DEPARTMENT OF PHYSICS

SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCE (SMPS)

Curriculum Framework Bachelor of Science

In

(B.Sc.) Physics

BASED ON NATIONAL EDUCATION POLICY- 2020

DATE OF BOS 16/09/2022

Doctor Harisingh Gour Vishwavidyalaya
(A Central University)
Sagar-Madhya Pradesh-470003

Brief Introduction of the Department :

The Department of Physics was established in the year 1946 by Prof. D.R. Bhawalkar, who had studied at King's College, the University of London under the able guidance of Nobel Laureate Sir O.W.R. Richardson. He was known as the father of Luminescence. He remained the Head of the Department of Physics until 1969. It is the pioneer teaching and research department of India. In its 75 years of old history, the department has produced scores of scholars who have won laurels for themselves at both international and national levels.

Physics is the science of nature dealing with the whole universe. It mainly involves the study of matter, energy, and their interactions. Other sciences are reliant on the concepts and techniques developed through physics. Physics extends and enhances our understanding of other disciplines, such as; agricultural, chemical, biological, environmental sciences, astrophysics and cosmology, statistics, sociology, etc. which are subjects of substantial importance to all people of the world.

The department keeps itself alive with regular academic activities like seminars, workshops, conferences. It is well equipped with advanced and sophisticated instruments and laboratories. Faculty members have liaisons with research institutions of repute in India and abroad.

Under Graduate Curriculum Framework for Bachelor of Science (B.Sc. - Physics)

1. **Name of the Programme : B.Sc. Physics**

2. **About the Programme:** The Department of Physics offering three year's under graduate course (VIII - Semesters) leading to Bachelor of Science.

Vision

Establish a platform for the dissemination and creation of knowledge through teaching and research in Physics at various levels. Further, it helps create a scientific society that encourages logical thinking. Physics portraits the landscape of life and this department looks forward to exploring the physics lying beneath our observations.

Mission

- To offer state-of-the-art Academic Programs in Physics and in interdisciplinary areas.
- To create intellectual property through innovations, quality research publications, and patents.
- To evolve strategies in the Department for continuous Improvement.
- Providing an exciting learning opportunity for non-physics and non-science majors that provides a basic understanding of physics and problem-solving skills.
- Maintaining a research environment, in which key scientific and technical innovation are generated.
- Providing undergraduate and master's student's research experience, through which they contribute the scientific enterprises.
- Maintain a healthy level of external research funds allowing us to provide financial support for the Ph.D. students during their thesis research and prepare them for academic, research, and industrial careers.
- Having faculty brings exciting and current research perspectives to the classroom

Objectives:

- To motivate students towards research in Physics as well as in interdisciplinary areas.
- To carry out high-quality scientific research in wide areas of Physics.
- To carry out research through collaboration with researchers of other reputed academic institutions of India and abroad.
- To bring externally sponsored funds in order to strengthen laboratory facilities and support doctoral students.
- To organize outreach activities to promote scientific culture.
- To realize the advancement of teaching and learning and discover new layers of knowledge in Engineering Physics by providing the right academic ambiance.
- To promote the department as a center of excellence.

3. Structure of the Programme:
Curriculum Framework
Syllabus – B.Sc. (Physics) 2022-23
L-5 (I & II Semester)

I-Semester :

Level / Semester	Nature of Course	Courses Code	Course Title	MM	Credits
L-5 I Semester	Discipline Specific: Major- 1	PHY-DSM-111	Mechanics and Relativity	100	4
	Discipline Specific: Major- 2	PHY- DSM 112	Mechanics lab.	100	2
	Multi Discipline Major - 3	PHY-MDM 113	General Physics -I	100	6
	Skill Enhancement Course	PHY-SEC 114	Basic Electronics	100	2
	Ability Enhancement	PHY-AEC-115	Report writing for Lab I	100	2
				Total Credits :	**16**

II-Semester:

