

Discipline: Math & Sc	Semester: 1 <sup>ST</sup>	Name of the teaching faculty: Satya Narayan Tripathy (Lect. In Physics)
Subject: Engg. Physics (Th.2a)	No. of days/week class allotted: 04	Semester from date: 25.10.2021 To date: 14/2/2022 No. of weeks: 15
Subject Course Outcomes		CO 1: Identify physical quantities & represent them as scalars & vectors to solve related problems.
		CO 2: Understand concepts of rest, motion & projectile motion & hence solve related problems.
		CO 3: Define work, Friction & solve related problems
		CO 4: Define & use the concepts of gravitation, wave motion, heat & optics to solve real life problems
		CO 5: Explain the concepts of electrostatics, magneto statics, current & magnetism in the context of engineering.
		CO 6: Understand LASER & its Applications.
Week	Class Day	Theory Topics
1 <sup>st</sup>	1 <sup>st</sup>	Unit-1: UNITS & DIMENSIONS <b>Physical quantities, Units, types of units and system of units</b>
	2 <sup>nd</sup> & 3 <sup>rd</sup>	Unit-1: UNITS & DIMENSIONS <b>Dimension and dimensional formulae of physical quantities Principle of homogeneity and application of dimensional analysis: Checking the correctness of physical relations and Examples</b>
	4 <sup>th</sup>	Unit-2: SCALARS AND VECTORS <b>Concept of scalar and vector quantities with definition, types of vectors, Rules of vector addition: Statements of Triangle law of vector addition</b>
2 <sup>nd</sup>	1 <sup>st</sup>	Unit-2: SCALARS AND VECTORS <b>Parallelogram law of vector addition and simple numericals, Concept on Resolution of vectors with simple numerical on Horizontal and vertical components</b>
	2 <sup>nd</sup>	Unit-2: SCALARS AND VECTORS <b>Vector multiplication: Dot product and Cross Product with simple numericals on dot and cross products</b>
	3 <sup>rd</sup> & 4 <sup>th</sup>	Unit-3: KINEMATICS <b>Concept of Rest and Motion with examples, Fundamental ideas on distance, displacement, speed, velocity, acceleration and force, equations of motion under gravity both for upward and downward motion</b>
3 <sup>rd</sup>	1 <sup>st</sup>	Unit-3: KINEMATICS <b>Circular motion: Conceptual idea on circular motion and terms related to circular motion such as angular displacement, angular velocity and angular acceleration.</b>
	2 <sup>nd</sup>	Unit-3: KINEMATICS <b>Derivations of Relation between- (i) Linear &amp; angular velocity, (ii) Linear &amp; Angular acceleration</b>
	3 <sup>rd</sup> & 4 <sup>th</sup>	Unit-3: KINEMATICS <b>Projectile motion: Definition and examples, Expression for equation of Trajectory, Time of Flight, Maximum Height and Horizontal Range for a projectile fired at an angel, condition for maximum horizontal range with simple numericals</b>
	1 <sup>st</sup>	Unit-4: WORK AND FRICTION <b>Definition of work, its formula and SI unit with simple numericals</b>

4 <sup>th</sup>	2 <sup>nd</sup>	Unit-4: WORK AND FRICTION Concept of friction with definition and simple examples, Types of friction
	3 <sup>rd</sup>	Unit-4: WORK AND FRICTION Definition with concept on limiting friction, and laws of limiting friction (statement only)
	4 <sup>th</sup>	Unit-4: WORK AND FRICTION Theory on Coefficient of Friction and simple numericals
5 <sup>th</sup>	1 <sup>st</sup>	Unit-4: WORK AND FRICTION Methods to reduce friction with practical examples
	2 <sup>nd</sup> & 3 <sup>rd</sup>	Unit-5: GRAVITATION Introduction, a detail explanation on Newton's Laws of Gravitation and definition of Universal Gravitational Constant (G) with its unit and dimensions
	4 <sup>th</sup>	Unit-5: GRAVITATION Definition and concept of acceleration due to gravity (g), Relation between 'g' and 'G' and definition of mass and weight
6 <sup>th</sup>	1 <sup>st</sup> & 2 <sup>nd</sup>	Unit-5: GRAVITATION Explanation (No derivation) on variation of 'g' with altitude and depth, statements on Kepler's Laws of Planetary motion
	3 <sup>rd</sup> & 4 <sup>th</sup>	Unit-6: OSCILLATIONS AND WAVES Definition and examples on Simple Harmonic Motion (SHM), expressions for displacement, velocity and acceleration of a body or particle in SHM
7 <sup>th</sup>	1 <sup>st</sup>	
	2 <sup>nd</sup> & 3 <sup>rd</sup>	Unit-6: OSCILLATIONS AND WAVES Wave Motion (Definition & Concept), Transverse and Longitudinal wave motion (Definition, examples and Comparison)
	4 <sup>th</sup>	Unit-6: OSCILLATIONS AND WAVES Wave parameters and Establish a relation between velocity, frequency and Time period, Ultrasonics-Definition, properties & Applications
8 <sup>th</sup>	1 <sup>st</sup>	Unit-7: HEAT AND THERMODYNAMICS Heat & temperature-Definition and difference, Units of Heat (FPS, CGS, MKS & SI)
	2 <sup>nd</sup> & 3 <sup>rd</sup>	Unit-7: HEAT AND THERMODYNAMICS Fundamental ideas on Specific heat, Change of State and Latent Heat with simple numericals
	4 <sup>th</sup>	Unit-7: HEAT AND THERMODYNAMICS Concept on Thermal expansion and Coefficient of linear ( $\alpha$ ), superficial ( $\beta$ ) and cubical ( $\gamma$ ) expansions of Solids, Relation between $\alpha$ , $\beta$ and $\gamma$
9 <sup>th</sup>	1 <sup>st</sup> & 2 <sup>nd</sup>	
	3 <sup>rd</sup>	Unit-7: HEAT AND THERMODYNAMICS Definition and Relation between Work and Heat, Joule's Mechanical Equivalent of Heat, Statement and explanation on 1 <sup>st</sup> law of thermodynamics
	4 <sup>th</sup>	Unit-8: OPTICS Concept of Reflection and laws of Reflection, Concept of Refraction and laws of Refraction and Refractive index (Definition, formula and Simple numericals)
10 <sup>th</sup>	1 <sup>st</sup>	
	2 <sup>nd</sup>	Unit-8: OPTICS Concept and Explanation of Total Internal Reflection and Critical angle
	3 <sup>rd</sup>	Unit-8: OPTICS Definition, Properties and Applications on Fiber Optics
	4 <sup>th</sup>	Unit-9: ELECTROSTATICS AND MAGNETOSTATICS Concept of Electric field and Electric field intensity, Statement and Explanation of Coulomb's law and definition of Unit charge,

