



**INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT (An autonomous Institute)**

Parandwadi, Pune – 410506, Ph. 02114 661500, [www.indiraicem.ac.in](http://www.indiraicem.ac.in)

Department of Basic Engineering Science

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## Department of Basic Engineering Science



First Year Engineering Syllabus

For Academic Year

**2024-25**



## Semester-I

Course Code	Name of Course	Course Category (As per NEP)	Teaching Scheme				Credits	Evaluation Scheme					Total Marks
			L	T	P	Total		Theory			Practical /Tut		
								TAE	CAE	ESE	INT	EXT	
24UBSL101	<b>Linear Algebra and Univariate Calculus</b>	Basic Science Course	03	01	-	04	04	10	15	50	25	-	100
24UBSL103 24UBSP103 / 24UBSL104 24UBSP104	<b>Engineering Physics/ Engineering Chemistry</b>	Basic Science Course	03	-	02	05	04	10	15	50	25	-	100
24UBSL105 24UBSP105/ 24UETL106 24UETP106	<b>Basic Electrical Engg. / Basic Electronics Engg.</b>	Engg Science Course	03	-	02	05	04	10	15	50	25	-	100
24UMEL111 24UBSL112	<b>Engineering Graphics/ Basic of Civil Engineering &amp; Mechanics</b>	Engg Science Course	02	-	-	02	02	10	15	25	-	-	50
24UCEL107 24UCEP107	<b>Fundamental Programming I</b>	Engg. Science Course	02	-	02	04	03	10	15	25	25	-	75
24UMEP109/ 24UMEP110	<b>Mechanical Technology/ Workshop Technology</b>	VSC-I	-	-	02	02	01	-	-	-	25	-	25
24UBSL113	<b>Professional Communication</b>	AEC-I	01	-	-	01	01	10	15	-	-	-	25
24UBSP114	<b>Yoga/Music/Dance/Sports</b>	CC-I	-	-	02	02	01	-	-	-	25	-	25
	<b>Total</b>		<b>14</b>	<b>01</b>	<b>10</b>	<b>25</b>	<b>20</b>						<b>500</b>



## Semester-II

Course Code	Name of Course	Course Category (As per NEP)	Teaching Scheme				Credits	Evaluation Scheme					
			L	T	P	Total		Theory			Practical /Tut		Total Marks
								TAE	CAE	ESE	INT	EXT	
24UBSL202	Multivariate calculus	Basic Science Course	03	01	-	04	04	10	15	50	25	-	100
24UBSL103 24UBSP103/ 24UBSL104 24UBSP104	<b>Engineering Physics/ Engineering Chemistry</b>	Basic Science Course	03	-	02	05	04	10	15	50	25	-	100
24UBSL105 24UBSP105/ 24UETL106 24UETP106	<b>Basic Electrical Engg. / Basic Electronics Engg.</b>	Engineering Science Course	03	-	02	05	04	10	15	50	25	-	100
24UMEL111 24UBSL112	<b>Engineering Graphics/ Basic of Civil Engineering &amp; Mechanics</b>	Engg. Science Course	02	-	-	02	02	10	15	25	-	-	50
24UCEL208/ 24UCEP208	<b>Fundamental Programming II</b>	Core Course	02	-	02	04	03	10	15	25	25	-	75
24UMEP109/ 24UMEP110	<b>Mechanical Technology/ Workshop Technology</b>	VSC-I	-	-	02	02	01	-	-	-	25	-	25
24UBSL215	<b>Vedic Mathematics</b>	IKS	01	-	-	01	01	10	15	-	-	-	25
24UBSP216	<b>Yoga/Music/Dance/Sports</b>	CC-II	-	-	02	02	01	-	-	-	25	-	25
<b>Total</b>			<b>14</b>	<b>01</b>	<b>10</b>	<b>25</b>	<b>20</b>						<b>500</b>



Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	<b>Linear Algebra and Univariate Calculus</b>			Code	24UBSL101		
<b>Credits</b>	4	<b>Pr /Tut</b>	1	<b>Scheme</b>	Th	Pr/Tut.	CAE
		<b>Th</b>	3		10 (TAE) 50 (ESE)	25	15
<b>Prerequisites:</b> Basic Mathematics							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>1. To make the students familiarize with concepts and techniques in Matrices, Calculus.</li> <li>2. To understand advanced level mathematics.</li> <li>3. To acquire basic knowledge about complex analysis.</li> <li>4. To enhance analytical thinking power, useful in their disciplines.</li> </ol>							
<b>Course Outcomes:</b> At the end of course the students will be able to							
<b>CO1</b> Find derivative of functions of several variables that are essential in various branches of Engineering.							
<b>CO2</b> Discuss the solution of system of linear equations, Eigen values and Eigen vectors.							
<b>CO3</b> Apply the concept of partial derivatives to find Jacobian, Derivatives of implicit function functional dependence and extreme values of the function.							
<b>CO4</b> Examine the basic concepts and fundamental definitions underlying complex analysis.							
Course Contents							
<b>Unit I</b>	<b>Matrices</b>						<b>9 Hours</b>
Rank, Normal form, System of linear Equation, linearly independent and dependent vector, Application of Matrices.							
<b>Unit II</b>	<b>Eigen values and Eigen vector</b>						<b>9 Hours</b>
Eigen values, Eigen vector, Caley-Hamilton Theorem, Diagonalization of Matrix, Quadratic form of Matrix.							
<b>Unit III</b>	<b>Differential Calculus-I</b>						<b>9 Hours</b>
Successive differentiation , Taylor's & Mclaurin's series , Indeterminant form , Partial derivative, Euler's Theorem, Total Derivatives							
<b>Unit IV</b>	<b>Differential Calculus-II</b>						<b>9 Hours</b>
Jacobians & It's Applications, Maxima and Minima of two variable functions, LaGrange's Method for finding the Extreme value of the function.							
<b>Unit V</b>	<b>Complex Analysis</b>						<b>9 Hours</b>
Basic of complex number, Demovier's theorem, Complex function, Differentiation of complex function ,Analytic function, C-R equation, Harmonic function							
<b>Text Books :</b>							
1. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi) .							



2. Higher Engineering Mathematics by B. V. Ramana (Tata McGraw Hill) .

**Reference Books:**

1. Linear Algebra –An Introduction, Ron Larson, David C. Falvo (Cenage Learning, Indian edition).
2. Applied Mathematics (Vol. I & Vol. II) by P.N.Wartikar and J.N.Wartikar Vidyarthi Griha Prakashan, Pune.
3. Thomas' Calculus by George B. Thomas, (Addison-Wesley, Pearson).

**Tutorial Session:** (Minimum 10 problems in each assignment).

**Assignment 1:** Problems on Matrices.

**Assignment 2:** Problems on Eigen values and Eigen vector.

**Assignment 3:** Problems on Differential Calculus -I.

**Assignment 4:** Problems on Differential Calculus -II.

**Assignment 5:** Problems on Complex Analysis.

**E-Contents:**

1. **Differential Calculus-** (<https://youtu.be/439NgymYJIw?si=nWDIQYHKO172DDmW>)

2. **Matrices:** ( <https://youtu.be/SK17H2w3fKA?si=rLB7a-w0182cZi3O> )

3. **Eigen values and Eigen vector:**([https://youtu.be/h5urBuE4Xhg?si=dN-K2QfBQ\\_CWuVi](https://youtu.be/h5urBuE4Xhg?si=dN-K2QfBQ_CWuVi) )

4. **Complex Number:** ( [https://youtu.be/tu-2W40Kg5Y?si=EQ\\_OGSKwCdILoRnc](https://youtu.be/tu-2W40Kg5Y?si=EQ_OGSKwCdILoRnc) )

