Syllabus: Chemistry-I
For
B.Tech. Civil, Mechanical, Electrical, Electronics & Communication Engineering

Effective from Session: 2024-25			
Course Code	CH101	**Title of the Course**	Chemistry-I
Year	First	**Semester**	First
Pre-Requisite	10+2 with Chemistry	**Credit**	04
Course Objectives	- Adoptive curiosity and cultivate interest in chemistry. - Attain a comprehensive knowledge and understanding of Chemistry. - Improve an understanding for chemistry and its practical applications in everyday life. - Develop proficiency in solving qualitative and quantitative problems. - Enhance practical and technical skills. - Develop the ability to work effectively and safely in a laboratory environment. - Improve communication skills to effectively convey scientific concepts and findings.		

Course Outcomes	
CO1	To study the fundamental concepts of inorganic chemistry including the prediction of geometry and shape of simple molecules and analyze the magnetic behavior and stability of homo and hetero-nuclear diatomic molecules and different theories of acids and bases and pH. To study the structures, synthesis and uses of fullerenes, and graphite. To practically determine the strength of a given unknown solution and equivalent weight by chemical displacement method.
CO2	To study the fundamental concepts of physical chemistry like chemical kinetics including order and molecularity of a reaction, with a focus on first- and second-order reactions. To know the concept of energy of activation and explore the phase rule and its practical applications. Furthermore, to know the functioning of electrochemical cells, the theory of electrochemical corrosion and strategies for its prevention.
CO3	To understand the fundamental concepts of molecular spectroscopy, with a focus on the interaction of electromagnetic radiation with molecules as well as the origin of electronic spectra. To know the basic principles of some important spectroscopic techniques and their applications. To practically understand the working of UV-visible spectrophotometer and determine the content of the given metal.
CO4	To study different polymers and their classification. To get acquainted with the synthesis and uses of some common polymers and laboratory synthesis of selected polymers.
CO5	To know the characteristics, composition and utility of different fuels and the working of bomb calorimeter. To know about the hardness in water and water softening processes for both temporary and permanent hardness and practical implementation of temporary and permanent hardness removal by complexometric titration, alkalinity and chlorine content in the water sample.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Chemical Bonding and Solid-State Chemistry**	*Theory*: Hybridization and geometry of simple molecules, VSEPR theory, Molecular orbital theory of homo and hetero diatomic molecules, theories of acids and bases, concept of pH and its measurement. Graphite and fullerenes: Preparation, properties and applications. *Practicals:* 1. To determine the strength of the given HCl solution by titrating it against NaOH solution using a pH meter. 2. To determine the Equivalent weight of Iron by Chemical Displacement method.	8	1
2	**Chemical Kinetics**	*Theory*: Reaction order and molecularity of reaction. First- and second-order reactions. The energy of activation and derivation of Arrhenius equation, Phase Rule and its application to one component system (water). Equilibrium potential, electrochemical cells (galvanic and concentration cells), theory of electrochemical corrosion and its prevention. *Practicals:* 1. To determine the alkalinity of the given water sample. 2. To determine the Chloride content in the given water sample by Mohr's method. (Argentometric method).	8	2
3	**Spectroscopic techniques and their applications**	*Theory:* Molecular spectroscopy: Electromagnetic radiations and their characteristics. Basic principle, working and applications of UV, visible, IR, and ^{1}H-NMR spectroscopic techniques for the determination of the structure of simple compounds. *Practicals:* 1. To determine the iron concentration in the given water sample by Spectrophotometer using potassium thiocyanate as colour developing agent. 2. Identification of simple organic compounds by spectral analysis.	8	3
4	**Chemistry of Polymers**	*Theory:* Polymers and their classification, thermoplastic and thermosetting resins. Polyamides (Nylon-6, Nylon-6,6, Nylon-6,10, Nylon-11, Kevlar), Polyesters (Terelene), and Polyacrylates (PMMA, PAN, PVC), bakelite, conducting, and biodegradable polymers. *Practicals:* 1. Synthesis of phenol formaldehyde resin 2. Synthesis of urea formaldehyde resin	8	4
5	**Fuel, and Water quality analysis**	*Theory:* Fuels: Classification of fuels, determination of gross and net calorific values using Bomb Calorimeter. Water quality treatment: Hardness and alkalinity of water, softening of water by Lime-Soda process, Zeolites and ion exchange resins process, Reverse Osmosis.	8	5

Treatment of boiler feed water by Calgon process.

Practicals:
1. To determine the temporary and permanent hardness in the given water sample by Complexometric titration using EDTA as the standard solution.
2. To determine the Percentage of Available Chlorine in the given sample of Bleaching powder iodometrically.

Reference Books:

Jain P. C. and Jain M. 1994. Engineering Chemistry. DanpatRai publishing company Pvt. Ltd., Delhi.

Bahl B.S, Arun, Bahl and Tuli B.D. 2007. Essentials of Physical Chemistry. S. Chand and Co. Ltd., Delhi.

Industrial Chemistry B.K.Sharma, Goel publishing house.

Fundamentals of Chemistry, R.L. Madan, S.Chand Publications

Fundamentals of Chemistry with Quantitative analysis-I, R.L. Madan., S. Chand Publications

Advance Practical Chemistry: Jagdamba Singh, L.D.S Yadav, Jaya Singh, I.R. Siddiqui, PragatiEdition.

e-Learning Source:

https://www.bing.com/videos/search?q=MO+diagram&&view=detail&mid=205AE2DEEABF42ACF824205AE2DEEABF42ACF824&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3DMO%2520diagram%26qs%3Dn%26form%3DQBVR%26%3D%2525eManage%2

https://www.bing.com/videos/search?q=phase+diagram+video&&view=detail&mid=D49B5109D6339097E40BD49B5109D6339097E40B&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3Dphase%2Bdiagram%2Bvideo%26FORM%3DHDRSC3

https://www.bing.com/videos/search?q=organic+reaction+mechanism&qpvt=organic+reaction+mechanism&FORM=VDRE

https://www.bing.com/videos/search?q=alkalinility+of+water+sample&qpvt=alkalinility+of+water+sample&view=detail&mid=7AF6506DB69D2C2F3EA37AF6506DB69D2C2F3EA3&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%

PO-PSO / CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	1	-	2	3	2	3
CO2	2	1	2	-	-	1	-	-	-	0	-	2	2	1	3
CO3	3	2	-	-	-	-	-	-	-	1	-	1	3	2	3
CO4	2	1	-	-	-	-	-	-	-	1	-	2	3	2	3
CO5	3	2	2	1	1	1	2	-	-	1	-	2	3	1	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session:2024-25							
Course Code	CS101	**Title of the Course**	Computer Programming	**L**	**T**	**P**	**C**
Year	I	**Semester**	II	3	0	2	4
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• To give knowledge of computers, networks, algorithms & flowcharts. • To provide fundamental concepts of programming language 'C'. • To show the use of functions and pointers to different problems. • To study the implementation of arrays, matrices and strings. • To give concepts of user defined datatypes, structure & union						

Course Outcomes	
CO1	Understanding basic concepts of computer, networks and formulation of algorithmic solutions to problems.
CO2	Understanding of programming concepts of C language and their implementation.
CO3	Analyze and develop programs on pointers and functions.
CO4	Acquire the knowledge and develop programs on different operations on arrays, matrices & strings.
CO5	Implementation of programs on structure, union & dynamic memory allocation.

