Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	PY101	**Title of the Course**	Physics	**L**	**T**	**P**	**C**
Year	First	**Semester**	First	3	0	2	4
Pre-Requisite	10+2 with Physics and Mathematics	**Co-requisite**	None				
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.						

Theory

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**	**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.	8	1
2	**Optical Activity and Modern Optics**	**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.	8	2
3	**Relativistic Mechanics**	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.	8	3
4	**Quantum Physics**	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).	8	4
5	**Physics of Materials**	**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	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

e-Learning Source:

1. https://nptel.ac.in/courses/115/101/115101011/
2. https://nptel.ac.in/courses/115/107/115107095/
3. https://nptel.ac.in/courses/113/106/113106093/
4. https://nptel.ac.in/courses/115/101/115101107/

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
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

Practicals

Course Outcomes	
CO1	To demonstrate how interference takes place by division of amplitude and by division of wavefront.
CO2	To demonstrate the practical applications of polarization phenomenon in finding the specific rotation, TIR in refractive index calculation.
CO3	To demonstrate the practical application of Fraunhoffer diffraction in wavelength determination and application of Carey Foster's bridge in resistivity determination.
CO4	To demonstrate the magnetic and heating effect of current in finding the magnetic field and Stefan's constant.
CO5	To demonstrate how to calculate the energy band gap of a semiconductor material and viscosity of a liquid.

Experiment No.	Title of the Experiment	Aim of the Experiment (*Offline)	Contact Hrs.	Mapped CO
1	Newton's Ring	To determine the wave length of monochromatic light by Newton's ring.	4	CO1
2	Fresnel's Biprism	To determine the wave length of monochromatic light with the help of Fresnel's Biprism.	4	CO1
3	Refractive Index	To determine the refractive index of a liquid using laser.	4	CO2
4	Polarimeter	To determine the specific rotation of cane sugar solution using Half Shade polarimeter.	4	CO2
5	Diffraction Grating	To determine the wavelength of prominent spectral lines by plane diffraction grating.	4	CO3
6	Carey Foster's Bridge	To determine the resistance per unit length of Carey Foster's bridge wire and (i) to prepare one ohm coil (ii) to determine the specific resistance of given wire.	4	CO3
7	Variation of Magnetic Field	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.	4	CO4
8	Stefan's Law	To verify Stefan's law by electrical method.	4	CO4
9	Energy Band Gap	To determine the energy band gap of a semiconductor using a PN junction diode.	4	CO5
10	Viscosity of water	To determine the coefficient of viscosity of water by Poiseuille's method.	4	CO5

Reference Books:

1. Practical Physics. by R. K. Shukla, New Age International Private Limited; Third edition.
2. B.Sc. Practical Physics by Harnam Singh and Hemne, S. Chand and Company.
3. B. Sc. Practical Physics by CL Arora, S Chand and Company
4. Practical Physics by Kumar P.R.S., Prentice Hall India Learning Private Limited
5. Engineering Physics Practical by S.K. Gupta, Krishna Prakashan

e-Learning Source:

1. https://youtu.be/fWhgguWc8rk
2. https://youtu.be/Bf0Tg-fNWjQ
3. https://youtu.be/dDp_Insp_p0
4. https://youtu.be/N0lxwqANsd4
5. https://youtu.be/G8Rqd2HNhuk
6. https://youtu.be/7Mq4isproEE
7. https://youtu.be/G8Rqd2HNhuk
8. https://youtu.be/NtfbmAw62Hw

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

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**	**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.

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

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/I	**3**	**0**	**1**	**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 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	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO 2	PSO 3	PSO4	PSO5
CO 1	1	1	1	2	1	2	1	3	3	3	3	2	3	2	2	1	-
CO 2	1	1	1	1	1	3	1	3	3	3	3	3	1	1	1	1	-
CO 3	1	1	2	2	1	3	2	3	3	3	2	2	1	1	1	1	-
CO 4	1	1	1	2	1	2	2	3	2	3	2	1	1	1	1	1	-
CO 5	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**

SYLLABUS

SEMESTER – I

1. Name of the Department: Mathematics						
2. Course Name	Mathematics-I for Computer Science & Engineering			L	T	P
3. Course Code	MT149			3	1	0
4. Type of Course (use tick mark)				Core ()	DE ( )	FC (√)
5. Pre-requisite (if any)	10+2 with Mathematics	6. Frequency (use tick marks)	Even ()	Odd (√)	Either Sem ( )	Every Sem ( )
7. Total Number of Lectures, Tutorials, Practical's						
Lectures = 30		Tutorials = 10		Practical = Nil		

8. 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.