Level / Semester	Nature of Course	Courses Code	Course Title	MM	Credits
L-5 II Semester	Discipline Specific: Major -1	PHY-DSM-211	Electricity and Magnetism	100	4
	Discipline Specific: Major-2	PHY- DSM 212	Electricity and Magnetism Lab.	100	2
	Multi Discipline Major - 1	PHY-MDM 213	General Physics -II	100	6
	Skill Enhancement Course	PHY-SEC 214	Basic Instrumentation	100	2
	Ability Enhancement	PHY-AEC-215	Report writing for Lab II	100	2
				Total Credits :	**16**

First Semester
Discipline Specific: Major-1
PHY-DSM-111 – Mechanics and Relativity
(Credits 4; 60 Hrs; M.M. 100 = 60 end sem. + 40 sessional)

Semester I			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Discipline Specific Major -1	**PHY-DSM-111**	**Mechanics and Relativity**	**4**

Course Learning Objectives:

Students will learn the basics of Vectors, Differential equations and Newtonian Mechanics. These part of paper will definitely very useful for other discipline/ areas of physics such as electromagnetic theory, solid state physics, waves and optics etc.. Students will be familiar with scalars, vectors and their uses, Laws of motion, conservation laws and their application in real world problems. They will also see the use of Mechanics in various areas of technology.

Unit wise Learning Outcomes :

Upon successful completion of the course, the student:

UO1: Will be able to understand scalars, vectors, differential equations and their applications in various areas of physics.

UO2: Will learn about Newton's laws of motion, their application, laws of conservation of energy and momentum and also learn to solve problems based on the concepts mentioned above.

UO3: Will have knowledge about Gravitational laws, rotational motion and Oscillatory motion. Students will also learn the application of rotational and oscillatory motion in human life.

UO4: Will be able to understand the properties of matter in different forms such as solids and liquids and their various applications. Students will learn about elastic properties of solids their types and viscous nature of liquids.

UO5: Will have idea about special theory of relativity. Students will learn how fundamental physical quantities like mass, length, time changes by the effect of relativity.

UNIT - I

Vectors: Introduction, Representation of vectors in various co ordinate systems (Cartesian, Spherical and Cylindrical) Vector Algebra: Addition and subtraction of vectors, Scalar and vector products (product of two and three vectors)

Derivatives of a vector with respect to a parameter: gradient, divergence, Curl and their significance

1st order homogeneous differential equations with variable coefficients, 2nd order homogeneous differential equations with constant coefficients **(Lectures-12)**

UNIT - II

Laws of Motion: Frames of reference, Newton's Laws of motion, Dynamics of a system of particles, Centre of Mass. **Momentum and Energy:** Conservation of momentum, conservation of energy, Work energy theorem, Motion of rockets. **(Lectures-12)**

Unit-III

Rotational Motion: Angular velocity and angular momentum, Torque, Conservation of angular momentum. **Gravitation:** Newton's Law of Gravitation, Kepler's Laws (statement only), Satellite in

circular orbit and applications, geosynchronous orbits, Weightlessness **Oscillations:** Simple harmonic motion, Differential equation of SHM and its solutions, Kinetic and Potential Energy, Total Energy and their time averages, Damped oscillations. **(Lectures-12)**

UNIT - IV

Properties of Matter:

Elasticity: Hooke's Law – Stress-strain diagram- Elastic moduli-Relation between elastic constants – Poisson's Ration-Expression for Poisson's ration in terms of elastic constants – Work done in stretching and work done in twisting a wire-Viscosity: Viscous flow of fluids, coefficient of viscosity, Stream Line flow Stokes law and expression for terminal velocity. **(Lectures-12)**

UNIT - V

Special Theory of Relativity: Postulates of Special Theory of Relativity, Michelson Morley Experiment, Galilean and Lorentz Transformation, Length contraction; Time dilation; Relativistic addition of velocities **(Lectures-12)**

Essential Readings :

- University Physics, FW Sears, MW Zemansky and HD Young13/e, 1986. Addison Wesley.
- Mechnics Berkeley Physics course, v.1: Charles Kittel, et.AL. 2007, Tata McGraw-Hill.
- Mathematical Physics, Lu Chipmann,

Suggested Readings :

- Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

First Semester
Discipline Specific: Major-2
PHY-DSM-112 –Mechanics Lab
(Credits 2; 60 Hrs; M.M. 100 = 60 end sem. + 40 sessional)

