KADISARVA VISHWAVIDYALAYA, GANDHINAGAR

B.Sc. Curriculum as Per NEP

Physics Courses for Semester 2

W.E.F.June2023

KADI SARVA VISHWAVIDYALAYA

Physics Major Course -2
PHM213-1C Basic Physics-II

LEARNINGOUTCOMES:

- Understand the concept of origin of Physical Science.
- Develop a concrete understanding of the optical phenomenon like refraction & interference.
- Gain knowledge about the properties of matter and elasticity with potential applications in daily life.
- Understand the concept of vectors algebra & vector analysis behind the understanding of motion in physics.
- Understanding of concepts of Mechanics.

TEACHINGANDEVALUATIONSCHEME:

Subject Code	Subject Title	Teaching Scheme	Credits	Examination Scheme			Total Marks
		Theory Per Week		Hrs.	Max Marks		
					CCE	SEE	
PHM213-1C	Basic Physics-II (Major)	4	4	2.5	50	50	100

Unit 1: Refraction through Lenses & Interference   **Teaching Hours: 15 (Weightage 25%)**

Introduction Principal Foci, least possible distance between an object & it's real image in a convex lens, Derivation produced by a thin lens, Equivalent Focal Length of Two Thin Lenses Separated by a Finite Distance, Cardinal Points of an Optical system, Principal Foci and Focal Planes, Principal Points and Principal Planes, Nodal Points, Illustrative Problems.

Interference in thin films, Interference due to reflected light, Interference due to transmitted light, Interference due to wedge shaped thin film, Newton's Rings, Determination of the wavelength ofsodium light using Newton's Rings, Refractive Index of a Liquid using Newton's Rings, Illustrative Problems

Unit 2: Basics of Elasticity   **Teaching Hours: 15 (Weightage 25%)**

Introduction, Load, Stress and Strain, Hooke's law, Elastic limit, Behavior of a wire or a bar under increasing stress, Elastic behavior or solids in general, Different types of elasticity, Equivalence of a shear to a tensile and a compressive strain at right angles to each other and each equal to half the shear, Work done per unit volume (or energy per unit volume) in a strain, Poisson's ratio, Relations connecting the elastic constants-deformation of a cube, Limiting values of Poisson's ratio(s), Determination of Young's modulus for a material-wire, Determination of Poisson's ratio (s), Relation between volume strain and linear strain, Ratio of Adiabatic And Isothermal Elasticities of A Gas, cantilever, Illustrative Examples.

Unit-3: Vector Algebra & Vector Analysis Teaching Hours: 15 (Weightage 25%)

<u>Vector Algebra</u>: Introduction, Surface area as a vector, distribution law for vector products, Dyadic, Scalar Triple product, Reciprocal Vectors, Vector triple product, Rotational quantities as vectors, Rotation of coordinate axes, Pseudo-vectors & Pseudo-scalars, Illustrative Examples.

Vector Analysis: Differentiation of vectors with respect to time, Line integral, Surface integral, volume integral, Partial differentiation of a Vector, Gradient of a scalar point function, Divergence of a Vector, Curl of a vector point function, Introduction of Irrotational and Solenoidal vectors, related problems and Solutions, Illustrative Examples

Unit-4: Mechanics   **Teaching Hours: 15 (Weightage 25%)**

Mechanics of a single particle and of particles:
Motion of a particle subjected to a resistive force, mechanics of a system of particle, Motion of a system with variable mass.

Motion in a central force field:
Equivalent one body problem, Motion in central force field, General features of the motion, Motion in an inverse square law force field, Equation of the orbit, Kepler's law of planetary motion, Illustrative Examples.

• *Continuous Evaluation: It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests

Reference Books

1) A textbook of Optics – N Subrahmanyam, Brij Lal& M.N. Avadhanulu, S.Chand, New Delhi
2) Elements of Properties of Matter – D. S. Mathur, S.Chand, New Delhi
3) Engineering Physics – V. Rajendran, Tata McGraw-Hill Publishing Company Ltd, New Delhi
4) Engineering Physics, G. Vijayakumari, Vikas Publication House Pvt. Ltd., New Delhi.
5) Introduction to Classical Mechanics – R G Takwale & P S Puranik, McGraw Hill Education (India) Pvt. Ltd.

