



JSS MAHAVIDHYAPEETHA

JSS UNIVERSITY NOIDA

B. TECH

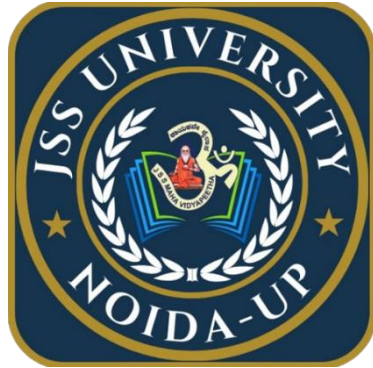
**FIRST YEAR
CIVIL ENGINEERING**

**EVALUATION SCHEME WITH
SYLLABUS**



www.jssuninoida.edu.in

JSS MAHAVIDYAPEETHA
JSS UNIVERSITY, NOIDA



EVALUATION SCHEME AND SYLLABUS

For

B.Tech. First Year

Civil Engineering (CE)

Effective from the Session

2025-2026

JSS UNIVERSITY, NOIDA

C-20/1, Sector-62, Noida, Uttar Pradesh, 201301

B. Tech. FIRST YEAR, CIVIL ENGINEERING

SEMESTER I

Sl.No	Course Code	Course Title	Course Category	Teaching Dept.	Teaching hours/ week				Credits	Marks			Exam Duration
					L	T	P	Total		CIE	ESE	Total	
1		Applied Physics for Civil Engineering Stream/ Applied Chemistry for Civil Engineering Stream	BSC	PH/CH	3	0	2	5	4	40	60	100	3hrs
2		Mathematical Methods for Engineering Application	BSC	MATHS	3	1	0	4	4	40	60	100	3hrs
3		Computational Thinking for Problem Solving	ESC	CSE	3	0	2	5	4	40	60	100	3hrs
4		Sustainable and Smart Construction Materials	ESC	CE	3	1	0	4	4	40	60	100	3hrs
5		Mechanics of Rigid Bodies	ESC	CE/ME	3	0	0	3	3	40	60	100	3hrs
6		Computer Aided Engineering Graphics Lab	/ ESC	HU/EN	0	0	2	2	1	100	--	100	2hrs
7		Value Education	MNC-AU	HU/EN	3	0	0	3	0	40*	60*	100*	2hrs
								26	20	300	300	600	
L: Lecture; T: Tutorial; P: Practical; CIE: Continuous Internal Examination ESE:EndSemesterExamination *MNC-AU Audit Course													

B. Tech. FIRST YEAR, CIVIL ENGINEERING

SEMESTER II

Sl.No	Course Code	Course Title	Course Category	Teaching Dept.	Teaching hours/ week				Credits	Marks			Exam Duration
					L	T	P	Total		CIE	ESE	Total	
1		Applied Chemistry for Civil Engineering Stream /Applied Physics for Civil Engineering Stream	BSC	CH/PH	3	0	2	5	4	40	60	100	3hrs
2		Advanced Mathematical Methods for Engineering	BSC	MATHS	3	1	0	4	4	40	60	100	3hrs
3		Architecture and Material Testing	ESC	CE	2	0	2	4	3	40	60	100	2hrs
4		Geology for Engineers	ESC	CE	3	0	0	3	3	40	60	100	3hrs
5		Product Realization Through Manufacturing	ESC	ME	3	0	2	5	4	40	60	100	3hrs
6		Basics of AI and ML	ESC	CE	3	0	0	3	3	40	60	100	3hrs
7		English for Technical Communications	HSMC	EN/HU	1	0	2	3	2	100	--	100	2 hrs
8		Sports and Yoga	MNC-AU	--	0	0	2	2	0	50*	--	--	--
								29	23	340	360	700	

L: Lecture; T: Tutorial; P: Practical; CIE: Continuous Internal Examination ESE: End Semester Examination *MNC-AU Audit Course

DETAILED SYLLABUS

B.Tech. First Year

I SEMESTER

Civil Engineering (CE)

Effective from the Session

2025-2026

JSS UNIVERSITY, NOIDA

C-20/1, Sector-62, Noida, Uttar Pradesh, 201301

APPLIED PHYSICS FOR CIVIL ENGINEERING STREAM**Course Outcomes**

CO1: Understand the fundamental concepts of wave-particle duality, Heisenberg uncertainty principle, Schrödinger's wave equation, and their applications in quantum mechanics.

CO2: Analyze the principles of oscillatory motion, sound waves, and architectural acoustics for designing acoustically efficient structures.

CO3: Describe and analyze crystal structures, the principles of X-ray, and apply non-destructive testing methods in civil engineering materials and infrastructure.

CO4: Understand the mechanical properties of materials and their significance in the design and safety of civil engineering structures.

CO5: Discuss the principle and working of LASER and optical fibre, and examine the industrial and scientific applications.

UNITS	Syllabus	No of Hours
Unit – I	Quantum Mechanics: Wave-Particle Duality, group velocity and phase velocity, Heisenberg Uncertainty Principle and its applications, wave function and its physical significance, Operators, Schrödinger Equation (Time-independent and Time-dependent forms), Particle in a Box, quantum mechanical tunneling, applications of quantum mechanics.	08 Hrs
Unit – II	Oscillations and Architectural Acoustics: Simple Harmonic Motion (SHM), differential equations, free, damped, and forced oscillations, resonance, coupled oscillations. Sound: Classification, characteristics of musical sound, intensity, pressure level, human audiogram, loudness units. Sound Behavior: Diffraction, refraction, resonance, absorption coefficient, transmission loss. Architectural Acoustics: Auditoriums, concert halls, offices, and the role of acoustic insulation in civil engineering.	08 Hrs
Unit – III	Crystal Structure and Non-Destructive Testing: Introduction to Crystal Structures: symmetry, space lattice, basis, unit cell, Bravais lattices (Seven Crystal Systems, Fourteen Bravais Lattices), Atomic Arrangements in Cubic Structures: Coordination number, atomic radius, packing fraction, void space, density, lattice planes, and Miller indices. X-ray Diffraction: Bragg's law, types of defects. Non-destructive Testing (NDT) methods: visual inspection, liquid penetrant testing, magnetic particle testing, eddy current testing, ultrasonic inspection (advantages and limitations).	06 Hrs
Unit – IV	Mechanical properties of solids: Stress and strain, Hooke's law, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between Y , n and σ (with derivation), mention relation between K , Y and σ , limiting values of Poisson's ratio. Beams, bending moment and derivation of expression, Cantilever and I section girder and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation).	08 Hrs
Unit – V	Lasers and Optical Fibers: Introduction to Lasers: Spontaneous and Stimulated Emission. Population Inversion, Einstein's Coefficient, Construction and Working of He-Ne laser, Industrial Applications of Lasers: Laser range finder and Laser Printing. Optical Fibre: Working Principles of Optical fibre, light propagation mechanism in Optical Fibers and its parameters, Fiber Optic Communication (schematic diagram).	06 Hrs
APPLIED PHYSICS FOR CIVIL ENGINEERING PRACTICALS		

Preamble: The Applied Physics course provides students with a strong foundation in the fundamentals of physics and serves as a basis for various engineering disciplines. This course is designed to develop a scientific perspective in students and equip them with hands-on experience in engineering education

List of experiments

1. To determine the Energy band gap of a given semiconductor material using four probe method.
2. To study the variation of Magnetic field along the axis of current carrying coil and then to estimate the Radius of coil.
3. To verify the Stefan's law by electrical method.
4. To determine the Specific resistance of a given wire using Carey foster's bridge.
5. Evaluating Optical Flatness of Surfaces Using Newton's Rings Interference Pattern.
6. Measurement of Electro Chemical Equivalent of copper.
7. Determination of the dielectric constant of the dielectric material used in a capacitor by charging and discharging of the capacitor.
8. Determination of Charge density, charge velocity and Hall coefficient of a given p-type semiconductor by Hall Effect method.
9. Determination of the relative permeability, retentivity, coercivity, and energy loss of a magnetic material by studying its magnetization (B-H) curve.
10. To determine the Numerical aperture, Angle of divergence and Attenuation coefficient of a given optical fiber cable.