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Curriculum of First Year Engineering							
Course	Engineering Physics			Code	24UBSL103		
Credits	3	PR		Scheme	TH	PR	CAE
		TH	3 hrs		10 TAE 50 ESE		15
<b>Pre-Requisite:</b> Fundamentals of: Optics, wave-particle duality, semiconductors, PN junction and magnetism							
<b>Course Objectives:</b> To enable the student to acquire the knowledge in the following topics 1.To outline basic concepts and principles of lasers and fibre optics. 2.To introduce current technologies in Physics. 3.To investigate about different renewable energy sources.							
<b>Course Outcomes:</b> <b>On completion of the course, student will be able to</b> <b>CO1</b> Learn basics of lasers and optical fibres and their use in some applications. <b>CO2</b> Understand concepts and principles in quantum mechanics. <b>CO3</b> Apply theory of semiconductors and their applications in some of the devices. <b>CO4</b> Know about basics of magnetism, and its properties and applications. <b>CO5</b> superconductivity and technological applications <b>CO6</b> Assess comprehensive use of renewable energy sources, materials and applications.							
Course Contents							
Unit I	Laser & Fibre Optics						9 Hours
<b>Laser:</b> Basics of laser and its mechanism, characteristics of laser - Semiconductor laser: Single Hetro-junction laser - Gas laser: CO2 laser - Applications of lasers: Holography, IT, industrial, medical <b>Optic Fiber:</b> Introduction, parameters: Acceptance Angle, Acceptance Cone, Numerical Aperture - Types of optical fiber- step index and graded index - Attenuation and reasons for losses in optic fibers (qualitative) - Communication system: basic building blocks Advantages of optical fiber communication over conventional methods.							
Unit II	Quantum Physics						9 Hours
De-Broglie hypothesis, Heisenberg Uncertainty Principle, Wave-function and its physical significance - Schrodinger's equations: time independent and time dependent - Application of Schrodinger's time independent wave equation - Particle enclosed in infinitely deep potential well (Particle in Rigid Box) - Particle in Finite potential well (Particle in Non-Rigid box) (qualitative) - Tunnelling effect, Tunnelling effect examples (principle only): Alpha Decay, Scanning Tunnelling Microscope.							
Unit III	Semiconductor Physics						9 Hours
<b>Free electron theory (Qualitative)</b> - Opening of band gap in solids - Fermi Dirac distribution function - Conductivity of conductors and semiconductors - Position of Fermi level in intrinsic							



and extrinsic semiconductors (with derivations based on carrier concentration) - Working of PN junction based on band diagram - Expression for barrier potential (derivation) - Applications of PN junction diode: Ideal diode.

<b>Unit IV</b>	<b>Magnetism and Superconductivity</b>	<b>9 Hours</b>
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**Magnetism:** Origin of magnetism - Classification of magnetic materials viz. Ferromagnetic, Paramagnetic and Diamagnetic (qualitative) - Characteristic features of Magnetic Materials. CGS and SI units and their conversion. Applications of magnetic devices: transformer cores, magnetic storage, magneto-optical recording

**Superconductivity:** Introduction to superconductivity; Properties of superconductors: zero electrical - resistance, critical magnetic field, persistent current, Meissner effect - Type I and Type II superconductors - Low and high temperature superconductors.

<b>Unit V</b>	<b>Non-Conventional Energy Sources</b>	<b>9 Hours</b>
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Introduction to Various non-conventional energy resources viz Solar energy, Wind energy, Tidal energy, Nuclear energy, relative merits and demerits. Solar radiation, Flat plate collectors and their materials, focusing of collectors and their materials, Applications and performance, Solar thermal power plants.

**Text Books:**

1. Engineering Physics, Avadhanulu, Kshirsagar, S. Chand Publications
2. A Textbook of Optics – N Subrahmanyam and BriLal , S. Chand Publications
3. Engineering Physics, Gaur, Gupta, Dhanpat Rai and Sons Publications

**Reference Books:**

1. Fundamentals of Physics, Resnick and Halliday (John Wiley and Sons)
2. Principles of Physics, Serway and Jewett (Saunders college publishing)
3. Introduction to Solid State Physics, C. Kittel (Wiley and Sons)
4. Principles of Solid State Physics, H. V. Keer, New Age International
5. Laser and Non-Linear Optics, B. B. Laud (Oscar publication)

**Assignments**

1. Basic Concepts of Laser and Fibre optics
2. Numerical of quantum Mechanics and two derivations
3. Basic terms in magnetism and superconductivity
4. Basic terms and one application in solar Energy

**E-contents**

1. <http://www.coursera.org/specializations/quantum-mechanics-for-engineers> Quantum Mechanics
2. <http://www.coursera.org/learn/semiconductor-physics> Fundamentals of Semiconductor
3. [A Brief Course On Superconductivity - Course \(nptel.ac.in\)](http://www.nptel.ac.in) Superconductivity
4. <http://www.coursera.org/learn/introduction-to-quantum-information> Quantum Computing
5. <http://www.coursera.org/learn/solar-energy-basic> Solar Energy

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Indira College of Engineering and Management (An autonomous Institute)

Curriculum of First Year Engineering



Course	Engineering Physics			Code	24UBSP103		
Credits	1	PR	2 hrs.	Scheme	TAE	PR	CAE
		TH				25	
<b>List of Practical's (Any 6)</b>							
1. Testing of optic power loss between two plastic optical fibers in ST connectors. 2. Measuring optical power attenuation in your plastic optical fiber 3. Malus cosine square Law 4. Semiconductor Energy band gap 5. Characteristics of solar cell 6. Ultrasonic Interferometer: Determination of velocity of ultrasonic waves in given liquid and find its compressibility 7. Measurement of Thickness of wire using laser 8. Determination of number of lines on grating surface using Laser							

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Engineering Chemistry			Code	24UBSL104		
Credits	3	PR		Scheme	Th	PR	CAE
		Th	3		10 (TAE) 50 (ESE)		15
<b>Pre-requisites:</b> The students should have Basic knowledge of Periodic table, Molecular weight of element, Equivalent weight of element, Acid/Base-strong and weak, pH scale, cell, Monomer, conjugation in the molecules, spectrum, basic fuels.							
<b>Course Objective:</b> To bring the adaptability to developments in Engineering Chemistry and to acquire skills of chemical analysis to apply for engineering applications. 1.To relate basic concepts of the methods used for improving the quality of water. 2.To discuss the corrosion mechanism and preventive methods for corrosion control. 3.To illustrate conventional and alternative fuel with respect to properties and applications 4.To identify the application of spectroscopic techniques, for chemical analysis							
<b>Course Outcomes</b> <b>CO1</b> Describe the methodologies and techniques for removing the impurities of water commercially <b>CO2</b> Predict appropriate analytical technique for the detection of material <b>CO3</b> Examine the causes of corrosion and methods for its minimization <b>CO4</b> Analyze the fuel and suggest the use of alternative fuel <b>CO5</b> Assess chemical compound by use of spectroscopic techniques							
<b>Course Contents:</b>							
<b>Unit I</b>	<b>Water technology</b>						<b>9 Hours</b>
<b>Part A:</b> Impurities in water, hardness of water: Types, Units and Numerical. Determination of hardness (by EDTA method) and alkalinity, numerical. Boiler troubles - priming and foaming, boiler corrosion, caustic embrittlement, scale and sludge. Softening of water) Zeolite method and numerical ii) Demineralization method. Purification of water: Reverse osmosis and Electro dialysis. <b>Part B:</b> Polymers: Introduction, classification, Conducting Polymers: Synthesis reactions, properties, applications. Polymers Composites: Introduction, constitution, classification. Types: fibre, glass, reinforced Composites with applications.							
<b>Unit II</b>	<b>Electrochemistry</b>						<b>9 Hours</b>
<b>Part A:</b> Fundamentals of an electrochemical cell, EMF of cell, Principle, Instrumentation of reference and glass electrode -its application in the determination of pH of samples. Conductometry: Introduction, titrations of acid vs base pH metry: standardization of pH-meter, titration of weak acid versus strong base, Battery technology <b>Part B:</b> Nanomaterials: Introduction, properties and engineering applications of Quantum dot graphene and carbon nanotubes							