9. COURSE OUTCOMES (CO):

After the successful course completion, learners will develop following attributes:

COURSE OUTCOME (CO)	ATTRIBUTES
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 find out the various properties of a matrices and linear transformation over a vector spaces.
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.

10. Unit wise detailed content

Unit-1 | **Number of lectures** | **08**

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.

Unit-2 | **Number of lectures** | **08**

Vector space, subspace, examples, linear span, basis, dimension, extension of a basis of a subspace, intersection and sum of two subspace, examples. Linear transformation, kernel and range of a linear map , rank-nullity theorem, row and column spaces

Unit-3 | **Number of lectures** | **08**

n^{th} derivative, Leibnitz theorem, Partial differentiation, Euler's theorem, curve tracing, change of variables , expansion of function of several variables..

Unit-4 | **Number of lectures** | **08**

Jacobian, Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (simple applications).

Unit-5 | **Number of lectures** | **08**

Double and triple integrals, Change of order of integration, change of variables, Gamma and Beta functions, Applications to area and volume, Dirichlet's integral and its applications.

11. CO-PO mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	2	-	1	3	2	3	2	3	3	3	2
CO2	3	3	2	3	2	2	-	1	2	2	3	2	3	3	2	2
CO3	2	2	3	2	2	1	-	1	1	1	2	2	2	2	1	1
CO4	2	2	3	1	1	1	-	1	1	1	2	2	2	1	1	1
CO5	2	2	1	1	2	1	-	1	1	2	1	2	2	2	2	1

3 Strong contribution, 2 Average contribution , 1 Low contribution

12. Brief description of self-learning / E-learning component

1. https://nptel.ac.in/courses/122104018/
2. https://nptel.ac.in/courses/111104092/
3. https://nptel.ac.in/courses/111107108/
4. https://archive.nptel.ac.in/courses/111/105/111105122/

13. Books recommended:

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
5. Introduction to Engineering Mathematics-I, S.Chand & Company, New Delhi

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**	**2**
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**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	CS131	**Title of the Course**	Web Design Lab	**L**	**T**	**P**	**C**
Year	I	**Semester**	I	0	0	2	1
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	The objectives of this course uses of various front-end tools. They can understand and create applications on their own. Demonstrate and design of web site can be carried out.						

Course Outcomes	
CO1	Develop front end website architecture.
CO2	Basics of HTML and CSS.
CO3	Work Alongside graphic designers for web design features.
CO4	Apply acquired knowledge and skills to build a web project.
CO5	Handle various aspects of full web development, ensuring they can build robust and scalable websites.

Experiment No.	**Name of Experiment**	**Contact Hrs.**	**Mapped CO**
1	Write an HTML code to display your education details in a tabular format.	2	1
2	Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.	2	1
3	Write an HTML code to illustrate the usage of the following: Ordered List, Unordered List and Definition List	2	2
4	Write a HTML program to design a form which should allow to enter your personal data (Hint: make use of text field, password field, e-mail, lists, radio buttons, checkboxes, submit button)	2	2
5	Write HTML Code to demonstrate the use of Anchor Tag for the Following: - • Creating a web link that opens in a new window. • Reference within the same html document. • Making an image a hyperlink to display second image.	2	3
6	Write an HTML code to create a frameset having header, navigation, and content sections.	2	3
7	Write an HTML code to demonstrate the usage of inline, internal, and external CSS.	2	4
8	Create a web page to demonstrate the usage of following CSS properties: • List properties • Border Properties • Positioning Properties • CSS Lists	2	4
9	Create a web page to demonstrate the usage of following CSS properties: • CSS Tables • CSS Menu Design • CSS Image Gallery	2	5
10	Introduction to GitHub and Version Control Tools • Git • Concurrent Versions System (CVS) • Apache Subversion (SVN) • Mercurial	2	5

e-Learning Source:

Udemy

		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	1	3	3	1	3		3	1	1		1	1	1	3		3
CO2	2	2	3	3	1		2	2	1		1	2	2	2	1	
CO3	1	1	1	2	3			2	2		2	1		3	1	2
CO4	2	2	1	2	2		2	1	3		3		2	1	1	1
CO5	1	2	1	3	1	3	1		2	3	2	1	1	2	3	1

