Integral University, Lucknow

Effective from Session: 2022-23							
Course Code	**PY 101**	**Title of the Course**	**Physics**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**1st**	**3**	**1**	**0**	**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.						

Course Outcomes	
CO1	To analyze the connection between daily life observations and science. To realize that apparently different ideas of Optics such as Interference and Diffraction have interrelationship between them. To realize the simplicity of ideas involved in explaining complex phenomenon
CO2	To grow in ideas of different aspect of light and develop connection between daily life applications and science. To analyze the process of development of a new theory while dealing with Polarization. To correlate that the conceptualization of an idea is far ahead than its practical realization while dealing with LASER. To grow in realization of totally different manifestation of light. To find the most recent applications of light in terms of communication and storage of data. To realize that how the design of complex systems is based on the simple ideas. To realize that the conceptualization of an idea is far ahead than its practical realization while dealing with Optical Fibers.
CO3	To grow in developing connection between philosophy and science. To find that seemingly different ideas such as Optics and Mechanics have interrelationship between them. To understand the process of development of a new theory and its application in life. To realize the requirement of power of imagination.
CO4	To grow in developing the connection between philosophy and science. To find that seemingly different ideas such as Compton Effect and Quantum Theory have interrelationship between them. To understand and analyze the process of development of a new theory and how the development of one idea leads to the development of a apparently different idea. To realize and appreciate the efforts made by the individuals to give a new understanding of science that led to the modern day applications.
CO5	To grow in developing connection between daily life utility and material science. To realize that apparently different materials with respect to Electric and Magnetic properties have inter relationship between them. To evaluate that how totally different manifestation of Modern Science leads to new technology. To do the evaluation that how an idea is far ahead than its practical realization while dealing with Nano Technology and Super Conductivity.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Wave Optics**	Methods of formation of coherent sources, Fresnel's Bi-prism, displacement of fringes, thin film interference, Newton's ring. Fraunhoffer diffraction at single slit, grating, Rayleigh's criterion of resolution, resolving power of grating.	8	CO1
2	**Optical Activity and Modern Optics**	Production of plane polarized light by reflection and Double refraction, Nicol prism, Optical activity, polarimeter(Laurent's and Bi-quartz). Principle of fiber optics, numerical aperture, attenuation, dispersion in optical fibers, material dispersion, waveguide dispersion, intermodal and intra-modal dispersion, Pulse dispersion in step index fiber. Main components of laser, Einstein's coefficients, He-Ne laser, Nd-YAG laser and their applications.	8	CO2
3	**Properties of Matter and Relativistic Mechanics**	Viscosity, Poiseulli's equation, Michelson-Morley experiment and its implications, Galilean transformation equations, Lorentz transformation equations and their consequences, energy mass relation, relativistic kinetic energy.	8	CO3
4	**Quantum Physics**	Compton effect, basic postulates of quantum mechanics, Wave function and its physical admissibility, orthogonality of wave functions, normalization of wave functions, Heisenberg's uncertainty principle (no derivation) and its applications (non-existence of electron in nucleus, Bohr's radius), Schrodinger's equation and its application to free particle, particle in one dimensional box.	8	CO4
5	**Physics of Materials**	Magnetic Properties: Magnetization, Origin of magnetic moment, dia, para and ferro magnetism, 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, BCS theory (Qualitative), High temperature superconductors and Applications of Super-conductors. Nano-Materials: Basic principle of nanoscience and technology, structure, properties and uses of Fullerene and Carbon nanotubes, Applications of nanotechnology.	8	CO5

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/

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

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

Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	**LN 101**	**Title of the Course**	**Basic Professional Communication**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**1st**	**2**	**1**	**0**	**3**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• Developing the art of communication and learning language though literature • Knowledge of Professional, cultural and cross-cultural communication • Basic concept of structural and functional grammar; meaning and process of communication, verbal and nonverbal communication • Knowledge of reading and comprehension of general and technical articles, precise writing, summarizing, abstracting • Basic concepts of group discussion, organizing seminars and conferences • Development of Reading and Writing skills						

Course Outcomes	
CO1	Basic Understanding of communication and Professional Communication
CO2	Basic knowledge of structural and functional grammar. Learning Language through literature
CO3	Basic tools of communication and improvement in communicative competence
CO4	Understanding the basic grammar and basic structure of language
CO5	Enhancement of writing skills in English i.e. writing application, report and various types of letters