Unit III	Corrosion and preventive measures	9 Hours
Introduction, Types of corrosion, Differential metal and differential aeration (pitting and water line) Factors affecting the rate of corrosion, Corrosion control: Cathodic protection, sacrificial anode and impressed current methods, Metal coatings, Galvanization and tinning, Principles of electroplating. Electroplating of metal introduction and application		
Unit IV	Fuels and Combustion	9 Hours
Classification, Calorific value, characteristic of ideal fuel, Types, Determination by Bomb calorimeter, Analysis of Coal, Proximate and Ultimate analysis, Significance, Numericals, Biodiesel, Power alcohol preparation, properties and applications, Refining of crude oil, fractions uses and applications, Petroleum, cracking, Octane Rating of fuels, Preparation of hydrogen gas and Advantages of hydrogen as fuel		
Unit V	Instrumental techniques	9 Hours
Introduction, interaction of electromagnetic radiation with matter, electronic transitions, terms involved in UV-visible Spectroscopy, Instrumentation and basic principle of single beam spectrophotometer, applications of UV-visible spectroscopy. Introduction, Principle of IR Spectroscopy, types of vibrations, conditions of absorption of IR radiations, Instrumentation with block diagram. Parts of IR spectrum, applications of IR spectroscopy		
<b>Assignments:</b> Assignment on the completion of each unit (Four units)		
<b>References:</b> 1.Engineering Chemistry by S.S. Dara, S.Chand Publications (2010). 2.Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co.(2016). 3.Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi. O. G. Palanna 4.Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992. Jain P.C & Jain Monica. 5.Spectroscopy of Organic Compounds by P. S. Kalsi, New Age International (2007). 6.Polymer Science by V. R. Gowariker, New Age International Publication (2015). 7.Polymer Science and technology (2nd Edition), P. Ghosh, Tata McGRAW Hill, 2008. 8.Hydrogen as a fuel by Ram D. Gupta, C. R. C. Publication (2009) 9.Introduction to Nanotechnology by Charles P. Poole, Frank Owens, John Wiley & Sons (2003). 10.Instrumental Methods of Analysis by H. H. Willard, L. L. Merritt, J. A. Dean, F. A. Settle, 6 th Edition, CBS Publisher.		
<b>E content-</b> 1.NPTEL Course : <a href="https://onlinecourses.nptel.ac.in/">https://onlinecourses.nptel.ac.in/</a> 2.Executive diploma in Chemical technology <a href="https://www.igmpi.ac.in/post-graduate-diploma-in-chemicaltechnology.html?gad_source=1&amp;gclid=Cj0KCQjwqdqvBhCPARIsANrmZhMilsHK4dj63VNiR52z72D9mFKFptSneaQlp2qEk0uHYylMC5fnr_gaAsStEALw_wcB">https://www.igmpi.ac.in/post-graduate-diploma-in-chemicaltechnology.html?gad_source=1&amp;gclid=Cj0KCQjwqdqvBhCPARIsANrmZhMilsHK4dj63VNiR52z72D9mFKFptSneaQlp2qEk0uHYylMC5fnr_gaAsStEALw_wcB</a> 3.Virtual Lab <a href="https://chemcollective.org/vlabs">https://chemcollective.org/vlabs</a> , <a href="https://www.vlab.co.in/broad-area-chemical-sciences">https://www.vlab.co.in/broad-area-chemical-sciences</a>		

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First Year of Engineering Curriculum							
Course	Engineering Chemistry			Code	24UBSP104		
Credits	1	Pr	2 hrs.	Scheme	Th	PR	CAE
		Th				25	
List of Experiments: (Any 6)							
<ol style="list-style-type: none"><li>1. Determination of Hardness of water sample by EDTA method.</li><li>2. To determine alkalinity of water sample.</li><li>3. To determine dissociation constant and strength of weak acid by pH – metric Titration with base.</li><li>4. To measure the strength of mixture of acid by conductometric titration with base</li><li>5. To determine ECE of copper</li><li>6. To determine the Proximate analysis of coal</li><li>7. Verification of Beer-Lambert's Law. and estimation of the unknown concentration of the copper in the given solution by UV Vis spectrophotometer.</li><li>8. Determination of molecular weight and Viscosity of Liquids by Ostwald's Viscometer</li><li>9. Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin and its characterization</li><li>10. Preparation of nickel coating on copper metal using both methods, Electroplating &amp; Electro less plating.</li></ol>							

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Basic Electrical Engg			Code	24UBSL103		
Credits	3	PR		Scheme	Th	PR	CAE
		Th	3 hrs		10 (TAE) 50 (ESE)		15
<b>Prerequisite:</b> Basic Physics and Mathematics							
<b>Course Objectives:</b>							
Enable the student to acquire the knowledge in the following topics							
<ol style="list-style-type: none"> <li>1.To introduce fundamental knowledge of electrical quantities and energy conversion techniques.</li> <li>2.To impart the basics of magnetism, electromagnetic induction and transformer.</li> <li>3.To develop skills that can assist in the analysis of DC and AC electric circuits.</li> <li>4.To familiarize students with different wiring components and wiring schemes.</li> <li>5.To inculcate skills that aid to understand electricity bill and related calculations.</li> </ol>							
<b>Course Outcomes:</b>							
On the completion of the course, the students will be able to							
<b>CO1</b> Understand the elementary concepts, concept of work, power and energy.							
<b>CO2</b> Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.							
<b>CO3</b> Compare between magnetic circuits and electrical circuits.							
<b>CO4</b> Understand the fundamentals of AC.							
<b>CO5</b> Describe electric circuit and solving the networks							
<b>Unit-I</b>	<b>Elementary Concepts of Electricity:</b>						<b>9 Hours</b>
<b>Elementary concepts:</b> Resistance, EMF, current, potential, potential difference, and Ohm's law. Generalized block diagram of elementary power system showing stages such as Generation, Transmission, and Distribution of electrical energy. Effect of temperature on resistance, resistance temperature coefficient.							
<b>Work Power Energy:</b> Elementary concept of work-power-energy, calculations for energy consumption in household appliances, electric heater and motor-pump set.							
<b>Unit-II</b>	<b>DC Circuits</b>						<b>9 Hours</b>
Classification of electrical networks, Energy sources – ideal and practical voltage and current sources, Simplifications of networks using series and parallel combinations and star-delta conversions, Kirchhoff's laws and their applications for network solutions using loop analysis, Superposition theorem, Thevenin's theorem.							
<b>Unit-III</b>	<b>Electromagnetism and Single-Phase Transformer:</b>						<b>9 Hours</b>
<b>Electromagnetism:</b> Faraday Laws of Electromagnetic Induction, Fleming's rules, Lenz's law, types of EMF and numerical.							
<b>Transformer:</b> Principle, construction and working of single phase transformer, types (based on construction), EMF equation, losses, (Numerical related to EMF equation and Efficiency)							
<b>Unit-IV</b>	<b>AC Fundamentals</b>						<b>9 Hours</b>



Generation of single-phase sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, period, frequency, instantaneous, peak, average and RMS. values, peak factor and form factor. Phase, Phase difference, lagging, leading in phase quantities and their phasor representation. Rectangular and polar representation of phasor. Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance.

**Unit-V**

**AC Circuits**

**9 Hours**

**Single Phase AC Circuits:** Series R-L, R-C and R-L-C circuits, concept of impedance, power factor, phasor diagrams, Voltage, current and power waveforms. Concept of active, reactive, apparent and complex power. Resonance in RLC series circuits.

**Polyphase A.C. Circuits:** Concept of three-phase AC symmetrical system, phase sequence, balanced and unbalanced load. Voltage, current and power relations in three phase balanced star and delta connected loads along with phasor diagrams

**Reference books:**

1. C. L. Wadhwa, “Basic Electrical Engineering”, New Age International (P) Limited
2. E. Hughes, “Electrical and Electronics Technology”, Pearson
3. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill Education
4. T. K. Nagsarkar, M. S. Sukhija, “Basic Electrical Engineering”, Oxford University Press

**Text Books:**

1. B.L. Theraja, “A textbook on Electrical Technology, Vol-I”, S Chand Publications
2. V. K. Mehta, Rohit Mehta, “Basic Electrical Engineering”, S Chand Publications
3. J. B. Gupta, “A textbook of Electrical Engineering”, S. K. Kataria & Sons
4. S. K. Bhattacharya, “Electrical Machines”, McGraw Hill Education

**e-Content:**

1. **AC Circuits:** <http://nptel.ac.in/courses/115104088/36>
2. **Transformer:** <https://nptel.ac.in/courses/108105017/>

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Basic Electrical Engg			Code	24UBSP103		
Credits	1	PR	2 hrs.	Scheme	Th	PR	CAE
		Th				25 (INT)	
<b>List of Practical: (Any 6)</b>							
1. Wiring Exercise							
a) Study of various wiring components (wires, switches, fuses. sockets, plugs lamp holders etc Their uses and ratings.							
b) Control of two lamps from two switches (looping in system).							
c) Staircase wiring.							
d) Use of meggers for insulation test and continuity test of wiring installations and machines.							
2.To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, real life resistors, inductors and capacitors							
3. To derive resonance frequency and analyze resonance in series RLC circuit.							
4. To verify the relation between phase and line quantities in three phase balanced star delta connections of load.							
5. To determine efficiency and regulation of transformer by direct loading test of a single phase transformer.							
6. To verify KVL and Superposition theorem.							
7. To verify Thevenin's theorem in a DC network							
8. To demonstrate different types of electrical protection equipment's such as fuses, MCB, MCCB, ELCB.							
9. To measure of earth resistance at substation earthing using fall of potential method with IS 3043 standards.							
10. To study of LT and HT electricity bills.							