KADI SARVA VISHWAVIDYALAYA

Physics Major Course -2

PHM214-1C Physics Practical - II

LEARNINGOUTCOMES:
- Understand the concept of characteristics of PN Junction diode.
- Develop a concrete understanding of the optical phenomenon like refraction & interference.
- Gain knowledge about the properties of matter and elasticity with potential applications in daily life.
- Understanding of concepts of Mechanics.
- Understand the bridge rectifier, condenser and Stefan's law of radiation.

TEACHINGANDEVALUATIONSCHEME:

| Subject Code | Subject Title | Teaching Scheme | Credits | Examination Scheme | | | Total Marks |
| | | Practical Per Week | | Hrs. | Max Marks | | |
					CCE	SEE	
PHM214-1C	**Physics Practical - II**	**8**	**4**	**5**	**50**	**50**	**100**

Unit-I   **(Weightage :50%)**

1) Study of PN junction Diode.
2) Study of Resonator.
3) Stephan's Law of radiation.
4) Decay of potential across condenser.
5) Simple Pendulum.
6) Refractive index of a Prism
7) Refractive index of a liquid using convex lens

Unit-II   **(Weightage :50%)**

1) Melde's Experiment
2) Capacity of a Condenser
3) Young's modulus of Beam
4) Young's modulus of Cantilever
5) Bridge Rectifier
6) Calcite Prism as Polaroid
7) Moment of Inertia of a fly wheel.

Note:

1) New Experiments can be introduced AND / OR replaced as per need by the permission of the Head / Principal of the institute.
2) Hands-on / Project /Model etc. will carried out additionally for the enhancement of related skills

Physics Minor Course – Semester 2

PHE208-1C Fundamentals of Physics -II

LEARNINGOUTCOMES:

- Understand the concept of origin of Physical Science.
- Develop a concrete understanding of the Physical systems around us.
- Gain knowledge about the various laws of nature, new frontier of physics with potential applications in our day-by-day life.
- Develop a concrete understanding of the optical phenomenon like refraction & interference.
- Gain knowledge about the properties of matter and elasticity with potential applications in daily life.

TEACHINGANDEVALUATIONSCHEME:

Subject Code	Subject Title	Teaching Scheme		Credits	Hrs.	Examination Scheme		Total Marks
		Theory Per Week	Practical Per week			**Max Marks**		
						CCE	SEE	
PHE208-1C	**Fundamentals of Physics - II**	**2**	**4**	**4**	**2.5**	**50**	**50**	**100**

Unit 1: Refraction through Lenses & Interference   Teaching Hours: 15 (Weightage 25%)

Introduction Principal Foci, least possible distance between an object & it's real image in a convex lens,Derivation produced by a thin lens, Equivalent Focal Length of Two Thin Lenses Separated by aFinite Distance, Cardinal Points of anOptical system, Principal Foci and Focal Planes, PrincipalPoints and Principal Planes, Nodal Points, Illustrative Problems.

Interference in thin films, Interference due to reflected light, Interference dueto transmitted light, Interference due to wedge shaped thin film, Newton'sRings, Determination of the wavelength ofsodium light using Newton's Rings, Refractive Index of a Liquid using Newton's Rings, Illustrative Problems

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Unit 2: Basics of Elasticity   Teaching Hours: 15 (Weightage 25%)

Introduction, Load, Stress and Strain, Hooke's law, Elastic limit, Behavior of a wire or a bar under increasing stress, Elastic behavior or solids in general, Different types of elasticity, Equivalence of a shear to a tensile and a compressive strain at right angles to each other and each equal to half the shear, Work done per unit volume (or energy per unit volume) in a strain, Poisson's ratio, Relations connecting the elastic constants-deformation of a cube, Limiting values of Poisson's ratio(s), Determination of Young's modulus for a material-wire, Determination of Poisson's ratio (s), Relation between volume strain and linear strain, Ratio of Adiabatic And Isothermal Elasticities of A Gas, cantilever, Illustrative Examples.

Practical   **Teaching Hours: 30**

1) Study of PN junction Diode.
2) Study of Resonator.
3) Stephan's Law of radiation.
4) Decay of potential across condenser.
5) Simple Pendulum.
6) Refractive index of a Prism
7) Refractive index of a liquid using convex lens

Note:

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Physics Multidisciplinary Course – Semester 2

MDC219-1C Fundamentals of Computational Physics -II

LEARNINGOUTCOMES:
- To understand about the available Open Sources.
- Scientific Computer Programming Skill development.
- Gain the insight of theoretical modelling for Physical Sciences.
- A stepping stone for Physics Simulation.
- Problem Solving skills and high-level conceptual understanding.