Demonstration Experiments (Not to be part of Examination)

1. To determine the wavelength of spectral lines using plane transmission grating.
2. Determination of Curie temperature of a ferromagnetic material by studying the variation of loop area with temperature.

Text Books

1. A Text book of Engineering Physics-M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy (S Chand).
2. Applied Physics for Engineers- Neeraj Mehta (PHI Learning).
3. Engineering Physics-H.K. Malik and A.K. Singh (McGrawHill)
4. Engineering Physics- Shatendra Sharma & Jyotsna Sharma (Pearson)

Reference Books

1. Concepts of Modern Physics Arthur Beiser (McGraw Hill).
2. Solid State Physics-S.O.Pillai (New AgeInt.)
3. Principles of Physics- Jearl Walker, David Halliday and Robert Resnick.
4. Physics for Scientists and Engineers with Modern Physics- John W Jewett and Raymond A. Serway.

NPTEL Web Links

1. <https://youtu.be/TcmGYe39XG0>
2. <https://youtu.be/R-x9KdNjQmo>
3. <https://youtu.be/2CsMpEB15QY>
4. <https://youtu.be/-ap00IUJm7k>
5. <https://www.youtube.com/watch?v=N1ZRGnwv8gw>
6. <https://youtu.be/dZ2nbc06cVs>

MATHEMATICAL METHODS FOR ENGINEERING APPLICATIONS**Common for Mechanical Engineering (ME) and Civil Engineering
(CE)**

Course Outcome:

CO1: Apply the fundamental concepts of linear algebra including system of linear equations and analyze eigenvalues, eigenvectors of matrices.

CO2: Develop the structure of vector spaces and linear transformations, including subspaces, basis, dimension, and matrix representations to solve linear algebra problems.

CO3: Develop analytical skills in differential calculus for solving mathematical and applied problems effectively.

CO4: Apply ordinary differential equations to model and solve real-world problems in engineering and science.

CO5: Apply various methods to solve second order linear differential equation with its applications.

UNIT S	Syllabus	No of Hours
Unit – I	Linear Systems and Eigenvalue Analysis: Elementary transformation, Inverse of a matrix, Echelon forms, Rank of matrix, Solution of system of linear equations, Linear dependence and independence of vectors, Characteristic equation, Cayley-Hamilton theorem and its applications (without proof), Eigenvalues and eigenvectors	08 Hrs
Unit – II	Vector Spaces and Linear Transformations: Introduction to vector spaces, Subspaces, Spanning sets, Basis and dimension, Row space, Column space and null space, Linear transformations, Matrix representation of a linear transformation, Rank Nullity theorem	07 Hrs
Unit – III	Advanced Differentiation and Multivariable Optimization: Successive Differentiation (nth order derivatives), Partial derivatives, Total derivative, Euler's theorem for homogeneous functions, Jacobians and their properties, Maxima and minima of functions of two variables, Lagrange's method of multipliers	09 Hrs
Unit – IV	Solution Techniques for Ordinary Differential Equations: Introduction to ordinary differential equations, Exact differential equations, Homogeneous differential equations, Linear differential equations of nth order with constant coefficients, Complementary function, Particular integral, Cauchy-Euler equation, Simultaneous linear differential equations	08 Hrs
Unit – V	Advanced Methods for Second Order Differential Equations: Solution of second order linear differential equations by changing independent variables, Method of variation of parameters, Series solution method with variable coefficient- Frobenius method (Distinct roots not differing by an integer, Distinct roots differing by an integer), Applications to engineering problems (Mechanical vibrations and free oscillations).	08 Hrs

TextBooks

1. First course in Linear Algebra by P. B. Bhattacharya, S. K. Jain, S. R. Nagpaul, NewAgeInternational Publishers, 2nd Edition (2018).
2. Advanced Engineering Mathematics by R. K. Jain & S. R. K. Iyengar, Narosa publishing House, 5th Edition (2016).
3. Ordinary and Partial Differential Equations by M. D. Raisinghania, S. Chand & Company Ltd., 19th Edition (2018).

ReferenceBooks

1. Schaum's Outline of Linear Algebra by Frank Ayres Jr. and Robert M. Stern, Tata McGraw-Hill Education, New Delhi, 6th Edition (2017).
2. Linear Algebra and Its Applications by Gilbert Strang, Cengage Learning, 5th Edition (2016).
3. Advanced Engineering Mathematics by Peter V. O'Neil, Thomson (Cengage) Learning, 7th Edition (2017).
4. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, USA, 10th Edition (2011).
5. Differential Equations with Applications and Historical notes by G. F. Simmons, Tata McGraw-Hill Education, New Delhi, 3rd Edition (2016).

NPTEL Web Links

1. <https://youtu.be/KaLA1cWhQIA>
2. <https://youtu.be/LJ-LoJhbBA4>
3. <https://youtu.be/Ld9AtgPmyvM>
4. <https://youtu.be/ClvFwUpi3ZA>
5. <https://youtu.be/ES741wq3APA>

COMPUTATIONAL THINKING FOR PROBLEM SOLVING**SUBJECT CODE:****LTP:3-0-2**

Course Outcome:

CO1: Understand and explain the components of computer systems and the foundational concepts of computational thinking, including problem decomposition and algorithmic efficiency.

CO2: Apply various operators and construct complex conditional statements in C to solve computational problems effectively.

CO3: Implement and utilize loops and arrays in C to manage and manipulate data efficiently, including nested loops and multidimensional arrays.

CO4: Develop programs using built-in and user-defined functions and apply basic searching and sorting algorithms to organize data.

