://www.youtube.com/watch?v=WEy939Rkd_M&t=2s
- https://www.classcentral.com/course/swayam-strength-of-materials-iitm-184204
- https://www.coursera.org/learn/mechanics-1
- https://www.edx.org/learn/engineering/massachusetts-institute-of-technology-mechanical-behavior-of-materials-part-1-linear-elastic-behavior
- https://archive.nptel.ac.in/courses/112/107/112107146/

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(23ME0305) MATERIAL SCIENCE AND METALLURGY

COURSE OBJECTIVES:
The objectives of the course are to

1. *Understand the crystalline structure of different metals and study the stability of phases in different alloy systems.*
2. *Study the behavior of ferrous and non ferrous metals and alloys and their application in different domains*
3. *Able to understand the effect of heat treatment, addition of alloying elements on properties of ferrous metals.*
4. *Grasp the methods of making of metal powders and applications of powder metallurgy*
5. *Comprehend the properties and applications of ceramic, composites and other advanced methods*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Understand the crystalline structure of different metals and study the stability of phases in different alloy systems*
2. *Study the behavior of ferrous and non-ferrous metals and alloys and their application in different domains*
3. *Understand the effect of alloying elements on ferrous metals*
4. *Analyze the heat treatment process and properties of ferrous metals*
5. *Grasp the methods of making of metal powders and applications of powder metallurgy*
6. *Comprehend the properties and applications of ceramic, composites and other advanced methods*

UNIT– I
Structure of Metals and Constitution of alloys: Crystallization of metals, Packing Factor - SC, BCC, FCC & HCP- line density, plane density. Grain and grain boundaries, effect of grain boundaries – determination of grain size.
Imperfections, Slip and Twinning.
Necessity of alloying, types of solid solutions, Hume Rothery's rules, intermediate alloy phases, and electron compounds
Equilibrium Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring

miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of binary phase diagrams such as Cu-Ni and Fe-Fe$_3$C.

UNIT–II

Ferrous metals and alloys: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast iron. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

Non-ferrous Metals and Alloys: Structure and properties of Copper and its alloys, Aluminium and its alloys, Titanium and its alloys, Magnesium and its alloys, Super alloys.

UNIT–III

Heat treatment of Steels: Effect of alloying elements on Fe-Fe$_3$C system, annealing, normalizing, hardening, TTT diagrams, tempering, hardenability, surface - hardening methods, age hardening treatment, Cryogenic treatment.

UNIT–IV

Powder Metallurgy: Basic processes- Methods of producing metal powders- milling atomization- Granulation-Reduction-Electrolytic Deposition. Compacting methods – Sintering - Methods of manufacturing sintered parts. Secondary operations, Applications of powder metallurgical products.

UNIT– V

Ceramic and Advanced materials: Crystalline ceramics, glasses, cermets, abrasive materials, Classification of composites, manufacturing methods, particle reinforced composites, fiber reinforced composites, PMC, MMC, CMC and CCCs. Introduction to Nanomaterials and smart materials.

TEXT BOOKS:

1. S.H.Avner, *Introduction to Physical Metallurgy*, 2/e, Tata McGraw- Hill, 1997.
2. Donald R.Askeland, *Essentials of Materials science and Engineering*, 4/e, CL Engineering publications, 2018.

REFERENCES:

1. Dr. V.D.kodgire, *Material Science and Metallurgy*, 39/e, Everest Publishing House, 2017.
2. V.Raghavan, *Material Science and Engineering*, 5/e, Prentice Hall of India, 2004.
3. William D. Callister Jr, *Materials Science and Engineering: An Introduction*, 8/e, John Wiley and Sons, 2009.
4. George E.Dieter, *Mechanical Metallurgy*, 3/e, McGraw-Hill, 2013.
5. Yip-Wah Chung, *Introduction to Material Science and Engineering*, 2/e, CRC Press, 2022.

6. A V K Suryanarayana, *Material Science and Metallurgy*, B S Publications, 2014.
7. U. C. Jindal, *Material Science and Metallurgy*, 1/e, Pearson Publications, 2011.

Online Learning Resources:
- https://archive.nptel.ac.in/courses/113/106/113106032/
- https://www.edx.org/learn/mechanics/massachusetts-institute-of-technology-mechanical-behavior-of-materials-part-3-time-dependent-behavior.
- https://www.youtube.com/watch?v=9Sf278j1GTU
- https://www.coursera.org/learn/fundamentals-of-materials-science
- https://www.coursera.org/learn/material-behavior.