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Basic Electronics Engineering			Code	24UETL106		
Credits	3	PR		Scheme	Th	PR	CAE
		Th	3 hrs		10 (TAE) 50 (ESE)		15
<b>Prerequisite for the subject:</b> Knowledge of semiconductor physics and Ohm's law, KCL, KVL, etc.							
<b>Course Objectives:</b> 1.To impart basic knowledge for conceptual understanding of working of various active and passive elements. 2.To make students describe the basics of semiconductor devices. 3.To apply digital logic gates theory in forming digital circuits. 4.To introduce students to the basics of communication systems.							
<b>Course out comes:</b> On completion of the course, learner will be able to – <b>CO1</b> Understand the working and functionality of PN junction diodes, rectifiers & special purpose diodes <b>CO2</b> Discuss the transistor and MOSFET working with its characteristics <b>CO3</b> Apply the knowledge of different digital logic gates to implement digital circuits for application. <b>CO4</b> Describe the working and functionality of sensors for specific applications. <b>CO5</b> Explain basic principles and block diagrams of communication systems.							
Course Contents							
Unit- I	Diode Circuits						9 Hours
PN junction Diode, working and VI characteristics, Rectifiers circuits and performance parameters. Block diagram of linear regulated DC power supply. Zener diode, Zener voltage regulator, Light Emitting Diode, Photodiode along with their V-I characteristics. Seven segment display.							
Unit II	BJT and MOSFET Transistors						9 Hours
Bipolar Junction Transistor: Construction, types, Operation, V-I Characteristics, region of operations, BJT as switch, BJT CE amplifier. Metal Oxide Semiconductor Field Effect Transistors (MOSFET): Construction, Types, Operation, V-I characteristics, regions of operation, MOSFET applications							
Unit III	Digital Electronics and Number System.						9 Hours
Introduction to digital electronics. Analog and discrete signals and sampling theorem. Number System: - Decimal, Binary, Octal, Hexadecimal their conversion and arithmetic. Basic and universal gates, DE-Morgan's theorems. Adders, Flip Flops, MUX and Demux introduction.							
Unit IV	Sensors and Electronic Instrumentation.						9 Hours
Classification of a sensors, Active /Passive Sensors, Analog/Digital Sensors, Motion Sensor LVDT, Temperature Sensors (Thermocouple, Thermistor, RTD), Semiconductor GAS Sensors, Mechanical Sensor Strain Gauge, Agriculture and Biosensors with examples. Block diagram of Instrumentation system.							
Unit – V	Modern Communication Systems						9 Hours





Communication System and Mobile communication: Block Diagram, Communication Medium, IEEE frequency band for different applications, AM and FM Modulation. Mobile communication and GSM system.

**Text Books:**

- 1.“Electronics Devices” by Thomas. L. Floyd, 9th Edition, Pearson
- 2.“Modern Digital Electronics” by R.P. Jain, 4th Edition, TMH.
- 3.“Electronic Instrumentation” by H.S. Kalsi, 3rd Edition, TMH
- 4.“Sensors and Transducers” by D. Patrnabis, 2nd Edition, PHI
- 5.“Electronic Communication Systems” by Kennedy & Davis, 4<sup>th</sup> Edition, Tata McGraw Hill
- 6.“Power Electronics” by MD Singh, K B Khanchandani, 2<sup>nd</sup> edition, McGraw Hill

**Reference Books:**

- 1.“Digital Fundamentals” by Thomas. L. Floyd, 11th Edition, Pearson
- 2.“Mobile Communication” by J. Schiller, 2nd Edition, Pearson
- 3.David A.Bell,“Electronic Devices and Circuits”,5th Edition, Oxford press.
- 4.R. L. Boylestad, L. Nashlesky, “Electronic Devices and circuits Theory”, 9th Edition, Prentice Hall of India, 2006.

**E Contents:**

- 1.Fundamentals of semiconductor devices <https://nptel.ac.in/courses/108108122>
- 2.Analog Electronic Circuits <https://nptel.ac.in/courses/108106188>

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Basic Electronics Engineering			Code	24UETP106		
Credits	1	PR	2 hrs.	Scheme	Th	PR	CAE
		Th				25 INT	
List of experiments BXE (Any 8)							
1.Study of Active and Passive Electronic components 2.Use of Electronic Measuring Lab Instruments. 3.V-I characteristics of P-N Junction Diode and Zener Diode. 4.Bridge rectifier using diodes, effect of capacitor filter on rectifier output. 5.BJT CE amplifier and calculation of voltage gain and Bandwidth 6.Study of Autotransformer, its uses and measurement of voltage output. 7.Sensor application RPM Measurement using photo transistor sensor. 8.Test and verify the truth tables of Basic and Universal Gates, Half / Full Adder using digital gate ICs.							

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Engineering Graphics			Code	24UMEL111		
Credits	2	PR		Scheme	Th	PR	CAE
		Th	2		10 TAE		15
				Marks	25 ESE	-	
<b>Prerequisites:</b>							
1. Basic Geometry Constructions like division and bisection of geometrical entities, triangle, square, pentagon, hexagon, curved features 2. Using geometrical instruments 3. Use of basic mathematical operators and geometrical terms like, periphery, surfaces, tangents, normal, parallelism, planer, and co-planer, non-coplanar concepts							
<b>Course Objectives:</b>							
1. To introduce basic knowledge about engineering drawing language, line types, dimension methods, and simple geometrical construction. 2. To familiarize construction of conic sections by various methods, involutes, cycloid and spiral and development of lateral surfaces of solids. 3. To develop imagination of engineering objects and shall be able to draw its different Orthographic and Isometric views. 4. To construct simple engineering objects using CAD drafting software.							
<b>Course Outcomes:</b>							
On completion of the course, learner will be able to							
<b>CO1</b> Draw the fundamental engineering objects using basic rules and able to construct various engineering curves using the drawing instruments.							
<b>CO2</b> Apply the concept of orthographic projection of an object to draw several 2D views, its sectional views and Isometric views for visualizing the physical state of the object.							
<b>CO3</b> Construct the development of lateral surfaces for cut section of geometrical solids.							
<b>CO4</b> Design fully dimensioned 2D, 3D drawings using computer aided drafting (AutoCAD) tools.							
<b>Course Contents:</b>							
<b>Unit I</b>	<b>Drawing Basics and Curves</b>						<b>8 Hours</b>
Instruments, Basic Geometry constructions, Dimensioning, Lettering, Sheet Sizes, Scales, Line types, construction of polygon, drawing conventions, Conics by directrix focus method (Ellipse, Parabola and Hyperbola), Helix on Cylinder, cycloid, Involute, Spiral (for one convolution only).							
<b>Unit II</b>	<b>Orthographic Projection</b>						<b>10Hours</b>
<b>Projection Methods:</b> First angle method, Symbol, orthographic views, sectional views (Full sectional views only).							
<b>Unit III</b>	<b>Development of Surfaces</b>						<b>7 Hours</b>
Introduction to development of lateral surfaces and their industrial applications. Draw the development of lateral surfaces for cut section of cone, pyramid, prism etc.							
<b>Unit IV</b>	<b>AutoCAD Basics and Drafting</b>						<b>5 Hours</b>



Evolution of CAD, Importance of CAD, Basic Commands - Edit, View, Insert, Modify, Dimensioning Commands, setting and tools etc. and its applications to construct the 2D and 3D drawings

**Textbooks**

1. Bhatt, N. D. and Panchal, V. M., (2016), “Engineering Drawing”, Charter Publication, Anand, India
2. K. Venugopal, K, (2015), “Engineering and Graphics”, New Age International, New Delhi
3. Jolhe, D. A., (2015), “Engineering Drawing with introduction to AutoCAD”, Tata McGraw Hill, New Delhi
4. Rathnam, K., (2018), “A First Course in Engineering Drawing”, Springer Nature Singapore Pte. Ltd., Singapore

