GIET ENGINEERING COLLEGE

(AUTONOMOUS)

(Approved by AICTE, New Delhi, Affiliated to JNTUK, Kakinada)

Accredited by NAAC with 'A+' Grade.

NH-16, CHITANYA KNOWLEDGE CITY, VELUGUBANDA, RAJAMAHENDRAVARAM–533296, E.G.Dt., A.P., INDIA

MECHANICAL ENGINEERING

(APPLICABLE FROM THE ACADEMIC YEAR 2024-25)

B.Tech. I Year I Semester

S. No	Category	Title	L/D	T	P	Credits
1.	BS&H	Engineering Physics	3	0	0	3
2.	BS&H	Linear Algebra & Calculus	3	0	0	3
3.	ES	Basic Electrical & Electronics Engineering	3	0	0	3
4.	ES	Engineering Graphics	1	0	4	3
5.	ES	Introduction to Programming	3	0	0	3
6.	ES	IT Workshop	0	0	2	1
7.	BS&H	Engineering Physics Lab	0	0	2	1
8.	ES	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9.	ES	Computer Programming Lab	0	0	3	1.5
10.	BS&H	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total			**13**	**00**	**15**	**20.5**

B.Tech. I Year II Semester

S.No.	Category	Title	L/D	T	P	Credits
1.	BS&H	Communicative English	2	0	0	2
2.	BS& H	Engineering Chemistry / Chemistry / Fundamental Chemistry	3	0	0	3
3.	ES	Differential Equations & Vector Calculus	3	0	0	3
4.	ES	Basic Civil & Mechanical Engineering	3	0	0	3
5.	PC	Engineering Mechanics	3	0	0	3
6.	BS&H	Communicative English Lab	0	0	2	1
7.	BS&H	Engineering Chemistry / Chemistry / Fundamental Chemistry Lab	0	0	2	1
8.	ES	Engineering Workshop	0	0	3	1.5
9.	PC	Engineering Mechanics Lab	0	0	3	1.5
10	BS&H	Health and wellness, Yoga and Sports	-	-	1	0.5
Total			**14**	**00**	**11**	**19.5**

B.Tech. II Year I Semester

S.No.	Category	Title	L/D	T	P	Credits
1.	BS	Numerical Methods and Transform Techniques	3	0	0	3
2.	HSMC	Universal Human Values– Understanding Harmony& Ethical Human Conduct	2	1	0	3
3.	ES	Thermodynamics	2	0	0	2
4.	PC	Mechanics of Solids	3	0	0	3
5.	PC	Material Science and Metallurgy	3	0	0	3
6.	PC	Mechanics of Solids and Materials Science Lab	0	0	3	1.5
7.	PC	Computer-aided Machine Drawing	0	0	3	1.5
8.	ES	Python programming Lab	0	0	2	1.0
9.	SOC	Embedded Systems and IoT	0	1	2	2
10.	AC	Environmental Science	2	0	0	-
Total			**15**	**02**	**10**	**20**

B.Tech. II Year II Semester

S.No.	Category	Title	L/D	T	P	Credits
1.	MS	Industrial Management	2	0	0	2
2.	BS	Complex Variables, Probability and Statistics	3	0	0	3
3.	PC	Manufacturing processes	3	0	0	3
4.	PC	Fluid Mechanics & Hydraulic Machines	3	0	0	3
5.	PC	Theory of Machines	3	0	0	3
6.	PC	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5
7.	PC	Manufacturing processes Lab	0	0	3	1.5
8.	SOC	Soft Skills	0	1	2	2
9.		Design Thinking & Innovation	1	0	2	2

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (1st Semester)			
Course Code 24BS2T03	**Engineering Physics** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

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

After completion of this course, the learners will be able to

CO1	Analyze the intensity variation of light due to polarization, interference and diffraction.
CO2	Familiarize with the basics of crystals and their structures.
CO3	Summarize various types of polarization of dielectrics and classify the magnetic materials.
CO4	Explain fundamentals of quantum mechanics and apply it to one-dimensional motion of particles.
CO5	Identify the type of semiconductor using Hall effect.

Unit-1: Wave Optics CO1 12L

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-2: Crystallography and X-ray diffraction CO2 8L

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-3: Dielectric and Magnetic Materials CO3 10L

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-4: Quantum Mechanics and Free electron Theory CO4 10L

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-5: Semiconductors CO5 10L

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.

Text book(s)

1. A Textbook of Engineering Physics, M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D. K. Bhattacharya and Poonam Tandon, Oxford press (2015).
3. Engineering Physics – P.K. Palanisamy, Scitech publishers(2011).

Reference book(s)

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics –Dr. M. Armugam, Anuradha Publications , 2015.
4. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010.
5. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web reference(s)

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

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (1st Semester)			
Course Code 24BS1T02	**Linear Algebra and Calculus** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

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	
After completion of this course, the learners will be able to	
CO1	Developanduseofmatrixalgebratechniquesthatareneededbyengineersfor Practical applications.
CO2	ApplicationsofEigenvaluesandEigenVectorsinCommunicationEngineering.
CO3	Utilize mean value theorems to real life problems.
CO4	Familiarizewithfunctionsofseveralvariableswhichisusefulinoptimization. Learnimportanttoolsofcalculusinhigherdimensionsinpartialdifferentiation.
CO5	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-1: Matrices CO1 12L

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, Gauss Jordan method and Gauss Seidel Iteration Methods.

Unit-2: Eigenvalues, Eigenvectors and Orthogonal Transformation CO2 12L

Eigen values, 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-3: Calculus CO3 11L

Infinite series tests, Ratio, comparison nth root test, Alternating series Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorem swith remainders (without proof), Problems and applications on the above theorems.

Unit-4: Partial differentiation and Applications (Multi variable calculus) CO4 13L

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Mac laurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange Multipliers.

Unit-5: Multiple Integrals (Multi variable Calculus) CO5 12L

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

Text book(s)

1. Higher Engineering Mathematics, B.S. Grewal, KhannaPublishers,2017,44thEdition
2. Advanced Engineering Mathematics, ErwinKreyszig, JohnWiley & amp; Sons, 2018,10th Edition.

Reference book(s)

1. Advanced Engineering Mathematics, Micheael Green berg, Pearsonpublishers,9th edition.
2. Higher Engineering Mathematics, H. K Das, Er.Rajnish Verma,S. Chand Publications,2014,
Third Edition (Reprint2021).

Web reference(s)

1.https://www.loc.gov/rr/scitech/selected-internet/mathematics.html

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (1st Semester)			
Course Code 24ES2T03	**Basic Electrical & Electronics Engineering** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	3	0	0	3

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.

Course Outcomes

After the completion of the course students will be able to

CO1	Describe fundamental laws, operating principles of motors/generators, MC/MI instruments.
CO2	Demonstrate the working of electrical machines, measuring instruments and power generation stations.
CO3	Calculate electrical load and electricity bill of residential and commercial buildings.
CO4	Demonstrate fundamental of semiconductor devices.
CO5	Demonstrate Rectifiers and power supplies, Amplifiers and Conversion of number systems, Describe logic gates.

Unit-1: DC & AC Circuits CO1 10L

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. 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.

Unit-2: Measuring Instruments CO2 7L

Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge, Energy meter, Phantom loading, Absolute instruments, Standardization of meter.

Unit-3: Energy Resources, Electricity Bill CO3 10L

Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation. 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.

Unit-4: Semiconductor Devices CO4 8L

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.

CO5 10L

Unit-5: Basic Electronic Circuits and Digital Electronics

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. Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra.

Textbook(s)

1. R. L. Boylestad& Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.

2. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition

3. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, DhanpatRai& Co, 2013.

4. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

Reference book(s)

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. SantiramKal, 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.
4. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition.
5. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020.
6. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.
7. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017.