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(23ME0306) MECHANICS OF SOLIDS AND MATERIALS SCIENCE LAB

COURSE OBJECTIVES:

The objectives of the course are to

1. *Evaluate the values of yield stress, ultimate stress and bending stress of the given specimen under tension test and bending test*
2. *Conduct the torsion test to determine the modulus of rigidity of given specimen.*
3. *Justify the Rockwell hardness test over with Brinell hardness and measure the hardness of the given specimen.*
4. *Examine the stiffness of the open coil and closed coil spring and grade them.*
5. *Analyze the microstructure and characteristics of ferrous and non ferrous alloy specimens.*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Understand the stress strain behavior of different materials.*
2. *Evaluate the hardness of different materials.*
3. *Explain the relation between elastic constants and hardness of materials.*
4. *Identify various microstructures of steels and cast irons.*
5. *Analyze various microstructures of non ferrous metals*
6. *Evaluate hardness of treated and* untreated steels.

NOTE: Any 6 experiments from each section A and B.
A) MECHANICS OF SOLIDS LAB:

1. Tensile test
2. Bending test on
   a) Simply supported beam
   b) Cantilever beam
3. Torsion test
4. Hardness test
   a) Brinell's hardness test
   b) Rockwell hardness test
   c) Vickers hardness test
5. Test on springs
6. Impact test
   a) Charpy test

    b) Izod test

7. Punch shear test
8. Liquid penetration test

B) MATERIAL SCIENCE LAB:

1. Preparation and study of the Microstructure of pure metals.
2. Preparation and study of the Microstructure of Mild steel, medium carbon steels, and High carbon steels.
3. Study of the Microstructures of Cast Irons.
4. Study of the Microstructures of Non-Ferrous alloys.
5. Study of the Microstructures of Heat treated steels.
6. Hardenability of steels by Jominy End Quench Test.

Virtual lab:

1. To investigate the principal stresses σa and σb at any given point of a structural element or machine component when it is in a state of plane stress. (https://virtual-labs.github.io/exp-rockwell-hardness-experiment-iiith/objective.html)
2. To find the impact resistance of mild steel and cast iron.(https://sm-nitk.vlabs.ac.in/exp/izod-impact-test).
3. To find the impact resistance of mild steel.(https://sm-nitk.vlabs.ac.in/exp/charpy-impact-test/index.html)
4. To find the Rockwell hardness number of mild steel, cast iron, brass, aluminum and spring steel etc. (https://sm-nitk.vlabs.ac.in/exp/rockwell-hardness-test)
5. To determine the indentation hardness of mild steel, brass, aluminum etc. using Vickers hardness testing machine. (https://sm-nitk.vlabs.ac.in/exp/vickers-hardness-test).

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(23ME0307) COMPUTER-AIDED MACHINE DRAWING

COURSE OBJECTIVES:

The objectives of the course are to

1. *Introduce conventional representations of material and machine components.*
2. *Train to use software for 2D and 3D modeling.*
3. *Familiarize with thread profiles, riveted, welded and key joints.*
4. *Teach solid modeling of machine parts and their sections.*
5. *Explain creation of 2D and 3D assembly drawings and Familiarize with limits, fits, and tolerances in mating components*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Demonstrate the conventional representations of materials and machine components*
2. *Model riveted, welded and key joints using CAD system*
3. *Create solid models and sectional views of machine components*
4. *Generate solid models of machine parts and assemble them*
5. *Translate 3D assemblies into 2D drawings*
6. *Explain the procedure to draw part drawings from a given assembled diagram* and *limits, fits, and tolerances in mating components.*

The following are to be done by any 2D software package

Conventional representation of materials and components:

Detachable joints: Drawing of thread profiles, hexagonal and square-headed bolts and nuts, bolted joint with washer and locknut, stud joint, screw joint and foundation bolts.

Riveted joints: Drawing of rivet, lap joint, butt joint with single strap, single riveted, double riveted double strap joints.

Welded joints: Lap joint and T joint with fillet, butt joint with conventions.

Keys: Taper key, sunk taper key, round key, saddle key, feather key, woodruff key.

Couplings: rigid – Muff, flange; flexible – bushed pin-type flange coupling, universal coupling, Oldham's' coupling.

The following exercises are to be done by any 3D software package:

Sectional views:

Creating solid models of complex machine parts and sectional views.

Assembly drawings: (Any four of the following using solid model software)

Lathe tool post, tool head of shaping machine, tail-stock, machine vice, gate valve, carburetor, piston, connecting rod, eccentric, screw jack, plumber block, axle bearing, pipe vice, clamping device, Geneva cam, universal coupling.

Production drawing:

Representation of limits, fits and tolerances for mating parts. Use any four parts of above assembly drawings and prepare manufacturing drawing with dimensional and geometric tolerances.

TEXTBOOKS:

1 Machine Drawing by K.L.Narayana, P.Kannaiah and K.Venkat Reddy, New Age International Publishers, 3/e, 2014
2 Machine drawing by N.Sideshwar, P. Kannaiah, V.V.S.Sastry, TMH Publishers. 2014.

REFERENCES:

1. Cecil Jensen, Jay Helsel and Donald D.Voisinet, Computer Aided Engineering Drawing, Tata McGraw-Hill, NY, 2000.
2. James Barclay, Brain Griffiths, Engineering Drawing for Manufacture, Kogan Page Science, 2003.
3. N.D.Bhatt, Machine Drawing, Charotar Publishers, 50/e, 2014.