CO5: Utilize pointers, dynamic memory allocation, file handling, macros, and command-line arguments to enhance the functionality and efficiency of C programs

UNITS	Syllabus	No of Hours
Unit I	<p>Components of Computer Systems: Memory, Processor, I/O Devices, Storage, concepts of system software: Operating System, Assembler, Compiler, Interpreter, Loader and Linker</p> <p>Foundation of computational Thinking: Definition and importance of computational thinking, Real-world applications of computational thinking, Problem definition, Problem decomposition, Algorithmic Thinking Algorithm, divide and conquer approach, Flowchart, concept of Pseudo Code with Examples, From Algorithms to Programs, Source Code, algorithm efficiency (time and space complexity).</p> <p>Programming Basics: Structure of C Program, Writing and Executing the First C- Program, Syntax and Logical Errors in Compilation, Object code and Executable Code , Standard I/O in C, Fundamental Data types, identifiers, Variables and Memory Locations, Storage Classes</p>	8 Hrs
Unit II	<p>Operators and Solving Expressions: Operators and Expression Using Numeric and Relational Operators, Mixed Operands, implicit and explicit type Conversion, Logical Operators, Bit Operations, Assignment Operator, Operator precedence and Associativity.</p> <p>Conditional Statements: if, else and else if statements, switch statements, nested if- else, and their replacement by Switch statements, and various programs based on conditional statements</p>	8 Hrs
Unit III	<p>Loops: Need of loops, while, do While and for Loops, nested loops, Multiple Loop Variables, Use of Break, Continue Statements and goto statements.</p> <p>Concept of Arrays: Notations for 1-D, 2-D and n-D arrays and their representation, Manipulating Array Elements, Character Arrays and Strings, String and String functions. Functions: Introduction to Function, Types of Functions, Functions using Array, Passing Parameters to Functions, Call by Value, Call by Reference, concept of Recursion techniques</p>	8 Hrs
Unit IV	Basic of Searching and Sorting Algorithms: Searching techniques: linear	6 Hrs

	search, binary search, hashing, Sorting Algorithms: Bubble Sort, Insertion and Selection Sort. Structure and Union: Introduction to Structure, union, structure vs union, Enumerated Data types, Array of Structures, and various programs based on loops, arrays, and structures.	
Unit V	Pointers: Introduction, Declaration, Introduction to Dynamic Memory Allocation (Malloc, Calloc, Realloc, Free), Use of Pointers in Self-Referential Structures, Basics of Linked List and node creation File Handling and Macros: File I/O Functions, Standard C Preprocessors, programs based on file handling, Defining and Calling Macros, functions vs macros, types of macros	6 Hrs

COMPUTATIONAL THINKING FOR PROBLEM SOLVING PRACTICALS

Preamble: The objective of the course is to introduce the basic ideas and concepts of programming using C as a basic language. This will help students to design and implement cross- platform programming concepts as well

List of experiments

1. WAP to calculate the area and circumference of a circle.
2. WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.
3. WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula $C/5=(F-32)/9$.
4. WAP that swaps values of two variables using a third variable.
5. WAP that checks whether the two numbers entered by the user are equal or not.
6. WAP to find the greatest of three numbers.
7. WAP that tells whether a given year is a leap year or not.
8. WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:
 - Between 90-100% ----- Print 'A'
 - 80-90% -----Print 'B'
 - 60-80% -----Print 'C'
 - Below 60% ----- Print 'D'
9. WAP that takes two operands and one operator from the user, perform the operation, and prints the result by using Switch statement.
10. WAP to find the factorial of a given number using normal and recursive functions.
11. WAP to print sum of even and odd numbers from 1 to N numbers.
12. WAP to print the Fibonacci series using normal and recursive functions.
13. WAP to check whether the entered number is prime or not.
14. WAP to print Armstrong numbers from 1 to 100.

15. WAP to convert binary number into decimal number and vice versa.
16. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.
17. WAP to search an element in a array using Linear Search.
18. WAP to sort the elements of the array in ascending order using Bubble Sorttechnique.
19. WAP to add and multiply two matrices of order mxn.
20. WAP to transpose a matrix of order mxn.
21. WAP that finds the sum of diagonal elements of a mxn matrix.
22. WAP to implement strlen (), strcat (), strcpy (), strcmp () using the concept ofFunctions and pointers.
23. WAP to swap two elements using the concept of pointers.
24. WAP C Program to Calculate Difference between Two Time Periods.
25. C Program to Store Information of Students dynamically Using Structure
26. WAP to compare the contents of two files and determine whether they are sameor not.
27. WAP to check whether a given word exists in a file or not. If yes, then find thenumber of times it occurs.
28. WAP to square of a given number using macro.

Text books

1. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill.
2. The C programming by KRernighan Brain W. and Ritchie Dennis M., Pearson Education.

Reference Books

1. Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison- Wesley, 2006.
2. Let Us C By Yashwant P. Kanetkar.
- 3, Expert C Programming by Peter van der Linden, Pearson.

WebReferences

1. <https://archive.nptel.ac.in/courses/106/105/106105171/>
2. <https://archive.nptel.ac.in/courses/106/104/106104128/>
3. <https://www.mooc-list.com/tags/c-programming>
4. <https://www.coursera.org/courses?query=c%20programming>

SUSTAINABLE AND SMART CONSTRUCTION MATERIAL

Course Outcomes:

CO1: Understand the properties and applications of basic construction materials like bricks, concrete, and timber.

CO2: Describe the manufacturing and testing processes for common materials like cement, steel, and bitumen.

CO3: Identify the role of sustainable materials and practices in modern construction.

CO4: Explain basic construction techniques, including walls, formwork, and waterproofing.

CO5: Recognize the importance of green building practices and introductory smart materials.

Unit	Syllabus	No. of Hours
UNIT - I	Introduction to Construction Materials: Classification of materials (natural, synthetic, composite), Aggregates: Types, properties, and sources, Cement and concrete: Types, basic properties, and applications, Bricks and masonry: Types, properties, and uses.	8 Hours
UNIT - II	Traditional and Alternative Materials: Timber: Types, seasoning, defects, and applications, Steel: Basic manufacturing and uses in construction, Alternative materials: Introduction to geotextiles, recycled materials, and low-VOC paints.	8 Hours
UNIT - III	Construction Techniques: Walls: Load-bearing and non-load-bearing, basic design considerations, Formwork and scaffolding: Types and requirements, Plastering and waterproofing: Methods and importance.	8 Hours
UNIT - IV	Sustainable Construction Practices: Green building concepts: Introduction to LEED, GRIHA, and energy conservation codes, Thermal insulation and ventilation: Basic principles and materials, Sustainable materials: Permeable concrete, cool concrete, and biomaterials.	8 Hours
UNIT - V	Introduction to Smart Materials and Technologies: Overview of smart materials: Phase-change materials, self-healing concrete, Basic nanotechnology applications in construction (e.g., stronger windows, coatings), Acoustics and sound insulation: Basic concepts and materials.	8 Hours

TEXT BOOKS AND REFERENCES

1. Building Construction by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain
2. Concrete Technology by M.S. Shetty
3. Formwork for Concrete Structures by Kumar Neeraj Jha and M.K. Sharan
4. Sustainable Construction: Green Building Design and Delivery by Charles J. Kibert
5. Introduction to Smart Materials and Structures by M.V. Gandhi and B.S. Thompson
6. Building Construction by Dr. Rinku Kumar (Available on AICTE Ekumbh portal) Link: <https://ekumbh.aicte-india.org/allbook.php>
7. Building Materials by S.K. Duggal

MECHANICS OF RIGID BODIES**(Common to ME &CE)****Course Outcomes:** At the end of the course, students will be able to**CO1:** Apply the fundamental concepts of mechanics to analyze equilibrium of a body subjected to a system of forces**CO 2:**Analyze reactions developed in the trusses and effect of friction force on rigid bodies subjected to different types loading.**CO 3:** Compute centroid and second moment of area for plane and composite sections.