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

Integral University, Lucknow

Effective from Session: 2023-24							
Course Code	EC102	**Title of the Course**	Switching theory and logic design	**L**	**T**	**P**	**C**
Year	I	**Semester**	II	**3**	**1**	**2**	**5**
Pre-Requisite		**Co-requisite**					
Course Objectives	• To understand the concepts of digital electronics and their applications. To provide a conversion in mathematical form. Can identify type of complements, can apply 1's and 2's complements. • To learn the Boolean Expression, K- Map method. To understand the basic concepts of various combinational circuits including gates, adders, subtractor, multiplexers. • To learn the analysis of various sequential circuits, flip flops, counters and various shift registers. • To understand the concept and design of synchronous/asynchronous sequential logic. • To understand the concepts of various logic devices programming logic array, programming array logic PROM and various memories.						

Course Outcomes	
CO1	Students shall be able to understand fundamental concepts of digital systems and binary numbers and converting numbers between different bases.
CO2	Students shall be able to understand logic of universal gates to build simple digital circuits and analyze Boolean expressions using fundamental postulates and theorems.
CO3	Students shall be able to implement Boolean functions using Karnaugh Maps for simplification.
CO4	Given concept students shall be able to understand and analyze the structure and function of combinational and sequential circuits.
CO5	Given a AND and OR array, student shall be able to analyze the characteristics of different types of memory.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Binary System**	Introduction of Digital Computers and Digital Systems, Binary numbers, Base Conversion, Conversion of numbers, Binary, Decimal, Hexadecimal, Octal, Binary Code: BCD, Excess-3, Gray Code	8	CO1
2	**Binary Logic and Boolean Algebra**	Basic Logic Gates: AND, OR, NOT, Universal Gates: NAND, NOR, Combinational Gates: X-OR, X-NOR gates, Fundamental Postulates of Boolean Algebra, Basic theorems of Boolean algebra, De-Morgan's Theorems.	8	CO2
3	**Boolean Function Implementation**	Need for simplification, K–Map method, 2-Variable K-map, 3-Variable K – Map, K-Map using Don't care condition.	8	CO3
4	**Combinational Logic**	Combinational circuits, Analysis procedure, design procedure, Binary adder-subtractor, Decimal adder, Binary multiplier. Multiplexer & Demultiplexer. Sequential Logic: Latches, Flip Flops, Synchronous/Asynchronous Counter, Register	8	CO4
5	**Memory**	Introduction of logic families: TTL, DTL & CMOS. Memory: ROM: PROM, EROM, RAM SRAM, DRAM PLD: PLA, PAL, and FPGA	8	CO5

Books recommended:

Text Books:

1. "Digital Design", M. Morris Mano and M. D. Ciletti, 5th Edition, Pearson Education

Reference Book:

1. "Fundamentals of Logic Design", Charles H. Roth, Jr., 5th Edition, Brooks/Cole, a division of Thomson, 2004.

2. "Digital Principles and Application", D P Leach, A P Malvino and Goutam Saha, 7th Edition, TMH.

3. " Digital Fundamentals", Thomas L. Floyd, 11th Edition by Pearson.
e-Learning Source:
https://www.youtube.com/watch?v=HcH0khFGwS8

	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**	**3**	**3**	**1**		**1**			**1**				**1**	**2**	**2**	
CO2	**3**	**3**	**3**	**1**		**1**			**1**			**1**	**3**	**3**	**2**	**1**
CO3	**3**	**2**	**3**	**2**	**1**	**1**			**2**				**2**	**3**	**2**	**1**
CO4	**3**	**3**	**2**	**2**	**1**				**1**				**3**	**3**	**2**	**1**
CO5	**3**	**3**	**2**	**1**					**1**				**2**	**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: 2025-26 (NEP)							
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.

e-Learning Source:

https://onlinecourses.nptel.ac.in/noc22_cs40/preview

https://archive.nptel.ac.in/courses/106/104/106104128/

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

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

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

B.Tech (All Branches)

Attributes & SDGs Common for all branches/Disciplines

Course Code	Course Title	Attributes							SDGs No.
ES102	Concept of Environmental Studies	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
						√			SDGs 6,13,14,& 15