Online Learning Resources:

- https://eeedocs.wordpress.com/wp-content/uploads/2014/02/machinedrawing.pdf
- https://archive.nptel.ac.in/courses/112/105/112105294/
- https://www.edx.org/learn/engineering/dassault-systemes-solidworks-solidworks-cad-fundamentals?index=product&queryID=c90b35a82a6ef58b0d6f89679c63f6a1&position=2&linked_from=autocomplete&c=autocomplete
- https://www.youtube.com/watch?v=0bQkS3_3Fq4

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(23EC0406) EMBEDDED SYSTEMS AND IOT

COURSE OBJECTIVES:

The objectives of the course are to

1. *Comprehend Microcontroller-Transducers Interface techniques*
2. *Establish Serial Communication link with Arduino*
3. *Analyse basics of SPI interface.*
4. *Interface Stepper Motor with Arduino*
5. *Analyse Accelerometer interface techniques*
6. *Introduce the Raspberry PI platform, that is widely used in IoT applications*
7. *Introduce the implementation of distance sensor on IoT devices.*

COURSE OUTCOMES:

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

1. *Comprehend Microcontroller-Transducers Interface techniques*
2. *Establish Serial Communication link with Arduino*
3. *Analyse basics of SPI interface*
4. *Understand the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor*
5. *Realize the revolution of internet in mobile devices , cloud and Sensor Networks*
6. *Establish connection and share data to cloud using IoT device*

Embedded Systems Experiments: (Any 5 experiments from the following)

1. Measure Analog signal from Temperature Sensor.

2. Generate PWM output.

3. Drive single character generation on Hyper Terminal.

4. Drive a given string on Hyper Terminal.

5. Full duplex Link establishment using Hyper terminal.

6. Drive a given value on a 8 bit DAC consisting of SPI.

7. Drive Stepper motor using Analog GPIOs.

8. Drive Accelerometer and Display the readings on Hyper Terminal.

COMPONENTS/ BOARDS: 1. Arduino Duemilanove Board 2. Arduino Software IDE.

TEXT BOOKS

1. Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications, 2013.

2. Embedded Systems-By Shibu. K.V-Tata McGraw Hill Education Private Limited, 2013.

3. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications, 2013.

4. Embedded Systems-Lyla B.Das-Pearson Publications, 2013.

Internet of Things Experiments: (Any 5 experiments from the following)

1. Getting started with Raspberry Pi, Install Raspian on your SD card.

2. Python-based IDE (integrated development environments) for the Raspberry Pi and how to trace

3. and debug Python code on the device.

4. Using Raspberry pi a. Calculate the distance using distance sensor.

   b. Basic LED functionality.

5. Raspberry Pi interact with online services through the use of public APIs and SDKs.

6. Study and Install IDE of Arduino and different types of Arduino.

7. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.

8. Calculate the distance using distance sensor Using Arduino.

9. Basic LED functionality Using Arduino and Node MCU.

10. Calculate the moisture content in the soil using Arduino and Node MCU.

11. Calculate the distance using distance sensor Using Node MCU.

12. Basic LED functionality Using Node MCU.

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(23CS0549) PYTHON PROGRAMMING

COURSE OBJECTIVES:

The objectives of the course are to

1. *Introduce core programming concepts of Python programming language.*
2. *Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries*
3. *Implement Functions, Modules and Regular Expressions in Python Programmingand to create practical and contemporary applications using these*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Understand the Basic knowledge of python programming and installation of Anaconda using Jupyter Notebook.*
2. *Apply the functions on libraries, usage of string and list operations.*
3. *Apply the concept of Dictionaries for analyzing the data with key and value.*
4. *Apply the concept of Tuples and Sets to perform operations on sets of data.*
5. *Analyze the file concepts and oops paradigms.*
6. *Apply the concepts of JSON and XML for data processing.*

UNTI-I: History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.
 i) Arithmetic Operators ii) Relational Operators iii) Assignment Operatorsiv) LogicalOperators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators
    viii) Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT-II: Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.
Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:
7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
            i. Addition   ii. Insertion   iii. slicing
12. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III: Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.
Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:
13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
14. Write a program to count the number of vowels in a string (No control flow allowed).
15. Write a program to check if a given key exists in a dictionary or not.
16. Write a program to add a new key-value pair to an existing dictionary.
17. Write a program to sum all the items in a given dictionary.

UNIT-IV:Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.
Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:
18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
19. Python program to print each line of a file in reverse order.
20. Python program to compute the number of characters, words and lines in a file.
21. Write a program to create, display, append, insert and reverse the order of the items in the array.
22. Write a program to add, transpose and multiply two matrices.
23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle,triangle, and square.

UNIT-V: Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
    a) Apply head () function to the pandas data frame
    b) Perform various data selection operations on Data Frame
30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

REFERENCES:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson,2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

TEXT BOOKS:

1. ArsheepBahga&Vijay Madisetti, Internet of Things - A Hands-on Approach, 1/e,Orient Blackswan Private Limited - New Delhi, 2015.
2. Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015.
3. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly(SPD), 2014,.