Semester I			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Discipline Specific Major -2	**PHY-DSM-112**	**Mechanics Lab**	**2**

LIST OF EXPERIMENTS :

S.No.	Name of Experiments
1	Measurements of length (or diameter) using vernier caliper, screw-gauge and travelling microscope
2	To determine the modulus of rigidity of wire by Torsional Pendulum.
3	To determine the Moment of Inertia of a Flywheel
4	To determine the Young's Modulus of a Wire by bending of beam..
5	To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
6	To determine the Elastic Constants of a Wire by Searle's method
7	To determine g by Bar Pendulum.
8	To determine g by Katter's Pendulum
9	To study the theorem of perpendicular axis of moment of inertia.
10	To study the Motion of a spring and calculate (Spring Constant (K) Value of g.

Essential Reading :

- A Text Book of Practical Physics, Indu-Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

Suggested Readings:

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.

First Semester
Multi Discipline Major-1
PHY-MDM-113 – General Physics-I
(Credits 6; 90 Hrs; M.M. 100 = 60 end sem. + 40 sessional)

Semester I			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Multi Disciplinary Major-1	**PHY-MDM-113**	**General Physics-1**	**6**

Course Learning Objectives:

Students will learn the very basic concepts of various areas of Physics which are very useful in our daily life. These concepts have wide applications in all area of science and technology. Students will be familiar with Mechanics, Thermal physics, waves and Oscillations, Optics their uses in real world problems.

Unit wise Learning Outcomes :

Upon successful completion of the course, the student:

UO1: Will be able to understand basic laws of mechanics and its application in real life.

UO2: Will learn about thermal Physics how heat flows and its effect on matter, working of thermometer.

UO3: Will have knowledge about various properties of solids and liquids. Which property is responsible for deformation etc in solids, what are the reasons for flow of liquids and their uses?

UO4: Will be able to understand about oscillations and waves. How waves will be produced, how waves propagate in the given medium, types of waves and their application.

UO5: Will have idea about Light, The nature of light and associated phenomenon which occurs in the nature. The use of optics to frame various types of optical instruments such as microscopes and telescopes.

Unit-I:

Mechanics: Newton's Laws of Motion, Energy, Momentum, conservation laws Centre of mass, Rotational Motion, Angular Momentum, Work, Work energy theorem,

(Lectures 18)

Unit-II

Thermal Physics: Heat, Thermometer, Types of thermometer: Mercury Thermometer, Gas Thermometer, Black body radiation. **(Lectures-18)**

Unit-III:

Properties of Matter: Solids: Elasticity, Stress, strain, Hooke's Law – Stress-strain diagram. Surface tension, angle of contact, Viscosity: Viscous flow of fluids, coefficient of viscosity, Stream Line flow, principle of continuity, Bernoulli's theorem, **(Lectures-18)**

Unit-IV

Wave and Oscillations: SHM, Hook's law, equation of SHM, Sound waves, velocity of waves in stretched wire, transverse and longitudinal waves, **(Lectures-18)**

Unit-V:

Optics: Reflection and refraction of light from plane and curved surface, Laws of reflection and refraction, refraction through Prism, Optical Instruments: Simple Microscope, Telescope.

(Lectures-18)

Essential Readings :

- University Physics, FW Sears, MW Zemansky and HD Young13/e, 1986. Addison Wesley.
- Mechnics Berkeley Physics course, v.1: Charles Kittel, et.AL. 2007, Tata McGraw-Hill.

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Suggested Readings :

- Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

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First Semester
Skill Enhancement Course
PHY-SEC-114 – Basic electronics
(Credits 2; 30 Hrs; M.M. 100 = 60 end sem. + 40 sessional)

Semester I			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Skill Enhancement Course	**PHY-SEC-114**	**Basic electronics**	**2**

Course Learning Objectives:

The aim of this course is to enable the students to design and trouble shoots the basic electrical circuits.

Unit Learning Outcomes:

Upon successful completion of the course, the student will be able to:

UO 1: Understand basic electricity like voltage, current, resistance, power will be familiar with multi-meter, voltmeter and ammeter.
UO 2 :Understand basic electric circuit elements and their combination.
UO3 : Understand AC circuits, impedance, series and parallel LCR circuit.
UO4 : Understand the use of generators and transformers in practical application.
UO5: Understand electrical wiring, different types of conductors and cables.