Effective from Session:							
Course Code	**ES102**	**Title of the Course**	Concept of Environmental Studies	**L**	**T**	**P**	**C**
Year	I	**Semester**	I/II	**2**	**1**	**0**	**3**
Pre-Requisite	10+2	**Co-requisite**					
Course Objectives	The objectives of environmental studies are Creating awareness about environmental problems among people and 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	Students will be able to **understand** about relationship between Humans and Environment
CO2	**Understand** about Ecosystem, Biodiversity and Conservation
CO3	**Identifying** environmental pollution, its impact on humans, ecosystems and control measures through latest technologies
CO4	**Analyze** and **apply** knowledge for understanding complex environmental- economic-social challenges, and active participation in solving current environmental problems and preventing the future ones
CO5	**Evaluate** the Environmental crisis and can propose effective environmental management

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)	06	CO1
2	**Unit II. Natural Resources, Ecosystem and Biodiversity**	Overview of natural resources: Definition, Classification and types of natural resources; Status and challenges. 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.	10	CO2
3	**Unit III. Environmental Pollution and International Treaties**	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; Primary and secondary pollutants; Indoor air pollution; National Ambient Air Quality Standards. Technology to mitigate air pollution Water pollution: Sources; River, lake, and marine pollution, groundwater pollution; Water quality parameters and standards; Technology to mitigate water pollution Soil pollution and solid waste; Solid and hazardous waste; Technology to mitigate waste pollution Noise pollution: Definition; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; Technology to mitigate noise pollution Thermal and Radioactive pollution: Sources, impacts and Technology to mitigate pollution	10	CO3
4	**Unit IV. 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, Indigenous knowledge for adaptation to climate change. 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 convention. Major Indian Environmental Legislations, Industry-specific environmental standards; Waste management rules; National Green Tribunal; Some landmark Supreme Court judgments	10	CO4
5	**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. • Model Making	09	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)

e-Learning Source:

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

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

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	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-		
CO2	-	-	1	-	-	-	3	-	1	-	-	-	-	-	1	1		
CO3	-	-	2	-	-	-	3	-	1	-	-	-	-	-	1	1		
CO4	-	-	2	-	-	-	2	-	1	-	-	-	-	-	1	1		
CO5	-	-	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: 2023-24							
Course Code	ME101	**Title of the Course**	Basic Mechanical Engineering	**L**	**T**	**P**	**C**
Year	I	**Semester**	II	3	1	0	4
Pre-Requisite	NONE	**Co-requisite**	NONE				
Course Objectives	1. Be able to have the basic concepts of thermal sciences and temperature measurement on the basis of Zeroth law of thermodynamics. 2. To understand and apply first and second law of thermodynamics to various processes and real systems. 3. Be able to model the problem using free-body diagrams and reach to solution by using equilibrium equations. 4. To impart knowledge of structural analysis for safe design. 5. Be able to test different mechanical properties of engineering materials.						

Course Outcomes	
CO1	Explain 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 to various processes and real systems.
CO3	Model the problem using free-body diagrams and reach to solution by using equilibrium equations.
CO4	To perform structural analysis for safe design.
CO5	Knowledge of different mechanical properties of engineering materials and its testing.

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.	8	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.	8	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.	8	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.	8	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 testing and impact test.	8	CO5

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.

D.S. Kumar, Mechanical Engineering, S.K. Katarial & Sons.

Bhavi Katti S.S., Engineering Mechanics, New Age Pub.

P.K. Bharti: Engineering Mechanics, Kataria and Sons.

W. D. Callister, 2006, "Materials Science and Engineering-An Introduction", 6th Edition, Wiley India

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

	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

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

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

SYLLABUS

SEMESTER – II

1. Name of the Department: Mathematics & Statistics						
2. Course Name	**Mathematics-II for Computer Science & Engineering**			**L**	**T**	**P**
3. Course Code	**MT150**			3	1	0
4. Type of Course (use tick mark)				**Core ()**	**DE ( )**	**FC (√)**
5. Pre-requisite (if any)	10+2 with Mathematics	**6. Frequency (use tick marks)**	Even (√)	Odd ()	Either Sem ( )	Every Sem ( )
7. Total Number of Lectures, Tutorials, Practical's						
Lectures = 30	**Tutorials = 10**	**Practical = Nil**				

8. 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.