Online Learning Sources

1. https://onlinecourses.nptel.ac.in/noc21_cs17/preview
2. https://onlinecourses.nptel.ac.in/noc20_ee98/preview
3. https://archive.nptel.ac.in/courses/108/105/108105057/
4. https://www.edx.org/learn/embedded-systems/the-university-of-texas-at-austin-   embedded-systems-shape-the-world-microcontroller-input-output?index=product&objectID=course-785cf551-7f66-4350-b736-64a93427b4db&webview=false&campaign=Embedded+Systems+-+Shape+The+World%3A+Microcontroller+Input%2FOutput&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fembedded-systems
5. https://www.edx.org/learn/iot-internet-of-things/universitat-politecnica-de-valencia- introduction-to-the-internet-of-things?index=product&queryID=e1322674dcb3d246be981d0669265399&position=4 &linked_from=autocomplete&c=autocomplete
6. https://www.edx.org/learn/iot-internet-of-things/curtin-university-iot-sensors-and-devices?index=product&queryID=94ff5bcb80b8e4f427a0985bb2a5e07f&position=3 &results_level=first-level-results&term=IOT&objectID=course-

967eee29-87e8-4f2d- 9257-
a1b38ec07e85&campaign=IoT+Sensors+and+Devices&source=edX&product
_catego
ry=course&placement_url=https%3A%2F%2Fwww.edx.org%2Fsearch

7. Virtual Labs - http://vlabs.iitkgp.ac.in/rtes/
8. Virtual Labs -https://cse02-iiith.vlabs.ac.in/
9. Virtual Labs - https://iotvirtuallab.github.io/vlab/Experiments/index.html

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(23HS0805) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES:
The objectives of this course

1. *To make the students to get awareness about the environment.*
2. *To understand the importance of protecting natural ecosystems for future.*
3. *To save earth from the inventions by Engineers.*

COURSE OUTCOMES:
On successful completion of this course, students will be able to
1. *To make the students to get awareness about the environment and its components.*
2. *To understand the importance of protecting natural ecosystems.*
3. *To understand various types of pollutions and their effects.*
4. *To understand the various engineering techniques to protect the environment.*
5. *To make awareness about the social issues and laws of environmental protection.*
6. *To understand the concept of sustainable development and role of Engineering Technology in environment and human health.*

UNIT I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated
problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:
a. Forest ecosystem.

b. Grassland ecosystem
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction, Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of :
a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes –
Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies –Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXTBOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S. Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K. Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

REFERENCES:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited

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(23HS0849) INDUSTRIAL MANAGEMENT

COURSE OBJECTIVES:

The objectives of the course are to

1. *Introduce the scope and role of industrial engineering and the techniques for optimal design of layouts*
2. *Illustrate how work study is used to improve productivity*
3. *Explain TQM and quality control techniques*
4. *Introduce financial management aspects and*
5. *Discuss human resource management and value analysis.*

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

1. *Learn about how to design the optimal layout.*
2. *Demonstrate work study methods.*
3. *Explain Quality Control techniques.*
4. *Understand the fundamental principles of Total Quality Management.*
5. *Discuss the financial management aspects.*
6. *Understand the human resource management methods.*

UNIT– I

INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, quantitative tools of IE and productivity measurement. Concepts of management, importance, functions of management, scientific management, Taylor's principles, Fayol's principles of management.

PLANTLAYOUT: Factors governing plant location, types of production layouts, advantages and Disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts.

UNIT–II

WORK STUDY: Importance, types of production, applications, work study, method study and time study, work sampling, PMTS, micro motionstudy, ratingtechniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.

UNIT–III

STATISTICAL QUALITY CONTROL: Quality control, Queuing assurance and its importance, SQC, attribute sampling inspection with single and double sampling, Control charts $\bar{X}$ and R –charts X and S charts and their applications, simple numerical examples.

TOTALQUALITYMANAGEMENT: Elements of TQM – Continuous Improvement – zero defect concept, quality circles, implementation, applications, ISO quality systems. Six Sigma– definition, basic concepts.

UNIT– IV

FINANCIAL MANAGEMENT: Scope and nature of financial management, Sources of finance, Management of working capital, estimation of working capital requirements, budget and budgetary control, Capital budgeting – Nature of Investment Decisions– InvestmentEvaluationcriteria-NPV,IRR,PI,PaybackPeriod,andARR,numericalproblems.

UNIT–V

HUMANRESOURCEMANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job- evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, and types.

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

TEXT BOOKS:

1. O.PKhanna,Industrial Engineering and Management,Dhanpat Rai Publications(P)Ltd. Martand Telsang, Industrial Engineering and Production Management, S.Chand &Company Ltd. New Delhi.