Units	Syllabus	No. of Hours
Unit 1	Resultant of coplanar force system: Basic dimensions and units, Idealizations, Classification of force system, principle of transmissibility of forces, composition of forces, resolution of forces, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.	7
Unit 2	Equilibrium of coplanar force system: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, , Free body diagrams, Equilibrium of coplanar non-concurrent force system, types of beams, types of loadings, types of supports and support reactions of statically determinate beams subjected to various types of loads, Numerical examples.	8
Unit 3	Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples and Identification of Zero force members Friction: Static Friction, Dynamic and Kinetic Friction, Coefficient of Friction, Angle of Friction, Laws of friction. Concept of Cone of friction, Application to problems involving sliding friction and ladders.	7
Unit 4	Centroid of plane areas: Introduction, Locating the centroid of a line ,rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, Centroid of composite areas and simple built up sections, Numerical examples.	6
Unit 5	Moment of inertia of plane areas: Introduction, Polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections, Numerical examples	8

Text Books

1. Tayal A K, Engineering Mechanics – Statics and Dynamics, Umesh Publications
2. Bhavikkatti, S.S., Engineering Mechanics, New Age International Publishers

3. Rajasekaran S and Sankarasubramanian G, Engineering Mechanics - Statics and Dynamics, VikasPublishing House Pvt Ltd.
4. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press.

Reference Books:

1. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol I – Statics, 6th Ed, John Wiley.
2. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol II – Dynamics, 6th Ed, John Wiley.
I. H. Shames, Engineering Mechanics: Statics and dynamics, 4th Ed, PHI

COMPUTER AIDED ENGINEERING GRAPHICS LAB

SUBJECT CODE: JME 102

LTP:0-0-2

Course Outcome:

CO1: Classify the systems of projection with respect to the observer, object and reference planes.

CO2: Develop and interpret orthographic projections of Points, Lines and Planes and solids using CAD software

CO3: Make use of engineering drawing principle's to convert orthogonal projections (2D) to isometric projections (3D) and Vice-Versa in AutoCAD

COMPUTER AIDED ENGINEERING GRAPHICS PRATICALS
Preamble: The objective of the course is to introduce the basic ideas and concepts Engineering Graphics and Design. This will help students to improve the problem solving and thinking in different directions
List of experiments
<ol style="list-style-type: none"> 1. Introduction to Engineering Graphics: Principles of Engineering Graphics and their significance 2. Orthographic Projection: Methods of projection, Principles of Orthographic projection, First angle versus Third angle of projection 3. Projection of Points: Projections of points when they are situated in different quadrants. 4. Projections of Lines: Projections of a line parallel to one of the reference planes and inclined to the other, line inclined to both the reference planes 5. Projections of Planes: Projection of polygonal surface and circular lamina located in first quadrant inclined to one or both reference planes 6. Projections of Solids: Classification of solids, Projection of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.. 7. Isometric Projection: Isometric Projection: Isometric scales, Isometric projections of simple and combination of solids. 8. Introduction to Computer Aided Design Introduction to AutoCAD: Basic commands for 2D drawing: Line, Circle, Polyline, Rectangle, Hatch, Fillet Chamfer, Trim, Extend, and Offset, Dim style, etc. Transformation of Projections: Conversion of Isometric Views to Orthographic Views and Vice-Versa in AutoCAD. Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint

Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R. (2014), Engineering Drawing, Charotar Publishing House.
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C.M. (2012), Engineering Graphics, TMH Publication
4. Engineering Graphics & Design, A.P. Gautam & Pradeep Jain, Khanna Publishing House
5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

VALUE EDUCATION

Course Outcome:

CO1: Explain the values fundamentals for ethical living in society

CO2: Demonstrate harmony and confidence towards duty in society

CO3: Develop the personality to work with universal way of living with associates and nature

CO4: Interpret human rights for welfare and integration of citizen of the nation

CO5: Correlate beliefs and self management for healthy mindful living

UNITS	Syllabus	No of Hours
Unit – I	Values and self-development: Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non- moral valuation, Standards and principles, Value judgments.	5 Hrs
Unit – II	Importance of cultivation of values: Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline	5 Hrs
Unit – III	Personality and Behaviour: Development: Personality and Behaviour Development Soul and Scientific attitude, Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship, Happiness Vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, doing best for saving nature	8 Hrs
Unit – IV	Human Rights and Rules: Human Rights – Universal Declaration of Human Rights – Human Rights violations, National Integration – Peace and non-violence – Dr. A P J Kalam’s ten points for enlightened citizenship – Social Values and Welfare of the citizen – The role of media in value building.	6 Hrs
Unit – V	Character and Competence: Holy books vs Blind faith, Self-management and good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of Women, all religions and same message, mind your Mind, Self-control, Honesty, Studying effectively	6Hrs

Reference Books:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi
2. T. Anchukandam and J. Kuttainimathathil(Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995)

DETAILED SYLLABUS

B.Tech. First Year

II SEMESTER

Civil Engineering (CE)

Effective from the Session

2025-2026

JSS UNIVERSITY, NOIDA

C-20/1, Sector-62, Noida, Uttar Pradesh, 201301

APPLIED CHEMISTRY FOR CIVIL ENGINEERING STREAM

Course Outcomes

CO1: Understand the basic concepts of structural materials

CO2: Acquire the fundamentals of corrosion and energy harvesting systems.

CO3: Comprehend the principles of water technology for wastewater treatment.

CO4: Enumerate the properties, synthesis and applications of polymers and composites.

CO5: Apply the principles of Nanomaterials and Cleaner technologies for sustainable development

UNITS	Syllabus	No of Hours
Unit I	<p>Structural Materials Metal and Alloys: Introduction (Definitions and types of alloys), Properties and applications of Iron and its alloys (Stainless Steel). Aluminum and its alloys (Duralumin and Aluminum-Mg alloy). Cement: Introduction, composition, properties, classification, manufacturing process of cement (Wet method). Process of setting and hardening of cement. Additives for cement (Accelerators, Retarders, Extenders & dispersants) Refractories: Introduction (Definition), classification based on chemical composition, Properties and applications of refractory materials</p>	06 Hrs.
Unit II	<p>Energy Conversion and Storage, Corrosion Energy conversion: Introduction (Definition of solar energy), construction, working and applications of Photovoltaic cells. Storage devices: Introduction (Definition of Battery, secondary battery), construction and working of Li-ion, Lithium-polymer and Sodium –ion batteries Corrosion Science: Introduction, electrochemical theory of corrosion, differential metal and differential aeration corrosion, Stress corrosion, Factors affecting corrosion-Nature of metal, Nature of corrosion product, Relative areas of anode and cathode, pH, temperature, impurities in air, Corrosion Testing- Weight loss method and Corrosion Penetration Rate (CPR)- Definition, explanation and numerical problems. Corrosion control: Control of corrosion by (I) Proper designing, (II) Proper material selection, (III) Corrosion Inhibitors, (IV) cathodic protection (Impressed current method and sacrificial anodic method), (V) Anodizing (anodizing of Al) and (VI) Metallic coating (Galvanizing and tinning)</p>	06 Hrs.
Unit III	<p>Water Technology and Waste water Treatment Water Technology: Introduction, Hardness of water, Boiler troubles, Techniques for water Softening(Lime-soda, Zeolite, Ion exchange and reverse osmosis process), Determination of hardness and alkalinity of water, Numerical. Wastewater Treatment: Introduction, Determination of Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Numerical problems. Metal-organic frameworks (MOFs), Porous Organic polymers and MXene based nanosheets and iron rich industrial byproducts for water remediation. Properties and applications of Nanometal oxides for water treatment (TiO₂& Silver oxide).</p>	06 Hrs