THEORY

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Introduction to Computers**	Generation of computers, Characteristic and classifications of computers. Components of Computer: CPU, Various I/O Devices, Memory & its types, (Memory Hierarchy, Storage Media), Computer Software and their types, Operating System. Computer Networks & Communication: LAN, MAN, WAN, Network Topologies, Modes of Data Communication. Introduction to Internet and its Safeguard: Internet Addresses, Domain Name System, URL, Web Browsers Search Engines, Firewalls, Anti-Virus, Translators. Algorithm and flowchart: Algorithm and flow chart characteristics, Sketching Flowcharts of various problems.	9	1
2	**Introduction to C**	Standard I/O in 'C', 'C' Fundamental, C Character set, Constants, Variables, Keywords and Identifiers, Data types, Declaration. Operators and Expressions, Conditional statements (If, If-else), Nesting of if- else statement, switch statement, The? operator, goto statement. Decision making and Looping (While, Do-While, for), Break and Continue statements, Case Control Structures (Switch), C programs based on above concepts.	8	2
3	**Pointers & Functions**	Declaration and initialization of pointers, accessing the address of the variable, accessing the variable through the pointer, chain of pointers, pointers operators, pointer arithmetic Introduction to Functions: Need of "C" function, User Defined and Library Functions, Prototype of Function, Call by Value; Call by Reference; Nesting of Functions, Recursion. Pointers with function, C program based on above concept.	9	3
4	**Array**	Concept of One Dimensional and Multi-Dimensional arrays, Declaration, Operations: insert, delete, search, traverse, and merge, matrix operations, Sorting: Bubble sort, merge sort, insertion sort. Character array and strings: declaring and initializing strings variable, reading and writing a character, reading and writing strings from terminal, Arithmetic operations on characters, string handling functions. Application of pointers, and function on array, C program based on above concept.	10	4
5	**Structures**	Defining Structure, Declaration of Structure Variable, Accessing Structure members, copying and comparing structure variable, operation on individual member, nesting of structures, Array of structures. Application of pointers and function on Structures. Union Defining Union Declaration of Union, difference between structure and Union, Introduction of Static and Dynamic memory allocation- The process of Dynamic memory allocation, C program based on above concept.	8	5

PRACTICAL

S. No.	List of Experiments	Contact Hrs.	Mapped CO
1	Write a Program to print sum and multiply of two numbers.	2	1
2	WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.	2	1
3	Write a Program to enter the temperature in Celsius(c) then count it into Fahrenheit.	2	1
4	Write a Program to swap the number taking the help of third variable.	2	1
5	Write a Program to convert Decimal to Binary in C.	2	1
6	Write a Program to find the greater number enter by user.	2	2
7	Write a Program to check a year is leap year not.	2	2
8	Write a Program to print number is even or odd.	2	2
9	Write a C program to design calculator with basic operations using Switch case.	2	2
10	Write a Program to print the no is positive or negative.	2	2
11	Write a C program to print Fibonacci Series without using Recursion and using Recursion.	2	3

12	WAP to find a Factorial in C.	2	3
13	Write a Program to enter any no and check whether the given no is palindrome or not.	2	3
14	Write a Program to enter any no. and check whether the given no. is Armstrong or not.	2	3
15	Write a Program to Print Pattern * * * * * * * * * *	2	3
16	Write a Program to Print Pattern1 2 3 4 1 2 3 1 2 1	2	3
17	Write a C program to form Pascal Triangle using numbers.	2	3
18	Write a program to find in C to design the report card of 5 subject according to the following condition if the totalpercentage are. >=35 and <45 III Div >=45 and <60 II Div >=60 I Div If any students score <35 in any of the subject display fail	2	3
19	Write a Program to create 2-D array or order M*N and insert the element and display it.	2	4
20	Write a Program to find the addition of two matrix of order M*N.	2	4
21	Write a Program to find the Transpose of the matrix.	2	4
22	WAP to find Reverse of an Array using Functions in C.	2	4
23	Write a Program to swap two number using function pointers.	2	5
24	WAP to demonstrate Student Record System in C.	2	5

Reference Books:

1. Foundation of Information Technology by 'D.S. Yadav'- New age International

2. Programming in 'C' by 'E Balagurusamy'. -TMH Publication.

3. Let us 'C' by 'Yashwant Kanitkar'-BPB Publication.

4. The C Programming Essentials by Dey- Pearson Publication.

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	1								2	3	1	1	
CO2	3	3	1	1									3	3	2	
CO3	3	3	3	2									3	3	2	
CO4	3	3	2	2	1								3	3	2	
CO5	3	3	2	2	1								3	3	2	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Effective from Session: 2024-25								
Course Code	**MT101**	Title of the Course	**ENGINEERING MATHEMAICS-I**	L	T	P	C	
Year	I	Semester	I	3	1	0	4	
Pre-Requisite	10 + 2 Mathematics	Co-requisite	--					

Course Objectives	1. The course is aimed to develop the skills in mathematics which is necessary for grooming them into successful engineering graduate. 2. The topics introduced will serve as basic tools for specialized studies in science field.

	Course Outcomes
CO1	Able to calculate rank of matrix, characteristic equation & characteristic roots & use the applicability of Caylay Hamilton Theorem to find inverse of matrix which is very important in many engineering application.
CO2	To develop ability to solve higher derivative, expansion of functions in ascending power of variable & partial derivatives.
CO3	Develops ability to solve Jacobian, error and approximation and Extrema of the function.
CO4	Learn the evaluation policy of some special function like gamma & Beta function. & their relation which is helpful to evaluate some definite integral arising in various branch of Engineering.
CO5	Able to determine vector differentiation and integration.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Matrices**	Introduction, Different types of matrices, Algebraic operations, Elementary row and column transformations, Rank of matrix, Linear dependence, Consistency of linear system of equations, Characteristic equation, Cayley-Hamilton theorem, Eigen values and eigen vectors.	08	1
2	**Calculus of one variable and Partial differentiation.**	Leibnitz theorem, Partial differentiation, Homogeneous functions, Euler's theorem, Expansion of functions of one and two variables.	08	2
3	**Calculus of Several Variables.**	Jacobian, Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (simple applications).	08	3
4	**Multiple Integral.**	Double and triple integrals, Change of order of integration, Gamma and Beta functions, Applications to area and volume, Dirichlet's integral and its applications.	08	4
5	**Vector Calculus**	Scalar and Vector point functions, Gradient of a scalar function, Directional derivative, Divergence and Curl of a vector, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems (without proof).	08	5

Reference Books:

1. A Text Book of Matrices, S. Chand & Co. New Delhi
2. Calculus and Analytical Geometry, Narosa Publishing House, New Delhi
3. Higher Engineering Mathematics, Khanna, Publishers, Pvt. Ltd
4. Advanced Engineering Mathematics, Khanna Publication

e-Learning Source:

1. https://nptel.ac.in/courses/122104018/
2. https://nptel.ac.in/courses/111104092/
3. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/111104092/lec21.pdf
4. https://nptel.ac.in/courses/111107108/

Course Articulation Matrix:(Mappingof Cos with Pos and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	2	1				1	-	2	1	1		-
CO2	3	2	1	2	2	1			-	-	-	2	1	1		-
CO3	3	2	1	1	1	1			-	-	-	2	1	1		-
CO4	3	2	1	2	3	1			-	1	-	2	1	1		-
CO5	3	1	1	1	2	1			-	-	-	2	1	1		-