TEACHINGANDEVALUATIONSCHEME:

SubjectCode	SubjectTitle	Teaching Scheme		Credits	Hrs.	ExaminationScheme		TotalMarks
		Theory PerWeek	Practical Per week			MaxMarks		
						CCE	SEE	
MDC219-1C	Fundamentals of Computational Physics -II	2	4	4	2.5	50	50	100

Unit 1: Introduction, Variables & Data types   Teaching Hours: 15

GNU Octave- general introduction, Applications of GNU Octave,Limitations and drawback of Octave, GNU Octave as alternative ofMATLAB, Comparison Octave Vs MATLAB, Octave GUI, SimpleMathematical Operations, Built-in Mathematical Constants, Variables in GNU Octave, Global Variables, Conventions for Naming Variables, Datatypes in Octave, Arrays, Vector & Matrices, Indexing and operations ofArrays, Matrix manipulations functions

Unit-2 : Loops, Functions, Files & Data Visualization Teaching Hours: 15

Decision Making with If Statements, Loops, User-Defined Functions, Global Variables, Simple Plots, Plotting Options, Error bars, Visualizations – ScatterGraphs, Histograms, Contours, Polar Graphs, pie chart, Visualizing Dataas Images, 3D visualizations

List of Practical Teaching Hours: 30

1) Uranium Decay
2) The Pendulum- solution using the Euler method
3) Kepler's Laws – simulation of Earth's orbit with some initial velocity
and time step
4) Trajectories for idea projectile motion
5) RC Circuit – Charging of Capacitor
6) Motion of a Charge particle in EM field
7) Curl, Divergence & Gradient

Note:

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- Hands-on / Project /Model etc. will carried out additionally for the enhancement of related skills.

• *Continuous Evaluation: It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests

Reference Books

1) GNU Octave (A high-level interactive language for numerical computations) by John W. Eaton, David Bateman, SørenHauberg, RikWehbring, Edition 8 for Octave version 8.3.0August 2023 (The Octave Project Developers)
2) GNU Octave by Example - A Fast and Practical Approachto Learning GNU Octave by AshwinPajankar&SharvaniChandu, Apress
3) Introduction to GNU Octave- A brief tutorial for linear algebra and calculus students by Jason Lachniet
4) Introduction to Octave by Dr. P.J.G. Long, Department of Engineering, University of Cambridge
5) Programming forComputations – MATLAB/Octave by SveinLinge · Hans PetterLangtangen, Springer Open

KADI SARVA VISHWAVIDYALAYA

Physics SEC (Skill Enhancement Course) – Semester 2

SEC218-1C Introduction to Measurements & Instrumentation-I

LEARNINGOUTCOMES:
- Understand the concept of measurements and instrumentations of Physical Science.
- Understand the classifications and instrumentation of transducers.
- Gain the knowledge of measurement of pressure and forces.
- Understanding of Physics behind Industrial Weighing Systems.

Subject Code	Subject Title	Teaching Scheme		Credits	Hrs.	Examination Scheme		Total Marks
		Theory Per Week	Practical Per week			Max Marks		
						CCE	SEE	
SEC218-1C	**Introductions to Measurements & Instrumentation-I**	2	0	2	2	25	25	50

Unit-1: TRANSDUCERS (Weightage :50%)

Introduction, Classification of Transducers, A Few Phenomena, Selection of Transducers, Selection of Transducers & standards, Pneumatic Transducers, Electrical Transducers, Optical Transducers, Ultrasonic Transducer, Magneto strictive Transducer, Digital Displacement Transducers, Proximity Sensors.

Unit-2: PRESSURE & FORCE MEASUREMENT (Weightage :50%)

Introduction, Definitions, Pressure Units and Their Conversions, Comparison with Known Dead-weights, Force-summing Devices, Secondary Transducers, Vacuum Measurement, Accessories, Acceleration Measurement, Force Measurement, Industrial Weighing Systems, Torque Measurement, Tachometers.

Reference Books

1) Introductions to Measurements And Instrumentation, Arun K. Ghosh, PHI Learning Pvt. Ltd., New Delhi
2) Fundamentals of Instrumentation and Measurement, Dominique Placko, British Library Cataloguing-in-Publication Data, Great Britain