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Introduction to Communication**	Definition, Types of Communication, Channels of Communication, Language.	4	CO1
2	**Interpersonal Communication**	Culture- Definition and Types, Communication and Culture including Cross Cultural Communication.	6	CO2
3	**Written Communication**	Letter Writing- Informal and Formal - Letters of Enquiry, Letters of complaint, Response to complaints and enquiries,Self Exploration through description.	8	CO3
4	**Grammar through Worksheets**	Situational activities and modules- Parts of Speech, Tenses, Articles, Modals,Active and Passive, Subject-Verb Agreement, Direct and Indirect Speech, Degrees of comparison.	12	CO4
5	**Grammar through Worksheets Continued**	Sentences: Simple, Compound, Complex, Declarative, Assertive, Negative, Interrogative, Exclamatory, Imperative.	10	CO5

Reference Books:

1. Wren PC and Martin H, “High School Grammar and Composition”, S. Chand and Co.
2. K. Floyd, “Interpersonal Communication: The Whole Story” (2009), McGraw Hill.
3. Greenbaum Sidney and Nelson Gerald, “An Introduction to English Grammar”, Pearson.
4. Swan Michael, “Practical English Usage” OUP, 2005.
5. Raymond Murphy, “Intermediate English Grammar”, (2007) Cambridge University Press.

e-Learning Source:

	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	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		

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

Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	**MT101**	**Title of the Course**	**Mathematics I**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**1st**	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
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 Cay lay 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	**Differential Equations**	Linear differential equations of first order, Linear differential equations of higher order with constant coefficients,Complementary functions and particular integrals, Simultaneous linear differential equations, Solution ofsecond order differential equations by changing dependent and independent variables, Method of variation ofparameters, Applications to engineering problems (without derivation).	8	CO1
2	**Laplace Transform**	Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Unit stepfunction, Dirac-delta function, Laplace transform of periodic functions, Inverse Laplace transform, Convolutiontheorem, Applications to solve simple linear and simultaneous differential equations.	8	CO2
3	**Fourier Series and Partial Differential Equations**	Periodic functions, trigonometric series, Fourier series of period 2 π, Euler's formulae, functions havingarbitrary period, change of interval, Even and odd functions, Half range sine and cosine series. Introduction of partial differential equations, linear partial differential equations with constant coefficients ofsecond order and their classifications to parabolic, 9 elliptic and hyperbolic forms with illustrative examples.	9	CO3
4	**Applications of Partial Differential Equations**	Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions,Laplace equation in two-dimensions, Heat conduction equations up to two dimensions, Equations of transmissionLines.	8	CO4
5	**Basic Statistics and curve fitting**	Mean, Median, Mode, Standard deviation and Variance, Method of least squares, Curvefitting of straight line and parabola.	7	CO5

Reference Books:

1. E. Kreyszig Advanced Engineering Mathematics, Wiley Eastern Ltd.
2. Jaggi and Mathur Advanced Engineering Mathematics, Khanna Publication.
3. B. S. Grewal Higher Engineering Mathematics, Khanna Publication.
4. Dennis G. Zill Advanced Engineering Mathematics, CBS Publication.

e-Learning Source:

	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	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		

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

Integral University, Lucknow

Effective from Session: 2022-2023							
Course Code	**EE103**	**Title of the Course**	**Basic Electrical Engg.**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**1st**	**3**	**1**	**0**	**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