**Reference Books**

1. Madsen, D. P. and Madsen, D. A., (2016), “Engineering Drawing and design”, Delmar Publishers Inc., USA
2. Bhatt, N. D., (2018), “Machine Drawing”, Charter Publishing house, Anand, India
3. Dhawan, R. K., (2000), “A Textbook of Engineering Drawing”, S. Chand, New Delhi
4. Luzadder, W. J. and Duff, J. M., (1992)
5. The Fundamentals of Engineering Drawing: With an Introduction to Interactive Computer Graphics for Design and Production”, Peachpit Press, USA
5. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Loving, R. O., Dygon, J. T., (1990), Jensen, C., Helsel, J. D., Short, D. R., (2008), “Engineering Drawing and Design”, McGraw-Hill International, Singapore

**Assignments:**

Can be utilized to teach the basic commands of any drafting package, by using this knowledge students shall be able to complete the five assignments on the CAD software. (Minimum 2 problems in each assignment)

**Assignment 1:** Construct any Engineering Curve using any method

**Assignment 2:** Orthographic view of any machine element along with sectional view.

**Assignment 3:** Draw Isometric view for given orthographic views.

**Assignment 4:** Draw the development of lateral surface of a solid/ truncated solid.

**Assignment 5:** Draw the isometric or Orthographic view using AutoCAD

**E-content Links:**

**Coursera Links:**

1. AutoCAD for Design and Drafting Exam <https://www.coursera.org/learn/autodesk-autocad-design-drafting>
2. 3D CAD Fundamental <https://www.coursera.org/learn/3d-cad-fundamental>
3. Autodesk CAD/CAM/CAE <https://www.coursera.org/specializations/autodesk-cad-cam-cae-mechanical-engineering>
3. CAD and Digital Manufacturing <https://www.coursera.org/specializations/cad-design-digital-manufacturing>

**Journal Articles:**

1. <http://www.cimt.org.uk/journal/sinanolkun.pdf>
2. <https://www.sciencedirect.com/science/article/abs/pii/S0734189X90901118>
3. <https://www.jstor.org/stable/pdf/jeductechsoci.9.3.149.pdf?seq=1>



4. <https://www.jstor.org/stable/3106007?seq=1>

5. <https://www.tandfonline.com/doi/abs/10.1080/22054952.2010.11464037>

**E-books:**

<https://www.sdcpublications.com/Textbooks/Engineering-Graphics-Essentials-Fifth-Edition/ISBN/978-1-63057-052-1/>

<https://www.pearson.com/store/en-us/pearsonplus/p/9780138187521.html>

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Basic Civil and Engg. Mechanics			Code	24UBSL112		
Credits	2	PR		Scheme	Th	PR	CAE
		Th	2 hrs		TAE 10 ESE 25	-	15
<b>Prerequisites:</b> Basic Mathematics, geography, environmental studies, Basic principles of trigonometry, geometry, algebra, Linear differentiation and integration, principles of Physics (equations of motions)							
<b>Course Objectives</b> 1.To provide knowledge of basic areas in Civil Engineering and build conceptual knowledge of various materials used for construction and building components. 2.To impart knowledge about force systems and methods to determine equilibrium of forces & friction 3.To impart knowledge to determine reaction of beams, calculate member forces in trusses, cables and frames using principles of equilibrium & space force system 4.To train students to solve problems related to particle mechanics using principles of kinematics, kinetics and work power energy							
<b>Course Outcomes</b> On completion of the course, learner will be able to: <b>CO1</b> To Understand demand and future in civil engineering <b>CO2</b> Determine resultant of various force systems & Determine reactions of beams, calculate forces in cables using principles of equilibrium & Analyse Space force system <b>CO3</b> Solve trusses, frames for finding member forces and solve problems related to friction <b>CO4</b> Calculate position, velocity and acceleration of particle using principles of Kinetics and Kinematics							
<b>Course Contents:</b>							
Unit I	<b>Introduction to Civil Engineering and Materials and Components of Buildings</b>						10 Hours
<b>Introduction to Civil Engineering and Materials and Components of Buildings:</b> Introduction to basic areas of civil engineering: surveying and planning, structural engineering, hydraulics and water resources engineering, geotechnical and foundation engineering, environmental engineering, transportation engineering, construction technology and management. Use of basic and advanced materials: Cement, concrete (PCC, RCC), pre-stressed and pre-cast concretes, bricks, stone, sand, reinforcing steel, smart and eco-friendly materials (recycled C&D waste) b. Substructure- Concept of bearing capacity of soil and settlement, foundation, functions of foundation, types of shallow foundation and introduction to pile foundation. <b>Resultants and Equilibrium Equations:</b> Basic Concepts and Fundamental Laws, System of Forces, Resolution and Composition of Forces, Resultant of 'Concurrent forces, Parallel forces & Coplanar forces', Moment of force about a point, Couples, Varignon's Theorem. Distributed Forces in a plane, Space Forces							
Unit II	<b>Equilibrium Forces, Analysis of Structures &amp; Friction</b> <b>Equilibrium of Forces</b>						10 Hours



<p>Free Body Diagram, Equilibrium of Forces, Lami's Theorem, type of loads, types of supports, equilibrium of general force system, Analysis of Simple beams and Compound Beam.</p> <p><b>Analysis of Structures</b> Analysis of plane trusses by method of joint &amp; section, Cables with supports at same level subjected to point loads.</p> <p><b>Friction</b> Laws of friction, Friction on inclined surfaces, Wedges, Ladder and belt/rope.</p>		
<b>Unit III</b>	<b>Kinematics &amp; Kinetics of Particle</b>	10 Hours
<p>Kinetics of linear motion, Newton's Laws, motion curves, D'Alembert's Principle, Work- Energy Principle, Impulse Momentum Principal, Projectile motion</p> <p><b>Impact and Collision</b> Impact, Types of Impact, Law of conservation of Momentum, Coefficient of Restitution, Numerical on Direct Central Impact</p>		
<p><b>Text Books</b></p> <ol style="list-style-type: none"><li>1.G K Hiraskar, Basic Civil Engineering, DanpatRai Publication, Edition 2004.</li><li>2.Basic Civil Engineering by S .S. Bhavikatti, New Age publications, 2020.</li><li>3.Engineering Mechanics – Bhavikatti ,Newage Publications, 8th Edition, (2017)</li><li>4.Engineering Mechanics,S.Ramamurtham,Dhanpat Rai Publication (2016)</li><li>5.Strength of Materials by S. Ramamurtham and R.Narayanan, Dhanpat Rai Publication (2008)</li></ol>		
<p><b>Reference Books</b></p> <ol style="list-style-type: none"><li>1.Surveying- N.N. Basak, Edition 2014 Tata Mc-Graw Hill</li><li>2.Building Construction and Drawing- Bindra and Arora, Edition 2012, DhanapatRai Publications.</li><li>3.Building Construction and Drawing- Sushil Kumar, Edition 2010, Standard Publications, Delhi.</li><li>4.A K Tayal, "Engineering Mechanics (Statics and Dynamics)", Umesh Publications.</li><li>5.D S Kumar, "Engineering Mechanics (Statics and Dynamics)", Kataria sons.</li><li>6.U.C. Jindal, "Applied Mechanics and Strength of Materials", Galgotia Publications.</li></ol>		
<p><b>Term Work/Assignments:</b></p> <p><b>A) Assignments</b> - Minimum five numerical examples from each unit given by concerned teacher.</p> <p><b>B) Exercise</b>-At least two examples on each part of the units should be solved during classes for practice under the guidance of the concerned teacher.</p> <p><b>Note:</b> Examples in Exercise and Assignment should be unsolved problems from text and reference books prescribed in the syllabus.</p>		
<p><b>E – content links</b> <b>Nptel:</b> <a href="https://onlinecourses.nptel.ac.in/noc19_me41/preview">https://onlinecourses.nptel.ac.in/noc19_me41/preview</a></p>		
<p><b>Course links</b> <a href="https://www.sciencedirect.com/science/article/pii/S1018363914000464">https://www.sciencedirect.com/science/article/pii/S1018363914000464</a> <a href="https://www.sciencedirect.com/journal/computer-methods-in-applied-mechanics-and-engineering">https://www.sciencedirect.com/journal/computer-methods-in-applied-mechanics-and-engineering</a></p>		
<p><b>Journal links</b> <a href="https://www.asce.org/publications-and-news/civil-engineering-source/civil-engineering-magazine">https://www.asce.org/publications-and-news/civil-engineering-source/civil-engineering-magazine</a> <a href="https://ascelibrary.org/jenmdt/machine-learning-enabled-modeling-discovery">https://ascelibrary.org/jenmdt/machine-learning-enabled-modeling-discovery</a></p>		
<p><b>E – sources</b></p>		



