



GOVERNMENT POLYTECHNIC, NABARANGPUR

DEPARTMENT OF MATHEMATICS AND SCIENCE

Discipline: MECHANICAL , ELECTRICAL	Semester: 2 ND	Name of the Teaching Faculty: DEEPAK RANJAN PATTNAIK
Subject: ENGINEERING PHYSICS	No. of days/per week class allotted: 4	Semester From date: 28/04/2021 To Date:10/07/2021 No. of Weeks:15
COURSE OUTCOMES	CO1: UNDERSTAND THE UNITS & DIMENSIONS , SCALAR & VECTORS CO2: UNDERSTAND THE KINEMATICS , WORK & FRICTION CO3: UNDERSTAND THE CONCEPT OF HEAT AND THERMODYNAMICS, OPTICS CO4: UNDERSTAND THE CONCEPT OF ELECTROSTATICS & MAGNETOSTATICS CO5: UNDERSTAND THE CONCEPT OF ELECTROMAGNETISM & MODERN PHYSICS	
Week	Class Day	Theory/Practical Topics
1 ST	1 ST	UNIT 1 - UNITS AND DIMENSIONS 1.1 Physical quantities - (Definition).
	2 ND	1.2 Definition of fundamental and derived units, systems of units (FPS, CGS, MKS and SI units).
	3 RD	1.3 Definition of dimension and Dimensional formulae of physical quantities
	4 TH	1.4 Dimensional equations and Principle of homogeneity(contd...)
2 ND	1 ST	QUIZ & ASSIGNMENT - I
	2 ND	1.4 Dimensional equations and Principle of homogeneity
	3 RD	1.5 Checking the dimensional correctness of Physical relations. (contd...)
	4 TH	1.5 Checking the dimensional correctness of Physical relations.
3 RD	1 ST	UNIT 2 - SCALARS AND VECTORS
	2 ND	QUIZ & ASSIGNMENT - II
	3 RD	2.1 Scalar and Vector quantities (definition and concept), Representation of a Vector – examples, types of vectors.(contd...)
	4 TH	2.1 Scalar and Vector quantities (definition and concept), Representation of a Vector – examples, types of vectors
4 TH	1 ST	Solved numericals

	2 ND	2.2 Triangle and Parallelogram law of vector Addition (Statement only). Simple Numerical.(contd...)
	3 RD	2.2 Triangle and Parallelogram law of vector Addition (Statement only). Simple Numerical.
	4 TH	2.3 Resolution of Vectors – Simple Numericals on Horizontal and Vertical components.
5 TH	1 ST	2.4 Vector multiplication (scalar product and vector product of vectors).
	2 ND	UNIT 3 - KINEMATICS 3.1 Concept of Rest and Motion.
	3 RD	3.2 Displacement, Speed, Velocity, Acceleration & FORCE (Definition, formula, dimension & SI units).
	4 TH	3.3 Equations of Motion under Gravity (upward and downward motion) - no derivation.
6 TH	1 ST	3.4 Circular motion: Angular displacement, Angular velocity and Angular acceleration (definition, formula & SI units).
	2 ND	3.5 Relation between –(i) Linear & Angular velocity, (ii) Linear & Angular acceleration)
	3 RD	3.6 Define Projectile, Examples of Projectile.
	4 TH	3.7 Expression for Equation of Trajectory, Time of Flight, Maximum Height and Horizontal Range for a projectile fired at an angle, Condition for maximum Horizontal Range.
7 TH	1 ST	UNIT 4 – WORK AND FRICTION 4.1 Work – Definition, Formula & SI units.
	2 ND	4.2 Friction – Definition & Concept
	3 RD	4.3 Types of friction (static, dynamic), Limiting Friction (Definition with Concept).

	4 TH	QUIZ & ASSIGNMENT - IV
8 TH	1 ST	4.4 Laws of Limiting Friction (Only statement, No Experimental Verification).
	2 ND	4.5 Coefficient of Friction – Definition & Formula, Simple Numericals.
	3 RD	4.6 Methods to reduce friction.
	4 TH	UNIT 5 - GRAVITATION 5.1 Newton's Laws of Gravitation – Statement and Explanation. (contd...)
9 TH	1 ST	5.1 Newton's Laws of Gravitation – Statement and Explanation.
	2 ND	5.2 Universal Gravitational Constant (G)- Definition, Unit and Dimension.
	3 RD	5.3 Acceleration due to gravity (g)- Definition and Concept.
	4 TH	5.4 Definition of mass and weight
10 TH	1 ST	REVISION.
	2 ND	QUIZ & ASSIGNMENT - V
	3 RD	5.5 Relation between g and G. 5.6 Variation of g with altitude and depth (No derivation – Only Explanation).
	4 TH	5.7 Kepler's Laws of Planetary Motion (Statement only). 6.1 Simple Harmonic Motion (SHM) - Definition & Examples
11 TH	1 ST	6.2 Expression (Formula/Equation) for displacement, velocity, acceleration of a body/ particle in SHM. 6.3. Wave motion – Definition & Concept.
	2 ND	UNIT 6 - OSCILLATIONS AND WAVES 6.1 Simple Harmonic Motion (SHM) - Definition & Examples
	3 RD	6.4 Transverse and Longitudinal wave motion – Definition, Examples & Comparison. 6.5 Definition of different wave parameters (Amplitude, Wavelength, Frequency, Time Period.