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**D.C Circuit Analysis and Network Theorems**	Circuit concepts: Concept of network, Active and passive elements, linear network and non linear network, unilateral and bilateral elements, lumped and distributed network, sources, open circuit and short circuit, source transformation, Kirchhoff's Law. Loop analysis and nodal analysis, star delta transformation. Network theorems: Needs of theorem, Superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem.	8	CO1
2	**Steady State Analysis of Single Phase AC Circuits**	AC fundamentals: Average and effective value of Sinusoidal waveform , form factor and peak factor,concept of phasors, phasors representation of sinusoidally varying voltage and current, analysis of series RLC circuits. Apparent, active and reactive powers, power factor, causes and problems of low power factor, power factor improvement, resonance, bandwidth and quality factor in series circuit.	8	CO2
3	**Three Phase AC Circuits**	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, induction type energy meter.	8	CO3
4	**Introduction of Power System**	General layout of electrical power system, standard generation, transmission and distribution voltage levels, concept of grid.Magnetic circuit: Concepts, analogy between electric and magnetic circuit. Single Phase Transformer: Principle of operation, construction, emf equation, equivalent circuit, losses, efficiency, Introduction to auto transformer.	8	CO4
5	**Electromechanical energy conversion devices**	DC Machines: Types, emf equation of generator and torque equation of motor, applications. Three Phase Induction Motor: Types, principle of operation, applications. Single Phase Induction Motor: Principle of operation and introduction to methods of starting, applications. Three Phase Synchronous Machines: Principle of operation of alternator, synchronous motor, applications.	8	CO5

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.

e-Learning Source:

	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	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		

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

Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	**EC101**	**Title of the Course**	**Basic Electronics**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**1st**	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives							

Course Outcomes	
CO1	Understand the current voltage characteristics of semiconductor devices. Identify the unique vocabulary associated with electronics and explain the basic concepts of Semiconductor diodes such as pn junction diode, characteristics and ammeters, DC loadline, Zener diode. To apply the basics of diode to describe the working of rectifier circuits such as Full and half wave rectifiers.
CO2	Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation Draw and explain the structure of bipolar junction transistor. Explain the operation of each device in terms of junction bias voltage and charge carrier movement. Identify and explain the various current components in a transistor.
CO3	Design and analyze of electronic circuits Describe the application of transistors for Current and voltage amplification. Also to describe the characteristics of different configurations of the transistor. Describe DC load line and bias point. List, explain, and design and analyze the different biasing circuits.
CO4	Evaluate frequency response to understand behavior of Electronics circuits. Sketch, explain and design the amplifier circuit for given specification and analyze them discuss oscillator principles, oscillator types, and frequency stability as it relates to its operation. Analyze and Design the different types of Oscillators. Discuss ideal and practical operational amplifier (op amp) their electrical parameters, need for op amp. Explain and design different application circuits using op amp
CO5	List and explain the different number system. Solve examples on converting one form of number system to another form. State Boolean laws and theorems. State and explain the different logic gates using truth table. Analyze and design different adder circuits.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Semiconductor Diode**	Mechanism of Conduction in Semiconductors: Mobility and Conductivity, Electrons and holes in anintrinsic semiconductors, Donor and acceptor impurities, Fermi level, Carrier densities insemiconductor, Hall effect, Diffusion, Recombination. Junction DiodePN junction characteristic and its equation, Effect of Temperature, Depletion Layer, Piecewise lineardiode model, Breakdown Mechanism, Zener and Avalanche Breakdown characteristics. Diode as circuit elementHalf wave and full wave rectifiers, capacitive filters, Zener diode as a regulator, clamper, clipper andvoltage double, special diode- LED, Schott key diodes.	8	CO1
2	**BJT characteristics and circuits**	Transistor Operation, CE, CB, CC configuration and their characteristics, transistor biasing circuits,stability factor, h- parameter model (low frequency), computation of Ai, Av, Ri, Ro of single transistorCE amplifier configuration.	8	CO2
3	**Field Effect Transistors**	JFET: Construction and principle of working,Drain / Transfer characteristics, basic amplifier circuits, Biasing of JFETMOSFET: Enhancement and depletion type Nchannel, P-channel, Drain / TransferCharacteristics.	8	CO3
4	**Switching theory & Logic gates**	Number system, Conversion, Compliments, Addition and Subtraction, BCD numbers,Boolean algebra, Canonical form, Logic gates, Minimization of logical function usingKarnaugh map.	8	CO4
5	**Operational Amplifier**	Concept of ideal operational amplifier (inverting and non-inverting) and its applications,Inverter, integrator, differentiator, voltage follower, summing and differential amplifierElectronic Instruments: Digital Multimeter (block diagram approach), CRO (block diagram and itsworking),Measurement of voltage, phase, frequency. Double beam CRO (block diagram & it'sworking).	8	CO5

Reference Books:

1. Bolyested&Nashekey / Electronic Devices and Circuit Theory, PHI
2. Milliman &Halkias: Integrated Electronics, Mc Graw Hill
3. J. S. Katre: Electronics Engineering, Tech-Max Publication

e-Learning Source:

	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	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		

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

Integral University, Lucknow

Effective from Session:							
Course Code	**PY102**	**Title of the Course**	**Physics Lab**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**1st**	**0**	**0**	**6**	
Pre-Requisite	10+2 with Physics and Mathematics	**Co-requisite**					
Course Objectives	The purpose of this undergraduate course is to impart practical knowledge of the concepts through different experiments related to its theoretical course.						