REFERENCE BOOKS:

1. Bhattacharya DK, Industrial Management, S.Chand, publishers.
2. J.G Monks, Operations Management, 3/e, McGraw Hill Publishers.
3. T.R.Banga,S.C.Sharma,N.K.Agarwal,Industrial Engineering and Management Science, Khanna Publishers.
4. Koontz O'Donnell, Principles of Management, McGraw Hill Publishers.
5. R.C.Gupta, Statistical Quality Control, Khanna Publishers.
6. NVS Raju, Industrial Engineering and Management, Cengage India Private Limited.

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(23HS0837) COMPLEX VARIABLES, PROBABILITY AND STATISTICS

COURSE OBJECTIVES:

The objectives of the course are

1. To study the techniques of complex variables and functions together with their derivatives, Contour integration and transformations.

2. To train the students thoroughly in Mathematical concepts fundamentals of probability, test of hypothesis, Test of significance.

COURSE OUTCOMES:

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

1. Analyze limit, continuity and differentiation of functions of complex variables and Understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions.

2. Understand Cauchy theorem, Cauchy integral formulas and apply these to evaluate complex contour integrals. Classify singularities and poles; find residues and evaluate complex integrals using the residue theorem.

3. Apply Probability theory to find the chances of happening of events.

4. Understanding the laws of probability axioms and rules.

5. Understand various probability distributions and calculate their statistical constants.

6. Analyze to test various hypotheses included in theory and types of errors for large samples.

UNIT I
Complex Variable – Differentiation

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.

UNIT II
Complex Variable – Integration

Line integral-Contour integration, Cauchy's integral theorem (Simple Case), Cauchy Integral formula, Power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

UNIT III
Probability theory

Probability, probability axioms, addition law and multiplicative law of probability, conditional

probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation

UNIT IV
Probability distributions: Binomial, Poisson approximation to the binomial distribution, Normal distribution and their properties

UNIT V
Estimation and Testing of hypothesis, large sample tests
Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

TEXTBOOKS:
1. B.S.Grewal, Higher Engineering Mathematics, KhannaPublishers,2017, 44th Edition
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.

REFERENCEBOOKS:
1. R.K.Jainand, S.R.K.Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021 5th Edition(9th reprint).
2. B.V.Ramana, Higher Engineering Mathematics, Mc Graw Hill publishers
3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

ONLINE LEARNING RESOURCES:
1. https://onlinecourses.nptel.ac.in/noc20_ma50/preview
2. https://archive.nptel.ac.in/courses/111/106/111106111

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(23ME0308) MANUFACTURING PROCESSES

COURSE OBJECTIVES:

The objectives of the course are to

1. *Know the working principle of different metal casting processes and gating system.*
2. *Classify the welding processes, working of different types of welding processes and welding defects.*
3. *Know the nature of plastic deformation, cold and hot working process, working of a rolling mill and types, extrusion processes.*
4. *Understand the principles of forging, tools and dies, working of forging processes.*
5. *Know about the Additive manufacturing.*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Design the patterns and core boxes for metal casting processes*
2. *Understand the different welding processes*
3. *Demonstrate the different types of hot working processes*
4. *Explain the concept of cold working process*
5. *Understand sheet metal forming processes*
6. *Learn about the different types of additive manufacturing processes*

UNIT– I

Casting: Steps involved in making a casting – Advantage of casting and its applications. Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Molding, different types of cores , Principles of Gating, Risers, casting design considerations. Methods of melting and types of furnaces, Solidification of castings and casting defects- causes and remedies. Basic principles and applications of special casting processes - Centrifugal casting, Die casting, Investment casting and shell molding.

UNIT–II

Welding: Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting. Basic principles of Arc welding, power characteristics, Manual metal arc welding, submerged arc welding, TIG& MIG welding. Electro–slag welding.

Resistance welding, Friction welding, Friction stir welding, Forge welding, Explosive

welding; Thermit welding, Plasma Arc welding, Laser welding, electron beam welding, Soldering &Brazing.

Heat affected zones in welding; pre & post heating, welding defects –causes and remedies.

UNIT–III
Bulk Forming: Plastic deformation in metals and alloys-recovery, recrystallization and grain growth.

Hot working and Cold working-Strain hardening and Annealing. Bulk forming processes: Forging-Types of Forging, forging defects and remedies; Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing.

UNIT– IV
Sheet metal forming-Blanking and piercing, Forces and power requirement in these operations, Deep drawing, Stretch forming, Bending, Spring back and its remedies, Coining, Spinning, Types of presses and press tools.

High energy rate forming processes: Principles of explosive forming, electromagnetic forming, Electro hydraulic forming, rubber pad forming, advantages and limitations.

UNIT -V
Additive manufacturing - Steps in Additive Manufacturing (AM), Classification of AM processes, Advantages of AM, and types of materials for AM, VAT photopolymerization AM Processes, Extrusion - Based AM Processes, Powder Bed Fusion AM Processes, Direct Energy Deposition AM Processes, Post Processing of AM Parts, Applications

TEXTBOOKS:
1. Kalpakjain S and Steven R Schmid, *Manufacturing Processes for Engineering Materials*, 5/e, Pearson Publications, 2007.
2. P.N. Rao, *Manufacturing Technology -Vol I*, 5/e, McGraw Hill Education, 2018.