	4 TH	6.6 Derivation of Relation between Velocity, Frequency and Wavelength of a wave 6.7 Ultrasonics – Definition, Properties & Applications.
12 TH	1 ST	7.1 Heat and Temperature – Definition & Difference 7.2 Units of Heat (FPS, CGS, MKS & SI). 7.3 Specific Heat (concept, definition, unit, dimension and simple numerical)
	2 ND	7.4 Change of state (concept), Latent Heat (concept, definition, unit, dimension and simple numerical) 7.5 Thermal Expansion – Definition & Concept 7.6 Expansion of Solids (Concept)
	3 RD	7.7 Coefficient of linear, superficial and cubical expansions of Solids – Definition & Units. 7.8 Relation between α , β & γ 7.9 Work and Heat - Concept & Relation. 7.10 Joule's Mechanical Equivalent of Heat (Definition, Unit) 7.11 First Law of Thermodynamics (Statement and concept only)
	4 TH	QUIZ & ASSIGNMENT - VI
13 TH	1 ST	8.1 Reflection & Refraction – Definition. 8.2 Laws of reflection and refraction (Statement only) 8.3 Refractive index – Definition, Formula & Simple numerical.
	2 ND	8.4 Critical Angle and Total internal reflection – Concept, Definition & Explanation 8.5 Refraction through Prism (Ray Diagram & Formula only – NO derivation).. 8.6 Fiber Optics – Definition, Properties & Applications.
	3 RD	9.1 Electrostatics – Definition & Concept. 9.2 Statement & Explanation of Coulombs laws, Definition of Unit charge. 9.3 Absolute & Relative Permittivity (ϵ) – Definition, Relation & Unit.
	4 TH	9.4 Electric potential and Electric Potential difference (Definition, Formula & SI Units). 9.5 Electric field, Electric field intensity (E) – Definition, Formula & Unit.

		9.6 Capacitance - Definition, Formula & Unit. 9.7 Series and Parallel combination of Capacitors (No derivation, Formula for effective/Combined/total capacitance & Simple numericals). 9.8 Magnet, Properties of a magnet
14 TH	1 ST	9.9 Coulomb's Laws in Magnetism – Statement & Explanation, Unit Pole (Definition). 9.10 Magnetic field, Magnetic Field intensity (H) - (Definition, Formula & SI Unit).
	2 ND	9.11 Magnetic lines of force (Definition and Properties) 9.12 Magnetic Flux (Φ) & Magnetic Flux Density (B) – Definition, Formula & Unit.
	3 RD	10.1 Electric Current – Definition, Formula & SI Units. 10.2 Ohm's law and its applications. 10.3 Series and Parallel combination of resistors (No derivation, Formula for effective/ Combined/ total resistance & Simple numericals). 10.4 Kirchhoff's laws (Statement & Explanation with diagram).
	4 TH	10.5 Application of Kirchhoff's laws to Wheatstone bridge - Balanced condition of Wheatstone's Bridge – Condition of Balance (Equation). UNIT 11 – ELECTROMAGNETISM & ELECTROMAGNETIC INDUCTION 11.1 Electromagnetism – Definition & Concept. 11.2 Force acting on a current carrying conductor placed in a uniform magnetic field, Fleming's Left Hand Rule 11.3 Faraday's Laws of Electromagnetic Induction (Statement only) 11.4 Lenz's Law (Statement)
15 TH	1 ST	11.5 Fleming's Right Hand Rule 11.6 Comparison between Fleming's Right Hand Rule and Fleming's Left Hand Rule. SOLVED NUMERICALS
	2 ND	UNIT 12 - MODERN PHYSICS 12.1 LASER & laser beam (Concept and Definition) 12.2 Principle of LASER (Population Inversion & Optical Pumping)
	3 RD	12.3 Properties & Applications of LASER 12.4 Wireless Transmission – Ground Waves, Sky Waves, Space Waves (Concept & Definition)
	4 TH	REVISION

LEARNING RESOURCES:

1. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Text Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
3. Text Book of Engineering Physics by Barik, Das, Sharma, Kalyani Publisher
4. Concepts in Physics by H. C. Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi

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