9. COURSE OUTCOMES (CO):

After the successful course completion, learners will develop following attributes:

COURSE OUTCOME (CO)	ATTRIBUTES
CO1	Students will understand the methods to solve first and higher order linear equations differential equations 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	Students will be able to determine given function in terms of sine and cosine terms in Fourier series.
CO4	Students will gain an understanding of probability and its applications. They will also learn different kind of probability distributions. They will understand the concept of correlation and regressions.
CO5	Students will be able to apply method of least squares to find the curve of best fit for the given data.

10. Unit wise detailed content

Unit-1	**Number of lectures**	**08**

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) .

Unit-2	**Number of lectures**	**08**

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.

Unit-3	**Number of lectures**	**08**

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., Fourier transform, Fourier cosine and sine transforms.

Unit-4	**Number of lectures**	**08**

Correlation and Regression Analysis, Definition of Probability: Classical and Axiomatic, Conditional Probability, Baye's theorem, Binomial Distribution, Poisson distribution and Normal Distribution.

Unit-5	**Number of lectures**	**08**

Method of least squares, Curve fitting of straight line and parabola, solution of cubic and biquadratic equations.

11. CO-PO mapping

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

3 Strong contribution, 2 Average contribution , 1 Low contribution

12. Brief description of self-learning / E-learning component

1. https://nptel.ac.in/courses/111106100/
2. https://nptel.ac.in/courses/111105123/
3. https://courses.maths.ox.ac.uk/node/view_material/1720
4. https://nptel.ac.in/courses/111103021/
5. https://www.youtube.com/watch?v=QuAiA1jaee0

13. Books recommended:

1. Advanced Engineering Mathematics, Wiley Eastern Ltd.
2. Advanced Engineering Mathematics, Khanna Publication.
3. Higher Engineering Mathematics, Khanna Publication.
4. Advanced Engineering Mathematics, CBS Publication.
5. Introduction to Engineering Mathematics-I, S.Chand & Company, New Delhi

Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	ME103	**Title of the Course**	ENGINEERING GRAPHICS	**L**	**T**	**P**	**C**
Year	**I**	**Semester**	I	**0**	**0**	**2**	**1**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• Main objective is to teach the fundamentals of Engineering Graphics. • This course enhances visualization skill and imagination power. • To understand techniques of drawings for various fields of engineering • To improve their technical communication skill in the form of communicative drawings.						

Course Outcomes	
CO1	Describe the fundamentals of engineering drawing, use of geometrical instruments and drawing steps
CO2	To understand the concept of projection and acquire visualization skills, draw the projection of points, lines and planes.
CO3	Classify solids and projection of solids at different positions
CO4	To get the exact sectioned view of solids and development of their surfaces.
CO5	To draw isometric projection and perspective views of an object.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Lettering and geometrical constructions	Describe the fundamentals of engineering drawing, use of geometrical instruments and layout for initial drawing.	2	CO1
2	Orthographic projections of points	Describe the fundamentals orthographic projections and use of geometrical instruments and layout for initial drawing.	2	CO2
3	Projections of lines	Describe the fundamentals of projections of lines and use of geometrical instruments and procedure for the drawing.	2	CO2
4	Projections of solids	Describe the fundamentals of projections of solids and use of geometrical instruments and procedure for the drawing.	2	CO3
5	Sectioning of solids	Describe the fundamentals of sectioning of solids and use of geometrical instruments and procedure for the drawing.	2	CO4, CO3
6	Isometric Projections	Describe the fundamentals of Isometric projections and use of geometrical instruments and procedure for the drawing.	2	CO5
7	Production drawing	Describe the fundamentals of production drawing.	2	CO1, CO2

Reference Books:

Engineering graphics by Pradeep Jain

Engineering graphics by Krunal Patel

e-Learning Source:

https://www.youtube.com/watch?v=p62LPzFqGQw&list=PLp6ek2hDcoNCjoRLQ4rjpCozisCACBxKA

https://www.youtube.com/watch?v=VrU73IwRyc4&list=PLLy_2iUCG87Bw9XPfEF3r3EW5UlAOv8iz

	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								1	2		3	3		3
CO2	3	2	2						1	2		3	3		3
CO3	3	2	2						1	2		3	3		3
CO4	3	2	2						1	2		3	3		3
CO5	3	2	2						1	2		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:2025-26							
Course Code	**CS161**	**Title of the Course**	**Python Programming**	**L**	**T**	**P**	**C**
Year	1st	**Semester**	1st	**3**	**0**	**2**	**4**
Pre-Requisite		**Co-requisite**					
Course Objectives	• Understand the process of installing and configuring Python along with its IDEs. To introduce Python fundamentals with a focus on syntax, control structures, and functions. • To develop strong understanding of data structures and modular coding. • To cultivate efficient coding habits for data analysis and AI applications. • To be able to understand the concept of data visualization techniques and its implementations.						

