KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR

B.Sc. Curriculum as Per NEP

Physics Courses for Semester 1

W.E.F. June 2023

KADI SARVA VISHWAVIDYALAYA

Physics Major Course -1

PHM205-1C Basic Physics-I

LEARNING OUTCOMES:

- 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.
- Gain the knowledge of physics behind the applications of LASER & Ultrasonic.
- Understanding of concepts of different types of Rectifier circuits and applications of Superconductivity.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme	Credits	Examination Scheme			Total Marks
				Hrs.	Max Marks		
		Theory Per Week			CCE	SEE	
PHM205-1C	Basic Physics-I (Major)	4	4	2.5	50	50	100

Unit 1: Fundamentals of LASER **Teaching Hours: 15 (Weightage 25%)**

Introduction and characteristics of Laser, attenuation of Light in Optical Medium, Thermal equilibrium, Interaction of light with matter- Absorption, Spontaneous Emission, Stimulated Emission, Light Amplification- two Conditions for Stimulated Emission, Population inversion, Metastable states, Components of Laser: Active medium, Pumping-Three level and four level, Optical Resonant Cavity, Types of Lasers- Ruby Laser, Nd-YAG Laser, He-Ne Laser, PN junction Laser, Applications, related Problems

Unit 2: Acoustic & Ultrasonic **Teaching Hours: 15 (Weightage 25%)**

Classification of Sound, Characteristics of Musical Sound, Acoustics of buildings, loudness and intensity of sound, reverberation time and Sabine's Formula, measurement of absorption coefficient, Sound Absorbing Materials, Principles to be observed in the Acoustical Design of an Auditorium, related Problems

Introduction, Classification of Ultrasonic Waves, Properties of Ultrasonic Waves, Generation of Ultrasonic Waves: Piezoelectric oscillator & Magnetostriction oscillator, determination of wavelength-velocity of ultrasound in liquid, Applications of Ultrasonic, SONAR & determination of depth of Sea, related Problems

Unit-3 Rectifier and Filter Circuits **Teaching Hours: 15 (Weightage 25%)**

The Half Wave Rectifier - Output Voltage, Output Current, RMS values, Efficiency, Ripple factor, Regulation, The Full Wave Rectifier - Output Voltage, Output Current, RMS values, Efficiency, Ripple factor, Regulation, The Bridge Rectifier. The Inductor filter, The Capacitor filter, The Choke input filter, C-L-C Filter, related Problems

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

Introduction: Metals, Insulators, Semiconductors & Superconductivity, Superconductivity, General Properties of Superconducting Materials, Types of superconductors (Type-I and Type-II), High Tc superconductors, Applications of Superconductors: Maglev, SQUID, and other applications, related Problems

• *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) Basics of LASER Physics – by Karl F. Renk, Springer Publication
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) Modern Engineering Physics; A.S. Vasudeva, S. Chand, New Delhi
6) Basic Electronics by B. L. Theraja, S.Chand, New Delhi
7) Principals of Electronics – by V K Mehta & Rohit Mehta, S. Chand, New Delhi

KADI SARVA VISHWAVIDYALAYA

Physics Major Course -2

PHM206-1C Physics Practical - I

LEARNING OUTCOMES:

- Understand the concept of measurement of length//diameter / thickness using Vernier caliper and screw gauge.
- Use of Spectrometer and measurement of angle of minimum deviation of prism.
- Graph plotting and error calculation
- Use of digital Multimeter.
- Knowledge of Transformer and Rectifier circuit
- Gain the knowledge of how to measure wavelength of LASER and mercury source.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme	Credits	Examination Scheme			Total Marks
				Hrs.	Max Marks		
		Practical Per Week			CCE	SEE	
PHM206-1C	Physics Practical - I	8	4	5	50	50	100

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

1) Measurements of length / diameter for different geometrical shapes using Vernier caliper.
2) Measurements of length /diameter / thickness using screw gauge.
3) Measurement of distance between two lines /slits using travelling microscope.
4) Calibration of Spectrometer for Parallel rays using Schuster's Method.
5) Measurement of angle of minimum deviation for a given Prism using Spectrometer.
6) Estimation of the value of resistance using color code
7) Graph Plotting: Experimental, Straight Line with intercept, Resonance Curve etc.

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

1) Measurement of various electrical quantities using Digital Multimeter
2) Absolute and relative errors calculation
3) Study of Transformer.
4) P-N Junction diode as Half Wave Rectifier (i) Without filter (ii) With Series inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of regulation.
5) P-N Junction diode as Full Wave Rectifier (i) Without filter (ii) With Series inductor Filter (iii)With Shunt Capacitor Filter. Calculation of percentage of regulation.
6) To determine the wavelength of a given laser source using diffraction grating.
7) To determine wavelength of bright lines of mercury light using diffraction grating.