<http://nptel.ac.in/courses/112103108>

<https://www.coursera.org/learn/engineering-mechanics-statics>

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Fundamental Programming-I			Code	24UCEL107		
Credits	2	PR		Scheme	Th	PR	CAE
		Th	2		10 TAE 25 ESE		15
<b>Prerequisite:</b> Basic knowledge of mathematics							
<b>Course Objectives:</b> 1.To introduce fundamentals of problem solving and programming concepts using the C language 2.To familiarize students with the syntax, semantics, and features of the C programming language. 3.To develop experience in writing, compiling, debugging, and executing C programs for problem solving and decision making. 4.To enable students to design and implement algorithms using C programming constructs using pointers and file handling.							
<b>Course outcomes:</b> Upon completion of the course, students will be able to <b>CO1</b> Understand problem solving techniques and basic programming concepts using C language <b>CO2</b> Apply their knowledge to write syntactically correct C programs and design efficient algorithms. <b>CO3</b> Analyze real-world problems and develop critical thinking skills through programming exercises. <b>CO4</b> Demonstrate programming competency in using pointers and file handling in C Language.							
<b>Unit I</b>	<b>Introduction to Algorithm and 'C' Language</b>						<b>7 Hours</b>
Introduction to Problem solving- Problem solving process- Basics of Algorithm and flowchart: Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudo-code with examples. Introduction to 'C' Language: Importance of 'C' Language, Sample 'C' Program, Structure of 'C' Program, Constants, variables and data types. Operators and expressions – I/O statements - Managing input/output operations.							
<b>Unit II</b>	<b>Control Structures and Functions</b>						<b>7 Hours</b>
Decision making and branching(if, if-else, switch case) , Decision making and looping(while,do-while, for), Unconditional control statement. Basics of function, definition, declaration and calling of function, Function prototype, Method of parameter passing- call by value, Recursion.							
<b>Unit III</b>	<b>Arrays and Pointers</b>						<b>8 Hours</b>
Array: Basics of Array, Array declaration and initialization, Types of arrays: One and Two-dimensional arrays, Character arrays, String, Passing array to function. Pointer Pointer: Fundamentals, Pointer declaration, Operations on pointer, Pointer to an array, Method of parameter passing- call by reference.							
<b>Unit IV</b>	<b>Structures, Union and Enumeration</b>						<b>8 Hours</b>





Structures: Need of Structure, Structure declaration and initialization, typedef, Array of structure variable, Pointer to structure, Methods of passing structure to function, Nested structure.  
Union: Need of union, union declaration and initialization  
Enumeration: Need of Enumeration, Enumeration declaration and initialization

**Text Books:**

1. Yashavant P. Kanetkar, Let us C, BpB publications
2. Yashavant P. Kanetkar, Understanding Pointers in C, BpB publications
3. K. Balaguruswamy, Programming in ANSI C, TGMH Publication.
4. A. M Padma Reddy, C Programming Techniques Sri Nandi Publication

**Reference Books:**

1. B.W. Kernighan, D. M. Ritchie, The 'C' Programming Language, Pearson Education.
2. Greg Perry, C Programming Absolute Beginner's guide, Que Publishing
3. Mike McGarth, C Programming in easy steps, In easy steps Ltd.
4. Herbert Schildt, The Complete Reference, McGraw Hill Education

**E-content:**

1. <https://www.coursera.org/specializations/c-programming>
2. <https://karadev.net/uroci/filespdf/files/Programming-in-ANSI-C.pdf>
3. <https://www.coursera.org/learn/c-for-everyone>
4. <https://www.coursera.org/learn/programming-c>

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Fundamental Programming-I			Code	224UCEP107		
Credits	1	PR	2 hrs.	Scheme	Th	PR	CAE
		Th				25 INT	
<b>List of Assignments/Practical's (Any 8)</b>							
<ol style="list-style-type: none"><li>1. Write a program to read the values of a, b, c and display value of x where <math>x=a/b-c</math>.</li><li>2. Write a program to check entered number is positive, negative or zero</li><li>3. Write a program to accept student's five subjects marks and compute his/her result. Student clears the exam, if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is <math>60 \geq</math> and <math>&lt;75</math> then the grade is first division. If aggregate is <math>50 \geq</math> and <math>&lt;60</math>, then the grade is second division. If aggregate is <math>40 \geq</math> and <math>&lt;50</math>, then the grade is third division.</li><li>4. Implement a simple calculator program that performs addition, subtraction, multiplication, and division using functions and switch-case.</li><li>5. Write a C program to find the factorial of a given number using recursion.</li><li>6. Implement a program to find the Fibonacci series up to a specified limit.</li><li>7. Write a program that reads a 5x5 array integer and prints the row and column sum.</li><li>8. Write a program to find the sum of two matrices.</li><li>9. Write a program that accepts a string from the user and counts the number of vowels and consonants in it.</li><li>10. Write a program to check whether the given string is palindrome or not</li><li>11. Write a program in C to show the various pointer operations.</li><li>12. Write a program in C to swap numbers using call by reference (use pointer to function).</li><li>13. Write a program to store information of employee using structure (compile time initialization)</li><li>14. Create a program that manages the storage and retrieval of different types of data (integer, float, or character) using a union based on user input. The program should allow the user to choose the type of data to store and then input and display the stored value accordingly.</li><li>15. Create a program that uses an enumeration to represent days of the week. Implement functions to print the name of a day based on its numerical value and to determine if a given day is a weekday or a weekend day.</li></ol>							

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Fundamental Programming-II			Code	24UCEL107,24UCEP107		
Credits	3	PR	2 hrs.	Scheme	Th	PR	CAE
		Th	2		10 (In) 25 (End)		15
<b>Prerequisite:</b> Basic Programming Skills							
<b>Course objectives:</b> The course should enable the students to: 1.To introduce students with foundational Python coding 2.To Implement program using loops, decision statements and functions in Python. 3.To make them understand the use of files, error handling and exceptions 4.To create awareness on python libraries such as numpy, pandas, matplotlib and							
Course Outcomes: Upon completion of the course, students will be able to CO1 Understand Python's data structures and write simple Python programs CO2 Decompose a Python program into functions, modules and packages CO3 Apply file operations, error and exception handling in Python applications. CO4 Create python applications using numpy, pandas and visualization libraries							
<b>Course Content:</b>							
<b>Unit I</b>	<b>Introduction to Python fundamentals:</b>						8 Hours
Introduction to Python , – Role of Python in AI and Data Science – Python Installation – Working Python IDLE Python syntax, Python comments, Identifiers-Numbers-Variables, Python data types and data structure, Python numbers, Python casting, Python Operators, Building python blocks-Python statements							
<b>Unit II</b>	<b>Python Decision-Control Statements, Functions, Modules and Packages</b>						8 Hours
Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements, Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, break, continue, pass, else statement used with loops. Python methods - Built in functions – user defined function building blocks – Lambda expressions – Map and Filter functions – Function scope and its types – *args and **kwargs -creating modules-built in modules – name spaces – user defined modules and packages							
<b>Unit III</b>	<b>Files and Exception Handling</b>						5 Hours
Basic file handling operations-read ,write, read lines, write lines and seek operations-accessing excel, csv and text files.  Standard errors – Exception handling- Try-except-Finally-else-Block – Multiple exceptions -Type of Error codes.							
<b>Unit IV</b>	<b>Data Analysis and Visualisation</b>						9 Hours



Topic: NumPy: Introduction to NumPy arrays – creation, attributes and indexing. array mathematical operations- array manipulations -shaping-stacking and splitting– Built-in methods - array transposition – universal arrays – Broad casting

Pandas : Basics – Series – Data Frame structure – attributes - Index – Re index- Drop entry- select entry- data alignment, rand and sort – summary statistics -Group by operations.