Course Outcomes	
CO1	Understand the process of python installation, IDEs, Python syntax, data types, and control structures.
CO2	Develop basic python programs using data structures, demonstrating foundational programming skills.
CO3	Apply, and evaluate functions & modules through object-oriented programming principles in Python. Utilize Python function and modular programming approach for problem-solving.
CO4	Analyze, apply, and optimize Python codes using built-in functions for developing efficient solutions. Debug Python code effectively using standard techniques and tools
CO5	Create, Design, and assess solution to real world problems using data visualization techniques, integrating various python-programming concepts for practical implementation.

THEORY

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Introduction to Python**	**Fundamentals of Python:** Overview of Python programming language and its significance, Python IDEs and setting-up the environment, Introduction to Jupiter notebooks, Basic Syntax, variables, data types (int, float, str, bool), and, handling Input/output functions, Control structures: if statements, loops	8	**CO1**
2	**Elementary Data Structures in Python**	**Data Structures:** Lists, tuples, sets, and dictionaries, List comprehensions and dictionary comprehensions, Basic operations on data structures (Lists, Tuples, Dictionaries); Advanced data manipulation: comprehensions, dictionary merging, slicing, and nested structures.	7	**CO2**
3	**Functions & Modules**	**Functions & Modules:** Defining and calling functions, Function arguments and return values, Importing and using modules, Creating and using custom modules. Functions, scope, default args, lambda, and modules	7	**CO3**
4	**Efficient Coding & Debugging Techniques**	**Coding & Debugging:** Code Optimization Techniques in Python: Code optimization using built-in functions: map, filter, zip; Refactoring for performance. Debugging with try-except, assertions; Introduction to Python debugging tools (e.g., pdb).	9	**CO4**
5	**Data Visualization & Real-world Applications**	**Introduction to Matplotlib:** Basic plotting with Matplotlib, Customizing plots (titles, labels, legends), Subplots and grid plots. **Seaborn for Statistical Plots:** Introduction to Seaborn, Creating various plots (histograms, box plots, violin plots), Interactive plots with Plotly. Applying learned concepts to solve simple data analysis or AI-related problems.	9	**CO5**

PRACTICAL

S.No.	List of Experiments	Contact Hrs.	Mapped CO
1	Understanding Python installation and its Integrated Development Environments (IDEs). Write a program to illustrate various data types & concepts of variables/Constant in Python.	**2**	**CO1**
2	Write a program to perform various Arithmetic Operations on numbers in Python (Addition, Subtraction, Multiplication, Division, etc.) along with conditional statements.	**2**	**CO1**
3	Perform operations on lists, tuples, and dictionaries.	**2**	**CO2**
4	Use comprehensions and nested structures for compact code.	**2**	**CO2**
5	Write a program implement the concept of "Functions" in python and sort „n" numbers in ascending and descending order after taking input (Integer number) from user. Define and use functions with default and keyword arguments.	**2**	**CO3**
6	Practice optimization using map, filter, and lambda functions.	**2**	**CO3**
7	Handle errors using try-except and raise exceptions deliberately.	**2**	**CO4**
8	Debug a faulty Python script using built-in debuggers and logging.	**2**	**CO4**
9	Extract text from sample social media data and count word frequency.	**2**	**CO5**
10	Perform basic sentiment analysis using keyword-based matching.	**2**	**CO5**

Reference Books:

1. Zelle, J. M. *Python Programming: An Introduction to Computer Science*, Franklin, Beedle & Associates.
2. Lutz, M. *Learning Python*, O'Reilly Media.
3. Downey, A. *Think Python: How to Think Like a Computer Scientist*, O'Reilly Media.
4. Bird, S., Klein, E., & Loper, E. *Natural Language Processing with Python*, O'Reilly Media.

e-LearningSource:

https://nptel.ac.in/courses/106105077

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

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

Integral University, Lucknow

Effective from Session:2025-26							
Course Code	**CS162**	**Title of the Course**	**A.I. and Machine Learning**	**L**	**T**	**P**	**C**
Year	1st	**Semester**	2nd	**3**	**0**	**2**	**4**
Pre-Requisite		**Co-requisite**					
Course Objectives	• Understand the fundamentals of AI and ML including key concepts and their real-world applications. • Gain knowledge of different machine learning types: supervised, unsupervised, and reinforcement learning. • Analyse data using classification, regression, and clustering techniques. • Implement basic machine learning algorithms using Python. • Understand Artificial Neural Network basics and Build & evaluate a machine learning model for a real-world problem.						