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

KADI SARVA VISHWAVIDYALAYA

Physics Minor Course – Semester 1

PHE203-1C Fundamentals of Physics - I

LEARNING OUTCOMES:

- 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.
- Gain the knowledge of LASER & Ultrasonic as well as their applications.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme		Credits	Examination Scheme			Total Marks
					Hrs.	Max Marks		
		Theory Per Week	Practical Per week			CCE	SEE	
PHE203-1C	Fundamentals of Physics - I	2	4	4	2.5	50	50	100

Unit 1: Fundamentals of LASER **Teaching Hours: 15 (Weightage 25%)**

Introduction and characteristics of Laser, attenuation of Light in Optical Medium, Thermal equilibrium, Interaction of light with matter- Absorption, Spontaneous Emission, Stimulated Emission, Light Amplification- two Conditions for Stimulated Emission, Population inversion, Metastable states, Components of Laser: Active medium, Pumping-Three level and four level, Optical Resonant Cavity, Types of Lasers- Ruby Laser, Nd-YAG Laser, He-Ne Laser, PN junction Laser, Applications, related Problems

Unit 2: Acoustic & Ultrasonic **Teaching Hours: 15 (Weightage 25%)**

Classification of Sound, Characteristics of Musical Sound, Acoustics of buildings, loudness and intensity of sound, reverberation time and Sabine's Formula, measurement of absorption coefficient, Sound Absorbing Materials, Principles to be observed in the Acoustical Design of an Auditorium, related Problems

Introduction, Classification of Ultrasonic Waves, Properties of Ultrasonic Waves, Generation of Ultrasonic Waves: Piezoelectric oscillator & Magnetostriction oscillator, determination of wavelength-velocity of ultrasound in liquid, Applications of Ultrasonic, SONAR & determination of depth of Sea, related Problems

Practical **Teaching Hours: 30**

1. Measurements of length / diameter for different geometrical shapes using Vernier caliper.
2. Measurements of length /diameter / thickness using screw gauge.
3. Measurement of distance between two lines /slits using travelling microscope.
4. Calibration of Spectrometer for Parallel rays using Schuster's Method.

5. Measurement of angle of minimum deviation for a given Prism using Spectrometer.
6. Estimation of the value of resistance using color code
7. Graph Plotting: Experimental, Straight Line with intercept, Resonance Curve etc.

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.

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KADI SARVA VISHWAVIDYALAYA

Physics Multidisciplinary Course – Semester 1

MDC214-1C Fundamentals of Computational Physics - I

LEARNING OUTCOMES:

- Gain the knowledge of computational physics and its needs.
- Understanding of the computer hardware, compilers, machine languages and open sources.
- Importance of matrices & determinants to solve mathematical physics & related problems.
- Practical performance enhances the knowledge and understanding to solve the problems.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme		Credits	Examination Scheme			Total Marks
					Hrs.	Max Marks		
		Theory Per Week	Practical Per week			CCE	SEE	
MDC214-1C	Fundamentals of Computational Physics - I	2	4	4	2.5	50	50	100

Unit 1: Introduction to Computational Physics **Teaching Hours: 15**

What is computational physics? Why do we need it? Computer hardware: basic computer architecture, hierarchical memory, cache, latency and bandwidth.
Overview of Excel, available compilers (Fortran, C, C++), machine languages (MATLAB & Python), Open Sources (Python, GNU Octave, Sci.Lab, Geogebra etc.) and their Comparison, Merits and Demerits

Unit-2 : Matrices & Determinant **Teaching Hours: 15**

Matrices, Types of matrices, Algebra of matrices, Multiplication of matrices,
Transpose of matrices, Determinant, Adjoint of matrices, The Inverse of matrices, Rank of matrices, Trace of matrices.

List of Practical **Teaching Hours: 30**

1) Basic Plotting in Excel.
2) Plotting Experimental data in Excel.
3) Calculation of Physics formula using Excel.
4) Plotting of Straight Line with intercept in Excel.
5) Addition & Subtraction of matrices using Excel.
6) Multiplication of matrices in Excel.
7) Transpose of matrices in Excel.
8) Determinant in Excel.
9) Adjoint of matrices in Excel.
10) The Inverse of matrices in Excel.

Note:

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

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KADI SARVA VISHWAVIDYALAYA

Physics SEC (Skill Enhancement Couse) – Semester 1

SEC213-1C Physics of Optical Instruments & Home Appliances

LEARNING OUTCOMES:

- Understand the concept of origin of Physical Science.
- Understand the concepts image formation by lenses & mirror.
- Gain the physics knowledge of optical instruments – Camera, Microscope and Telescopes.
- Understanding of Physics behind Home Appliances – Electric cooking appliances. Iron box water heater, Mixer etc.

Subject Code	Subject Title	Teaching Scheme		Credits	Examination Scheme			Total Marks
					Hrs.	Max Marks		
		Theory Per Week	Practical Per week			CCE	SEE	
SEC213-1C	Physics of Optical Instruments & Home Appliances	2	0	2	2	25	25	50

Unit-1: Physics of Optical Instruments - I **(Weightage :50%)**

Introduction, Image formed by plane mirror, spherical mirror, and refraction, The Eye, The Camera, The simple magnifier, Microscopes & Telescopes

Unit-2: Physics of Home Appliances - I **(Weightage :50%)**

Electrical cooking appliances – (i) Electric stove and (ii) Electric Toaster (iii) Electric Iron box, (iv) water heater and coffee makers, (v)Mixer

Reference Books

1) University Physics (volume – 3) by Samuel J ling, Jeff Sanny, William mobes.
2) Electrical machine & Appliances by Ms. A. Sumathi, Mr. R. Krishnakumar, Mr. P. Balasubramanian, Mr. K.S. Sampath Nagarajan