UNIT – I

Basic Electricity Principles: Voltage, Current, Resistance, and Power, Ohm's law, Series, parallel and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with multi-meter, voltmeter and ammeter. (Lecture 6)

UNIT – II

Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits.

UNIT - III

Electrical Circuits: AC Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit.

UNIT - IV

Generators and Transformers: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers.

UNIT - V

Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits.

Essential Readings :

- A text book in Electrical Technology - B L Theraja, A K Theraja, s. Chand & Co. Volume II,2005

Suggested Reading :

- Performance and design of AC machines - M G Say, CBS Publisher, 3rd Edition 2002

First Semester
Ability Enhancement Course
PHY-AEC-115 – Report Writing for Lab.
(Credits 2; 30 Hrs; M.M. 100 = 60 end sem. + 40 Sessional)

Semester I			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Ability Enhancement Course	**PHY-AEC-115**	**Report Writing for Lab.**	**2**

This course is for report writing skill for lab work. Student will get knowledge about the instruments used in laboratory and be able how to use and aware about the function of instruments

Second Semester
Discipline Specific: Major-1
PHY- DSM-211 – Electricity and Magnetism

(Credits 4; 60 Hrs; M.M. 100 = 60 end sem. + 40 sessional)

Semester II			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Discipline Specific Major-1	**PHY-DSM-211**	**Electricity and Magnetism**	**4**

Course Learning Objectives:

Students will learn the basics of Electricity and Magnetism which have wide applications in all area of science and technology. Students will be familiar with scalars, vectors and their uses, static and dynamic electric and magnetic fields, and the principles of electromagnetic induction, and Maxwell's Equations and their applications. The students will be able to apply the concepts learnt to several real world problems.

Unit wise Learning Outcomes :

Upon successful completion of the course, the student:

UO1: Will be able to understand scalars, vectors, various theorems and their uses in Physics.

UO2: Will learn about electric field and potential due to various charge distribution. Will have knowledge about electric field and potential of a dipole, capacitance of a condenser.

UO3: Will have knowledge about dielectrics, parallel plate capacitor, steady and non steady current, rise and decay of current in circuits containing L, R and C.

UO4: Will be able to understand magneto statics, various laws of magnetism, magnetic properties of materials.

UO5: Will have idea about electromagnetic induction, various laws, Maxwell's equations and electromagnetic wave propagation.

UNIT - I

Vector Calculus: Gradient, divergence, Curl and their significance, Vector Integration, Line, Surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem. **(Lecture-12)**

UNIT - II

Electrostatics: Electric field, Electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem - Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charges sheet, charged conductor, Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere, Calculation of electric field from potential, Capacitance of an isolated spherical conductor, Parallel plate, spherical and cylindrical condenser, Energy per unit volume in electrostatic field. **(Lecture-12)**

UNIT - III

Dielectric & Steady Currents: Dielectrics, Effect of electric field on dielectrics, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric. Electric polarization P, Relation between D, E and P.

Steady current, current density J, non-steady current and continuity equation, Kirchoff's law (statement only) rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits.

(Lecture-12)

UNIT - IV

Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field, Magnetic vector potential, Ampere's circuital law.

Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials. **(Lecture-12)**

UNIT - V

Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual nductance, L of single coil, M of two coils, Energy stored in magnetic field.

Maxwell's equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves. **(Lecture-12)**

Essential Readings :

- Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
- D.J. Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.
- Fundamentals of Electricity and Magnetism, Arthur F. Kip, 2nd Edn.1981, McGrawHill.

Suggested Readings:

- Electricity and magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.
- Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford Univ. Press.

Second Semester
Discipline Specific: Major-2
PHY- DSM-212 – Electricity and Magnetism Lab
(Credits 2; 60 Hrs; M.M. 100 = 60 end sem. + 40 sessional)

Semester II			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Discipline Specific Major-2	**PHY-DSM-212**	**Electricity and Magnetism Lab**	**2**

1. Course Learning Objectives:

Students will get hand on experience on different experiments related to the Electricity and Magnetism. Students will be able to see the applications of Electricity and Magnetism theory they learned from PHY-DSM-212. They will be familiar with different instruments like LCR circuit, Galvanometer, Wheatstone bridge, Capacitor, Inductor and solenoid coil.