Course Outcomes	
CO1	Understand key AI and ML concepts and their applications.
CO2	Explain and apply supervised learning techniques like classification and regression.
CO3	Implement unsupervised learning models such as clustering and dimensionality reduction.
CO4	Develop ML models using Python libraries (e.g., scikit-learn).
CO5	Evaluate and analyze model performance for real-world problem-solving and explain Artificial Neural Network basics

THEORY

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to AI and ML	Introduction To Machine Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Statistical Decision Theory Regression, Statistical Decision Theory Classification, and Decision tree learning. Key concepts and real-world applications in fields like healthcare, finance, and automation. Types of ML	7	**CO1**
2	Supervised Learning: Classification	Introduction to classification, k-nearest neighbour, Naive Bayes classifier, linear discriminant analysis, support vector machine, decision trees, bias-variance trade-off, cross-validation methods such as leave-one-out (LOO) cross validation, k-folds cross validation. Algorithms: Logistic Regression, Decision Trees, SVMs, Naive Bayes. Applications and use-cases.	8	**CO2**
3	Supervised Learning: Regression	Introduction to Regression, Linear Regression, Simple Linear Regression, Multiple Linear Regression, Ridge Regression, Multivariate Regression, Subset Selection, Shrinkage Method, Partial Least Square, Principle Component Analysis. Linear Regression, Lasso, and Ridge Regression. Performance metrics (R^2, MSE). Practical scenarios.	9	**CO3**
4	Unsupervised Learning: Clustering	Cluster evaluation techniques.: K-means / K-medoid, top-down, bottom-up: single-linkage, multiple linkage, Partitional Clustering, Hierarchical Clustering, The BIRCH Algorithm, The CURE Algorithm, Density Based Clustering, dimensionality reduction, principal component analysis, DBSCAN.	8	**CO4**
5	Dimensionality Reduction & Neural Network	Dimensionality Reduction – PCA & t-SNE, Applications in Data Visualization and Preprocessing. Perceptron, Gradient Descent & Delta Rule, Multilayer Perceptron (MLP), Feed-Forward Neural Network, Artificial Neural Networks – Training, Initialization, Validation, Deep Neural Network (DNN), Unsupervised Learning,	8	**CO5**

PRACTICAL

S.No.	List of Experiments	Contact Hrs.	Mapped CO
1	Build and evaluate a decision tree model	**2**	**CO1**
2	Perform K-means clustering on customer segmentation dataset	**2**	**CO1**
3	Apply PCA for dimensionality reduction and visualize output	**2**	**CO2**
4	Develop a churn prediction model using supervised learning	**2**	**CO2**
5	Evaluate the model using accuracy, precision, recall, F1-score.	**2**	**CO3**
6	Visualize results using confusion matrix and ROC curve.	**2**	**CO3**
7	Tune hyper parameters using GridSearchCV	**2**	**CO4**
8	Perform predictive analysis using multiple predictor variables	**2**	**CO4**
9	Perform binary classification using logistic regression.	**2**	**CO5**
10	Classify linearly separable data (i.e. AND, OR Gate)	**2**	**CO5**

Reference Books:

1. Aurélien Géron – *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, O'Reilly.
2. Tom Mitchell – *Machine Learning*, McGraw Hill.
3. Stuart Russell and Peter Norvig – *Artificial Intelligence: A Modern Approach*, Pearson.
4. Ethem Alpaydin – *Introduction to Machine Learning*, MIT Press.

e-LearningSource:

https://nptel.ac.in/courses/106105077

Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
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CO3	2	2	1	1	2	-	1	2	2	1	1	2	2	1
CO4	3	2	2	2	2	-	1			1	1	2	2	2
CO5	3	2	3	1	2	-	1	1	1	1	1	2	3	3

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