Web reference(s)

1. https://nptel.ac.in/courses/108105053

2. https://nptel.ac.in/courses/108108076

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (1st Semester)			
Course Code 24ES2T04	**Engineering Graphics** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

To equip students with foundational concepts like dimensioning, conventions, and engineering drawing standards, the course aims to impart knowledge on projecting points, lines, and plane surfaces, thereby enhancing visualization skills for a comprehensive understanding of solid projections. Additionally, it fosters imaginative abilities crucial for comprehending solid sections and surface developments, while enabling students to grasp the visual perception of solid objects through isometric projections.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
CO2	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
CO3	Understand and draw projection of solids in various positions in first quadrant.
CO4	Explain principles behind development of surfaces.
CO5	Prepare isometric and perspective sections of simple solids

Unit-1: Introduction, Curves and Scales CO1 9L

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 scale

Unit-2: Orthographic Projections- Projection of Points, Straight Lines and Planes CO2 9L

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-3: Projection of Solids CO3 12L

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-4: Section of Solids and Development of Surfaces CO4 10L

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-5: Conversion of Views and Computer Graphics CO5 10L

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(s)

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference book(s)

1. Engineering Drawing, K. L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B. C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to Auto CAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc21_me128/preview
2. https://www.sdcpublications.com/Textbooks/Engineering-Graphics/85/
3. https://fractory.com/engineering-drawing-basics/
4. https://omicstutorials.com/engineering-graphics-and-design/
5. https://onlinecourses.nptel.ac.in/noc24_mg131/preview
6. https://onlinecourses.swayam2.ac.in/aic22_ts42/preview

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (1st Semester)			
Course Code 24ES1T02	**Introduction to Programming** (Common for All Engineering Branches)	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

To Familiarize students with programming concepts such as data types, control structures, functions, and arrays. Gain knowledge of the operators, selection and repetition statements in C. Understand and Apply different programming concepts to deal with real world problems.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Explain fundamentals of computer, programming languages. Use appropriate data types for storing data and choose the operators for writing complex expressions in C.
CO2	Make use of Decision Making and Looping statements to Solve various problems in C.
CO3	Solve problems using Arrays and Strings for efficiently accessing homogenous data.
CO4	Develop programs using pointers, structures and unions.
CO5	Develop programs to handle functions for reusability and redundancy. Apply file-handling functions to read/write data to files.

Unit-1: Introduction CO1 10L

Introduction to Computer and Computer Languages

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Flow charts; Algorithms, Pseudo code

Introduction to C Programming

Data types, Key words; Variables and Constants; Format-Specifies, basic input and output statements; Operators: Arithmetic, relational, logical operators; Assignment, increment, decrement, conditional operators; Bitwise and special operators, operator precedence and associativity, type conversion.

Unit-2: Control Structures CO2 10L

Decision Making statements

Simple if, if-else; nested if, else-if ladder; Switch-Case.

Looping Statements

While loop, Do-while loop, For loop, Comparison of while, dowhile and for; Nested loops, Break and continue.

Unit-3: Arrays and Strings CO3 10L

Arrays

Introduction to Arrays, one-dimensional Arrays, two dimensional Arrays, Applications of 1D-Arrays: Bubble Sort, Insertion Sort; Selection Sort; Linear Search and Binary Search,

Applications of 2D-Arrays: Matrix Addition; Matrix Multiplication and Transpose.

Strings

Introduction to Strings; string handling functions; Implementation of string copy and string concatenation without using string library functions.

Unit-4: Structures, Unions and Pointers CO4 10L

Structures and Unions

Structures, Accessing elements of a structure, Array of structures; pointer to structure; Unions, Compare structures and unions; Bit fields.

Pointers

Pointers, dereferencing and address operators, Pointer arithmetic; Accessing array elements using pointers.

Unit-5: Functions and File Handling CO5 10L

Functions

Functions, Declaration, Definition, call; Actual and formal parameters, return values; Call by value, call by reference; passing and returning pointers through functions; Passing arrays to functions; Dynamic memory allocation, malloc(), calloc(), realloc(), free(), storage classes; Command line arguments.

File Handling

Files, File streams, File types, File modes of operation, Functions for reading from a file, Functions to write data to a file; Random file access functions, Macros.

Textbook(s)

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996.

Reference book(s)

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition.

Web Reference(s)

1. https://www.w3schools.com/c/c intro.php
2. https://www.geeksforgeeks.org/c-programming-language/
3. https://www.hackerrank.com/domains/c

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (1st Semester)			
Course Code 24ES2L04	**IT WORKSHOP** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	0	0	2	1

Course Objectives

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

Course Outcomes

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

CO1	Perform Hardware troubleshooting.
CO2	Understand Hardware components and inter dependencies
CO3	Safeguard computer systems from viruses/worms
CO4	Document/ Presentation preparation
CO5	Perform calculations using spreadsheets

List of Experiment(s)

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 VivaVirtual Machine setup

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

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure theTCP/IPsetting. 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 LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX 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 LaTeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX 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 Colours, Inserting Header and Footer, Using Date and Time option in both LaTeX 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**.**

Task4: 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 1: 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 inPowerPoint.
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 – ChatGPT

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?'"

Reference(s)

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003.
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition.
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.

Web Resource(s)

1. https://assembleyourpc.net
2. https://www.latex-tutorial.com/tutorial
3. http://www.teachmsoffice.com/
4. https://www.geeksforgeeks.org/top-12-most-used-git-commands-for-developers/

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (1st Semester)			
Course Code 24BS2L03	**Engineering Physics Lab** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	0	0	2	1

Course Objectives

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 completion of this course, the learners will be able to

CO1	Operate optical instruments like travelling microscope and spectrometer.
CO2	Estimate the wavelengths of different colours using diffraction grating.
CO3	Plot the intensity of the magnetic field of circular coil carrying current with distance.
CO4	Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.
CO5	Calculate the band gap of a given semiconductor.
CO6	Identify the type of semiconductor using Hall effect.

List of Experiment(s)

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 using diffraction 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's Method.
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 Torsional

pendulum.

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.

Reference(s)

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

Web Resource(s)

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

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (1st Semester)			
Course Code 24ES2L03	**Electrical & Electronics Engineering Workshop** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	0	0	3	1.5

Course Objectives

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

Course Outcomes

After competition of this course, the student will be able to

CO1	Measure voltage, current and power in an electrical circuit.
CO2	Measure of Resistance using Wheat stone bridge
CO3	Discover critical field resistance and critical speed of DC shunt generators.
CO4	Investigate the effect of reactive power and power factor in electrical loads.
CO5	Identify & testing of various electronic components.
CO6	Understand the usage of electronic measuring instruments.
CO7	Plot and discuss the characteristics of various electron devices.
CO8	Explain the operation of a digital circuit

List of Experiment(s)

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
8. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
9. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
10. Implementation of half wave and full wave rectifiers
11. Plot Input & Output characteristics of BJT in CE and CB configurations
12. Frequency response of CE amplifier.
13. Simulation of RC coupled amplifier with the design supplied
14. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gate using ICs.

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

Reference(s)

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

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

Web reference(s)

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

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (1st Semester)			
Course Code 24ES1L02	**Computer Programming Lab** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	0	0	3	1.5

Course Objectives

To be familiar with the programming concepts of C Language. To provide hands on experience with coding and debugging and to foster logical thinking and problem-solving skills using programming

Course Outcomes

After completion of this course, the learners will be able to

CO1	Develop C Programs with utilize memory efficiently using various programming constructs.
CO2	Select appropriate control structure to Solve real world problems.
CO3	Solve various complex problems using Modular Programming skills.
CO4	Develop, Debug and Execute programs that demonstrate the applications of arrays, functions, basic concepts of pointers in C.

List of Experiment(s)

1. 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().
2. 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 Verification of Brewster's law.
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
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
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.

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.
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 Determination of temperature coefficients of a thermistor.
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.
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() .
10. 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.
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.
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.
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.
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.

Textbook(s)

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

Reference(s)

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

Web Resource(s)

1. https://www.w3schools.com/c/index.php
2. https://www.geeksforgeeks.org/c-programming-language/?ref=lbp

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (1st Semester)			
Course Code 24HS1T01	**Communicative English** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	3	0	0	2

Course Objectives

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

After completion of this course, the learners will be able to

CO1	Understand the context, topic, and pieces of specific information from social or Transactional dialogues.
CO2	Apply grammatical structures to formulate sentences and correct word forms.
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions.
CO4	Evaluate reading / listening texts and to write summaries based on global comprehension of these texts.
CO5	Create a coherent paragraph, essay, and resume.

UNIT- 1: Human Values: Gift of Magi (Short Story) CO1 10L

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

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT – 2 : Nature: The Brook by Alfred Tennyson (Poem) CO2 10L

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 structure talks.

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 – 3 : Biography: Elon Musk CO3 8L

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.
Writing: Summarizing, Note-making, paraphrasing.
Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary: Compound words, Collocations.

UNIT – 4 : Inspiration: The Toys of Peace by Saki CO4 8L

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).
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, Jargon.

UNIT – 5 : Motivation: The Power of Intrapersonal Communication (An Essay) CO6 8L

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 and usage (articles, prepositions, tenses, subject verb agreement).
Vocabulary: Technical Jargons.

Textbook(s)

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

Reference book(s)

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 University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web reference(s)

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

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (1st Semester)			
Course Code 24BS1T01	**Chemistry** (Common to ECE, CSE, IT & allied branches)	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electro chemistry and polymers
- To introduce instrumental methods, molecular machines and switches.