Low Correlation; 2. Moderate Corresslation; 3. Substantial Correlation

Integral University, Lucknow

Effective from Session: 2024-25

Course Code	ME101	Title of the Course	Basic Mechanical Engineering & Workshop	L	T	P	C
Year	I	Semester	I / II	3	0	2	4
Course Objectives			To impart knowledge to the students of basic thermodynamics process and laws along with mechanics of materials, their properties and fabrication techniques				

Course Outcomes	
CO1	Understand the basic concepts of thermal sciences and temperature measurement on the basis of zeroth law of thermodynamics
CO2	Understand and apply first and second law of thermodynamics in various processes and systems
CO3	Will be able to model the problem using free-body diagrams and reach to solution by using equilibrium equations
CO4	Will be able to perform structural analysis for safe design and fabrication techniques
CO5	Will be able to understand mechanical properties of engineering materials, their testing and different operations performed in workshop to make components
CO6	Learn to perform operations on lathe machine shop, fitting shop, carpentry shop
CO7	Learn to perform operations on sheet metal shop, smithy shop, welding shop

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Fundamental Concepts for modelling of thermal systems	Role of thermodynamics in different fields of engineering, thermodynamics system, surrounding and universe, macroscopic & microscopic point of view, concept of continuum, thermodynamic equilibrium, property, state, path, process, Energy and its form, temperature and it's measurement, Zeroth law of thermodynamics.	08	CO1
2	First law & Second law of thermodynamics as a tool for analysing thermal systems	First law of thermodynamics and its application for non flow processes, Flow processes and control volume, Flow work, Steady flow energy equation, Mechanical work in a steady flow process. Essence of second law of thermodynamics, Thermal reservoir, heat engines, COP of heat pump and refrigerator and its introduction to industrial applications. Statements of second law, Carnot cycle, Clausius inequality and its applications.	08	CO2
3	Introduction to engineering mechanics and its application	Role of engineering mechanics in different fields of engineering, Laws of motion, Transfer of force to parallel position, Resultant of planer force system. Free Body diagrams, equilibrium and its equation, Coulomb's law of friction, Equilibrium of bodies involving dry friction.	08	CO3
4	Structure analysis for safe design	Beams: Introduction, its types and uses in engineering application, concept of shear force and bending moment, Shear and bending moment diagram for statically determinate beams. Simple Stress and strain: Introduction, Normal & shear stress-strain for unidirectional loading, pure bending of beam and its applications.	08	CO4
5	Mechanical properties and testing of engineering materials	Introduction to engineering materials & their applications, Mechanical properties of engineering materials. Mechanical Testing: Tensile and compressive test, stress-strain diagrams for ductile and brittle materials, bending test, hardness test and impact test.	08	CO5

	Practical			
S. No.	Name of shop	List of experiments	Contact Hrs.	Mapped CO
1	Machine shop	To study and sketch a lathe machine To perform facing, plain turning, step turning, taper turning & chamfering operations	4	CO6
2	Fitting shop	To perform step cutting, filing, drilling & tapping To make a 90° v-groove fitting on mild steel flat	4	CO6
3	Carpentry shop	To make a mortise and tenon joint To make a corner lap joint	4	CO6
4	Smithy shop	To make a square punch from mild steel round rod To make a pipe hook from a mild steel round rod	4	CO7
5	Welding shop	To weld the two given plates & make a lap joint (by arc welding) To weld the two given plates & make a butt joint (by arc welding)	4	CO7
6	Sheet metal	To perform different fabrication operations in sheet metal shop	4	CO7

Reference Books:

◆ Van Wylen G.J. & Sonnlog R.E. Fundamentals of Classical Thermodynamics, John Wiley & Sons, Inc. NY
◆ Wark Wenneth: Thermodynamics (2nd edition) Mc Graw Hill Book Co. NY
◆ Holman, J.P.: Thermodynamics, Mc Graw Hill Book Co.NY
◆ Shames I.H., Engineering Mechanics, P.H.I
◆ Kumar D.S, Mechanical Engineering, S.K. Katarial & Sons
◆ Bhavi Katti S.S., Engineering Mechanics, New Age Pub
◆ Bharti P.K: Engineering Mechanics, Kataria and Sons
◆ Callister W. D., 2006, "Materials Science and Engineering-An Introduction", 6th Edition, Wiley India
◆ Khurmi R.S, Workshop Technology, S.Chand Publication

e-Learning Source:

https://www.youtube.com/watch?v=Dy2UeVCSRYs&list=PL2_EyjPqHc10CTN7cHiM5xB2qD7BHUry7
https://www.youtube.com/watch?v=DzyIEz3dKXQ&t=1s
https://www.youtube.com/watch?v=A-3W1EbQ13k&list=PLyqSpQzTE6M_MEUdn1izTMB2yZgP1NLfs
https://www.vlab.co.in/

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		2						3	3	2	2
CO2	3	3	3	2		3						3	3	3	2
CO3	3	3	3	2		3						3	3	2	1
CO4	3	2	2	2		3						3	3	2	1
CO5	3	3	2	1		3						3	3	2	2
CO6	3	1		2		2			2			3	3	3	3
CO7	3	1		2		2			2			3	3	3	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HOD

Course Code	Course Title	Attributes							SDGs No.
ES01	Environmental Studies	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
						√			**SDGs 6,13,14,& 15**

Effective from Session:								
Course Code	**ES101**		**Title of the Course**	Environmental Studies	**L**	**T**	**P**	**C**
Year	I		**Semester**	I	3	0	0	3
Pre-Requisite	10+2		**Co-requisite**					
Course Objectives	The objectives of environmental studies are: (a) Creating awareness about environmental problems among people. (b) Imparting basic knowledge about the environment and its allied problems. The importance of environmental science and environmental studies cannot be disputed. The need for sustainable development is a key to the future of mankind. Continuing problems of pollution, loss of forget, solid waste disposal, degradation of the environment, issues like economic productivity and national security, Global warming, the depletion of the ozone layer and loss of biodiversity have made everyone aware of environmental issues							

Course Outcomes	
CO1	Gain in-depth knowledge on natural processes and resources that sustain life and govern the economy
CO2	Understand the consequences of human actions on the web of life, global economy, and quality of human life.
CO3	Acquire values and attitudes towards understanding complex environmental- economic-social challenges, and active participation in solving current environmental problems and preventing the future ones.
CO4	Aware students about problems of environmental pollution, its impact on humans and ecosystems and control measures.
CO5	Adopt sustainability as a practice in life, society, and industry