REFERENCES:

1. A.Ghosh & A.K.Malik, *Manufacturing Science*, East West Press Pvt. Ltd, 2010.
2. Lindberg and Roy, *Processes and materials of manufacture*, 4/e, Prentice Hall India Learning Private Limited, 1990.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 2022.
4. Sharma P.C., *A Text book of Production Technology*, 8/e, S Chand Publishing, 2014.
5. H.S. Shaun, *Manufacturing Processes*, 1/e, Pearson Publishers, 2012.
6. WAJ Chapman, *Workshop Technology*, 5/e, CBS Publishers & Distributors Pvt.Ltd, 2001.
7. Hindustan Machine Tools, *Production Technology*, Tata McGraw Hill Publishers, 2017.
8. Ian Gibson, David W Rosen, Brent Stucker., *Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing*, 2/e, Springer, 2015.

Online Learning Resources:

- https://www.edx.org/learn/manufacturing/massachusetts-institute-of-technology-fundamentals-of-manufacturing-processes
- https://onlinecourses.nptel.ac.in/noc21_me81/preview
- www.coursera.org/learn/introduction-to-additive-manufacturing-processessera
- https://archive.nptel.ac.in/courses/112/103/112103263/
- https://elearn.nptel.ac.in/shop/nptel/principles-of-metal-forming-technology/?v=c86ee0d9d7ed

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(23ME0309) FLUID MECHANICS & HYDRAULIC MACHINES

COURSE OBJECTIVES:

The students completing this course are expected to

1. *Understand the properties of fluids, manometry, hydrostatic forces acting on different surfaces*

2. *Understand the kinematic and dynamic behavior through various laws of fluids like continuity, Euler's, Bernoulli's equations, energy and momentum equations.*

3. *Understand the theory of boundary layer, working and performance characteristics of various hydraulic machines like pumps and turbines*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Understand the basic concepts of fluid properties*
2. *Estimate the mechanics of fluids in static and dynamic conditions*
3. *Explain the concept of Boundary layer theory and flow separation process*
4. *Identify the importance of dimensional analysis and Buckingham Pi theorem*
5. *Estimate the hydrodynamic forces ofjet on vanes in different positions*
6. *Understand the working Principles and performance evaluation of hydraulic pump and turbines*

UNIT I

Fluid statics: Dimensions and units: physical properties of fluids - specific gravity, viscosity and its significance, surface tension, capillarity, vapor pressure. Atmospheric, gauge and vacuum pressure, Measurement of pressure – Manometers - Piezometer, U-tube, inverted and differential manometers. Pascal's & hydrostatic laws.
Buoyancy and floatation: Meta center, stability of floating body. Submerged bodies. Calculation of metacenter height. Stability analysis and applications.

UNIT II

Fluid kinematics: Introduction, flow types. Equation of continuity for one dimensional flow, circulation and vorticity, Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Condition for irrotational flow, flownet, source and sink, doublet and vortex flow.
Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its applications, 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.

UNIT III
Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.
Dimensional Analysis: Dimensions and Units, Dimensional Homogeneity, Non dimensionalization ofequations, Method of repeating variables and Buckingham Pi Theorem.

UNIT IV
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 – draft tube- theory- functions and efficiency.

UNIT V
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. Hydraulic systems- hydraulic ram, hydraulic lift, hydraulic coupling. Fluidics – amplifiers, sensors andoscillators. Advantages, limitations and applications.
Centrifugal pumps: classification, working, work done – manometric head- losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, cavitation & NPSH. **Reciprocating pumps:** Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:

1. Y.A. Cengel, J.M.Cimbala, *Fluid Mechanics, Fundamentals and Applications*, 6/e, McGraw Hill Publications, 2019.
2. Dixon, *Fluid Mechanics and Thermodynamics of Turbomachinery*, 7/e, Elsevier Publishers, 2014.

REFERENCES:

1. P N Modi and S M Seth, *Hydraulics & Fluid Mechanics including Hydraulics Machines*, Standard Book House, 2017.
2. RK Bansal, *Fluid Mechanics and Hydraulic Machines*, 10/e, Laxmi Publications (P)Ltd, 2019.
3. Rajput, *Fluid Mechanics and Hydraulic Machines*, S Chand & Company, 2016.
4. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering*, S K Kataria & Sons, 2013.
5. D. Rama Durgaiah, *Fluid Mechanics and Machinery*, 1/e, New Age International, 2002.