Course Outcomes

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

CO1	Compare the materials of construction for battery and electrochemical sensors.
CO2	Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers conducting polymers.
CO3	Explain the principles of spectrometry, slc in separation of solid and liquid mixtures.
CO4	Apply the principle of Band diagrams in the application of conductors and semiconductors.
CO5	Summarize the concepts of Instrumental methods.

Unit-1: Structure and Bonding Models CO1 8L

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one-dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O2 and CO, etc.

π-molecular orbitals of butadiene and benzene, calculation of bond order.

Unit-2: Modern Engineering materials CO2 8L

Semiconductors – Introduction, basic concept, application

Super conductors - Introduction basic concept, applications.

Super capacitors: Introduction, Basic Concept-Classification – Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles.

Unit-3: Electrochemistry and Applications CO1 10L

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Unit-4: Polymer Chemistry **CO2** **12L**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics–Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

Unit-5: Instrumental Methods and Applications **CO5** **10L**
CO3,

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

Textbook(s)

1. Jain and Jain, EngineeringChemistry,16/e, Dhanpat Rai Publishers,2013.
2. Peter Atkins, Juliode Paula and James Keeler, Atkins' Physical Chemistry 10/e, Oxford University Press, 2010.

Reference book(s)

1. Skoog and West, Principles of Instrumental Analysis,6/e, Thomson,2007.
2. J.D.Lee,Concise Inorganic Chemistry,5th Edition,Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. BillmayerJr,3rd Edition.

Web reference(s)

1. https://nptel.ac.in
2. https://www.azdocuments.in/2022/02/engineering-chemistry-21che1222.html
3. http://www.tndte.gov.in/site/wp-content/uploads/2016/08/Engineering Chemistry.pdf
4. https://archive.nptel.ac.in/courses/122/101/122101001/

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (1st Semester)			
Course Code 24BS2T02	**Differential Equations and Vector Calculus** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

- To enlighten the learners in the concept of differential equations and
- multivariable calculus.
- To 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

After completion of this course, the learners will be able to

CO1	Solve the system of Homogeneous and non-Homogeneous equations by using Matrices.
CO2	Solve the differential equations related to various engineering fields.
CO3	Identify solution methods for partial differential equations that model physical processes.
CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence
CO5	Estimate the work done against a field, circulation and flux using vector calculus.

Unit-1: Differential equations of first order and first degree CO1 12L

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

Unit-2: Linear differential equations of higher order (Constant Coefficients) CO2 12L

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations.
Applications: L-C-R Circuit problems and Simple Harmonic motion.

Unit-3: Partial Differential Equations CO3 11L

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-4: Vector Differentiaon CO4 13L

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, Force conservative

Unit-5: Vector Integration CO5 12L

Line integral-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.

Textbook(s)

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

Reference book(s)

1. Advanced Engineering Mathematics, Micheal Greenberg, Pearson publishers,9thedition.
2. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications,2014,
Third Edition (Reprint 2021.

Web reference(s)

1. https://www.loc.gov/rr/scitech/selected-internet/mathematics.html

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (1st Semester)			
Course Code 24HS1L01	**Communicative English Lab** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	0	0	2	1

Course Objectives

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 completion of this course, the learners will be able to

CO1	Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
CO2	Apply communication skills through various language learning activities.
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	Evaluate and exhibit professionalism in participating in debates and group discussions.
CO5	Create effective Course Objectives.

List of Topics:

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

Suggested Software:

1. Walden Infotech
2. Young India Films

Reference(s)

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 Resource(s)

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

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (1st Semester)			
Course Code 24BS1L01	**Chemistry Lab** (Common to ECE, CSE, IT & Allied Branches)	L	T	P	C
Prerequisites	Nil	0	0	3	1

Course Objectives

Verify the fundamental concepts with experiments.

Course Outcomes

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

CO1	Determine the cell constant and conductance of solutions.
CO2	Prepare advanced polymer Bakelite materials.
CO3	Measure the strength of an acid present in secondary batteries.
CO4	Analyse the IR spectra of some organic compounds
CO5	Calculate strength of acid in Pb-Acid battery.

List of Experiment(s)

1. Measurement of 10Dq by spectro photometric method.
2. Conductometric titration of strong acid vs. strong base.
3. Conductometric titration of weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emfs.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of a Bakelite.
8. Verify Lambert-Beer’s law.
9. Wavelength measurement of sample through UV-Visible Spectroscopy.
10. Identification of simple organic compounds by IR.
11. Preparation of nanomaterials by precipitation method.
12. Estimation of Ferrous Iron by Dichrometry.

Reference(s)

1. "Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar.

Web Resource(s)

1. https://byjus.com/chemistry/conductometric-titration/
2. https://www.sciencedirect.com/topics/chemistry/potentiometric-titration
3. https://www.slideshare.net/slideshow/fundamentals-of-volumetric-analysispdf/253855292

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (2nd Semester)			
Course Code 24ES2T01	**Basic Civil and Mechanical Engineering** (Common for all branches of Engineering)	L	T	P	C
Prerequisites		3	0	0	3

Course Objectives

Upon course completion, students should be able to recognize the significance and breadth of mechanical engineering across various sectors and industries, articulate knowledge of different engineering materials and manufacturing processes, and provide a comprehensive overview of thermal and mechanical transmission systems while introducing the fundamentals of robotics and their practical applications.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Upon course completion, students will demonstrate a comprehensive understanding of the role of mechanical engineering in society and industry, including its application across various sectors. They will also exhibit knowledge of fundamental engineering materials and their properties.
CO2	Upon course completion, students will be able to explain the fundamental principles of manufacturing processes, including casting, forming, joining, and machining, and demonstrate knowledge of thermal engineering concepts such as combustion cycles, refrigeration, and air conditioning, as well as an introduction to electric and hybrid vehicles.
CO3	Upon course completion, students will be able to explain the working principles of various power plants (steam, diesel, hydro, and nuclear), analyze different mechanical power transmission systems, and demonstrate a basic understanding of robotics, including its components and applications..

PART A: BASIC MECHANICAL ENGINEERING

Unit-1: Introduction to Mechanical Engineering, Engineering Materials CO1 9L

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-2: Manufacturing Processes and Thermal Engineering CO2 9L

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-3: Power Plants, Mechanical Power Transmission and Robotics CO3 9L

Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and theirapplications.
Introduction to Robotics - Joints & links, configurations, and applications of robotics.

Textbook(s)

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India)Pvt. Ltd.
2. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications,(India) Pvt. Ltd.

Reference book(s)

1. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, TataMcGraw Hill publications (India) Pvt. Ltd.
2. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt.Ltd.
3. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
4. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
5. Nuclear Energy- Fundamentals and Concepts, Dr Yarrapragada Subba Rao, Volume-1, Scientific international publishing House
6. A Text Book of Engineering Thermodynamics, Dr Yarrapragada Subba Rao, Volume-1, Alpha International Publication

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc24_me104/preview
2. https://archive.nptel.ac.in/courses/112/103/112103108/

PART B: BASIC CIVIL ENGINEERING

Course Objectives

Students will develop an understanding of the breadth and significance of civil engineering disciplines. The course will introduce foundational concepts of surveying and the critical role of transportation in national economic growth. Students will also gain an appreciation for the importance of water quality, conveyance, and storage. Finally, the course will provide a basic overview of civil engineering materials and construction methods.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Upon successful completion of this course, students will demonstrate a comprehensive understanding of the civil engineering profession, including its diverse disciplines, the role of civil engineers in society, and fundamental knowledge of construction materials and techniques.
CO2	Upon completion of this course, students will be able to apply fundamental surveying techniques to accurately determine horizontal and vertical distances, angles, and elevations, and produce basic topographic maps.
CO3	Upon completion of this course, students will be able to evaluate the significance of transportation infrastructure in economic development and possess foundational knowledge of highway pavements, as well as a basic understanding of key transportation systems (harbors, tunnels, airports, and railways). Additionally, students will be introduced to water resources engineering concepts, including water sources, quality, and basic water management structures.

Unit-1: Basics of Civil Engineering, Hydraulics and Water Resources Engineering — CO1 9 L

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-2: Surveying — CO2 9 L

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-3: Transportation Engineering, Water Resources and Environmental Engineering: — CO3 9 L

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 andConveyance Structures (Simple introduction to Dams and Reservoirs).

Textbook(s)

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India)

Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

Reference book(s)

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

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc24_ce111/preview
2. https://archive.nptel.ac.in/courses/105/106/105106201/
3. https://www.nptelvideos.com/discipline.php?name=civil-engineering
4. https://onlinecourses.nptel.ac.in/noc22_ce42/preview

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (1st Semester)			
Course Code 24HS1L02	**Health and Wellness, Yoga and Sports** (Common to All branches of Engineering)	L	T	P	C
Prerequisites	Nil	0	0	1	0.5

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 this course, the learners will be able to

CO1	Understand the importance of yoga and sports for Physical fitness and sound health.
CO2	Demonstrate an understanding of health-related fitness components.
CO3	Compare and contrast various activities that help enhance their health.
CO4	Assess current personal fitness levels.
CO5	Develop Positive Personality

Unit-1: CO2,C04 7L

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.