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Unit I. Humans and the Environment**	The man-environment interaction: Humans as hunter-gatherers; Mastery of fire; Origin of agriculture; Emergence of city-states; Great ancient civilizations and the environment; Middle Ages and Renaissance; Industrial revolution and its impact on the environment; Population growth and natural resource exploitation; Global environmental change. The emergence of environmentalism: Anthropocentric and eco-centric perspectives (Major thinkers)	04	CO1
2	**Unit II. Natural Resources and Sustainable Development**	Overview of natural resources: Definition of resource; Classification of natural resources- biotic and abiotic, renewable and non-renewable. Microbes as a resource; Status and challenges. Water resources: Types of water resources- fresh water and marine resources; Availability and use of water resources; Environmental impact of over-exploitation, issues and challenges; Water scarcity and stress; Conflicts over water. Soil and mineral resources: Important minerals; Mineral exploitation; Environmental problems due to extraction of minerals and use; Soil as a resource and its degradation. Energy resources: Sources of energy and their classification, Implications of energy use on the environment. Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs.	06	CO2
3	**Unit III. Conservation of Biodiversity and Ecosystems**	Biodiversity as a natural resource; Levels and types of biodiversity; Biodiversity in India and the world; Biodiversity hotspots. Major ecosystem types in India and their basic characteristics; Ecosystem services- classification and their significance. Threats to biodiversity and ecosystems, Major conservation policies: in-situ and ex-situ conservation approaches; National and International Instruments for biodiversity conservation; the role of traditional knowledge, community-based conservation; Gender and conservation.	06	CO3
4	**Unit IV. Environmental Pollution and Health**	Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution. Air pollution: Sources of air pollution; Primary and secondary pollutants; Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. Water pollution: Sources of water pollution; River, lake, and marine pollution, groundwater pollution; Water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. Soil pollution and solid waste; Solid and hazardous waste; Impact on human health. Noise pollution: Definition; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health. Thermal and Radioactive pollution: Sources and impact on human health and ecosystems. Definition of pollution; Point sources and non-point sources of pollution.	07	CO3 & 4
5	**Unit V. Climate Change: Impacts, Adaptation and Mitigation**	Observed impacts of climate change on ocean and land systems; Sea level rise, changes in marine and coastal ecosystems; Impacts on forests and natural ecosystems; Impacts on animal species, agriculture, health, urban infrastructure; the concept of vulnerability and its assessment; Adaptation vs. resilience; Climate-resilient development; Indigenous knowledge for adaptation to climate change. Mitigation of climate change: Synergies between adaptation and mitigation measures; Green House Gas (GHG) reduction vs. sink enhancement; Concept of carbon intensity, energy intensity, and carbon neutrality; National and international policy instruments for mitigation, decarbonizing pathways and net zero targets for the future; Energy efficiency measures; Renewable energy sources; Carbon capture and storage, National climate action plan and Intended Nationally Determined Contributions (INDCs); Climate justice.	06	CO4
6	**Unit VI. Environmental Treaties and Legislation**	Major International Environmental Agreements: CBD; Cartagena Protocol on Biosafety; Nagoya Protocol on Access and Benefit-sharing; CITES; Ramsar Convention; UNCCD; Vienna Convention for the Protection of the Ozone Layer; Montreal Protocol and the Kigali Amendment; Basel Convention; Stockholm Convention; Minamata Convention; UNFCCC; Kyoto Protocol; Paris Agreement; India's status as a party to major conventions. Major Indian Environmental Legislations: The Wild Life (Protection) Act, 1972; The Water (Prevention and Control of Pollution) Act, 1974; The Forest (Conservation) Act, 1980; The Air (Prevention and Control of Pollution) Act, 1981; The Environment (Protection) Act, 1986; The Biological Diversity Act, 2002; The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; Noise Pollution (Regulation and Control) Rules, 2000; Industry-specific environmental standards; Waste management rules; Ecologically Sensitive Areas; Coastal Regulation Zone; India; National Green Tribunal; Some landmark Supreme Court judgments. Major International organizations and initiatives: UNEP, IUCN, WCED, UNESCO, IPCC, and MAB) program.	07	CO4

7	Unit VII. Case Studies and Field Work	• Discussion on one national and one international case study related to the environment and sustainable development. • Field visits to identify local/regional environmental issues, make observations including data collection and prepare a brief report. • Documentation of campus biodiversity. • Campus environmental management activities such as solid waste disposal, water management, and sewage treatment.	04	CO5

Reference Books:

1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.

2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.

3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill

4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)

5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jacob Publication House, Mumbai.

6) De. A.K. Environmental chemistry Willey Eastern Limited.

7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.

8) Hawkins R .E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.

9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment.Cambridge Univ. Press 1140 p.

10) Jadhave, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.

11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.

12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)

13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16

14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.

15) Survey of the Environment, The Hindu (M).

16) Sharma B.K.2001.Environmental Chemistry, Goel Pub House Meerut

e-Learning Source:

https://byjus.com/biology/difference-between-environment-and-eCOsystem.

https://www.youtube.com/watch?v=dRPl4TB8w7k

https://www.youtube.com/watch?v=3fbEVytyJCk

https://www.vedantu.com/biology/conservation-of-biodiversity

https://youmatter.world/en/definition/soil-erosion-degradation-definition/

https://byjus.com/biology/difference-between-environment-and-eCOsystem.

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	-	1	3	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	3	1	-	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	1	3	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	1	2	-	-	-	-	-	-	-	-	2	-	-	-
CO5	1	2	3	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HOD**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	ME103	Title of the Course	ENGINEERING GRAPHICS	L	T	P	C
Year	I	Semester	I/II	0	0	2	1
Pre-Requisite	None	Co-requisite	None				
Course Objectives		To impart knowledge to the students regarding fundamentals of engineering graphics and engineering drawings of two dimensional and three dimensional objects and to improve technical communication skill in the form of communicative drawing.					

Course Outcomes	
CO1	Understand the fundamentals of engineering drawing, use of geometrical instruments and drawing steps.
CO2	Understand the concept of projection and acquire visualization skills, draw the projection of points, lines and planes.
CO3	Understand classification of solids and projection of solids at different positions.
CO4	Perceive the exact sectioned view of solids and development of their surfaces.
CO5	Learn to draw isometric projections and perspective views of an object.

S. No.	Title of the Experiment	List of Experiment	Contact Hrs.	Mapped CO
1	Lettering and geometrical constructions	Introduction to sketching, principal views, orthographic projections, principles of dimensioning, and geometrical constructions	2	CO1
2	Computer Aided Graphics.	Introduction to Computer Aided Graphics	2	CO1
3	Projections of points and lines	Drafting of points and lines and their projections	2	CO2
4	Projections of planes	Drafting of planes and their projections	2	CO2
5	Projections of solids	Drafting of solids and their projections	2	CO3
6	Sectioning of solids	Drafting of sections of solids	2	CO4
7	Development of surfaces	Drafting of development of surfaces	2	CO4
8	Isometric projections	Drafting of Isometric views	2	CO5

Reference Books:
Pradeep Jain, Engineering Graphics and Design, Khanna Books Publisher
N D Bhatt, Engineering Drawing, Charotar Publication
R K Dhawan, A Textbook of Engineering Drawing, S Chand Publication

e-Learning Source:
https://www.youtube.com/watch?v=yk2SynF31cs
https://www.youtube.com/watch?v=uojN7SOHPBw&list=PL9RcWoqXmzaJT-fliqTSwUjWU4zCX_H2A
https://www.youtube.com/watch?v=uFJGNTxJlVk&list=PLDN15nk5uLiBuXu_VXENfC7tfugEI5sAb

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				3				1	2		2	3	2	2
CO2	3	2	2						1	2		2	3	2	2
CO3	3	2	2						1	2		2	3	2	2
CO4	3	2	2						1	2		2	3	2	2
CO5	3	2	2						1	2		2	3	2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session:2024-25							
Course Code	HM101	**Title of the Course**	RASHTRA GAURAV	**L**	**T**	**P**	**C**
Year	I	**Semester**	I	2	0	0	0
Pre-Requisite	Intermediate (Any Stream)	**Co-requisite**	None				
Course Objectives	The objective of the course on "Rashtra Gaurav" is to explore and critically analyze the multifaceted dimensions of national pride and glory, as depicted in the paper. Participants will delve into the historical, cultural, social, and political aspects that contribute to the concept of "Rashtra Gaurav" (National Pride) in the context of the specific themes and perspectives presented in the paper. Through in-depth discussions, readings, and interactive sessions, participants will gain a comprehensive understanding of the factors that shape and define a nation's sense of pride, and how these factors influence individual and collective identities. The course aims to foster a nuanced appreciation for the significance of "Rashtra Gaurav" in contemporary society, encouraging participants to critically evaluate its implications and applications within diverse global contexts.						