Unit IV	<p>Polymer and Composites</p> <p>Fibers: Synthesis, properties and applications of nylon fibers; Nylon 6 and Nylon-6,6</p> <p>Polymer composites: Introduction, properties and applications of fibre reinforced polymers composites (FRPC) and ceramic reinforced polymers composites, Glass and its reinforced materials.</p> <p>Geopolymer concrete: Introduction, synthesis, properties and applications.</p>	06 Hrs.
Unit V	<p>Nanotechnology and Sustainable Development Technologies</p> <p>Nanotechnology: Introduction (Definition of Nanomaterials), size dependent properties of nanomaterials (surface area optical, electrical and catalytic). Properties and engineering applications of carbon nanotubes (CNT & MWCNT) and graphene.</p> <p>Green Chemistry: Introduction, Basic principles of Green chemistry- explanation with examples</p> <p>Green Fuels: Introduction and Importance of Green fuels, Green Hydrogen, Photocatalytic and Photoelectrochemical water splitting, Hydrogen fuel cells, Production of Biodiesel from Jatropha and Biomass- based Ethanol.</p>	06 Hrs.
PRACTICALS		
<p>Preamble: The Chemistry Laboratory aims to create opportunities for students to gain hands-on experience with laboratory experiments, bridging the gap between theoretical concepts and their practical applications in everyday life.</p>		
List of experiments		
<ol style="list-style-type: none"> 1. Estimation of Copper in Electroplating Effluent by Optical Sensor (Colorimetry) 2. Estimation of Acids in Acid Mixture Conductometrically 3. Determination of Acid Concentration and pKa of Vinegar Using pH Sensor (Glass Electrode) 4. Estimation of Iron in TMT Bar by Diphenylamine/External Indicator Method 5. Determination of Rate of Corrosion of Mild Steel by Weight Loss Method 6. Estimation of Total Alkalinity of Industrial Feedwater by Neutralization Titration Method 7. Synthesis of Iron-Oxide Nanoparticles 8. Determination of Viscosity Coefficient of Polymer (Ostwald's Viscometer) 9. Synthesis of Thermosetting Polymer (Bakelite/Polyurethane) <p>Demonstration Experiments (Not to be Part of Examination)</p> <ol style="list-style-type: none"> 1. Chemical Structure Drawing Using Software: ChemDraw or ACD/ChemSketch 2. Construction of Photovoltaic Cell 3. Synthesis of Biodiesel 4. Electrolysis of Water 		

Textbooks

1. **Wiley Engineering Chemistry** by Wiley India Pvt. Ltd., New Delhi, 2013 - 2nd Edition
2. **A Text Book of Engineering Chemistry** by Sunita Rattan, Kataria Publication (Reprint 2024)

3. **A Textbook of Engineering Chemistry** by S.S. Dara & Dr. S.S. Umare, S. Chand & Company Ltd., 12th Edition, 2011
4. **A Textbook of Engineering Chemistry** by R.V. Gadag and A. Nityananda Shetty
5. **Engineering Chemistry (6th Edition)** by Mahesh B and Roopashree B., Sunstar Publisher, Bengaluru
6. **O.G. Palanna, Engineering Chemistry** by Tata McGraw Hill Education Pvt. Ltd., New Delhi, Fourth Reprint (2015 Edition)
7. **R.V. Gadag & A. Nityananda Shetty, Engineering Chemistry** by I.K. International Publishing House Pvt. Ltd., New Delhi (2015 Edition)

Reference Books

1. **Nanotechnology: A Chemical Approach to Nanomaterials** by G.A. Ozin & A.C. Arsenault, RSC Publishing, 2005
2. **Corrosion Engineering** by M.G. Fontana, N.D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996
3. **Linden's Handbook of Batteries** by Kirby W. Beard, Fifth Edition, McGraw Hill, 2019
4. **Textbook of Polymer Science** by F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999
5. **Polymer Science** by V.R. Gowariker, N.V. Viswanathan, Jayadev Sreedhar, New Age International Publishers, 4th Edition, 2021
6. **Nanostructured Materials and Nanotechnology** by Hari Singh Nalwa, Academic Press, 1st Edition, 2002

ADVANCED MATHEMATICAL METHODS FOR ENGINEERING

Common for Mechanical Engineering (ME) and Civil Engineering (CE)

Course Outcome:

CO1: Apply double and triple integrals and demonstrate knowledge of Beta and Gamma functions along with their properties and evaluation techniques.

CO2: Develop proficiency in vector calculus, compute vector derivatives, evaluate integrals, and apply fundamental integral theorems to solve engineering and physical problems.

CO3: Apply the concepts and properties of Laplace transforms and their inverses to effectively solve ordinary differential equations.

CO4: Apply numerical methods for solving algebraic and transcendental equations and perform interpolation using different techniques.

CO5: Apply numerical techniques to solve linear systems, perform numerical integration, and solve ordinary differential equations using various methods

UNITS	Syllabus	No of Hours
Unit – I	Multiple Integrals and Special Functions: Double integral (Cartesian and Polar coordinate), Change of order of integration, Triple integral (Cartesian and spherical polar coordinate), Change of variables (Cartesian to polar, Cartesian to spherical polar coordinate), Beta and Gama function and their properties.	09 Hrs
Unit – II	Vector Calculus and Integral Theorems: Gradient, Curl, Divergence, Directional derivatives, Line integral, Surface integral, Volume integral, Gauss’s Divergence theorem, Green’s theorem and Stoke’s theorem (without proof) and their applications	08 Hrs
Unit – III	Laplace Transform Techniques and Applications: Laplace transform, Existence theorem (without proof), Properties of Laplace transform, Laplace transform of derivatives and integrals, Laplace transform of unit step function, Laplace transform of periodic function, Inverse Laplace transform and its properties, Convolution theorem (without proof), Application of Laplace transform to solve ordinary differential equation	09 Hrs
Unit – IV	Numerical Methods for Root-Finding and Interpolation: Solution of Algebraic and Transcendental equations: Bisection (Bolzano) method, Method of False position (Regula-Falsi method), Newton-Raphson method, Interpolation: Finite differences, Newton’s forward and backward interpolation, Lagrange’s and Newton’s divided difference formula for unequal intervals.	08 Hrs

Unit – V	Numerical Techniques for Linear Systems, Integration, and Differential Equations: Solution of system of linear equations, LU decomposition methods, Jacobi method, Gauss- Seidal method, Numerical integration, Trapezoidal rule, Simpson’s one third and three-eight rules, Numerical solution of ordinary differential equations using the Fourth-Order Runge-Kutta method for first order, Second order, and simultaneous differential equations.	08 Hrs
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Text Books

1. Advanced Engineering Mathematics by R. K. Jain & S. R. K. Iyengar, Narosa Publishing House, 5th Edition (2019).
2. Higher Engineering Mathematics by B. S. Grewal, Khanna Publisher, 45th Edition (2017).
3. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R. K. Iyengar, and R. K. Jain, New Age International, New Delhi, 8th Edition (2023).