Unit-2: CO1,CO3 5L

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- 3 C04,CO5 5L

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

Text book(s)

1. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice.
2. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993.
3. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014.
4. 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 many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

1. Evaluated for a total of 100 marks.
2. 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.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (2nd Semester)			
Course Code 24ES2L01	**Engineering Workshop** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	0	0	3	1.5

Course Objectives

To impart practical knowledge to learners on woodworking, sheet metal operations, fitting, residential electrical wiring, and basic two-wheeler maintenance.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Identify workshop tools and their operational capabilities.
CO2	Practice on manufacturing of components using workshop trades including fitting,carpentry, foundry and welding.
CO3	Apply fitting operations in various applications.
CO4	Apply basic electrical engineering knowledge for House Wiring Practice

List of Experiment(s)

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 Bridlejoint
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) Square fit
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.
9. **Basic repairs of Two-wheeler vehicle** – Demonstration of working of two-wheelervehicle and its repairs.

Textbooks:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.

2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference(s)

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

Web Resource(s)

1. https://www.youtube.com/c/EngineersWorkshop
2. https://www.vlab.co.in/
3. https://www.vlab.co.in/broad-area-mechanical-engineering

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (2nd Semester)			
Course Code 24ME2PCT01	**Engineering Mechanics** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Engineering Physics	3	0	0	3

Course Objectives

The course aims to familiarize students with diverse force systems and to cultivate the ability to accurately represent forces and moments acting on a body through free body diagrams for equilibrium analysis. It further focuses on instilling fundamental principles of centre of gravity, centroid, and moment of inertia, enabling their calculation for various simple and composite bodies. The course also emphasizes the application of the Work-Energy method to particle motion and a comprehensive understanding of the kinematics and kinetics of rigid body translational and rotational motion.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.
CO2	Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.
CO3	Calculate the centroids, centre of gravity and moment of inertia of different geometrical shapes.
CO4	Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.
CO5	Solve the problems involving the translational and rotational motion of rigid bodies.

Unit-1: Introduction, System of forces and Friction CO1 9L

Introduction to Engineering Mechanics– Basic Concepts. Scope and Applications

Systems of Forces: Coplanar Concurrent Forces– Components in Space–Resultant– Moment of 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-2: Equilibrium of Systems of Forces CO2 9L

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorm, 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-3: Centroid, Centre of Gravity, Area and Mass MOI CO3 12L

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 gravityof composite bodies, Pappus theorems.

Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem,

Momentsof 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 Momentsof Inertia, Mass Moment of Inertia of composite bodies.

Unit-4: Rectilinear and Curvilinear motion of a particle CO4 10L

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-5: Rigid body Motion CO5 10L

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

Textbook(s)

1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw HillEducation 2017. 5th Edition.
2. Engineering Mechanics, R.K.Bansal ,Laxmi Publications. 2020. Twelth Edition.
3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

Reference book(s)

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw HillEducation. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L.G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press,2014. Second Edition
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc.,New Delhi, 2022, 14th Edition

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (2nd Semester)			
Course Code 24ME2PCL02	**Engineering Mechanics Lab**	L	T	P	C
Prerequisites	Engineering Physics	0	0	3	1.5

Course Objectives

Upon course completion, students are expected to verify the Law of Parallelogram and Triangle of Forces, determine the coefficients of static and rolling friction as well as the centre of gravity for various plane laminae, and analyse pulley systems, the moment of inertia of compound pendulums, and flywheels.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.
CO2	Verify Law of Polygon of forces and Law of Moment using force polygon and bell crank lever.
CO3	Determine the Centre of gravity and Moment of Inertia of different configurations.
CO4	Verify the equilibrium conditions of a rigid body under the action of different force systems.

List of Experiment(s)

1. Verification of Law of Parallelogram of Forces.
2. Verification of Law of Triangle of Forces.
3. 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.
4. Determination of coefficient of Static and Rolling Frictions
5. Determination of Centre of Gravity of different shaped Plane Lamina.
6. 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.
7. Study of the systems of pulleys and draw the free body diagram of the system.
8. Determine the acceleration due to gravity using a compound pendulum.
9. Determine the Moment of Inertia of the compound pendulum about an axis perpendicular tothe plane of oscillation and passing through its centre of mass.
10. Determine the Moment of Inertia of a Flywheel.
11. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

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

Reference(s)

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

Web Resource(s)

1. https://www.vlab.co.in/broad-area-mechanical-engineering
2. https://vlab.amrita.edu/index.php?sub=1&brch=74

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24BS3T06	**Numerical Methods and Transform Techniques**	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

Upon successful completion of this course, students will be proficient in applying various numerical methods to solve nonlinear algebraic equations and perform numerical integration, while also being equipped with foundational concepts and techniques to tackle advanced real-world applications.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Evaluate the approximate roots of polynomial and transcendental equations by different algorithms. Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals.
CO2	Apply numerical integral techniques to different Engineering problems. Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations.
CO3	Apply the Laplace transform for solving differential equations.
CO4	Find or compute the Fourier series of periodic signals.
CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms.

UNIT – I: Iterative Methods CO1 12L

Introduction – Solutions of algebraic and transcendental equations: Bisection method – Secant method – Method of false position – Iteration method – Newton-Raphson method (Simultaneous Equations) Interpolation: Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula.

UNIT – II: Numerical integration, Solution of ordinary differential equations with initial conditions CO2 10L

Trapezoidal rule– Simpson's 1/3rd and 3/8th rule– Solution of initial value problems by Taylor's series– Picard's method of successive approximations– Euler's method – RungeKutta method (second and fourth order) – Milne's Predictor and Corrector Method.

UNIT –III: Laplace Transforms: CO3 10L

Definition of Laplace transform - Laplace transforms of standard functions – Properties of Laplace Transforms – Shifting theorems–Transforms of derivatives and integrals – Unit stepfunction – Dirac's delta function – Inverse Laplace transforms – Convolution theorem (with out proof). Applications: Solving ordinary differential equations (initial value problems) and integro differential equations using Laplace transforms.

UNIT – IV: Fourier series CO4 10L

Introduction– Periodic functions – Fourier series of periodic function –Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine

series.

UNIT – V: Fourier Transforms **CO5 10L**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals – Infinite Fourier transforms – Sine and cosine transforms – Properties– Inverse transforms – Convolution theorem (without proof) – Finite Fourier transforms.

Textbook(s)

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. B. V. Ramana,Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference book(s)

1. Erwin Kreyszig,Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineering and Science,Tata Mc. Graw Hill Education.
3. M. K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
4. Lawrence Turyn,Advanced Engineering Mathematics, CRC Press.

Web reference(s)

1. https://www.loc.gov/rr/scitech/selected-internet/mathematics.html

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. I Sem. (2nd Semester)			
Course Code 24ES3T05	**Thermodynamics** (Mechanical Engineering)	L	T	P	C
Prerequisites		2	0	0	2

Course Objectives:

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. Provide fundamental concepts of Refrigeration and Psychrometry.

Course Outcomes:

After completion of this course, the learners will be able to

CO1	Explain the importance of thermodynamic properties related to conversion of heat energy to work.
CO2	Apply the Zeroth and First Law of Thermodynamics.
CO3	Understand Second Law of Thermodynamics.
CO4	Analyse the Mollier charts, T-S and h-s diagrams, Steam Calorimetry, phase Transformations
CO5	Evaluate the COP of refrigerating systems and properties, processes of psychometry and sensible and latent heat loads.

Unit – I: Introduction CO1 8L

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 CO2 9L

Energy in State and in Transition, Types, Work and Heat, Point and Path function. Zeroth 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 CO3 12L

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 CO4 9L

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 & Air Conditioning CO5 9L

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 Book (s):

1. P.K.Nag, Engineering Thermodynamics, 5/e, Tata McGraw Hill, 2013.
2. R.K Rajput, Thermal Engineering, ninth edition, Laxmi Publications

Reference Book (s)

1. Y.A.Cengel &M.A.Boles , Thermodynamics – An Engineering Approach, 7/e, McGraw Hill, 2010.
2. CP Arora, Refrigeration and Air-conditioning, 4/e, McGraw Hill, 2021.