Course Outcomes	
CO1	To understand the basics of Indian Society and culture.
CO2	To understand the literature, science and astrology.
CO3	To understand Indian heritage.
CO4	To examine the philosophical and spiritual developments in India.
CO5	To evaluate the contributions of Major National Characters and Personalities.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Indian Society & Culture	• Unity in Diversity: Cultural & Religious Harmony • Indian Diaspora • Ancient Indian Civilization. • National and International Awards & Awardees	05	01
2	Literature, Science, Astrology	• Indian Epics: Ramayan & Mahabharata • Prominent litterateur: Shudrak, Kalidas, Amir Khusru, • Kautilya's Arthashastra • Panini's Ashtadhyayi	05	02
3	Indian Heritage	• Cultural Heritage in India: Buddhist Monuments at Sanchi, Ajanta & Ellora Caves, Khajuraho, Taj Mahal • Tourist Places in India: Red Fort, Ambar Palace, Kaziranga National Park	04	03
4	Philosophical and Spiritual Developments	• Sufism & Bhakti Movement:Bulleh Shah, Data Ganj Baksh, Khwaja Moinuddin Chishti, and Nizamuddin Auliya.Tulsidas, Surdas, Meera, Nanak & Kabir • Jainism: Mahavir's Biography and Education • Buddhism: The life of Buddha, Contributions of Buddhism to India's Culture	05	04
5	Major National Characters And Personalities	• Ashoka the Great and His Dhamma • Raja Ram Mohan Roy& Brahmo Samaj • Swami Vivekanand and his philosophies • Mahatma Gandhi: Role of Gandhi in Indian National Movement • Dr. Bhimrao Ambedkar: A Chief architect of the Indian Constitution	06	05

Reference Books:

Jawaharlal Nehru - "The Discovery of India"
B.R. Ambedkar - "Annihilation of Caste"
Ramachandra Guha - "India After Gandhi: The History of the World's Largest Democracy"
Mahatma Gandhi – "My Experiment with Truth"
S C Dubey- "Indian Society"
Nadeem Hasnain –"Indian Society and Culture"
G Shah- "Social Movements in India"

Course Articulation Matrix: (Mapping of COs with POs and PSOs)									
PO-PSO CO	PO1	PO2	PO3	PO4	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	3	3	2	2	3	2	1	2
CO2	3	2	2	3	1	2	3	1	2	1
CO3	1	2	2	2	2	3	2	3	3	2
CO4	1	3	2	3	2	3	2	3	1	3
CO5	2	3	1	2	2	3	1	3	2	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign and seal of HoD**

Syllabus: Physics
For
B.Tech. Computer Science, Civil, Mechanical, Electrical, Electronics & Communication Engineering

Effective from Session:			
Course Code	PY101	**Title of the Course**	Physics
Year	First	**Semester**	First/Second
Pre-Requisite	10+2 with Physics	**Credit**	04
Course Objectives	The purpose of this undergraduate course is to impart basic knowledge of fundamental concept of physics which is necessary for a strong engineering knowledge base and to support this knowledge through its various experiments.		

	Course Outcomes
CO1	To realize that apparently different ideas of Optics such as Interference and Diffraction have interrelationship between them.
CO2	To grow in ideas of different aspect of light and develop connection between daily life applications and science
CO3	To grow in developing connection between philosophy and science and realize that seemingly different ideas such as Relativity and Mechanics have interrelationship between them.
CO4	To grow in developing the connection between philosophy and science and realize that seemingly different ideas such as Compton Effect and Quantum Theory have interrelationship between them.
CO5	To grow in developing connection between daily life utility and material science and to evaluate that how totally different manifestation of Modern Science leads to new technology.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Wave Optics**	**Theory**: **Interference:** Methods of formation of coherent sources, theory of interference fringes, fringe width, Fresnel's Biprism, thin film interference, Newton's ring and its application in determination of wavelength of light. **Diffraction:** Theory of Fraunhoffer's diffraction at single slit, Intensity distribution curve, (No derivation), Introduction to the grating, grating equation and its application in determination of wavelength of light, Resolving Power of Optical Instruments and Rayleigh's criterion of resolution. *Practicals:* 1. To determine the wave length of monochromatic light with the help of Fresnel's Biprism. 2. To determine the wave length of monochromatic light by Newton's ring. 3. To determine the wavelength of prominent spectral lines by plane diffraction grating.	8	1
2	**Optical Activity and Modern Optics**	**Theory**: **Polarization:** Production of plane polarized light by reflection, Double refraction, Nicol prism, Optical activity, specific rotation, polarimeter (Laurentz and Biquartz) and its application in determination of specific rotation. **Optical Fiber:** Principle of fiber optics, numerical aperture. **LASER:** Main components of laser, Einstein's coefficients, He-Ne laser, Nd-YAG laser and their applications. *Practicals:* 1. To determine the specific rotation of cane sugar solution using Half Shade polarimeter. 2. To determine the refractive index of a liquid using laser.	8	2
3	**Relativistic Mechanics**	**Theory:** Brief Introduction to the Michelson-Morley Experiment (Negative results and their explanation), Galilean Transformation Equations, Lorentz Transformation Equations and their consequences (Length Contraction, Time Dilation and Velocity Addition Theorem), Energy-Mass Relation, Relativistic Kinetic Energy. *Practicals: NIL*	8	3
4	**Quantum Physics**	**Theory:** Compton Effect, de-Broglie Hypothesis, Heisenberg's uncertainty principle (no derivation) and its applications (non-existence of electron in nucleus), Wave function and its physical admissibility, orthogonality of wavefunctions, normalization of wave functions, Schrodinger's equation (Time dependent and Time independent) and its application (particle in one dimensional potential box). *Practicals:* 1. To verify Stefan's law by electrical method.	8	4
5	**Physics of Materials**	**Theory: Magnetic Properties:** Magnetization, Origin of magnetic moment, Langevin's theory for diamagnetic material, Phenomena of hysteresis and its applications. **Superconductors:** Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type I and Type II superconductors, **Nano-Materials:** Basic Principle of Nanoscience and Technology, Structure, Properties and uses of Fullerene and Carbon Nanotubes, Applications of Nanotechnology *Practicals:* 1. Plot the graph showing variation of magnetic field with distance along the axis of a circular current carrying coil and then to determine the radius of the coil from it. 2. To determine the energy band gap of a semiconductor using a PN junction diode. 3. To determine the coefficient of viscosity of water by Poiseuille's method. 4. To determine the resistance per unit length of Carey Foster's bridge wire and to find the specific resistance of given wire.	8	5