Creating effective data visualizations-Identification of Plots – Data Visualization in Data Frames- Built in libraries – Matplotlib and Seaborn

**Textbooks: -**

- 1.Data Science and Machine Learning using Python by Dr Reema Thareja.  
Publisher: McGraw Hill , ISBN: 9789355322142 Edition: 1, 2022
- 2.Python for Data Science for Dummies, 2ed Paperback – 1 January 2019  
by Luca Massaron and John Paul Mueller , Wiley Publication , ISBN: 8126524936
- 3.Charles Dierbach, "Introduction to Computer Science Using Python

**Reference Books:**

- 1."Programming and Problem Solving with Python" by Amit Ashok Kamthane ,Ashok Namdev Kamthane 2nd Editoin Publisher: McGraw Hill ISBN: 978939011306, 939011302
- 2.Practical Python Projects by Yasoob Khalid
- 3.Practical python programming – Emenwa global

**MooC:**

The joy of computing using python -NPTEL / SWAYAM course by Sudarshan Iyengar, IIT ROPAR

**E-content:**

- 1.<https://www.coursera.org/learn/introducton-r-programming-data-science>
- 2.<https://www.coursera.org/learn/machine-learning-with-python>
- 3.<https://www.coursera.org/learn/python-crash-course>
- 4.<https://www.coursera.org/learn/get-started-with-python>
- 5.<https://www.coursera.org/learn/r-programming>

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Fundamental Programming-II			Code	224UCEP107		
Credits	1	PR	2 hrs	Scheme	Th	PR	CAE
		Th				25	

**List of practical's:**

**1. List Exercises**

- Create a list of your favorite movies and print the third movie in the list.
- Add a new movie to the list and print the updated list.
- Remove the second movie from the list and print the updated list.
- Sort the list in alphabetical order and print the sorted list.
- Create a new list that contains only the first and last movie in the original list and print it.

**2. Tuple Exercises:**

- Create a tuple of your favorite foods and print the second food in the tuple.
- Try to change the second food in the tuple and see what happens.
- Create a new tuple that contains only the first and last foods in the original tuple and print it.
- Use the **len()** function to find the number of foods in the tuple and print it.
- Convert the tuple to a list and print the list.

**3. Set Exercises:**

- Create a set of your favorite colors and print it.
- Add a new color to the set and print the updated set.
- Remove a color from the set and print the updated set.
- Create a new set that contains only the colors that start with the letter "B" and print it.
- Use the **len()** function to find the number of colors in the set and print it.

**4. Dictionary Exercises:**

- Create a dictionary of your favorite books and their authors and print it.
  - Add a new book to the dictionary and print the updated dictionary.
  - Remove a book from the dictionary and print the updated dictionary.
  - Use the **keys()** method to print a list of the book titles in the dictionary.
  - Use the **values()** method to print a list of the author names in the dictionary.
5. Write a program to read number from user and check its even or odd
  6. Program to Find the GCD of Two Positive Numbers
  7. Program to read year from user and Check If a Given Year Is a Leap Year or not
  8. Write Python Program to Find the Sum of Digits in a Number
  9. Write a program that prints the first 10 multiples of 3.
  10. Write a program that asks the user to enter a number and then prints all the even numbers from 0 to that number.
  11. Write a program to read percentage from user and print Grade



percentage	Grade
percentage >=80	O
percentage >=75	A+
percentage >=70	A
percentage >=65	B+
percentage >=60	B
percentage >=55	Pass

12. Write a lambda function that takes two arguments and returns their sum.
13. 18. Write a function called product that accepts any number of arguments and returns their product.
14. 19. Write a function called print\_info that accepts any number of keyword arguments and prints them.
15. 20. Write a program to compute compound interest using **keyword arguments**
16. 21. Write a Python function to Implement Stack Operations using \*args
17. 22. Write a Python function to print the age of a person for a given date of birth using \*\*kwargs
18. Write a Python Program to Add two lists using **map** function.
19. Create a Python module named math\_operations.py that contains functions for basic mathematical operations (addition, subtraction, multiplication, division).
20. Create a package named library and implement few functions of library in python.
21. Write a Python Program to Read the Contents of a text File and display the following information.  
Total number of characters, digits, special symbols, words, spaces and lines.
22. Path of the current file. Write a python program to copy contents of one file to other. While copying a) all full stops are to be replaced with commas b) lower case are to be replaced with upper case c) upper case are to be replaced with lower case.
23. Write a Program to illustrate following numpy array attributes.ndarray.ndim  
ndarray.shape  
ndarray.size  
ndarray.dtype  
ndarray.itemsize  
ndarray.data
24. Write a Program to Basic Arithmetic Operations on NumPy Arrays.
25. Write a Program to demonstrative NumPy Arrays Creation Functions:  
np.zeros() Creates an array of zeros  
np.ones() Creates an array of ones  
np.empty() reates an empty array  
np.full() Creates a full array  
np.eye() Creates an identity matrix  
np.random. random() Creates an array with random values
26. Use Automobile Dataset (Automobile\_data.csv) and perform following operations for data analysis. This Dataset has different characteristics of an auto such as body-style, wheel-base,engine-type, price, mileage, horsepower, etc.



- From the given dataset print the first and last five rows
- Find the most expensive car company name
- Print All Toyota Cars details
- Count total cars per company
- Find each company's Highest price car
- Find the average mileage of each car making company

#### 27. Scatter Plot Analysis

- Load a dataset containing students' scores in two subjects.
- Create a scatter plot using Matplotlib to visualize the relationship between the scores.
- Add labels and a title to the plot, and analyze if there's any correlation between the scores.

#### 28. Bar Plot Visualization

- Load a dataset containing sales data for different products.
- Use Seaborn to create a bar plot showing the total sales for each product category.
- Customize the plot with appropriate labels and colors, and interpret the results.

#### 29. Histogram Analysis

- Load a dataset containing ages of individuals.
- Use Matplotlib to create a histogram showing the distribution of ages.
- Adjust the bin size and labels, and analyze the age distribution in the dataset.

#### 30. Create a heat map for flight passenger data using Seaborn

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Mechanical Technology			Code	24UMEP109		
Credits	1	PR	2 hrs.	Scheme	Th	PR	CAE
					-	25	-
<b>Pre-requisites:</b> Laws of physics and forces, basics of materials and composition, awareness about handling equipment's carefully							
<b>Objectives:</b> 1.To train students for hands-on practices on mechanical assemblies. 2.To train students for hands-on practices on mechanical processes. 3.To understand the specifications & maintenance of household devices.							
<b>Course Outcomes:</b> After completing this course student will be able to <b>CO1</b> Describe and compare energy conversion devices. <b>CO2</b> List down the types of road vehicles and their specifications <b>CO3</b> Illustrate various basic parts and transmission system of a road vehicle <b>CO4</b> Discuss several manufacturing processes and identify a suitable process. <b>CO5</b> Able to explain various types of mechanism and its applications.							
<b>Contents: (Any 4)</b>							
1.Demonstration of 2S and 4S petrol / diesel engines. 2.Demonstration of Linkages, Mechanisms. 3.Demonstration of Refrigerator and Air conditioner. 4.Washing machine gearbox maintenance. 5.Demonstration of couplings, keys. 6.Hands on door closure, door lock unit. 7.Demonstration of rope and belt drives, chain and Sprocket. 8.Demonstration of Brake drum and clutch. 9.Demonstration of gears and bearings. 10.Steam Generator (Package Type Boiler)							
<b>Books &amp; Other Resources Textbooks</b> 1.Nag, P. K., "Engineering Thermodynamics," Tata McGraw-Hill Publisher Co. Ltd. 2.Chaudhari and Hajra, "Elements of Workshop Technology", Volume I and II, Media Promoters and Publishers, Mumbai 3.Agrawal, Basant and Agrawal, C. M., (2008), "Basics of Mechanical Engineering", John Wiley and Sons, USA 4.Rajput, R.K., (2007), "Basic Mechanical Engineering", Laxmi Publications Pvt. Ltd. 5.Pravin Kumar, (2018), "Basic Mechanical Engineering, 2nd Ed.", Pearson (India) Ltd. 6.Moran, M. J., Shapiro, H. N., Boettner, D. D., and Bailey, M. "Fundamentals of Engineering Thermodynamics", Wiley 7.Surinder Kumar, (2011), "Basic of Mechanical Engineering", Ane Books Pvt. Ltd. New Delhi 8.Hazra and Chaudhary, Workshop Technology-I & II, Media promoters & Publisher Pvt. Ltd.							