Web reference (s):

1. https://www.edx.org/learn/thermodynamics.
2. https://archive.nptel.ac.in/courses/112/106/11210631
3. https://www.youtube.com/watch?v=7NI5P4KqrAs&t
4. https://kp.kiit.ac.in/pdf_files/02/Study-Material_3rd-
5. Semester_Winter_2021_Mechanical-Engg.-_Thermal-Engineering
6. https://www.coursera.org/learn/thermodynamics-intro

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24ME3PCT03	**Mechanics Of Solids** (Mechanical Engineering)	L	T	P	C
Prerequisites	Engineering Mechanics	3	0	0	3

Course Objectives

The importance of the different types of stresses acting on a material. Different mechanical properties. Concept of shear force and bending moment diagrams. Clear idea on deflection of beams and problems on thick and thin cylinders.

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. Course Outcomes

After completion of this course, the learners will be able to

CO1	Understand the behaviour of basic structural members subjected to uni axial and biaxial loads. Apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, moment and torsional moment.
CO2	Correct and complete shear and bending moment diagrams for beams.
CO3	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.
CO4	Students attain a deeper understanding of the loads, stresses, and strains acting on a structure and their relations in the elastic behaviour.
CO5	Design and analysis of Industrial components like pressure vessels.

Unit-1: Simple Stresses & Strains: CO1 9L

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 uni axial 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-2: Shear Force and Bending Moment: CO2 9L

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 load sand combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

Unit-3: Flexural Stresses and Shear Stresses: CO3 12L

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-4: Deflection of Beams : CO4 10L

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-5: Thin And Thick Cylinders: CO5 10L

Thin And Thick Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter 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

Textbook(s)

1. S.S.Bhavikatti, Strength of materials,10/e, Vikas Publishing House, NewDelhi, 2018.
2. A Textbook of SOM, R.K. Bansal 5th Edition 2019.

Reference book(s)

1. Gere & Timoshenko, Mechanics of materials, 2/e, CBS publications.
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. Popov, Mechanics of Solids, 2/e, New Pearson Education, 2015.

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc19_ce18/preview.
2. https://youtube/iY_ypychVNY?si=310htc4ksTQJ8Fv6

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24ME3PCT04	**Material Science & Metallurgy** (Mechanical Engineering)	L	T	P	C
Prerequisites	Engineering Chemistry	3	0	0	3

Course Objectives

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

Course Outcomes

After completion of this course, the learners will be able to

CO1	Understand the crystalline structure of different metals and study the stability of phases in different alloy systems.
CO2	Study the behaviour of ferrous and non-ferrous metals and alloys and their application in different domains.
CO3	Understand the effect of heat treatment, addition of alloying elements on properties of ferrous metals.
CO4	Grasp the methods of making of metal powders and applications of powder metallurgy.
CO5	Comprehend the properties and applications of ceramic, composites and other advanced methods.

Unit-1: Structure of Metals and Constitution of alloys and Equilibrium Diagrams CO1 13L

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_3C.

Unit-2: Ferrous metals and alloys & Non-ferrous Metals and Alloys CO2 9L

Ferrous metals and alloys

Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal 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-3: Heat treatment of Steels CO3 10L

Heat treatment of Steels

Effect of alloying elements on Fe-Fe_3C system, annealing, normalizing, hardening, TTT diagrams, tempering, harden ability, surface – hardening methods, age hardening treatment, Cryogenic treatment.

Unit-4: Powder Metallurgy CO4 10L

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-5: Ceramic and Advanced materials CO5 10L

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 Nano materials and smart materials.

Textbook(s)

1. Dr. V.D. Kodgire, Material Science and Metallurgy, 39/e, Everest Publishing House, 2017.
2. S.H.Avner, Introduction to Physical Metallurgy, 2/e, Tata McGraw- Hill, 1997.

Reference book(s)

1. William D. Callister Jr, Materials Science and Engineering: An Introduction, 8/e, John Wiley and Sons, 2009.
2. Donald R.Askeland, Essentials of Materials science and Engineering, 4/e, CL Engineering publicatios, 2018.
3. V.Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2004
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.

Web reference(s)

1. https://archive.nptel.ac.in/courses/113/106/113106032/
2. https://www.edx.org/learn/mechanics/massachusetts-institute-of-technologymechanical-behavior-of-materials-part-3-time-dependent-behavior.
3. https://www.youtube.com/watch?v=9Sf278j1GTU
4. https://www.coursera.org/learn/fundamentals-of-materials-science
5. https://www.coursera.org/learn/material-behavior.

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (1st Semester)			
Course Code 24HS3T02	**Universal human Values- Understanding Harmony & Ethical Human Conduct** (Common for all branches of Engineering)	L	T	P	C
Prerequisites		2	1	0	3

Course Objectives

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. 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. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Define the terms like Natural Acceptance, Happiness and Prosperity Identify one's self, and one's surroundings (family, society nature)
CO2	Apply what they have learnt to their own self in different day-to-day settings in real life Relate human values with human relationship and human society
CO3	Justify the need for universal human values and harmonious existence Develop as socially and ecologically responsible engineers

Unit-1: Universal human Values- Understanding Harmony & Ethical Human Conduct

Introduction to Value Education (6 lectures and 3 tutorials for practice session)
Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development 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-2: Harmony in the Human Being

Understanding Human being as the Co-existence of the self and the body.
Distinguishing between the Needs of the self and the body
Practice Session PS4 Exploring the difference of Needs of self and body.
The body as an Instrument of the self

Understanding Harmony in the self
Practice Session PS5 Exploring Sources of Imagination in the self Harmony of the self with the body Programme to ensure self-regulation and Health Practice Session PS6 Exploring Harmony of self with the body

Unit-3: Harmony in the Family and Society

Harmony in the Family – the Basic Unit of Human Interaction
'Trust' – the Foundational Value in Relationship
Practice Session PS7 Exploring the Feeling of Trust
'Respect' – as the Right Evaluation
Practice Session PS8 Exploring the Feeling of Respect
Other Feelings, Justice in Human-to-Human Relationship
Understanding Harmony in the Society
Vision for the Universal Human Order
Practice Session PS9 Exploring Systems to fulfil Human Goal

Unit-4 Harmony in the Nature/Existence

Understanding Harmony in the Nature
Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature
Practice Session PS10 Exploring the Four Orders of Nature
Realizing Existence as Co-existence at All Levels
The Holistic Perception of Harmony in Existence
Practice Session PS11 Exploring Co-existence in Existence.

Unit-5 Implications of the Holistic Understanding

Natural Acceptance of Human Values
Definitiveness of (Ethical) Human Conduct
Practice Session PS12 Exploring Ethical Human Conduct
A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Competence in Professional Ethics
Practice Session PS13 Exploring Humanistic Models in Education
Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Strategies for Transition towards Value-based Life and Profession
Practice Session PS14 Exploring Steps of Transition towards
Universal Human Order

Reference book(s)

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, 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 – Pandit Sunderlal
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)

Web reference(s)

1. https://fdp-si.aicte-india.org/UHVII%
   20Class%20Notes%20&%20Handouts/UHV%20Handout%201-
2. Introduction%20to%20Value%20Education.pdf
3. https://fdp-si.aicte-india.org/UHVII%
   20Class%20Notes%20&%20Handouts/UHV%20Handout%202-
4. Harmony%20in%20the%20Human%20Being.pdf
5. https://fdp-si.aicte-india.org/UHVII%
   20Class%20Notes%20&%20Handouts/UHV%20Handout%203-
6. Harmony%20in%20the%20Family.pdf
7. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3
   S2%20Respect%20July%2023.pdf
8. https://fdp-si.aicte-india.org/UHVII%
   20Class%20Notes%20&%20Handouts/UHV%20Handout%205-
9. Harmony%20in%20the%20Nature%20and%20Existence.pdf
10. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-
    days%20FDPSI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%2
    0D3-S2A%20Und%20Nature-Existence.pdf
11. https://fdp-si.aicteindia.
    org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-
    25%20Ethics%20v1.pdf.

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24AC3T01	**Environmental Science** (Mechanical Engineering)	L	T	P	C
Prerequisites	Engineering Mechanics	2	0	0	-

Course Objectives

The students completing this course are expected to get awareness on environment.To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life. To save earth from the inventions by the engineers.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Multi-disciplinary nature of environmental studies and various renewable and non-renewable resources.
CO2	Understand flow and bio-geo- chemical cycles and ecological pyramids.
CO3	Understand various causes of pollution and solid waste management and related preventive measures.
CO4	Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
CO5	Illustrate the causes of population explosion, value education and welfare programmes.

Unit-1: CO1 9L

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-2: CO2 9L

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 and 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-3: **CO3** **9L**

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-4: **CO4** **9L**

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-5: **CO5** **9L**

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.

Textbook(s)

1.Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
2.K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd, 2010.

Reference book(s)

1. M.Anji Reddy, “Textbook of Environmental Sciences and Technology”, BS Publication, 2014..
1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e,

Cengage Publications, 2012.