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, refractive index and Brewster's angle.
CO3	To demonstrate the practical application of Fraunhoffer diffraction in wavelength and focal length calculation.
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.

List of experiments	**Content of Unit**
Exp.1	To determine the wave length of monochromatic light by Newton's ring.
Exp.2	To determine the wave length of monochromatic light with the help of Fresnel's Biprism.
Exp.3	To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
Exp.4	To determine the specific rotation of cane sugar solution using Half Shade polarimeter.
Exp.5	To determine the wavelength of spectral lines using plane transmission grating.
Exp.6	To determine the Brewster's angle and refractive index of material with the help of a laser source.
Exp.7	To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil.
Exp.8	To verify Stefan's law by electrical method.
Exp.9	To determine the energy band gap of a given semiconductor material.
Exp.10	To determine the coefficient of viscosity of a liquid.

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

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

Integral University, Lucknow

Effective from Session: 2017-18							
Course Code	**EE104**	**Title of the Course**	**Electrical Engineering Lab**	**L**	**T**	**P**	**C**
Year	**I**	**Semester**	I/II	**0**	**0**	**2**	**1**
Pre-Requisite		**Co-requisite**					
Course Objectives	• To understand and experiment with the verification of DC Network Theorems • To understand and experiment with the study of diode, rectifier, BJT characteristics and Amplifier • To understand and experiment with the study of resonance and determination of transformer losses • To understand and experiment with the calibration of energy meter and operation of induction motor						

Course Outcomes	
CO1	Adopt, perform, analyze and implement the methods of verification of DC Network Theorems; contribute in related development
CO2	Adopt, perform, analyze and implement the methods of study of diode, rectifier, BJT characteristics and Amplifier; contribute in related development
CO3	Adopt, perform, analyze and implement the methods of study of resonance and determination of transformer losses; contribute in related development
CO4	Adopt, perform, analyze and implement the methods of calibration of energy meter and operation of induction motor; contribute in related development

Unit No.	Title of the Unit	Content of Experiment	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. R. Boylestad, “Electronic Devices and Circuit Theory”, Pearson, 2013.

	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	1	3
CO3	3	2	1	1	2	2	3					3	3	3	2	3
CO4	3	2	2	2	3	3						2	3	2	2	3

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

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/II	**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

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

Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	ME104	**Title of the Course**	WORKSHOP PRACTICE	**L**	**T**	**P**	**C**
Year	**I**	**Semester**	II	0	0	2	1
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• To impart practical knowledge and hands-on practice on the lathe machine. • To impart practical knowledge of basic tools and operations in the fitting shop and carpentry shop. • To impart basic knowledge of smithy tools and hands-on practice in smithy shop. • To impart basic knowledge of different welding tools and equipment and hands-on practice of making different welding joints. • 5. To impart practical knowledge of different types of sheet metal tools and equipments and hands-on practice of making sheet metal components.						

Course Outcomes	
CO1	Perform different operations on lathe machine.
CO2	Manufacture components using tools and equipments of fitting shop and carpentry shop.
CO3	Make components in smithy shop using different types of smithy tools and equipments.
CO4	Perform different joining operations using welding tools and equipments.
CO5	Make sheet metal components using different sheet metal tools and equipments.