Reference Books:
1. Fundamentals of Optics by Jenkins and White.
2. Optical Fiber Communication by Gerd Keiser.
3. Concepts of Modern Physics by Arthur Beiser.
4. Introduction to Special Theory of Relativity by Robert Resnick.
5. Quantum Physics by Eisberg.
6. Introduction to Nanotechnology by Poole Owens, Wiley India.
7. Solid State Physics by S.O. Pillai, New Age Publications
8. Practical Physics. by R. K. Shukla, New Age International Private Limited; Third edition.
9. B.Sc. Practical Physics by Harnam Singh and Hemne, S. Chand and Company.
10. B. Sc. Practical Physics by CL Arora, S Chand and Company
11. Practical Physics by Kumar P.R.S., Prentice Hall India Learning Private Limited
12. Engineering Physics Practical by S.K. Gupta, Krishna Prakashan

e-Learning Source:
https://nptel.ac.in/courses/115/101/115101011/
https://nptel.ac.in/courses/115/107/115107095/
https://nptel.ac.in/courses/113/106/113106093/
https://nptel.ac.in/courses/115/101/115101107/
https://youtu.be/fWhgguWc8rk
https://youtu.be/Bf0Tg-fNWjQ
https://youtu.be/dDp_Insp_p0
https://youtu.be/N0lxwqANsd4
https://youtu.be/G8Rqd2HNhuk
https://youtu.be/7Mq4isproEE
https://youtu.be/G8Rqd2HNhuk
https://youtu.be/NtfbmAw62Hw

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					1										2
CO2			1		2							2			2
CO3	1														2
CO4				3								2			2
CO5	2			2	2							2			2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Course Code	EC101	Title of the Course	Basic Electronics	L	T	P	C
Year	I	Semester	I	3	0	0	3
Pre-Requisite	-	Co-requisite	-				
Course Objectives		● Understand the basics of semiconductors, including how current flows and how various types of diodes work. ● Analyze the characteristics and biasing techniques of Bipolar Junction Transistors (BJTs) and Field Effect Transistors (FETs). ● Design and implement basic circuits using operational amplifiers (op-amps) for various functionalities like inverting, integrating, and differentiating signals. ● Grasp the concepts of number systems, logic gates, and Boolean algebra, and learn how to simplify logic functions using Karnaugh maps. ● Explore different types of sensors and transducers, understand the working principles of basic motors, and learn about common consumer electronics and their applications.				

Course Outcomes	
CO1	Understand and analyze the behavior of semiconductor materials and basic electronic devices like diodes and transistors.
CO2	Design and build circuits using operational amplifiers for various applications.
CO3	Apply Boolean algebra and logic gates to simplify digital circuits.
CO4	Comprehend the working principles of various sensors, transducers, and basic motors for robotics.
CO5	Demonstrate a basic understanding of common consumer electronics and their functionalities.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Semiconductor & Devices	Current Conduction in Semiconductors, Electrons and holes, PN junction diode, working and its characteristic, Halfwave and full wave rectifiers, LED. BJT characteristics and circuits: Transistor, configuration and characteristics, transistor biasing.	8	CO1
2	Field Effect Transistors	JFET: Working and its characteristics, MOSFET: Working of Enhancement and depletion type, Biasing of FET. Implementation of Basic functions through circuits (Using Operational Amplifier) Op-Amp & its application: Inverting, Non-inverting, integrator, differentiator. Summer.	8	CO2
3	Number System & Logic gates	Number system, Conversion, 2's and 10's, 1's Compliments, 9's Compliments Addition and Subtraction, Boolean algebra, Logic gates, Minimization of logical function using Karnaugh map.	8	CO3
4	Sensors & Transducers	Types and Application of Sensors & Transducers, Pressure sensor, IR sensors, PiezoElectric transducers. Basics of Motors: Working principle of Servo Motors, Stepper Motors.	8	CO4
5	Consumer Electronics	Working of TV, Remote, Microwave Oven, Washing Machine, Electronic Security systems. Application of Digital Multimeter	8	CO5

Books recommended:

Text Books:

1. Bolyested & Nashekey: Electronic Devices and Circuit Theory, PHI.

2. J. S. Katre, Electronics Engineering, Tech-Max Publication.

3. B.R. Gupta, V. Singhal, Consumer Electronics, S.K. Kataria & Sons.

4. S. H. Saeed, Automatic Control System, S.K. Kataria & Sons.

Reference Book:

Milliman & Halkias: Integrated Electronics, McGraw- Hill

e-Learning Source:

https://www.youtube.com/watch?v=4_nGFY7zgDM

https://www.youtube.com/results?search_query=diode+characteristics

https://nptel.ac.in/courses/117108140

PO-PSO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3			2							3	2		
CO2	3	2	3										3		3	3
CO3	3	3	3	2	2			1					3	2		
CO4	3	3	2			2						1	3		3	3
CO5	3	2	2	1	1			1				1	3	2		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

EffectivefromSession: 2024-25									
Course Code	MT112	Title of the Course	ENGINEERING MATHEMATICS-II		SDG Goals	L	T	P	C
Year	I	Semester	II			3	1	0	4
Pre-Requisite	10+2 Mathematics	Co-requisite	--						

Course Objectives	1. The course is aimed to develop the skills in mathematics which is necessary for grooming them into successful engineering graduate. 2. The topics introduced will serve as basic tools for specialized studies in science field.

Course Outcomes	
CO1	Solve first order linear equations and higher order differential equation of certain types and interpret the solutions.
CO2	To use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
CO3	Able to determine given function in terms of sine and cosine terms in Fourier series.
CO4	Apply problem-solving using concepts and techniques from PDE's and Fourier analysis applied to diverse situations in physics, engineering, financial mathematics and in other mathematical contexts.
CO5	Apply method of least squares to find the curve of best fit for the given data. Also understanding of elementary geometry.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Linear Differential Equation	Linear differential equations of first order, Linear differential equations of higher order with constant coefficients, Complementary functions and particular integrals, Solution of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation) .	08	1
2	Laplace Transform Method	Laplace transform of different types of functions, Laplace transform of derivatives and integrals, Unit step function, Laplace transform of periodic functions, Inverse Laplace transform, Convolution theorem, Applications to solve simple linear differential equations.	08	2
3	Fourier Series	Periodic functions, Trigonometric series, Fourier series of period 2π, Euler's formulae, Even and odd functions, Functions having arbitrary period, Change of interval, Half range sine and cosine series.	06	3
4	Partial Differential Equation	Introduction of partial differential equations, Solution of second order linear homogeneous partial differential equations with constant coefficients and their classifications to parabolic, elliptic and hyperbolic forms with illustrative examples. Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions, Heat conduction equations up to two dimensions, Laplace equation.	10	4
5	Elementary Geometry and Statistics	Cartesian Coordinate system in 3D, Equation of plane: Normal form, Intercept form, equation of straight line: unsymmetrical and symmetrical, angle between straight line and plane. Method of least squares, Curve fitting of straight line and parabola.	08	5

Reference Books:
Advanced Engineering Mathematics, Wiley Eastern Ltd.
Advanced Engineering Mathematics, Khanna Publication.
Advanced Engineering Mathematics, CBS Publication.
Introduction to Engineering Mathematics-I, S.Chand & Company, New Delhi

e-Learning Sources:
https://nptel.ac.in/courses/111106100/
https://nptel.ac.in/courses/111105123/
https://nptel.ac.in/courses/111103021/
https://www.youtube.com/watch?v=QuAiA1jaee0

Course Articulation Matrix:(Mappingof Cos with Pos and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	2	1	3	2	1	1	1	2	1	1	1	-
CO2	3	2	1	2	2	1	2	-	-	-	-	2	1	1	1	-
CO3	3	2	1	1	1	1	1	-	-	-	-	2	1	1	1	-
CO4	3	2	1	2	3	1	3	1	-	1	1	2	1	1	1	-
CO5	3	1	1	1	2	1	1	-	-	-	-	2	1	1	1	-

1. Low Correlation; 2: Moderate Corresslation; 3: Substantial Correlation

Integral University, Lucknow

Effective from Session:2024-25							
Course Code	**EE103**	**Title of the Course**	**Basic Electrical Engg**	**L**	**T**	**P**	**C**
Year	I	**Semester**	I / II	**3**	**0**	**2**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	* Knowledge and concept of D.C Circuit Analysis and Network Theorems Circuit. • Use of Steady State Analysis of Single-Phase AC Circuits AC fundamentals. • Knowledge and concept of Three Phase AC Circuits Three phase system and measuring devices. • Basic concepts of Power System and Transformer • Study of Electromechanical energy conversion devices: AC/ DC Machines.						