11 <sup>th</sup>	1 <sup>st</sup>	<b>Absolute &amp; Relative Permittivity (Definition, Relation &amp; Unit</b>
	2 <sup>nd</sup> & 3 <sup>rd</sup>	Unit-9: ELECTROSTATICS AND MAGNETOSTATICS <b>Electric potential &amp; Electric potential difference (Definition, formula &amp; SI units), Concept of capacitor and capacitance, Series and parallel combination of capacitors: Formula for equivalent capacitance and simple numericals</b>
	4 <sup>th</sup>	Unit-9: ELECTROSTATICS AND MAGNETOSTATICS <b>Fundamental idea on magnet, Coulomb's law in magnetism and definition of Unit pole</b>
12 <sup>th</sup>	1 <sup>st</sup>	Unit-9: ELECTROSTATICS AND MAGNETOSTATICS <b>Definition of magnetic field and Magnetic field Intensity (H) with its formula and SI unit, Magnetic lines of force-Definition and Properties</b>
	2 <sup>nd</sup>	Unit-9: ELECTROSTATICS AND MAGNETOSTATICS <b>Magnetic flux(<math>\phi</math>) and Magnetic flux density (B)</b>
	3 <sup>rd</sup> & 4 <sup>th</sup>	Unit-10: CURRENT ELECTRICITY <b>Introduction to Electric Current, Ohm's law and its applications</b>
13 <sup>th</sup>	1 <sup>st</sup> & 2 <sup>nd</sup>	Unit-10: CURRENT ELECTRICITY <b>Series and parallel combination of resistors: Formula for equivalent resistance and simple numericals</b>
	3 <sup>rd</sup>	Unit-10: CURRENT ELECTRICITY <b>Kirchhoff's laws: Statements &amp; Explanation with diagram</b>
	4 <sup>th</sup>	Unit-10: CURRENT ELECTRICITY <b>Application of Kirchhoff's laws to Wheatstone bridge-Derivation of balance condition of Wheatstone bridge</b>
14 <sup>th</sup>	1 <sup>st</sup> & 2 <sup>nd</sup>	Unit-11: ELECTROMAGNETISM AND ELECTROMAGNETIC INDUCTION <b>Introduction, Force acting on a current carrying conductor placed in a uniform magnetic field, Fleming's left hand rule</b>
	3 <sup>rd</sup> & 4 <sup>th</sup>	Unit-11: ELECTROMAGNETISM AND ELECTROMAGNETIC INDUCTION <b>Statement on Faraday's Laws of Electromagnetic Induction &amp; Lenz's law</b>
15 <sup>th</sup>	1 <sup>st</sup>	Unit-11: ELECTROMAGNETISM AND ELECTROMAGNETIC INDUCTION <b>Fleming's Right Hand Rule, Comparison between Fleming's RHR &amp; LHR</b>
	2 <sup>nd</sup> & 3 <sup>rd</sup>	Unit-12: MODERN PHYSICS <b>Introduction to LASER and laser beam, its principle: Population inversion &amp; Optical Pumping</b>
	4 <sup>th</sup>	Unit-12: MODERN PHYSICS <b>Concept on Wireless Transmission- Ground waves, Sky waves &amp; Space Waves</b>

*Satya*  
25.10.21  
HOD (Math & Sc)

*Satya*  
25.10.21  
Submitted by  
Satya Narayan Tripathy  
Lect. Physics GP Kraput