Reference Books

1. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Education, New Delhi, 1st Edition (2017).
2. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, 10th Edition (2020).
3. Advanced Engineering Mathematics by C. R. Wylie and L. C. Barrett, Tata McGraw-Hill Education, New Delhi, 6th Edition (2017).
4. Advanced Engineering Mathematics by Peter V. O’Neil, Thomson (Cengage) Learning, 7th Edition (2017).
5. Numerical Methods by E. Balagurusamy, Tata McGraw-Hill Education, New Delhi, 1st Edition Reprint (2019).

NPTEL Web Links

1. <https://youtu.be/Ld9AtgPmyvM>
2. https://youtu.be/ksS_yOK1vtk
3. <https://youtu.be/d7NF-8vVv4>
4. https://youtu.be/TWAN_T66Cps

ARCHITECTURE AND MATERIAL TESTING

Course Outcomes

CO1: Identify and interpret building materials, architectural drawings, and basic building bye-laws.

CO2: Explain structural components and describe construction elements like lintels and formwork.

CO3: Describe types and construction of stairs, doors, windows, and their functional design aspects.

CO4: Identify roofing, flooring types, and explain basic low-cost and sustainable construction practices.

Unit	Syllabus	No. of Hours
UNIT - I	Introduction to Architectural Drawings and Building Materials <ul style="list-style-type: none"> • Classification of building materials: natural, synthetic. • Architectural drawings: site plans, building layouts, Principles of proportion, orientation. • Building bye-laws: basic requirements (e.g., setbacks, height restrictions). 	7 Hours
UNIT - II	Structural Components and Construction Elements <ul style="list-style-type: none"> • Building components: Load-Bearing and framed structures (walls, columns, beams). • Lintels: types, construction details. • Formwork: types, role in concrete casting. 	7 Hours
UNIT - III	Vertical Circulation and Building Openings <ul style="list-style-type: none"> • Stairs: types (straight, quarter-turn), location, and basic design for residential buildings. • Handrails: materials and purpose. • Doors: types, sizes, placement, low-cost options. • Windows: types, placement, energy-efficient options. • Construction techniques: wooden and aluminium doors/windows. 	7 Hours
UNIT - IV	Roofing, Flooring, and Basic Construction Practices <ul style="list-style-type: none"> • Flooring: types (cement, tile), materials, and applications. • Flat roofs: RCC roofs, basic construction methods. 	

	<ul style="list-style-type: none"> • Low-cost housing: hollow blocks, basic precast components, sustainable practices. 	
MATERIALS TESTING		
<p>Preamble: The Building Materials and Construction course provides students with a strong foundation in the fundamentals of construction materials and serves as a basis for various engineering disciplines. This course is designed to develop students' scientific perspectives and equip them with hands-on experience in engineering education.</p>		
LIST OF EXPERIMENTS		
<p>1. Cement</p> <ol style="list-style-type: none"> Consistency of Cement Setting Time of Cement Fineness of Cement Soundness of Cement <p>2. Coarse Aggregate</p> <ol style="list-style-type: none"> Impact Test on Aggregates Sieve Analysis of Coarse Aggregate Specific Gravity and Water Absorption Test <p>3. Fine Aggregate</p> <ol style="list-style-type: none"> Grain Size Analysis Specific Gravity and Water Absorption Bulk Density [Loose and Compacted] <p>4. Bricks</p> <ol style="list-style-type: none"> Dimension Water Absorption Compressive Strength of Brick 		

Text Books

1. Building Construction and Materials, Singh, Gurcharan, Standard Book House (2019).
2. Building Construction, Sharma, S. K., S. Chand and Company (2012).
3. Building and Construction Materials: Testing and Quality Control (Lab Manual Series) by M.L. Gambhir and Neha Jamwal

Reference Books

1. Building Construction, Kumar, Sushil, Standard Publisher and Distributors (2020).
2. Building Construction, Punima, B. C., Laxmi Publishing House (2002).
3. A Text Book of Building Construction, Sharma and Kaul, S., Chand and Company (1987).
4. National Building Code, Volume-I and Volume-II, Bureau of Indian Standards (2016)
5. IS: 962: Code of Practice for Architectural and Building Drawings, Bureau of Indian Standards (2001)

GEOLOGY FOR ENGINEER**Course Outcomes (COs)**

CO1: Explain the fundamental concepts of Engineering Geology, including Earth's origin, composition, and dynamic processes.

CO2: Identify different types of rocks and minerals, their formation processes, and their engineering significance.

CO3: Analyze the geological processes shaping the Earth's surface and their impact on engineering structures.

CO4: Apply knowledge of structural geology, plate tectonics, and geophysical methods to site investigations and hazard assessment.

CO5: Evaluate the suitability of geological materials and conditions for various civil engineering projects such as dams, tunnels, and foundations

Unit	Syllabus	Hours
Unit-I	Fundamentals of Engineering Geology: Introduction to Engineering Geology, Dynamic Earth: Origin, Age, and Interior of Earth, Earth Materials: Minerals and Their Physical Properties, Silicate Structures and Symmetry Elements	8
Unit II	Rock Formation and Geological Processes: Formation and Classification of Rocks: Igneous, Sedimentary, and Metamorphic, Rock Structures and Their Characterization, Weathering Processes and Soil Formation, Geological Time Scale	8
Unit-III	Geological Agents and Landforms: Geological Work of Rivers, Glaciers, Wind, and Oceans, Resulting Deposits and Landforms, Structural Features: Attitude of Beds, Folds, Joints, and Faults	8
Unit IV	Geodynamics and Geophysical Methods: Plate Tectonics and Its Implications, Stress Distribution in Rocks, Geophysical Methods for Subsurface Exploration, Earthquakes: Causes, Effects, and Mitigation.	8
Unit V	Engineering Applications of Geology: Engineering Properties of Rocks and Their Suitability as Construction Materials, Geological Site Selection for:Tunnels and Underground Structures, Foundations and Dams, Rock Slopes and Landslides	8

Textbooks

Parbin Singh – Engineering and General Geology, S.K. Kataria & Sons

Krynine& Judd – Principles of Engineering Geology and Geotechnics, CBS Publishers & Distributors

Bell F.G. – Engineering Geology, Elsevier

Davis G.H. – Structural Geology of Rocks and Regions, John Wiley & Sons

N. Chenna Kesavulu – Textbook of Engineering Geology, Macmillan India

P.B. Pandey – Principles of Engineering Geology, CBS Publishers

P.C. Varghese – Engineering Geology for Civil Engineers, PHI Learning

Reference Books

Arthur Holmes – Holmes' Principles of Physical Geology, Nelson Thornes D. Venkat Reddy – Engineering Geology, Vikas Publishing

Alan E. Kehew – Geology for Engineers and Environmental Scientists, Prentice Hall

Charles C. Plummer & Diane H. Carlson – Physical Geology, McGraw-Hill

F.G. Bell – Fundamentals of Engineering Geology, Butterworth-Heinemann

PRODUCT REALIZATION THROUGH MANUFACTURING**(Common to ME, EE, CE & EEE)****Course Outcomes:**

CO1: Identify various Manufacturing processes and Engineering Materials used in engineering applications

CO2: Illustrate the working principle various metal joining process and Principles of Metal Casting

CO3: Compare various conventional machining processes and choose appropriate machine tool for engineering application.