Online Learning Resources:

- https://archive.nptel.ac.in/courses/112/105/112105206/
- https://archive.nptel.ac.in/courses/112/104/112104118/
- https://www.edx.org/learn/fluid-mechanics
- https://onlinecourses.nptel.ac.in/noc20_ce30/previewnptel.ac.in
- www.coursera.org/learn/fluid-powerera

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(23ME0310) THEORY OF MACHINES

COURSE OBJECTIVES:

The objectives of the course are to make the students learn about

1. *Introduce various basic mechanisms and their applications.*
2. *Explain importance of degree of freedom.*
3. *Familiarize velocity and acceleration in mechanisms.*
4. *Describe the cams and follower motions.*
5. *Explain the importance of gyroscopic couples.*
6. *Introduce the equation of motion for single degree of freedom system.*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. Understand different mechanisms and their inversions

2. Calculate velocity and acceleration of different links in a mechanism

3. Apply the effects of gyroscopic couple in ships, aero planes and road vehicles.

4. Analyze various types of gear profiles and gear trains

5. Evaluate unbalance mass in rotating machines.

6. Explain free and forced vibrations of single degree freedom systems.

UNIT – I: Simple Mechanisms
Simple Mechanisms: Classification of mechanisms – Basic kinematic concepts and definitions – Degree of freedom, mobility – Grashof's law, kinematic inversions of four bar chain and slider crank chains- Limit positions – Mechanical advantage- Transmission angle- Description of some common mechanisms- Quick return mechanism, straight line mechanisms – UniversalJoint – Rocker mechanisms.

UNIT – II: Plane and motion analysis
Plane and motion analysis: Displacement, velocity and acceleration analysis of simple mechanisms, graphical velocity analysis using instantaneous centers, velocity and acceleration analysis using loop closure equations – kinematicanalysis of simple mechanisms – slidercrank mechanism dynamics – Coincidentpoints – Corioliscomponent of acceleration.

UNIT – III: Gyroscope & Gear Profile

Gyroscope: Principle of gyroscope, gyroscopic effect in an aeroplane, ship, car and two wheeler, simple problems

Gear Profile: Involute and cycloidal gear profiles, gear parameters, fundamental law of gearing and conjugate action, spur gear contact ratio and interference/undercutting – helical, bevel, worm, rack & pinion gears, epicyclic and regular gear train kinematics.

UNIT – IV: Balancing of Rotating masses & Cams

Balancing of Rotating masses: Need for balancing, balancing of single mass and several masses in different planes, using analytical and graphical methods.

Cams: Classification of cams and followers- Terminology and definitions – Displacement diagrams –Uniform velocity, parabolic, simple harmonic and cycloidal motions – derivatives of follower motions- specified contour cams- circular and tangent cams –pressure angle and undercutting

UNIT – V: Vibrations & Turning Moment Diagrams and Flywheels

Vibrations: Introduction, degree of freedom, types of vibrations, free natural vibrations, Newton method and energy method for single degree of freedom. Damped vibrations- under damped, critically damped; and over damped systems, forced vibrations with and without damping in single degree of freedom; Vibration isolation and transmissibility.

Turning Moment Diagrams and Flywheels: Turning moment diagrams for steam engine, I.C engine and Multi Cylinder Engine. Crank effort – coefficient of fluctuation of energy, coefficient of fluctuation of speed – Fly Wheel and their design, fly wheels for punching press.

Textbooks:
1. S.S.Rattan, Theory of Machines, 4/e, Tata Mc-Graw Hill, 2014.

2. P.L.Ballaney, Theory of Machines & Mechanisms, 25/e, Khanna Publishers, Delhi, 2003.

Reference Books:

1. F. Haidery, Dynamics of Machines, 5/e, NiraliPrakashan, Pune, 2003.

2. J.E.Shigley, Theory of Machines and Mechanisms, 4/e, Oxford, 2014.

3. G.K.Groover, Mechanical Vibrations, 8/e, Nemchand Bros, 2009.

4. Norton, R.L., Design of Machinery – An Introduction to Synthesis and Analysis of Mechanisms and Machines, 2/e, McGraw Hill, New York, 2000.

5. William T. Thomson, Theory of vibration with applications, 4/e, Englewood Cliffs, N.J.: Prentice Hall, 1993.2018.

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(23ME0311) FLUID MECHANICS & HYDRAULIC MACHINES LAB

COURSE OBJECTIVES:

To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Demonstrate the devices used for measuring flow.*
2. *Compute major losses in pipes.*
3. *Illustrate the operating parameters of turbines.*
4. *Explain the working of different types of pumps.*
5. *Explain the devices used for measuring flow.*

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 pipeline.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flowmeter.

Virtual Lab:
1. To study different patterns of a flow through a pipe and correlate them with the Reynolds number of the flow. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/reynolds/introduction.html)
2. To calculate Total Energy at different points of venture meter. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/bernoulli/introduction.html).
3. To calculate the flow (or point) velocity at center of the given tube using different flow rates. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/pitot/introduction.html)
4. To determine the hydrostatic force on a plane surface under partial submerge and

full submerge condition. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/cop/introduction.html).