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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Workshop Technology			Code	24UMEP110		
Credits	1	PR	2 hrs.	Scheme	Th	PR	CAE
					-	25	-
<b>Prerequisites:</b> Basic abilities of handling machines and electrical equipment, awareness of safety procedures.							
<b>Objectives:</b> 1.To understand the construction and working of machine tools and functions of its parts. 2.To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shops leading to understanding of a production process. 3. To understand workshop layout and safety norms							
<b>Course Outcomes:</b> <b>CO1</b> Familiar with safety norms to prevent any mishap in workshop. <b>CO2</b> Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job. <b>CO3</b> Able to understand the construction, working and functions of machine tools and their parts. <b>CO4</b> Able to know simple operations (Turning and Facing) on a center lathe.							
<b>Contents:</b>							
Students must perform (Any 8) jobs /hands-on sessions out of the following list 1.Demonstration of Lathe operation (Turning, Threading, Knurling, Drilling, Facing) 2.Plumbing / Fitting 3.Demonstration of Milling operation 4.Demonstration of Drilling operations 5.Welding, soldering and brazing 6.Carpentry / pattern making 7.Casting, Mould preparations 8.Sheet Metal operations 9.Injection Moulding 10.Fire and Floor Safety precautions							
<b>Reference/Textbooks:</b> 1.John, K. C., (2010), “Mechanical Workshop Practice, Prentice Hall Publication, New Delhi 2.Hazra and Chaudhary, Workshop Technology-I & II, Media promoters & Publisher Pvt. Ltd.							
<b>Guidelines for Instructor’s Manual Instructor manual shall contain:</b> 1.The production drawing of a job with all linear and geometric dimensions, Raw material, size and shape, allowances provided. 2.List of tooling required. 3.Process plan to complete the job. 4.General safety instructions.							
<b>Guidelines for Student’s Lab Journal</b> Student must maintain a workshop diary consisting of drawing / sketches of the jobs and a brief description of tools, equipment, and procedure used for doing the job and time schedule. b.Student must maintain one file for write ups based on demonstration of machine tools and safety norms							



**Guidelines for LAB/TW Assessment**

Term work assessment shall be based on the timely completion of jobs, quality of job, skill acquired, and maintain of workshop diary and brief write-ups on illustrations/sketches of demonstrated parts/mechanisms/machine tools etc.

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Indira College of Engineering and Management (An autonomous Institute)								
First Year of Engineering Curriculum								
Course	Multivariate calculus			Code	24UBSL202			
Credits	4	Pr /Tut	1	Scheme	Th	Pr/Tut	Tw/CAE	
		Th	3		10 (TAE) 50 (ESE)	25	15	
<b>Prerequisites:</b> Basic Mathematics								
<b>Course Objectives:</b>								
1.To make the students familiarize with Mathematical Modelling of physical systems using differential equations advanced techniques of integration,								
2.To explain tracing of curve, multiple integrals and their applications.								
3.To Learn the use of Fourier series to represent periodical physical phenomena in engineering analysis.								
<b>Course Outcomes:</b> At the end of course, the students will be able								
<b>CO1</b> To understand the first order differential equations that model physical processes such as Newton’s law of cooling, electrical circuit, rectilinear motion, etc.								
<b>CO2</b> To predict multiple integrals by using Reduction formulae, Beta & Gamma functions, multiple integrals and its application.								
<b>CO3</b> To illustrate curve tracing for a given equation and measure arc length of various curves.								
<b>CO4</b> To inspect the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.								
Content								
Unit I	<b>Differential Equation</b>						9 Hours	
Exact differential equation, Non-Exact differential equation, linear differential equation and reducible form of linear differential equations, Application of differential equation.								
Unit II	<b>Integral Calculus I</b>							
Reduction formula, beta function, gamma function, relation between beta function & gamma function. Differentiation under integral sign (DUIS RULE)								
Unit III	<b>Curve Tracing:</b>						9 Hours	
Unit IV	<b>Integral Calculus II</b>						9 Hours	
Double integration, Evaluation of double integration, change of order of integration, change of variables in double integral by Jacobians, change of variables from Cartesian to polar coordinates. Triple integration, evaluation of triple integration.								
Unit V	<b>Fourier Series</b>						9 Hours	
Introduction of Fourier series, some Basic formulae, even function & odd function, full range Fourier series, Half Range Fourier series.								



**Textbooks:**

1. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
2. Higher Engineering Mathematics by B. V. Ramana (Tata McGraw Hill).

**Reference Books:**

1. Applied Mathematics (Vol. I & Vol. II) by P.N.Wartikar and J.N.Wartikar Vidyarthi Griha Prakashan, Pune.
2. Thomas' Calculus by George B. Thomas, (Addison-Wesley, Pearson).
3. Differential Equations by S. L. Ross (John Wiley and Sons)

**Tutorial Session:** (Minimum 10 problems in each assignment) .

Assignment 1: Problems on Differential Equation.

Assignment 2: Problems on Integral Calculus I.

Assignment 3: Problems on Curve Tracing.

Assignment 4: Problems on Integral Calculus II

Assignment 5: Problems on Fourier Series

**E Contents:**

**1.Differential Equation:** ( <https://youtu.be/NBcGLLU90fM> )

**2.Integral Calculus:** ( <https://youtu.be/1ipcBkRRXbg?si=PrASKzmkEGHqVd-f> )  
( [https://youtu.be/w\\_KiHgultbM?si=rtUQ79i8dh90J4CH](https://youtu.be/w_KiHgultbM?si=rtUQ79i8dh90J4CH) )

**3.Solid Geometry:** ( <https://youtu.be/zwtAWNWrEZY?si=Ew1iFHcQzGYDhd77> )

**4.Curve Tracing:** ( <https://youtu.be/ixDGaEqWuA0?si=FJSetlAltLJCGTX-> )

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Indira College of Engineering and Management (An autonomous Institute)							
First Year of Engineering Curriculum							
Course	Vedic Mathematics			Code			
Credits	1	PR	2 hrs.	Scheme	Th	PR	Tw/CAE



					-	-	25
<b>Course Objectives:</b>							
1.Foster the love for mathematics by creating a positive attitude through Vedic and ancient Indian Mathematics							
2.Help students appreciate ancient Indian Mathematics and its contribution to the world.							
3.Enhance computational proficiency by involving procedures in Linear Algebra							
4.Improve geometrical thinking by understanding the basic tenets of geometry such as construction of line segments, angles, triangles and circles as used in Ancient India							
5.Develop conceptual knowledge of mathematical concepts							
6.Appreciate the need of conceptual knowledge over procedural processes							
<b>Course Outcomes:</b>							
CO1 Able to think critically							
CO2 Find mathematical solution of algebraic expressions							
CO3 Solve system of linear equations faster and with ease.							
CO4 Appreciate the Mathematical advancements of Ancient India.							
<b>Contents:</b>							
<b>Unit I</b>	<b>Basic in Vedic Mathematics</b>						
Addition, Subtraction, Multiplication, Fractional Arithmetic, Algebraic Techniques							
<b>Unit II</b>	<b>Easy Solution of linear equations</b>						
Introduction of simple equation, Solutions of simple equations , Solutions of linear equations in two variables , Practical application of linear equations in two variables							
<b>Unit III</b>	<b>Vedic Geometry</b>						
Different forms of straight lines, The Triangle, The Cyclic Quadrilateral, Squares, and the Circle, Geometrical constructions, Transformation of simple shapes.							
<b>List of Books:</b>							
1."Vedic Mathematics" by Jagadguru Swami Sri Bharati Krsna Tirthaji Maharaja -							
2."The Cosmic Calculator Course: Vedic Mathematics Demystified" by Kenneth Williams -							
3."Vedic Mathematics for All Ages: A Beginners' Guide" by Bharti Krsna Tirthaji, Michael M. Williams -							
4."The Complete Idiot's Guide to Vedic Mathematics" by Kenneth Williams							
5."Vedic Mathematics Made Easy" by Dhaval Bathia							
6."Speed Mathematics Using the Vedic System" by Vali Nasser							
7."Vedic Mathematics: The Ancient Art of Superfast Calculations" by Rajesh Kumar Thakur							
8."The Power of Vedic Maths" by Atul Gupta -							
9."Vedic Mathematics Secrets: Fun Applications of Vedic Math In Your Everyday Life!" by William Q.							
10."Vedic Geometry Course", S. K. Kapoor, Lotus Press							



**INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT (An autonomous Institute)**

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Department of Basic Engineering Science

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