Web reference(s)

1.https://onlinecourses.nptel.ac.in/noc23_hs155/preview
2. http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-I/Data%20Files/pdf/lec07.pdf

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech.I Sem. (1st Semester)			
Course Code 24ME3PCL05	**Mechanics Of Solids & Materials Science Lab** (Mechanical Engineering)	L	T	P	C
Prerequisites	Nil	0	0	3	1.5

Course Objectives

To study the concepts of yield stress, ultimate stress and bending stress. Have idea on Hardness test. Knowledge of microstructures and characteristics of ferrous and non—ferrous alloys like aluminium, copper, brass, grey cast-iron etc.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Evaluate the values of yield stress, ultimate stress and bending stress of the given specimen under tension test and bending test
CO2	Conduct the torsion test to determine the modulus of rigidity of given specimen.
CO3	Justify the Rockwell hardness test over with Brinell hardness and measure the hardness of the given specimen.
CO4	Examine the stiffness of the open coil and closed coil spring and grade them.
CO5	Analyze the microstructure and characteristics of ferrous and nonferrous alloy specimens.

NOTE: Any 6 experiments from each section A and B.

List of Experiment(s)

A) Mechanics Of Solids Lab:

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

7. Liquid penetration test pendulum.

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.

Textbook(s)

1. B.C. Punmia, Strength of materials,10/e, Lakshmi publications Pvt. Ltd, NewDelhi, 2018.
2. A Textbook of SOM, R.K. Bansal 5th Edition 2019.

Reference book(s)

1. Gere & Timoshenko, Mechanics of materials, 2/e, CBS publications.
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. Popov, Mechanics of Solids, 2/e, New Pearson Education, 2015.

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc19_ce18/preview.
2. https://youtube/iY_ypychVNY?si=310htc4ksTQJ8Fv6.

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24ME3PCL06	**Computer-Aided Machine Drawing**	L	T	P	C
Prerequisites	Any 2D and 3D Modelling Software & Engineering Graphics	0	0	3	1.5

Course Objectives

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

Course Outcomes

After completion of this course, the learners will be able to

CO1	Demonstrate the conventional representations of materials and machine components.
CO2	Model riveted, welded and key joints using CAD system.
CO3	Create solid models and sectional views of machine components.
CO4	Generate solid models of machine parts and assemble them.
CO5	Translate 3D assemblies into 2D drawings.

List of Experiment(s)

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, carburettor, 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.

Reference(s)

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.

Web Resource(s)

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

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24EC3SCL01	**Embeded Systems & IOT**	L	T	P	C
Prerequisites	Nil	0	0	3	1.5

Course Objectives

To provide students with a comprehensive understanding of interfacing techniques and communication protocols for microcontrollers, focusing on practical applications with Arduino and Raspberry Pi platforms, including the integration of transducers, stepper motors, accelerometers, and distance sensors, as well as the basics of SPI and serial communication, to prepare them for advanced IoT applications

Course Outcomes

After completion of this course, the learners will be able to

CO1	Proficiency in Python Installation and Setup
CO2	Understanding of Basic Python Programming Constructs.
CO3	Competence in Using Functions and Modules
CO4	Skill in Data Structures and File Handling
CO5	Application of Advanced Python Concepts

List of Experiment(s)

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.

List of Experiment(s)

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 and debug Python code on the device.

3. Using Raspberry pi a. Calculate the distance using distance sensor. b. Basic LED functionality.
4. Raspberry Pi interact with online services through the use of public APIs and SDKs.
5. Study and Install IDE of Arduino and different types of Arduino.
6. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.
7. Calculate the distance using distance sensor Using Arduino.
8. Basic LED functionality Using Arduino.
9. Calculate temperature using temperature sensor Using Arduino.
10. Calculate the distance using distance sensor Using Node MCU.
11. Basic LED functionality Using Node MCU.

Text Books:

1. Arsheep Bahga &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.

Web References(s) :

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/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
5. 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-9257a1b38ec07e85&campaign=IoT+Sensors+and+Devices&source=edX&product_c ategory=course&placement_url=https%3A%2F%2Fwww.edx.org%2Fsearch
6. Virtual Labs - http://vlabs.iitkgp.ac.in/rtes/
7. Virtual Labs - https://cse02-iiith.vlabs.ac.in/
8. Virtual Labs - https://iotvirtuallab.github.io/vlab/Experiments/index.html

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. I Sem. (3rd Semester)			
Course Code 24ES3L05	**Python Programming Lab**	L	T	P	C
Prerequisites	Nil	0	0	3	1.5

Course Objectives

1. **Fundamental Understanding:** Develop a solid foundation in Python programming, covering essential syntax, semantics, and constructs.
2. **Data Manipulation:** Equip students with skills to handle and manipulate data using Python libraries like Pandas and NumPy.
3. **Problem-Solving:** Enhance problem-solving abilities by implementing various algorithms and data structures in Python.
4. **Software Development:** Foster software development skills, including version control, package management, and project documentation.
5. **Advanced Techniques:** Introduce advanced Python topics such as web scraping, API interaction, and database management.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Proficiency in Python Installation and Setup
CO2	Understanding of Basic Python Programming Constructs.
CO3	Competence in Using Functions and Modules
CO4	Skill in Data Structures and File Handling
CO5	Application of Advanced Python Concepts

List of Experiment(s)

Experiment 1: Introduction to Python

Objective: Install Python and set up the development environment.

Tasks:

Install Python and an IDE (e.g., PyCharm, VSCode, or Jupyter Notebook).

Write and run a simple "Hello, World!" program.

Understand and demonstrate basic Python syntax and semantics.

Experiment 2: Basic Python Programming

Objective: Learn basic programming constructs in Python.

Tasks:

Create programs using variables, data types, and operators.

Implement basic input and output functions.

Write programs using control structures (if statements, for loops, while loops).

Experiment 3: Functions and Modules

Objective: Understand functions and module usage in Python.

Tasks:

Define and call functions with different types of arguments and return values.

Explore and use built-in Python modules.

Write a script that imports and utilizes at least two different standard library modules.

Experiment 4: Lists and Tuples

Objective: Work with Python lists and tuples.

Tasks:
Create, modify, and iterate over lists and tuples.
Perform list comprehensions to create new lists.
Demonstrate the immutability of tuples.

Experiment 5: Dictionaries and Sets

Objective: Explore dictionaries and sets in Python.
Tasks:
Create and manipulate dictionaries.
Use dictionary comprehension.
Create and perform operations on sets.

Experiment 6: Strings and File I/O

Objective: Manipulate strings and perform file I/O operations.
Tasks:
Demonstrate various string methods.
Write programs to read from and write to text files.
Work with different file formats, including CSV and JSON.

Experiment 7: Error Handling and Exceptions

Objective: Implement error handling in Python programs.
Tasks:
Write programs using try, except, else, and finally blocks.
Handle specific exceptions.
Create and raise custom exceptions.

Experiment 8:Object-Oriented Programming (OOP)

Objective: Understand and implement OOP concepts in Python.
Tasks:
Define classes and create objects.
Demonstrate inheritance and polymorphism.
Use class and instance variables in programs.

Experiment 9:Libraries and Packages

Objective: Utilize third-party libraries and create Python packages.
Tasks:
Install and use libraries like NumPy and Pandas.
Create a simple Python package and distribute it.
Work with virtual environments to manage dependencies.

Experiment 10: Working with Data

-Objective: Perform data manipulation and visualization.
Tasks:
Use Pandas to load, manipulate, and analyze datasets.
Create visualizations using Matplotlib and Seaborn.
Conduct basic data analysis tasks and summarize findings.

Experiment 11: Web Scraping and APIs

Objective: Extract data from the web and interact with APIs.
Tasks:
Access and parse data from RESTful APIs.
Process and analyze JSON data from APIs.

Experiment 12: Databases

Objective: Work with databases in Python.

- **Tasks:**

Connect to a database using SQLite and SQLAlchemy.

Perform CRUD operations on the database.

Write queries to manage and retrieve data.

