EVALUATION SCHEME

OF

B. TECH

OF

I YEAR

(As per NEP-2020)

DEPARTMENT OF CIVIL ENGINEERING

INTEGRAL UNIVERSITY LUCKNOW

EVALUATION SCHEME

Branch: B. Tech Civil Engineering Program as per NEP-2020

w.e.f Batch 2025-26

Year – I, Semester – I

S. No.	Course Category	Code No	Name of Subject	Periods				Continuous Assessment (CA)			Exam ESE			Course Total
				L	T	P	Credits	CT	TA	Total	TE	PE	Total	
1	BSC	CH101	Chemistry	3	-	2	4	65	35	100	75	25	100	200
2	BSC	MT101	Mathematics I	3	1	-	4	50	25	75	75	-	75	150
3	ESC	EE103	Basic Electrical Engineering	3	-	2	4	65	35	100	75	25	100	200
4	ESC	EC101	Basic Electronics	3	-	-	3	50	25	75	75	-	75	150
5	HSSM	ES102	Concept of Environmental Studies	3	-	-	3	50	25	75	75	-	75	150
6	ESC	CE102	Civil Engineering Drawing	-	-	4	2	15	10	25	-	25	25	50
7	MC	HM101	Rastra Gaurav	2	-	-	0	-	-	-	100	-	100	100
Total				**17**	**1**	**8**	**20**			**450**			**550**	**1000**

L – Lecture; **T –** Tutorial; **P –** Practical; **C** – Credits; **CT** – Class Test; **TA** – Teacher's Assessment,
TE- Theory Exam, **PE**- Practical Exam
Continuous Assessment (CA) = Class Test + Teacher Assessment
End Semester Exam (ESE) = Theory Exam + Practical Exam
Course Total = CA + ESE

BSC- Basic Science Courses **ESC-** Engineering Science Courses **MC-** Mandatory Course
HSSM- Humanities, Social Sciences & Management Courses

EVALUATION SCHEME

Branch: B. Tech Civil Engineering Program as per NEP-2020

w.e.f Batch 2024-25

Year – I, Semester – II

S. No.	Course Category	Code No	Name of Subject	Periods				Continuous Assessment (CA)			Exam ESE			Course Total
				L	T	P	Credits	CT	TA	Total	TE	PE	Total	
1	BSC	PY101	Physics	3	-	2	4	65	35	100	75	25	100	200
2	BSC	MT112	Mathematics II	3	1	-	4	50	25	75	75	-	75	150
3	ESC	CS101	Computer Programming	3	-	2	4	65	35	100	75	25	100	200
4	ESC	ME101	Basic Mechanical Engineering and Workshop	3	-	2	4	65	35	100	75	25	100	200
5	PEC	As per Annexure	Department Elective - I	3	-	-	3	50	25	75	75	-	75	150
6	ESC	CE103	Building Information Modelling	-	-	4	2	15	10	25	-	25	25	50
7	IPC	CE104	Internship/Mini Project/Training	-	-	2	1	-	-	50	-	-	-	50
Total				**15**	**1**	**12**	**22**	**-**	**-**	**525**	**-**	-	**475**	**1000**

L – Lecture; **T –** Tutorial; **P –** Practical; **C** – Credits; **CT** – Class Test; **TA** – Teacher's Assessment,
TE- Theory Exam, **PE**- Practical Exam
Continuous Assessment (CA) = Class Test + Teacher Assessment
End Semester Exam (ESE) = Theory Exam + Practical Exam
Course Total = CA + ESE

BSC- Basic Science Courses **ESC-** Engineering Science Courses **PEC-** Professional Elective Courses
IPC- Internship/Project Courses

Departmental Elective – I
CE106 Introduction to Civil Engineering Profession
CE161 Sustainable Design of Building
CE162 Construction Equipment and Techniques

Integral University

Effective from Session: 2024-25			
Course Code	CH101	**Title of the Course**	Chemistry-I
Year	I	**Semester**	I
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. 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.	8	5

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&&F ORM=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

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	-	-	-	-	-	-	-	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 subjects according to the following condition if the total percentages 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

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

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	MT101	**Title of Course**	Engineering Mathematics-I	**L**	**T**	**P**	**C**
Year	I	**Semester**	I	3	1	0	4
Pre-Requisite	10 + 2 Mathematics	**Co-Requisite**	--				
Course Objectives	The Course Is Aimed To Develop The Skills In Mathematics Which Is Necessary For Grooming Them Into Successful Engineering Graduate. 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:

- https://nptel.ac.in/courses/122104018/
- https://nptel.ac.in/courses/111104092/
- https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/111104092/lec21.pdf
- 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		-

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	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 Modeling 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 Analyzing 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-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

Integral University, Lucknow

Effective from Session:							
Course Code	ES101	**Title of 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	**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	**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	**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	**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	**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	**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.	**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.

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

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	HM101	**Title of 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 a t 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-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 & Seal of HoD**

Integral University, Lucknow

Effective from Session:			
Course Code	PY101	**Title of 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: To determine the wave length of monochromatic light with the help of Fresnel's Biprism. To determine the wave length of monochromatic light by Newton's ring. 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: To determine the specific rotation of cane sugar solution using Half Shade polarimeter. 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: 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: 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. To determine the energy band gap of a semiconductor using a PN junction diode. To determine the coefficient of viscosity of water by Poiseuille's method. 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

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					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

Effective from Session: 2023-24							
Course Code	EC101	**Title of 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

https://nptel.ac.in/courses/108102156

Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO	**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**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	MT112	**Title of Course**	Engineering Mathematics-II	**L**	**T**	**P**	**C**
Year	I	**Semester**	II	3	1	0	4
Pre-Requisite	10+2 Mathematics	**Co-requisite**	--				
Course Objectives	The course is aimed to develop the skills in mathematics which is necessary for grooming them into successful engineering graduate. 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 2 π , 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:(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	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 Correlation; 3- Substantial Correlation

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

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**	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.

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	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

Name & Sign of Program Coordinator	Sign & Seal of HoD