CO4: Identify various Advanced Manufacturing Processes and Additive Manufacturing for various real-life applications

CO5: Illustrate and Compare the construction details and working of internal combustion engines and Electric Vehicles (EVs)

UNITS	Syllabus	No of Hours
Unit -I	<p>Introduction to Manufacturing: Definition and importance of manufacturing, Classification of Manufacturing Processes, Selection of Manufacturing Process, Industrial Safety and Pollution Control in Manufacturing.</p> <p>Foundry Operations: Definition and Overview of Casting, Principles of Metal Casting Advantages and Limitations of Casting, Functions of Patterns, Types of Patterns, Pattern Allowances, Pattern Materials, Classification of Casting Processes, Principle, Merits, De-merits and Applications sand casting, die casting, investment casting, centrifugal casting.</p>	08 Hrs
Unit -II	<p>Engineering Materials and Metal Joining Processes</p> <p>Engineering Materials: Introduction, Classification and Mechanical Properties of Engineering Materials, Difference between Steel and Cast Iron, Classification of Steels with its applications, Need of Alloy, Introduction of Ceramics, Composite Materials with its Classifications.</p> <p>Metal Joining Processes: Importance of Welding, Classification of Welding, Principle, Merits, De-merits and Applications of Oxy-Acetylene Welding, Arc Welding (TIG & MIG) and Resistance Welding (Spot & Seam), Difference between Welding, Soldering and Brazing.</p>	08 Hrs
Unit-III	<p>Machine Tool Operations</p> <p>Lathe: Principle of Working, Construction of Centre Lathe, Lathe operations – Turning, Facing, Knurling, Thread Cutting, Taper Turning.</p> <p>Drilling: Principle of Working, Construction and Working of Bench Drilling Machine, Drilling Operations - Drilling, Boring, Reaming, Tapping.</p> <p>Milling: Principle of Working, Construction and Working of Horizontal Milling Machine, Milling Operations - Slot Milling, Form Milling, Angular Milling.</p>	06 Hrs
Unit-IV	<p>Advanced & Additive Manufacturing</p> <p>Advanced Manufacturing Processes: Introduction to Advanced Manufacturing Processes and its Classifications, Principle and Working of Abrasive Jet</p>	08 Hrs

	Machining, Ultrasonic Machining, Chemical Machining and Electrochemical machining, Electron Beam and Laser Beam Machining. Additive Manufacturing: Basic Definition, Generic Process Advantages and Applications of Additive Manufacturing Types of Additive Manufacturing Process, Principle and Working of Vat Photo-polymerization –SLA (Stereolithography), Material Extrusion –FDM (Fused Deposition Modelling), Binder Jetting, Direct Energy Deposition (DED), Material Jetting, Powder Bed Fusion and Sheet Lamination.	
Unit -V	Mechanical & Electrical Drives Mechanical Drives: Introduction to Internal Combustion Engines. Construction and working 2 stroke 4 stroke Petrol and Diesel engines. Simple problems on Power and Efficiency calculations. Electrical Drives: History and Evolution of Electrical Drives, Components of an Electrical Drive system, Overview of Electric Vehicles (EVs) and Well-to-Wheel Analysis, Configuration of Electric Vehicles and Internal Combustion Engine Vehicles (ICEV) – Technical Comparison, Performance and Acceleration Comparison, Traction Motor Characteristics. Introduction to Hybrid Electric Vehicles (HEVs), Classification, Advantages and Disadvantages	06 Hrs

PRACTICALS: PRODUCT REALIZATION THROUGH MANUFACTURING
(Common to ME, EE, CE & EEE)

S. No.	Facility: Mechanical Workshop & Idea Lab	Duration
1.	Introduction To Mechanical Workshop, Material, Tools and Machines	2 hours
	To Study Layout, Safety Measures and Different Engineering Materials (Different Types of Steel and Cast Iron etc.) used in Workshop.	
	To Determine the Least Count of Given Metallic Objects using Vernier Calliper, Vernier Height Gauge, Micrometer (Screw Gauge).	
2.	Foundry Operations	2 hours
	Study and Demonstration of Sand Casting	
3.	Metal Joining Process	4 hours
	To Gain Hands-on Experience in Preparing and Performing Butt Joints and Lap Joints using TIG and MIG Welding Techniques.	
	To study and Perform Soldering and desoldering techniques for Electronic Components (resistors, ICs and capacitors) on a PCB.	
4.	Machine Shop	4 hours
	To Perform Various Operations on the Lathe - Facing, Plane Turning, Step Turning, Taper Turning, Threading, Knurling, and Parting.	
5.	Advanced Manufacturing	4 hours
	To prepare a Product using Laser Cutting, engraving, and a CNC Router.	
6.	Additive Manufacturing	4 hours

	To prepare a 3D Printing Product using FDM (Fused Deposit Modeling).	
	Study and Demonstration of Vat Photopolymerization – SLA (Stereolithography).	

Reference/Text books:

1. *“Manufacturing Engineering and Technology”*, by Author: SeropeKalpakjian& Steven R. Schmid, Pearson.
2. *“Product Design and Manufacturing”*, by Author:A.K. Chitale and R.C. Gupta.
3. *“Automation, Production Systems, and Computer-Integrated Manufacturing”*,by Mikell P. Groover.
4. *“Fundamentals of Modern Manufacturing”*, by Mikell P. Groover.
5. *“Manufacturing Processes”*, by Author: H. N. Gupta, R. C. Gupta, Arun Mittal.

BASICS OF AI and ML

Course Outcomes

- CO 1: Describe the fundamentals, history and applications of AI and ML.
 CO 2: Illustrate knowledge representation techniques, predicate logic, and problem-solving in AI.
 CO 3: Apply concepts of linear and logistic regression for machine learning problems.
 CO 4: Explain clustering and classification problems and select suitable algorithms.
 CO 5: Discuss ethical issues, societal impacts and emerging trends in AI and ML.

Unit	Content	Total Hrs.
1	Introduction to AI and ML: History, evolution, goals of AI, Types of AI: Narrow, General, Reactive, Limited Memory, Theory of Mind. Introduction to ML, Types: Supervised, Unsupervised, Reinforcement. AI vs ML vs Data Science. Applications of AI and ML in different domains	07
2	Knowledge Representation and Problem Solving: Knowledge representation using predicate logic and rules. Representing simple facts, computable functions and predicates. Procedural vs declarative knowledge. Introduction to logic programming. Problem formulation and basic problem-solving strategies	07
3	Mathematical Foundations and Linear Regression: Basic matrix operations, vectors, importance in ML. Essential statistics: mean, variance, standard deviation. Introduction to data visualization and interpretation. Linear regression: model, cost function, gradient descent. Feature scaling and convergence in practice	07
4	Logistic Regression, Classification and Clustering: Difference between classification & regression problems. Logistic regression: hypothesis, decision boundary, cost function, one-vs-all. Overfitting and regularization concepts. Introduction to clustering: k-means concept and applications. Use-cases of clustering & classification in industry	07
5	Applications, Ethics and Future Trends: Case studies of AI & ML applications (healthcare, finance, smart systems). Bias, fairness, privacy and ethical concerns in AI. AI's impact on employment, society. Brief on advanced topics: Deep Learning, AI in IoT, autonomous systems. Responsible and explainable AI	08

Textbooks

1. **Tom M. Mitchell**, *Machine Learning*, McGraw Hill.
2. **Saroj Kaushik**, *Artificial Intelligence*, Cengage Learning.