Course Outcomes	
CO1	Know about the concept of D.C Circuit Analysis and Network Theorems Circuit.
CO2	Steady State Analysis of Single Phase AC Circuits AC fundamentals.
CO3	Know about concept of Three Phase AC Circuits Three phase system and measuring devices
CO4	Layout of Power System and transformer
CO5	Know about Electromechanical energy conversion devices: AC/ DC Machines

THEORY

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**D.C. Circuit Concept and its Analysis**	**Circuit concepts:** Active and passive elements, linear and nonlinear network, unilateral and bilateral elements, Series and Parallel connections, Ohms law, Kirchhoff's Law: loop and nodal methods of analysis. **Network theorems:** Superposition theorem, Thevenin's theorem, Maximum Power Transfer theorem	8	CO1
2	**Domestic/ Single Phase A.C. Circuits and its Analysis**	**AC fundamentals:** Average and effective value of Sinusoidal waveform , form factor and peak factor, Concept of phasor, Analysis of R, L and C Circuits, power factor, Apparent, active and reactive powers, causes and problems of low power factor, resonance in series RLC circuit.	8	CO2
3	**Commercial/ Industrial Three Phase A.C. Circuits and its measurement**	**Three phase system:** Its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply, line and phase voltage/current relationship. **Measuring Instruments:** Types of instruments: construction and working principle of PMMC, MI type instruments, Electrodynamometer type wattmeter.	8	CO3
4	**Transformer and its concept in Household/ Commercial application**	**Magnetic circuit:** Concepts, analogy between electric and magnetic circuit. **Single Phase Transformer**: Principle of operation, construction, emf equation, losses and efficiency.	8	CO4
5	**House Hold/ Industry oriented Electrical Machines**	**UNIT-5: House Hold / Industry oriented Electrical Machines** **DC Machines:** Construction, Types, Principle of operation and application. **Single Phase Induction Motor**: Principle of operation and application. **Three Phase Induction Motor**: Principle of operation and application. **Three Phase Synchronous Machines**: Principle of operation and application.	8	CO5

PRACTICAL

S. No.	List of Experiments	Contact Hrs.	Mapped CO
1	Verification of Thevenin's Theorem.	2	1
2	Verification of Superposition Theorem.	2	1
3	Verification of Maximum Power Transfer Theorem.	2	1
4	To study V-I characteristics of diode.	2	2
5	To study the input & output characteristics of BJT in CE configuration.	2	2
6	To study the full wave rectifier circuit with & without filter and determine the ripple factor.	2	2
7	To study the phenomenon of resonance in series RLC circuit.	2	3
8	Determination of losses in single phase transformer by OCT and SCT.	2	3
9	To calibrate a single-phase induction type energy meter.	2	4
10	To study the running and reversing of a three phase SCIM.	2	4

| 11 | Study of OP Amp based inverting and non-inverting amplifier | 2 | 2 |

Reference Books:

1. V.Deltoro, "Principle of Electrical Engg." PHI, 2009..

2. M.A Mallick, Dr. I. Ashraf, "Fundamental of Electrical Engg," CBS Publishers, 2010.

3. A. Hussain, "Basic Electrical Engg" Dhanpat Rai & sons, 2007

4. I J Nagrath,"Basic Electrical Engg" ,TMH, 2010.

PO-PSO / CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	2	1	1	3						3	3	3	2	3
CO2	3	3	3	2	1	1						2	3	2	2	3
CO3	3	2	1	1	2	2	3					3	2	2	2	3
CO4	3	2	2	2	3	3						2	3	2	2	3
CO5	3	1	1	1	1	2	1					2	3	2	2	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Course Outcomes	
CO1	Understanding of four stroke internal combustion engines, their classification, applications, operation and processes.
CO2	Understand two stroke spark ignition engine, cycles of operation and vapor compression refrigeration system through model.
CO3	Understand basic components and working of water tube boiler through model study.
CO4	Learn the principles of material testing and characterization and to apply them for various engineering applications.
CO5	Learn to determine compressive strength of a specimen.

S.No	Title of the Experiment	List of Experiment	Contact Hrs.	Mapped CO
1	Four Stroke Petrol Engine	To Study & Sketch the model of S.I. Engine (4 Stroke)	2	CO1
2	Four Stroke Diesel Engine	To Study & Sketch the model of C.I. Engine (4 Stroke).	2	CO1
3	Two Stroke Petrol Engine	To Study & Sketch the model of S.I. Engine (2 Stroke)	2	CO2
4	Vapor Compression	To Study & Sketch the model of Vapor Compression Refrigerators	2	CO2
5	Water Tube Boiler	To Study & Sketch the model of water tube boiler (Babcock & Wilcox)	2	CO3
6	Impact Testing	To determine the Impact Strength of Mild Steel using Izod Method	2	CO4
7	Hardness Testing	To determine the hardness of a mild steel specimen by using hardness tester (Rockwell Hardness test)	2	CO4
8	Compression Testing	To determine the compressive strength of a brick by using the Universal Testing Machine (UTM).	2	CO5
e-Learning Source:				
https://www.vlab.co.in/, Nptel Lectures.				

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3		1	1						1	3	2	2
CO2	3	1	3		1	2						1	3	2	2
CO3	3	2	3		2	1						1	3	2	2
CO4	3	3	1		2	1						1	3	2	2
CO5	3	3	1		2	1						1	3	2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: **2024-25**							
Course Code	LN132	**Title of the Course**	Communication Skills: Theory and Practices	**L**	**T**	**P**	**C**
Year	Ist	**Semester**	I/II	3	0	2	4
Pre-Requisite	10+2	**Co-requisite**	Graduation				
Course Objectives	• The course aims to educate the students in the artistry and utility of the English language for professional purposes by studying language. • The key component of the various types of professional communication is communication in English, which is now a global language. • The Department of Languages caters to the needs of the students aspiring for training, expertise, and excellence in professional communication with a marked emphasis on English for Specific/Special Purposes (ESP).						