List of Experiments :

1. To use a Multimeter for measuring (a) Resistance, (b) AC and DC voltages, (c) DC Current and (d) Checking electrical fuses.
2. Study of characteristic of Ballistic Galvanometer and calculate of its Ballistic Constant ..
3. To study of variation of magnetic field due to flow of current in a circular coil along its axis .
4. To study the charging and discharging of a capacitor through resistance.
5. To study the frequency response characteristic curves of LCR circuit in series.
6. To study the frequency response characteristic curves of LCR circuit in parallel .
7. Calculation of resistance per unit length of a given wire by Carey Foster's Bridge and determination of Low Resistance of a given wire.
8. To determine impedance and power factor of LCR Circuit
9. To verify the Thevenin theorem.
10. To verify the Norton theorem.
11. To verify the maximum power transfer theorem.
12. To verify the Superposition theorem.

Outcome: *Students will be able to understand the applications of basic principle of Electricity and Magnetism theory in real world.*

Essential Reading :

- A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

Suggested Readings:

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.

Link for e-Books for Physics :

- -964210
- http://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAJkNDp5v8Yy6xK1s0Kma0VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE
- https://www.sciencebooksonline.info/physics.html
- http://www.cambridgeindia.org/
- https://bookboon.com/en/physics-ebooks

Second Semester
Multi Discipline Major-1
PHY-MDM- 213 – General Physics II

(Credits 6; 90 Hrs; M.M. 100 = 60 end sem. + 40 sessional)

Semester II			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Multi Disciplinary Major-1	**PHY-MDM-213**	**General Physics- II**	**6**

Course Learning Objectives:

Students will learn the very basic concepts of various areas of Physics which are very useful in our daily life. These concepts have wide applications in all area of science and technology. Students will be familiar with electricity, Magnetism, Atomic Physics, Nuclear Physic, Semiconductors and their uses in real world problems.

Unit wise Learning Outcomes :

Upon successful completion of the course, the student:

UO1: Will be able to understand electric charges, forces between charges, electric current and how to utilize optimum current by using combination of resistances.

UO2: Will learn about magneto-statics, Electromagnetic Induction and their application

UO3: Will have knowledge about Atomic Structure, Constituents of Atom, Spectra arises because of transition of electrons.

UO4: Will be able to understand Nuclear Structure, Stability of Nucleus and disintegration of nucleus.

UO5: Will have idea about solid structures, semiconductors, types of semiconductors, the application of semiconductor based diodes

Unit-I

Electricity: Forces between charges Coulomb's law, electric field, electric lines of forces, electric field due to point charge, electric field due to line, surface and volume charges, Gauss law and its application, Capacitors, dielectrics, energy in capacitor, series and parallel combination of capacitors, Resistance, drift velocity, resistivity, electric current and potential, Ohm's law, combination of resistances series and parallel, battery, EMF. **(Lectures-18)**

Unit-II

Magnetism : Magnetic field, Lorentz force, Biot savart law, Fleming Left and Right hand rule, Magnetic field due to wire, circular loop, solenoid, Ampere's law, Application of Ampere's law, Magnetic flux, electromagnetic Induction, Faraday's Law, Lenz Law, Transformer, Eddy currents, D C Motor and A C motor **(Lectures-18)**

Unit-III

Atomic Physics: Rutherford's Model, Bhor's Model, Hydrogen Atom spectra: Lyman, Balmer, Paschen, Bracket and Pfund series, Atomic orbital, energy levels quantum numbers, Hunds law, Aufbau principle, Pauli exclusion principle. **(Lectures-18)**

Unit-IV:

Nuclear Physics: Nuclear Structure and properties, Nuclear Radius Atomic number and Mass number, Binding energy, Mass defect, Binding energy curve, Radio activity, Law of disintegration, Half life, decay constant, alpha, beta and gamma decay. **(Lectures-18)**

Unit-V

Solids and Semiconductor Physics: Crystal Structure, Lattice, Simple Cubic, BCC and FCC Lattice, Bravious lattice, Band Structure in solids: Energy band gap, Intrinsic and Extrinsic Semiconductor, N type and P type semiconductors, PN diode, Biasing: forward and reverse biasing in PN diodes, Characteristics of PN diode, Rectifier: half wave and full wave rectifier. **(Lectures-18)**

Essential Readings :

- University Physics, FW Sears, MW Zemansky and HD Young13/e, 1986. Addison Wesley.
- Mechnics Berkeley Physics course, v.1: Charles Kittel, et.AL. 2007, Tata McGraw-Hill.