5. To determine the discharge coefficient of a triangular notch. (https://me.iitp.ac.in/Virtual-Fluid-Laboratory/notch/introduction.html)

6. To determine the coefficient of impact of jet on vanes. (https://fm-nitk.vlabs.ac.in/exp/impact-of-jet).

7. To determine friction in pipes. (https://fm-nitk.vlabs.ac.in/exp/friction-in-pipes/index.html).

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(23ME0312) MANUFACTURING PROCESSES LAB

COURSE OBJECTIVES:

Acquire practical knowledge on *Metal Casting, Welding, Press Working and Processing of Plastics.*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *Make moulds for sand casting.*
2. *Fabricate different types of components using various manufacturing techniques*
3. *Adapt unconventional manufacturing methods*
4. *Develop Different Weld joints*
5. *Explain different types of 3d Printing techniques*

List of Experiments

1. Design and making of pattern
   i. Single piece pattern
   ii. Split pattern
2. Sand properties testing
   i. Sieve analysis (dry sand)
   ii. Clay content test
   iii. Moisture content test
   iv. Strength test (Compression test & Shear test)
   v. Permeability test
3. Mould preparation
   i. Straight pipe
   ii. Bent pipe
   iii. Dumble
   iv. Gear blank
4. Gas cutting and welding
5. Manual metal arc welding
   i. Lap joint
   ii. Butt joint
6. Injection Molding
7. Blow Molding
8. Simple models using sheet metal operations
9. Study of deep drawing and extrusion operations

10. To make weldments using TIG/MIG welding
11. To weld using Spot welding machine
12. To join using Brazing and Soldering
13. To make simple parts on a 3D printing machine
14. Demonstration of metal casting.

Virtual Lab:

1. To study and observe various stages of casting through demonstration of casting process. (https://virtual-labs.github.io/exp-sand-casting-process-dei/theory.html)

2. To weld and cut metals using an oxyacetylene welding setup. (https://virtual-labs.github.io/exp-gas-cutting-processes-iitkgp/index.html).

3. To simulate Fused deposition modelling process (FDM) (https://3dpdei.vlabs.ac.in/exp/simulation-modelling-process)

4. https://altair.com/inspire-mold/

5. https://virtual-labs.github.io/exp-simulation-cartesian-system-dei/theory.html

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(23HS0818) SOFT SKILLS

COURSE OBJECTIVES:

1. *To encourage all round development of the students by focusing on soft skills*
2. *To make the students aware of critical thinking and problem-solving skills*
3. *To enhance healthy relationship and understanding within and outside an organization*
4. *To function effectively with heterogeneous teams*

COURSE OUTCOMES:

After completion of the course the students will be able to

1. *List out various elements of soft skills*
2. *Describe methods for building professional image*
3. *Apply critical thinking skills in problem solving*
4. *Analyse the needs of an individual and team for well-being*
5. *Assess the situation and take necessary decisions*
6. *Create a productive workplace atmosphere using social and work-life skills ensuringpersonal and emotional well-being*

 UNIT I Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills -Significance, process, types - Barriers of communication - Improving techniques.

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives ofthe great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

UNIT II Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT III Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Teambuilding - Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT IV Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness –Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm,gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –riddensituations caused by failure, anger, jealousy, resentment and frustration in the form of writtenand oral presentation, Organizing Debates

UNIT V Corporate Etiquette

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette - Corporate grooming tips -Overcoming challenges

Activities

Providing situations to take part in the Role Plays where the students will learn about bad andgood manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Prescribed Books:

1. Mitra Barun K, Personality Development and Soft Skills, Oxford University Press,Pap/Cdr edition 2012
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018

REFERENCES:

1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
2. Alex K, Soft Skills S.Chand & Co, 2012 (Revised edition)
3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approachto Maximise Personality Published by Wiley, 2013
4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, CambridgeUniversity Press, 2018
5. Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher :Vayu Education of India, 2014

Online Learning Resources:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc
7. https://www.businesstrainingworks.com/training-resource/five-free-business- etiquette-training-games/
8. https://onlinecourses.nptel.ac.in/noc24_hs15/preview
9. https://onlinecourses.nptel.ac.in/noc21_hs76/preview

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(23HS0815)   DESIGN THINKING & INNOVATION

COURSE OBJECTIVES:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

COURSE OUTCOMES:

1. *Define the concepts related to design thinking*
2. *Explain the fundamentals of Design Thinking and innovation*
3. *Apply the design thinking techniques for solving problems in various sectors*
4. *Analyse to work in a multidisciplinary environment*
5. *Evaluate the value of creativity*
6. *Formulate specific problem statements of real time issues*

UNIT I Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT II Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development.

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT III Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT V Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup

TEXTBOOKS:

1. Tim Brown,Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

REFERENCES:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell,Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough.H, The Era of Open Innovation – 2013

Online Learning Resources:
https://nptel.ac.in/courses/110/106/110106124/
https://nptel.ac.in/courses/109/104/109104109/
https://swayam.gov.in/nd1_noc19_mg60/preview