Experiment No.	**Title of the experiment**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Lathe machine**	To study and sketch a lathe machine Practice of operations - facing, plain turning, step turning, Taper turning & chamfering	2	CO1
2	**Fitting shop & carpentry shop**	To study and sketch fitting tools and equipment Practice of step cutting, filing, drilling & tapping To make a 90^0 v-groove fitting on mild steel flat To study and sketch different types of carpentry tools & machines To make a mortise and tenon joint To make a corner lap joint	2	CO2
3	**Smithy shop**	To study and sketch different smithy tools & equipments To make a squire punch from mild steel round rod To make a pipe hook from a mild steel round rod	2	CO3
4	**Welding shop**	To study and sketch the welding equipments and tools 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)	2	CO4
5	**Sheet metal**	To study and sketch different sheet metal tools & equipments To make a rectangular tray To make a conical funnel	2	CO5
e-Learning Source:				
https://www.vlab.co.in/				

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

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

Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	**CH101**	**Title of the Course**	**Chemistry**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**2nd**	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• The core is aimed to develop the skills in Chemistry which is necessary for grooming shes in casal engineering graduate. • The topics introduced will serve as basic tools for specialized studies in science field.						

Course Outcomes	
CO1	Analyze and compare magnetic behavior and stability of heteronuclear diatomic molecules, Significance of hydrogen bonding band theory, radius ratio, density of unit cell, fullerenes and graphite
CO2	Comprehension of types of polymers to make an appropriate choice of use of polymers (Natural, synthetic and biodegradable)
CO3	Compare reaction intermediates and mechanism of chemical reactions and isomerism.
CO4	Interpret phase rule, phase diagram, corrosion and its prevention, calculation of activation energy, rate constant, half-life period, emf of electrochemical cells, construction and operation of galvanic cell and concentration cells.
CO5	Determination of calorific value, analyzing water softening methods, principles, instrumentations of UV, IR and NMR spectroscopy and their applications.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Chemical bonding and state of matter:**	Molecular theory of hetero diatomic molecules, Band theory of bonding in metals, Hydrogen bonding. Solid state chemistry: Radius ratio rule, Space lattice (only cubes), Types of Unit cells, Bragg's law, calculation of density of unit cell. One and Two Dimensional solids, Graphite as two dimensional solid and its conducting and lubricating properties. Fullerene and its applications.	8	CO1
2	**Polymers:**	Polymerization and its classification, Thermoplastic and thermosetting resins. Elastomers (Buna-S, Buna-N, thiokols, polyurethanes, silicons), Polyamides (Nylon-6, Nylon-6,6, Nylon-6,10, Nylon-11, Kevlar), Polyesters (Terelene), Polyacrylates (PMMA, PAN, PVC). Organic conducting and biodegradable polymers.	8	CO2
3	**Structural and mechanistic concepts in organics:**	Stability of reaction intermediates, e.g. Carbanions, Carbocations and free radicals. Types of organic reactions, mechanism of nucleophilic substitutionreactions. Mechanism of the following name reactions. i. Aldolcondensation ii. Cannizzaro reactioniii. Beckmann rearrangement iv. Hofmann rearrangement and v. Diels-Alderreaction E-Z Nomenclature. R.S configuration, Optical isomerism of organic compounds containing one chiral center. Examples of optically active compounds without chirality. Conformations of n-butane.	8	CO3
4	**Reaction kinetics, Phase rule, Electrochemistry and Corrosion:**	Order and molecularity of reactions. First and second order reactions. Energy ofactivation. Phase Rule, its application to one component system(water). Equilibrium potential, electrochemical cells (galvanic and concentrationcells) Electrochemical theory of corrosion and protection ofcorrosion.	8	CO4
5	**Analytical methods, Fuel and Water treatment:**	Basic principles of spectroscopic methods. The use of UV, Visible, IR, 1HNMR, for the determination of structure of simple organic compounds. Classification of fuels, determination of gross and net calorific values using Bomb Calorimeter. Hardness of water, softening of water by Lime-Soda process, Zeolites and ion exchange resins process and Reverse Osmosis. Treatment of boiler feed water by Calgon process.	8	CO5

Reference Books:

1. Jain P. C. and Jain M. 1994. Engineering Chemistry. Danpat Rai publishing company Pvt. Ltd., Delhi.
2. Bahl B.S, Arun Bahl and Tuli B.D. 2007. Essentials of Physical Chemistry. S. Chand and Co. Ltd., Delhi.
3. Industrial Chemistry B.K Sharma, Goel publishing house.

e-Learning Source:

	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	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: 2015-16							
Course Code	**ES101**	**Title of the Course**	**Environmental Studies**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**2nd**	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• The purpose of this undergraduate course is to impart basic and key knowledge of environment and ECOsystem. • This will help students in enhancing their knowledge of biodiversity and its conservation. • After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and ECOsystem.
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and eCOsystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**Introduction to Environment and ECOsystems**	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, ECOsystem, Structure & Function, Energy flow in the ECOsystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	**Natural Resources**	Renewable and non renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies.	8	CO2
3	**Biodiversity and Conservation**	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, ECOsystem and biodiversity services.	8	CO3
4	**Environmental Pollution, Policies and Practices**	Environmental pollution, Solid waste management , Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	**Human Population and the Environment**	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	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, Jaicob Publication House, Mumbai.