Suggested Readings :

- Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

Second Semester
Skill Enhancement Course
PHY-SEC 214 – Basic Instrumentation
(Credits 2; 30 Hrs; M.M. 100 = 60 end sem. + 40 sessional)

Semester II			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Skill Enhancement Course	**PHY-SEC-214**	**Basic Instrumentation**	**2**

Course Learning Objectives:
This course is to get exposure with basic instruments and their usage.

Unit Learning Outcomes:
Upon successful completion of the course, the student will be able to:

- Find out errors, accuracy, precision, sensitivity of the instruments.
- Measure voltage and current using multi-meter, electronic voltmeter, AC mili-voltmeter.
- Use CRO in practical applications.
- Use signal generator, function generator.
- Understand digital meter.

UNIT - I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. **(Lecture-6)**

UNIT - II

Multi-meter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. **Electronic Voltmeter:** Principles of voltage measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. **AC milli-voltmeter:** Type of AC millivoltmeters: Amplifier- rectifier, and rectifier-amplifier. Block diagram ac milli-voltmeter**,** specifications and their significance. **(Lecture-6)**

UNIT - III

Cathode Ray **Oscilloscope:** Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration. brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance**)**. Use of CRO for the measurement of voltage, frequency, time period.
(Lecture-6)

UNIT - IV

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. **(Lecture-6)**

UNIT - V

Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter. **(Lecture-6)**

Essential Readings :

- A text book in Electrical Technology - B L Theraja, A.K. Theraja - S Chand and Co. Volume II, 2005
- Performance and design of AC machines - M G Say CBS Publisher 3rd Edition 2002.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Logic circuit design, Shimon P. Vingron, 2012, Springer.

Suggested Readings :

- Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
- Electronic Devices and circuits, S. Salivahanan & N. S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill
- Electronic circuits: Handbook of design and applications, U.Tietze, Ch.Schenk, 2008, Springer
- Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

Second Semester
Ability Enhancement Course
PHY-AEC-115 – Report Writing for Lab.
(Credits 2; 30 Hrs; M.M. 100 = 60 end sem. + 40 Sessional)

Semester II			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Ability Enhancement Course	**PHY-AEC-215**	**Report Writing for Lab.**	**2**

This course is for report writing skill for lab work. Student will get knowledge about the instruments used in laboratory and be able how to use and aware about the function of instruments

Member of Board of Studies in Physics
On 16-09-2022

Prof. A.P. Mishra
External Member
Deptt. of Chemistry

Prof. Devashish Bose
External Member
Deptt. of Criminology & Forensic Sc.

Prof. Manoj K. Shrma
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Dr. Maheswar Panda
Deptt. of Physics

Prof. Ashish Verma
Dean, SMPS
Deptt. of Physics

Prof. Ranveer Kumar
HoD & Chairman, BoS

School Board of Studies Meeting held on 19th September, 2022

Prof. A.K. Saxena
(External Member)
Department of Mathematics, Maharaja Chhatrasal University, Chhatarpur, MP

Prof. K.S. Varsney
(External Member)
HoD Physics, D.S. College, Aligarh, UP

Prof. Narendra Pandey
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Department of Physics, University of Lucknow, UP

Prof. Diwakar Shukla
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Department of Mathematics & Statistics, Dr. Harisingh Gour V.V., Sagar

Prof. R.K. Gangele
(Member)
Department of Mathematics & Statistics, Dr. Harisingh Gour V.V., Sagar

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Dr. Maheshwar Panda
(Member)
Department of Physics, Dr. Harisingh Gour V.V., Sagar

Mr. Kamal Kant Ahirwar
(Member)
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