Reference Books

1. **Stuart Russell & Peter Norvig**, *Artificial Intelligence: A Modern Approach*, Pearson.
2. **Christopher M. Bishop**, *Pattern Recognition and Machine Learning*, Springer.
3. **Aurélien Géron**, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, O'Reilly.

ENGLISH FOR TECHNICAL COMMUNICATION

SUBJECT CODE:

LTP: 1-0-2

Course Outcome:

CO1: Memorize and repeat the recordings to improve their listening and speaking skills.

CO2: Identify proper words to summarize the recordings and write grammatically and logically correct statements.

CO3: Use the techniques of reading and write paragraphs in an organized manner.

CO4: Implement their understanding of the concepts of communication and use their communicative competencies in different social and cultural context.

CO5: Distinguish themselves by strengthening their discourse competencies and presentation skills.

UNITS	Syllabus	No of Hours
Unit – I	<p>Text : Emerging Technologies-Trends & Impact</p> <p>Listening: Listening as a process, difference between listening & hearing, Types of listening, Three As of Listening. Qualities of a good listener</p> <p>Speaking: Phonetics: English Sounds: Vowels: Monophthong & diphthong, Consonants: classification based on the place and manner of articulation</p> <p>Stress/Accent: Primary and Secondary Intonation: Rising and Falling</p> <p>Lab Practice: Experiment 1: Listening to the recordings on the aforementioned topics & record their videos and answer the questions given based on the recordings.</p> <p>Experiment 2: Listening to an expert talk on the topic by an expert and record the same</p>	6 Hrs
Unit – II	<p>Text: Engineering Ethics</p> <p>Vocabulary: Synonyms, Antonyms, Homonyms, Homophones, Affixation (Prefix & Suffix)</p> <p>Word Formation: Rules of Word Formation: Derivations, Polysemy, Compounding, Conversion, reduplication, blending & clipping</p> <p>Writing: Linking statements: Parts of Speech (Noun, Pronoun, Verb, Adverb, Adjective, Prepositions, conjunctions, Interjections & Articles) Phrases, clauses, and Tenses.</p> <p>Removing ambiguities from the sentences: Use of Dangling Participle, Split Infinitive, Squinting Construction</p> <p>Lab Practice: Experiment: Listening to the articles on the aforementioned topics and write & speak 20-25 grammatically correct and cohesive statements.</p>	06 Hrs
Unit – III	<p>Text: Environmental Consciousness (SDG 15)</p> <p>Reading: Techniques of Reading: Intensive-extensive, Silent-loud, Fast</p> <p>Reading: Skimming & Scanning, Slow Reading: Churning & Assimilation.</p> <p>Writing: Paragraph Development Methods: Inductive, Deductive, Linear,</p>	06 Hrs

	spatial, Chronological, exposition and Interrupted ways. Lab Practice: Experiment: Read the aforementioned topics using the techniques of reading & write cohesive paragraph.	
Unit – IV	Text: Environmental Consciousness (CSR) Communication Concepts: Meaning, Process, Levels: Intrapersonal, interpersonal & Organizational, Communication Barriers: Psychological barriers, Physical barriers, cultural barriers, language barriers, attitudinal barriers, gender barriers, physiological barriers. Communicative Competencies: Socio cultural Competencies. Lab Practice: Experiments: 1. Group discussion on Corporate Social responsibilities. 2. Debate for handling Corporate Social responsibilities	6 Hrs
Unit – V	Text: Case Studies- 1. Re branding Godiva 2. Barrack Obama’s re branding plan: Attack, Orate, Repeat. 3. Communicative Competencies: Discourse competencies. Perceptive Communication: Working on Communication Styles by understanding purpose, Analyzing audience & locale, Collecting material, Organizing and sequencing the data, Making Visuals. Factors affecting the presentation: Kinesics, Paralinguistic aspects, Proxemics & Chronemics Lab practice: Experiments: 1. Role Play based on Case studies from the business world. 2. Presentation	06 Hrs

Reference Books:

1. Technical Communication: Principles and Practice, Third Edition, Ed. By Meenakshi Raman & Sangeeta Sharma, Oxford University Press, 2018, New Delhi.
2. Mindscapes-English for Technologists and Engineers, Orient Black swan, 2012.
3. Personality Development & Soft Skills by Barun K. Mitra, OUP, 2012, New Delhi.
4. Personality: Theory and Research" by Daniel Cervone and Lawrence A. Pervin, Wiley, 2019
5. A Course in Phonetics and Spoken English by J.Sethi & P. V. Dhamija, Prentice Hall, India, 1999

SPORTS AND YOGA**SUBJECT CODE:****LTP: 0-0-2****Course Outcomes****CO1:** Introduce students to the benefits and fundamental concepts of sports and yoga**CO2:** Promote physical fitness, mental well-being and holistic health**CO3:** Develop basic skills and techniques in selected sports and yoga practices.**CO4:** Promote a healthy lifestyle and stress management techniques**CO5:** Foster an understanding of the importance of physical activity and its impact on overall health**CO6:** To instill discipline, teamwork, and ethical values through sports and yoga.

UNITS	Syllabus Part A: Sports	No of Hours
Unit – I	UNIT-I – Introduction: Introduction and Definition of Sports Importance of sports in education Physical and mental benefits of sports	
Unit – II	Basic Rules and Techniques of Selected Sports: Popular Indoor and Outdoor sports (Choose 2-3) (e.g., Badminton, Table Tennis, Basketball, Volleyball) Rules of the game, Basic skills, and techniques Practice and demonstration	
	Syllabus Part B: Yoga	
Unit – I	Introduction: Introduction, Definition, History and philosophy of yoga Aims and Objectives of Yoga Need, Benefits and Importance of Yoga in Physical Education and Sports	
Unit – II	Foundation of Yoga Introduction of Patanjali Yoga, The Astanga Yoga: Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Meditation (Dhyana) and Samadhi. Yoga in the Bhagavadgita - Karma Yoga, Raja Yoga, Jnana Yoga and Bhakti Yoga	6 Hrs
Unit – III	Asanas, Kriyas, Bandhas and Mudras. Effect of Asanas and Pranayama on various system of the body Classification of asanas with special reference to physical education and sports Standing Asanas, Sitting Asanas & Surya Namaskar: 12 count Types of Bandhas and mudras, Types of Kriya	06 Hrs



JSS UNIVERSITY

C-20/1 SECTOR 62, NOIDA UP – 201301

VISION

JSS University Noida aims to become an Institution of excellence in imparting quality Outcome Based Education that empowers the young generation with Knowledge, Skills, Research, Aptitude and Ethical values to solve Contemporary Challenging Problems.



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