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

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

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

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

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

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

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

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

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

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

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

e-Learning Source:

	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	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: 2015-16							
Course Code	**MT112**	**Title of the Course**	**Mathematics II**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**2nd**	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
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 specializedstudies 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 todiverse 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

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**Differential Equations**	Linear differential equations of first order, Linear differential equations of higher order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solution ofsecond order differential equations by changing dependent and independent variables, Method of variation ofparameters, Applications to engineering problems (without derivation).	8	CO1
2	**Laplace Transform**	Laplace transform, Existence theorem. Laplace transform of derivatives and integrals, Unit stepfunction, Dirac-delta function, Laplace transform of periodic functions, Inverse Laplace transform, Convolutiontheorem, Applications to solve simple linear and simultaneous differential equations.	8	CO2
3	**Fourier Series and Partial Differential Equations**	Periodic functions, trigonometric series, Fourier series of period 2 n. Euler's formulac, functions havingarbitrary period, change of interval, Even and odd functions, Half range sine and cosine series. Introduction of partial differential equations, linear partial differential equations with constant coefficients ofsecond order and their classifications to parabolic, elliptic and hyperbolic forms with illustrative examples.	8	CO3
4	**Applications of Partial Differential Equations**	Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions,Laplace equation in two-dimensions, Heat conduction equations up to two dimensions, Equations of transmissionLines.	8	CO4
5	**Curve fitting and Solution of Equations**	Method of least squares, curve fitting of straight line and parabola, Solution of cubic and biquadratic equations.	8	CO5

Reference Books:

1. E. Kreyszig Advanced Engineering Mathematics, Wiley Eastern Ltd.
2. Jaggi and Mathur Advanced Engineering Mathematics, Khanna Pub.
3. B. S. Grewal Higher Engineering Mathematics, Khanna Pub.
4. Dennis G. Zill Advanced Engineering Mathematics, CBS Pub.

e-Learning Source:

	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	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: 2015-16							
Course Code	**ME101**	**Title of the Course**	**Basic Mechanical Engg.**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**2nd**	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• Be able to have the basic concepts of thermal sciences and temperature measurement on the basis of zeroth law of thermodynamics. • To understand and apply first and second law of thermodynamics to various processes and real systems. • Be able to model the problem using free-body diagrams and reach to solution by using equilibrium equations. • Be able to draw Shear Force Diagram (SFD) and Bending Moment Diagrams (BMD) for statistically determinate beams. • Be able to design simple components on the basis of knowledge of stress, strain and strength of material.						

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 freebody diagrams and reach to solution by using equilibrium equations.
CO4	Draw Shear Force Diagram (SFD) and Bending Moment Diagrams (BMD) for statistically determinate beams.
CO5	D esign simple components on the basis of knowledge of stress, strain and strength of material.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**FUNDAMENTALS OF THERMODYNAMICS**	Fundamental Concepts and Definitions: Definition of Thermodynamics, System, surrounding and universe, Phase, Concept of continuum,Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature. Thermodynamic equilibrium, Property, State, Path, process, Cyclic process, Energy and its form, Work and heat, Enthalpy.Laws of thermodynamics: Zeroth law: Concepts of Temperature, Zeroth law.	8	CO1
2	**FIRST LAW &SECOND LAW**	First law: First law of thermodynamics. Concept of processes, Flow processes and control volume,Flow work. Steady flow energy equation, Mechanical work in a steady flow of process. Second law: Essence of second law. Thermal reservoir, Heat engines, COP of heatpump and refrigerator Statements of second law, Carnot cycle, Clausius inequality.	8	CO2
3	**MECHANICS AND STRENGTH OF MATERIALS**	Force system and Analysis: Basic Concept: Laws of motion. Transfer of force to parallel position. Resultant of planer force system Free Body diagrams, equilibrium and its equation. Friction: Introduction, Laws of Coulomb friction, Equilibrium of bodies involving dry friction, belt friction.	8	CO3
4	**STRUCTURE ANALYSIS**	Beams: Introduction, Shear force and bending moment, Shear and bending moment diagram for staticallydeterminate beams.	8	CO4
5	**STRESS AND STRAIN ANALYSIS**	Simple Stress and strain: Introduction, Normal, shear stresses, Stress-strain diagrams for ductile andbrittle materials. Pure Bending of Beams: Introduction, Simple bending theory.	8	CO5