Web Resource(s)

1. https://www.udemy.com/course/python-the-complete-python-developer-course/?matchtype=e&msclkid=0584dfb54dc715f39c0bb9aaf74033be&utm_campaign=BG
2. Python_v.PROF_la.EN_cc.INDIA_ti.7380&utm_content=deal4584&utm_medium=udemyads&utm_source=bing&utm_term=_._ag_1220458320107116_._ad ._kw_Python+language_._de_c_._dm ._pl._ti_kwd-76278984197882%3Aloc-90_._li_116074_._pd._&couponCode=IND21PM
3. https://www.w3schools.com/python/python_intro.asp
4. https://www.youtube.com/watch?v=eWRfhZUzrAc
5. https://onlinecourses.nptel.ac.in/noc20_cs83/preview
6. https://www.edx.org/learn/python
7. Virtual Labs - https://python-iitk.vlabs.ac.in/
8. Virtual Labs - https://virtual-labs.github.io/exp-arithmetic-operations-iitk/
9. Virtual Labs - https://cse02-iiith.vlabs.ac.in/
   https://mlritm.ac.in/assets/cse/cse_lab_manuals/R20_cse_manuals/Python%20Lab%20Manual.pdf

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24BS4T11	**Complex Variables, Probability and Statistics**	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

Upon successful completion of this course, students will be able to apply complex variable functions, series expansions, probability distributions, sampling theory, and hypothesis testing to solve real-world problems in engineering and science.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic
CO2	Make use of the Cauchy residue theorem to evaluate certain integrals
CO3	Infer the statistical inferential methods based on small and large sampling tests
CO4	Find the differentiation and integration of complex functions used in engineering problems
CO5	Design the components of a classical hypothesis test

Unit-1: Functions of Complex Variables and Complex integration CO1 12L

Introduction–Continuity –Differentiability–Analyticity –Cauchy-Riemann equations in Cartesian and polar coordinates–Harmonic and conjugate harmonic functions– Milne–Thompson method.

Complex integration: Line integral –Cauchy's integral theorem –Cauchy's integral formula–Generalized integral formula (all without proofs) and problems on above theorems.

Unit-2: Series Expansions and Residue Theorem CO1 12L

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated – Essential –Pole of order m– Residues – Residue theorem (without proof)

Unit-3: Probability and Distributions CO2 12L

Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

Unit-4: Sampling Theory CO4 10L

Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only)–Central limit theorem (without proof)–Representation of the normal theory distributions– Introduction to t, χ^2 and F-distributions- point and interval estimations – maximum error of estimate.

Unit-5: Tests of Hypothesis CO5 10L

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples)–Tests on proportions.

Textbook(s)

1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
2. Miller and Freund's, Probability and Statistics for Engineers,7/e,Pearson,2008.

Reference book(s)

1. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 9/e, Mc-Graw Hill,2013.
2. S.C.Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics,11/e, Sultan Chand &Sons Publications,2012.
3. Jay I. Devore, Probability and Statistics for Engineering and the Sciences, 8/e, Cengage.
4. ShronL. Myers, KeyingYe, Ronald E Walpole, Probability and Statistics Engineers and the Scientists,8/e,Pearson 2007.
5. Sheldon, M.Ross, Introduction to probability and statistics Engineers and the Scientists, 4/e, Academic Foundation,2011.

Web reference(s)

1. https://archive.nptel.ac.in/courses/111/103/111103070/
2. https://biet.ac.in/pdfs/PROBABILITY%20AND%20STATISTICS%20&%20COMPLEX%20VARIABLES.pdf
3. https://archive.nptel.ac.in/courses/111/105/111105090/
4. http://acl.digimat.in/nptel/courses/video/111102160/L23.html
5. https://onlinecourses.nptel.ac.in/noc21_ma57/preview

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (1st Semester)			
Course Code 24HS4T03	**Industrial Management**	L	T	P	C
Prerequisites		2	0	0	2

Course Objectives

To provide a comprehensive understanding of industrial engineering, encompassing the optimal design of layouts, productivity improvement through work study, Total Quality Management (TQM) and quality control techniques, financial management, and human resource management, including value analysis.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Students will be able to understand the fundamental concepts of industrial engineering, including its development, applications, and the role of an industrial engineer, as well as differentiate between production management and industrial engineering.
CO2	Students will be able to apply various work study techniques, including method study and time study, to improve productivity and efficiency in industrial operations.
CO3	Students will be able to implement statistical quality control methods, such as control charts and sampling inspection, to ensure product quality and process improvement.
CO4	Students will be able to analyze financial statements, manage working capital, and apply capital budgeting techniques to make informed financial decisions in an industrial context.
CO5	Students will be able to understand and apply human resource management principles, including job evaluation, merit rating, and wage incentive plans, to effectively manage personnel and improve organizational performance.

UNIT– I: Introduction

Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.

Plant Layout: 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, plant maintenance, preventive and break down maintenance.

UNIT–II: Work Study

Importance, types of production, applications, work study, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.

UNIT–III: Statistical Quality Control & Total Quality Management:

Quality control, Queuing assurance and its importance, SQC, attribute sampling inspection

with single and double sampling, Control charts – X and R –charts X and S charts and their applications, numerical examples.
Total Quality Management: 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, Ratio analysis, Management of working capital, estimation of working capital requirements, stock management, Cost accounting and control, budget and budgetary control, Capital budgeting – Nature of Investment Decisions – Investment Evaluation criteria- NPV, IRR, PI, Payback Period, and ARR, numerical problems.

UNIT–V : Human Resource Management

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.P Khanna, Industrial Engineering and Management, Dhanpat Rai Publications (P) Ltd, 2018.
2. Mart and Telsang, Industrial Engineering and Production Management, S.Chand&Company Ltd. NewDelhi, 2006.

Reference book(s) :

1. Bhattacharya DK, Industrial Management,S.Chand, publishers, 2010.
2. J.G Monks, Operations Management,3/e, McGraw Hill Publishers1987.
3. . T.R. Banga, S.C.Sharma, N. K. Agarwal, Industrial Engineering and Management Science, Khanna Publishers, 2008.
4. KoontzO' Donnell, Principles of Management, 4/e, McGraw Hill Publishers, 1968.
5. R.C. Gupta, Statistical Quality Control, Khanna Publishers, 1998.
6. NVS Raju, Industrial Engineering and Management,1/e, Cengage India Private Limited 2013.

Web references (s):

1. https://onlinecourses.nptel.ac.in/noc21_me15/preview
2. https://onlinecourses.nptel.ac.in/noc20_mg43/preview
3. https://www.edx.org/learn/industrial-engineering
4. https://youtube.com/playlist?list=PL299B5CC87110A6E7&si=TghLCbEobuxjEaXi
5. https://youtube.com/playlist?list=PLbjTnjt5Gkl0z3OHOGK5RB9mvNYvnlmW&si=oaX_5RG69hS3v2ll

Regulation GEBT24	GIET Engineering College (Autonomous)	I B. Tech. II Sem. (4th Semester)			
Course Code 24ME4PCT08	**Fluid Mechanics & Hydraulic Machines** (Mechanical Engineering)	L	T	P	C
Prerequisites	Engineering Mechanics	3	0	0	3

Course Objectives

The students completing this course are expected to

- Understand the properties of fluids, manometer, hydrostatic forces acting on different surfaces
- Understand the kinematic and dynamic behaviour through various laws of fluids like Continuity, Euler's, Bernoulli's equations, energy and momentum equations.
- Understand the theory of boundary layer, working and performance characteristics of various hydraulic machines like pumps and turbines.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Understand the basic concepts of fluid properties.
CO2	Estimate the mechanics of fluids in static and dynamic conditions.
CO3	Apply the Boundary layer theory, flow separation and dimensional analysis.
CO4	Estimate the hydro dynamic forces of jet on vanes indifferent positions.
CO5	Understand the working Principles and performance evaluation of hydraulic pump and turbines.

Unit-1: Fluid statics, Buoyancy and Floatation CO1 9L

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 metacentre height. Stability analysis and applications.

Unit-2: Fluid Kinematics, Fluid dynamics and Closed conduit flow: CO2 9L

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, double tand vortex flow.

Fluid dynamics: Surface and body forces –Euler's and Bernoulli's equations for flow along a streamline, 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-3: Boundary Layer Theory and Dimensional Analysis CO3 12L

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 of equations, Method of repeating variables and Buckingham Pi Theorem.

Unit-4: Basics of turbo machinery and Hydraulic Turbines CO4 10L

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-5: Performance of hydraulic turbines, Centrifugal pumps and Reciprocating pumps CO5 10L

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 and oscillators. 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.

Textbook(s)

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.

Reference book(s)

1. Rajput, Fluid Mechanics and Hydraulic Machines, S Chand & Company, 2016.
2. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering, S K Kataria &Sons, 2013.

Web reference(s)

1. https://www.edx.org/learn/fluid-mechanics
2. www.coursera.org/learn/fluid-powerera

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24ME4PCT07	**Manufacturing Processes** (Mechanical Engineering)	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

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

Course Outcomes

After completion of this course, the learners will be able to

CO1	Design the patterns and core boxes for metal casting processes
CO2	Understand the different welding processes
CO3	Demonstrate the different types of bulk forming processes
CO4	Understand sheet metal forming processes
CO5	Learn about the different types of additive manufacturing processes

Unit-1: Casting CO1 11L

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-2: Welding CO2 10L

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-3: Bulk Forming CO3 10L

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-4: Sheet Metal Forming and High energy rate forming processes CO4 10L

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-5: Additive manufacturing CO5 10L

Additive manufacturing

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

Textbook(s)

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

Reference book(s)

1. R.K. Jain, Production Technology, Khanna Publishers, 2022.
2. Sharma P.C., A Text book of Production Technology, 8/e, S Chand Publishing, 2014.
3. A.Ghosh & A.K.Malik, Manufacturing Science, East West Press Pvt. Ltd, 2010.
4. Lindberg and Roy, Processes and materials of manufacture, 4/e, Prentice Hall India Learning Private Limited, 1990.
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.