Course Outcomes	
CO1	Students will be introduced to the basic understanding of communication and Professional Communication. Knowledge of Professional, cultural, and cross-cultural communication will be imparted. The meaning and process of communication, verbal and nonverbal communication will be focused. A basic understanding of questions will be provided. They will also learn & practice how to introduce themselves in a professional setting & how to manage speaking anxiety.
CO2	Students will develop an understanding of the concept and theory of Lingua Franca ELF, Its Importance and its use as a means of communication between populations speaking vernaculars that are not mutually intelligible. Students will develop an understanding of IPA symbols and improve pronunciation through practice
CO3	Basic tools of communication and improvement in communicative competence. Oral Communication techniques through situational conversations.
CO4	Understanding the structural and functional grammar and basic structure of language. Students will also develop the ability for group discussion and debate.
CO5	Enhancement of writing skills in English i.e., writing applications, reports, and various types of letters. Preparing PowerPoint Presentations and practicing for oral presentations to develop competency-based professional skills.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Professional Communication**	Professional Communication: It's Meaning and Importance, Essentials of Effective Communication, Barriers to Effective Communication. (Theory)	6	CO 1
		Lab-1 Introduction (SWOT Analysis) Framing Questions (Yes/No Questions, Why-Questions, Question tags, Rhetorical Questions)	2	
2	**Oral Communication Skills (Speaking Skills)**	English as Lingua Franca: From Theory to Practice Importance of Spoken English Status of Spoken English in India (Theory)	6	CO 2
		Lab-2 International Phonetic Alphabets (IPA) Symbols Spelling and Pronunciation (Practical)	2	
3	**Basic Vocabulary**	Euphemism, One-word Substitution, Synonyms, Antonyms, Homophones, Idioms and Phrases, Common Mistakes, Confusable Words and Expressions, Portmanteau Words, Foreign Words and Expressions. (Theory)	6	CO 3
		Lab-3 **Oral Communication Practice**: - Asking for and giving information Congratulating people on their success Expressing condolences Apologizing and forgiving (Practical)	2	
4	**Basic Grammar**	Articles, Prepositions, Tenses, Concord, (Subject-Verb agreement), Modal Auxiliaries, Verbs: its Kinds and uses, Degrees of Comparison, Punctuation. (Theory)	6	CO 4

		Lab-4 **Oral Practice:** Group Discussion (Based on Topic and Case Study) Debate (Topic Based) (Practical)	**2**	
5	**Basic Composition**	Report Writing: What is report? Kinds and Objectives of reports, writing reports, Business Letter writing; Introduction to Business Letters, Layout of Business letters, Letters of Enquiry/Complaint Proposal writing. (Theory)	**6**	**CO 5**
		Lab-5 Oral Presentation through PPT (Topic based) (Practical)	**2**	

Reference section

Reference Books:

1. Gerson, Sharon J. *Technical Writing: Process and Product* (5th edition). Prentice Hall, 2005.

2. K. Floyd, *Interpersonal Communication: The Whole Story*. McGraw Hill, 2009.

3. Greenbaum, Sidney and Nelson Gerald, *An Introduction to English Grammar*. Routledge, 2009.

4. Swan, Michael, *Practical English Usage*. OUP, 2005.

5. Murphy, Raymond. *English Grammar in Use*. Cambridge University Press, 2019.

6. Kumar, Sanjay and Pushp Lata., Communication Skills. Oxford University Press, Oxford 2011.

7. Raman, Meenakshi, and Sangeeta Sharma. Technical Communication: Principals and Practice. Second Edition, Oxford University Press, 2012.

8. Gerson, Sharon J. *Technical Communication: Process and Product* (9th edition). Longman Pub., 2016.

e-Learning Source:

1. http://www.uptunotes.com/notes-professional-communication-unit-i-nas-

2. https://www.docsity.com/en/subjects/professional-communication/

3. https://lecturenotes.in/download/note/22690-note-for-communication-skills-for-profession...

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	2	1	2	1	3	3	3	3	2	3	2	2	1	-
CO2	1	1	1	1	1	3	1	3	3	3	3	3	1	1	1	1	-
CO3	1	1	2	2	1	3	2	3	3	3	2	2	1	1	1	1	-
CO4	1	1	1	2	1	2	2	3	2	3	2	1	1	1	1	1	-
CO5	1	1	1	2	3	3	2	3	3	3	2	3	1	3	2	3	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2024-25								
Course Code	ME105	**Title of the Course**	Design Thinking and Idea Lab	**L**	**T**	**P**	**C**	
Year	I	**Semester**	II	0	0	2	1	
Pre-Requisite	None	**Co-requisite**	None					
Course Objectives		To provide the new ways of creative thinking and learning the innovation cycle of Design Thinking process for developing innovative products using advanced manufacturing techniques.						

Course Outcomes	
CO1	Compare and classify the various ideas and apply them in engineering applications
CO2	Develop new ways of creative thinking and learn the innovation cycle of design thinking process for developing innovative products
CO3	Understand users and their responses while designing innovative products
CO4	Propose real-time innovative engineering product designs and choose appropriate frameworks, strategies, techniques during prototype development
CO5	Perceive individual differences and its impact on everyday decisions and further create a better customer experience

To perform minimum eight experiments (first four experiments are compulsory)

S. No.	Title of the Experiment	List of Experiments	Contact Hrs.	Mapped CO
1	Introduction to Design Thinking	To study basic aim, objectives and need of design thinking and to perform simple exercise on the application of design thinking approach.	2	CO1
2	Stages in Design Thinking	To study in detail various stages of design thinking and to perform simple exercise on the application of design thinking approach.	2	CO1
3	Process of Product Design	To study process of engineering product design and to compare examples of best product designs and their functions.	2	CO2
4	Prototyping	To study different types of Prototypes and understand rapid prototype development process and its testing process.	2	CO3
5	Introduction to Simulation and Modeling Software	To study basic commands used in sketching/ drafting / modelling software and to draw simple simulated models.	2	CO3
6	Fabrication of mechanisms	To study various mechanisms for motion and to perform schematic fabrication/ design of a suitable 4-bar mechanism and its inversion mechanisms.	2	CO4
7	Machining of 3D Geometries	To study various machining operations and joints of soft material and to make a 3D geometry, of soft material such as soft wood.	2	CO4
8	Laser Machining	To study laser machining techniques and to perform laser machining operation on the given material.	2	CO2
9	3D Printing	Introduction to 3D printing and techniques used in 3D printing and to perform 3D sketching and printing of 3D complex objects (scissor).	2	CO4
10	3D Printing	To study redesign and recreate approach in solving practical engineering problems and to perform 3D scanning of simple geometry surface and print the modified geometry using 3D printer.	2	CO5
11	Creative Problem Solutions	To study and understand creative thinking process and brain storming approach for solving problems and to analyze their application considering various case studies.	2	CO5
12	Aerodynamic Modelling	To study various aerodynamic models and to understand fabrication of simple drone / Unmanned aircraft model.	2	CO3

Reference Books:

D. K. Veeranna, Manufacturing Practices (with Lab Manual), Khanna Book Publishing Company

Dr. Sabrie Soloman ,3D Printing & Design, Khanna Book Publishing Company

Ian Gibson, David W Rosen, Brent Stucker., Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Springer Publication

P. K. .Venuvinod, Rapid Prototyping – Laser Based and Other Technologies, Kluwer Publication

PO-PSO / CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	3	3			3	2		3	3	3	3
CO2	3	3	3	2	3	3			3	2		3	3	2	3
CO3	3	3	3	2	3	3			2	2		3	3	2	3
CO4	3	3	3	3	3	3			3	2		3	3	2	3
CO5	3	3	3	3	3	3			3	2		3	3	3	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**