Reference Books:

1. Van Wylen G.J. &Sonnlog R.E. Fundamentals of Classical Thermodynamics, John Wiley & Sons, Inc. NY.
2. Wark Wenneth: Thermodynamics (2nd edition) Mc Graw Hill Book Co. NY.
3. Holman, J.P: Thermodynamics, Mc Graw Hill Book Co.NY.
4. Shames LH, Engineering Mechanics, P.H.L.
5. D.S. Kumar, Mechanical Engineering, S.K. Katarial& Sons.
6. BhaviKatti S.S. Engineering Mechanics, New Age Pub,
7. P.K. Bharti: Engineering Mechanics, Kataria and Sons.
8. R.K. Rajput, Mechanical Engineering. Laxmi Pub

e-Learning Source:

	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	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: 2015-16							
Course Code	**CS101**	**Title of the Course**	**Computer Programming**	**L**	**T**	**P**	**C**
Year	**1st**	**Semester**	**2nd**	**3**	**1**	**0**	**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 data types structure & union.						

Course Outcomes	
CO1	Understand 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	Develop programs on different operations on arrays, matrices & strings.
CO5	Implement programs on structure, union & Dynamic memory allocation.

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.	8	CO1
2	**Starting 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	CO2
3	**Introduction to pointers**	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.	8	CO3
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.	8	CO4
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	CO5

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 'YashwantKanitkar-BPB Publication.
4. The C Programming Essentials by Dey- Pearson Publication.

e-Learning Source:

	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	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: 2015-16							
Course Code	ME102	**Title of the Course**	MECHANICAL ENGINEERING LAB	**L**	**T**	**P**	**C**
Year	**I**	**Semester**	II	**0**	**0**	**2**	**1**
Pre-Requisite	NONE	**Co-requisite**	NONE				
Course Objectives	• To understand the working and basic components of 4 stroke petrol engine and 4 stroke Diesel engine through study their models. • To understand the working and basic components of 2 stroke petrol and vapor compression refrigeration system through model study. • To understand basic components and working of water tube boiler through model study. • To learn the technique for determine of hardness and impact strength of a material. • To learn the technique for determine of compressive strength of a brick through UTM.						

Course Outcomes	
CO1	To understand the working and basic components of 4 stroke petrol engine and 4 stroke Diesel engine through study their models.
CO2	To understand the working and basic components of 2 stroke petrol and vapor compression refrigeration system through model study
CO3	To understand basic components and working of water tube boiler through model study.
CO4	To learn the technique for determine of hardness and impact strength of a material.
CO5	To learn the technique for determine of compressive strength of a brick through UTM.

Experiment No.	**Title of the Experiment**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Four Stroke Petrol Engine	To Study & Sketch the model of S.I. Engine (4 Stroke)	2	CO1
2	Four Stroke Diesel Engine	To Study & Sketch the model of C.I. Engine (4 Stroke).	2	CO1
3	Two Stroke Petrol Engine	To Study & Sketch the model of S.I. Engine (2 Stroke)	2	CO2
4	Vapor Compression	To Study & Sketch the model of Vapor Compression Refrigerators	2	CO2
5	Water Tube Boiler	To Study & Sketch the model of water tube boiler (Babcock & Wilcox)	2	CO3
6	Impact Testing	To determine the Impact Strength of Mild Steel using Izod Method	2	CO4
7	Hardness Testing	To determine the harness of a mild steel specimen by using hardness tester (Rockwell Hardness test)	2	CO4
8	UTM Testing	To learn the technique for determine of compressive strength of a brick through UTM.	2	CO5

e-Learning Source:

https://www.vlab.co.in/

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

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