Web reference(s)

1. https://www.edx.org/learn/manufacturing/massachusetts-institute-of-technologyfundamentals-of-manufacturing-processes
2. https://onlinecourses.nptel.ac.in/noc21_me81/preview
3. www.coursera.org/learn/introduction-to-additive-manufacturing-processessera
4. https://archive.nptel.ac.in/courses/112/103/112103263/
5. https://elearn.nptel.ac.in/shop/nptel/principles-of-metal-formingtechnology/?v=c86ee0d9d7ed

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24ME4PCT09	**Theory of Machines** (Mechanical Engineering)	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

To provide students with a foundational understanding of basic mechanisms and their applications, emphasizing the importance of degrees of freedom, velocity and acceleration in mechanisms, cams and follower motions, gyroscopic couples, and the equation of motion for single degree of freedom systems.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Understand different mechanisms and their inversions.
CO2	Calculate velocity and acceleration of different links in a mechanism
CO3	Apply the effects of gyroscopic couple in ships, aero planes and road vehicles.
CO4	Evaluate unbalance mass in rotating machines.
CO5	Analyze free and forced vibrations of single degree freedom systems.

Unit-1: Simple Mechanisms CO1 12L

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-2: Plane and Motion analysis CO1 12L

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 – kinematic analysis of simple mechanisms – slider crank mechanism dynamics – Coincident points – Coriolis component of acceleration.

Unit-3: Gyroscope and Gear Profile CO2 12L

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-4: Balancing of Rotating masses and Cams CO4 10L

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-5: Vibrations & Turning Moment Diagrams and Flywheels CO5 10L

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.

Textbook(s)

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 book(s)

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.

Web reference(s)

1. 1.https://archive.nptel.ac.in/courses/112/106/112106270/
2. 2.https://archive.nptel.ac.in/courses/112/105/112105268/

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24ME4PCL10	**Fluid Mechanics & Hydraulic Machines Lab** (Mechanical Engineering)	L	T	P	C
Prerequisites	Engineering Mechanics	0	0	3	1.5

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 this course, the learners will be able to

CO1	Demonstrate the devices used for measuring flow.
CO2	Compute major losses in pipes.
CO3	Illustrate the operating parameters of turbines.
CO4	Explain the working of different types of pumps.
CO5	Explain the devices used for measuring flow.

List of Experiment(s)

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 Orificemeter.
10. Determination of friction factor for a given pipeline.
11. Determination of loss of head due to sudden contraction in a pipeline.

Textbook(s)

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.

Reference book(s)

1. Rajput, Fluid Mechanics and Hydraulic Machines, S Chand & Company, 2016.
2. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering, S K Kataria &Sons, 2013.

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24ME4PCL11	**Manufacturing Processes Lab** (Mechanical Engineering)	L	T	P	C
Prerequisites	Nil	0	0	3	1.5

Course Objectives

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

Course Outcomes

After completion of this course, the learners will be able to

CO1	Make moulds for sand casting.
CO2	Fabricate different types of components using various manufacturing techniques.
CO3	Adapt unconventional manufacturing methods.
CO4	Develop Different Weld joints.
CO5	Explain different types of 3d Printing techniques.

List of Experiment(s)

1. Design and make a
   - i. Single piece pattern and
   - ii. Split pattern
2. Sand Properties testing of
   - 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.

Reference(s)

1. R.K. Jain, Production Technology, Khanna Publishers, 2022.
2. Sharma P.C., A Text book of Production Technology, 8/e, S Chand Publishing, 2014.

Web Resource(s)

1. www.vlab.co.in
2. To study and observe various stages of casting through demonstration of casting process. (https://virtual-labs.github.io/exp-sand-casting-processdei/theory.html)
3. To weld and cut metals using an oxyacetylene welding setup. (https://virtuallabs.github.io/exp-gas-cutting-processes-iitkgp/index.html).
4. To simulate Fused deposition modelling process (FDM) (https://3dpdei.vlabs.ac.in/exp/simulation-modelling-process)
5. https://altair.com/inspire-mold/
6. https://virtual-labs.github.io/exp-simulation-cartesian-system-dei/theory.html

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24HS4L01	**Soft Skills**	L	T	P	C
Prerequisites	Nil	3	0	0	3

Course Objectives

To equip students with comprehensive life skills, encompassing intra-personal, inter-personal, verbal, and non-verbal communication, and interview techniques, thereby bridging the gap between academic knowledge and industry requirements, and fostering holistic personality development.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Assimilate and understood the meaning and importance of soft skills and learn how to develop them.
CO2	Understand the significance of soft skills in the working environment for professional excellence.
CO3	Prepare to undergo the placement process with confidence and clarity.
CO4	Ready to face any situation in life and equip themselves to handle them effectively.
CO5	Understand and learn the importance of etiquette in both professional and personal life

Unit-1: Introduction CO1 11L

Introduction- Emergence of life skills, Definition & Meaning, Importance& need, reasons for skill gap, Analysis--Soft Skills vs Hard skills, Linkage between industry and soft skills, Challenges, Personality Developments. Soft Skills, Soft Skills vs English - Improving Techniques.

Unit-2: Intra- Personal CO2 10L

Definition-Meaning – Importance-SWOT analysis, Johari windows - Goal Setting- quotient skills - Emotional Intelligence- Attitudinal skills - Right thinking- Problem Solving-Time management, stress management.

Unit-3: Inter-Personal CO3 10L

Definition – Meaning – Importance-Communications skills- Team Work, managerial skills -Negotiation skills- Leadership skills, corporate etiquettes.

Unit-4: Verbal Skills CO4 10L

Definition and Meaning-Listening skills, need- types, advantages, Importance-Improving Tips for Listening, Speaking, need- types, advantages, Importance- Improving Tips, Reading- Writing Skills, Report, Resume, statement of purpose, need- types, advantages, Importance-Improving Tips.

Unit-5: Non-Verbal Skills and Body Skills CO5 10L

Definition and Meaning – Importance- Facial Expressions- Eye Contact – Proxemics-

Haptics -Posture, cross cultural body language, body language in interview room, appearance and dress code – Kinetics- Para Language -tone, pitch, pause, neutralization of accent, use of appropriate language, Interview skills, interview methods and questions.

Textbook(s)

1. Sherfield, M. Robert at al, Cornerstone Developing Soft Skills, 4/e, Pearson Publication, New Delhi, 2014.
2. Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited, 2016.

Reference book(s)

1. Sambaiah. M. Technical English, Wiley publishers India. New Delhi. 2014.
2. Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.
3. Alex. K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
4. Meenakshi Raman and Sangita Sharma, Technical Communication: Principle and Practice, Oxford University Press, 2009.
5. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication, New Delhi, 2014.
6. Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc20_hs60/preview
2. http://www.youtube.com/@softskillsdevelopment6210
3. https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&si=Fs05Xh8ZrOPsR8F4
4. https://www.coursera.org/learn/people-soft-skills-assessment?language=English
5. https://www.edx.org/learn/soft-skills

Regulation GEBT24	GIET Engineering College (Autonomous)	II B. Tech. II Sem. (4th Semester)			
Course Code 24ES4L06	**Design Thinking & Innovation** (Common for all branches of Engineering)	L	T	P	C
Prerequisites	Nil	1	0	2	2

Course Objectives

Bring awareness on innovative design and new product development. Explain the basics of design thinking. Familiarize the role of reverse engineering in product development. Train how to identify the needs of society and convert into demand. Introduce product planning and product development process.

Course Outcomes

After completion of this course, the learners will be able to

CO1	Define the concepts related to design thinking.
CO2	Explain the fundamentals of Design Thinking and innovation.
CO3	Apply the design thinking techniques for solving problems in various sectors
CO4	Analyse to work in a multidisciplinary environment.
CO5	Evaluate the value of creativity.

Unit-1: Introduction to Design Thinking CO1 9L

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-2: Design Thinking Process CO2 9L

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-3: Innovation CO3 12L

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-4: Product Design CO4 10L

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-5: Design Thinking in Business Processes CO5 10L

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 Start-ups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for start-up.

Textbook(s)

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009. .
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference book(s)

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
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Web reference(s)

1. https://onlinecourses.nptel.ac.in/noc22_de16/preview.
2. https://nptel.ac.in/courses/109/104/109104109/