List of Revised Courses

Department : *Pure and Applied Physics*

Program Name : *B.Sc. (Physics)*

Academic Year : 2016-17

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	BP-101	Mechanics and Properties of Matter
02.	BP-102	Electromagnetic Theory – I
03.	BP-201	Kinematics and Oscillation
04.	BP-202	Electromagnetic Theory-II
05.	BP-203	Lab-II

Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2016-17

School : *School of Physical Sciences*

Department : *Pure and Applied Physics*

Date and Time : *December 12, 2016 – 11:30 AM*

Venue : *Smart Class Room*

The scheduled meeting of member of Board of Studies (BoS) of Department of Pure and Applied Physics, School of Studies of Physical Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, was held to design and discuss the B. Sc. (Physics) First year (I and II Semesters), scheme and syllabi.

The following members were present in the meeting:

1. Dr. R. P. Prajapati
2. Dr. M. N. Tripathi
3. Dr. R. K. Pandey
4. Dr. Parijat Thakur
5. Dr. H. S. Tewari
6. Prof. D. P. Ojha
7. Prof. P. K. Bajpai

The committee discussed and approved the scheme and syllabi. The following courses were revised in the B. Sc. (Physics) First year (I and II Semesters):

- Mechanics and Properties of Matter (BP-101)
- Kinematics and Oscillation (BP-201)

The following new courses were introduced in the B. Sc. (Physics) First year (I and II Semesters):

- Electromagnetic Theory – I (BP-102)
- Electromagnetic Theory - II (BP-202)

The earlier course of Electromagnetic Theory provided in 2nd semester has been divided into two courses provided in 1st and 2nd semester.

Signature & Seal of HoD

Scheme and Syllabus

Course Structure

5 Years Integrated UG/PG B.Sc. Physics

1st and 2nd Semester 2015-16

Credit Based System

Department of Pure and Applied Physics
Guru Ghasidas Vishwavidalaya, Bilaspur-495 009 (C.G.)

Semester-I (Physics)			
Paper	**Code**	**Paper Name**	**Marks**
I	**BP-101**	Mechanics and Properties of Matter	**50**
II	**BP-102**	Electromagnetic Theory - I	**50**
III	**BP--103**	Lab-1	**50**
Semester-II			
Paper	**Code**	**Paper Name**	**Marks**
IV	**BP-201**	Kinematics and Oscillation	**50**
V	**BP-202**	Electromagnetic Theory - II	**50**
VI	**BP--203**	Lab-II	**50**

w. e. f.: 2016-17
BoS held on: 12/12/2016

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Guru Ghasidas Vishwavidyalaya
बिलासपुर (छ.ग.)
Bilaspur (C.G.)

(External Expert)

Semester-I

Paper-I (BP-101): Mechanics and properties of Matter

Objective: This course would empower the student to acquire engineering skills and practical knowledge regarding mechanical motions, which help the students in their everyday life. This syllabus will cater the basic requirements for their higher studies.

Unit I: Cartesian coordinate system, Frame of reference, Laws of motion, One dimensional motion of particle under the influence of (i) constant force F (ii) time dependent force $F(t) = F_o e^{-\lambda t}$, F_o Sin $(\omega t+\phi)$ (iii) velocity dependent force $F(v) = -kv$, k is a constant and (iv) position dependent force $F(x) = -kx$, k is a constant. Uniformly rotating frame, Centrifugal acceleration and Coriolis force. [8]

Unit II: System of particles, Centre of mass, Conservation of linear and angular momentum, Conservation of energy, Rigid body motion, Moment of inertia, theorem of parallel and perpendicular axis (statement) for calculation of moment of inertia, Derivation of moment of inertia for (i) rectangular lamina (ii) circular disc (iii) annular disc (iv) solid sphere (v) spherical shell and (vi) Flywheel. [7]

Unit III: Elasticity, Stress and Strain, Hook's law, Types of elasticity, Young Modulus, Bulk Modulus, Modulus of rigidity, Relation between elastic constants, Poission's ratio, Torsion of cylinder, Twisting couple, Torsional pendulum, Bending of beam, Bending moment, Beam supported at both ends, Cantilever. [8]

Unit IV: Kinematics of moving fluids, streamline and turbulent flow, Equation of continuity, Viscous fluids, Critical velocity, Reynold's number, Stoke's law, Terminal velocity, Determination of viscosity using Stoke's law. [7]

Outcome: The properties of solids especially knowledge of elasticity helps the students to identify materials suitable for the construction of building house etc.

Reference books:

1. Mechanics By D. S. Mathur
2. Mechanics By J. C. Upadhyaya
3. Mechanics By R. B. Singh
4. Classical Mechanics By A. P. Arya
5. Elements of Properties of Matter by D.S.Mathur
6. Classical Dynamics of Particles and Systems By Thornton & Marion
7. Berkeley Physics Course, Vol. I, Mechanics
8. The Fynman Lecture Series, Vol. I

PAPER-II (BP-102): Electromagnetic Theory-I

Objectives: To provide students a better understanding of Electromagnetic Waves and Fundamentals. Further, the students will also gain the ability to solve the problems in different EM fields.

Unit-I: Concept of Scalar and Vector fields, Gradient of a scalar field and its geometrical interpretation, Divergence and Curl of a vector field, line, surface and volume integral, Flux of a vector field, Gauss's Divergence Theorem, Stokes Theorem.

(7)

Unit-II: Electric field, Force on a charged particle in electric field, Electric dipole, Electric field of dipole and electric dipole in electric field, Potential energy of an electric dipole, Work done on a charge in a electrostatic field expressed as a line integral, Conservative nature of the electrostatic field, Electric potential, Potential due to electric dipole. Continuous charge distributions, line, surface, volume charge densities; Gauss's Law and its application, Calculation of electric field for symmetric charge distributions, Field at the surface of a conductor. (7)

Unit-III: Dielectrics, polarization and polarization vector (P), displacement vector (D), electric susceptibility, dielectric constant, relation between E, D, & P, Gauss's law in presence of dielectric, energy in dielectric system and force on dielectric.

(7)

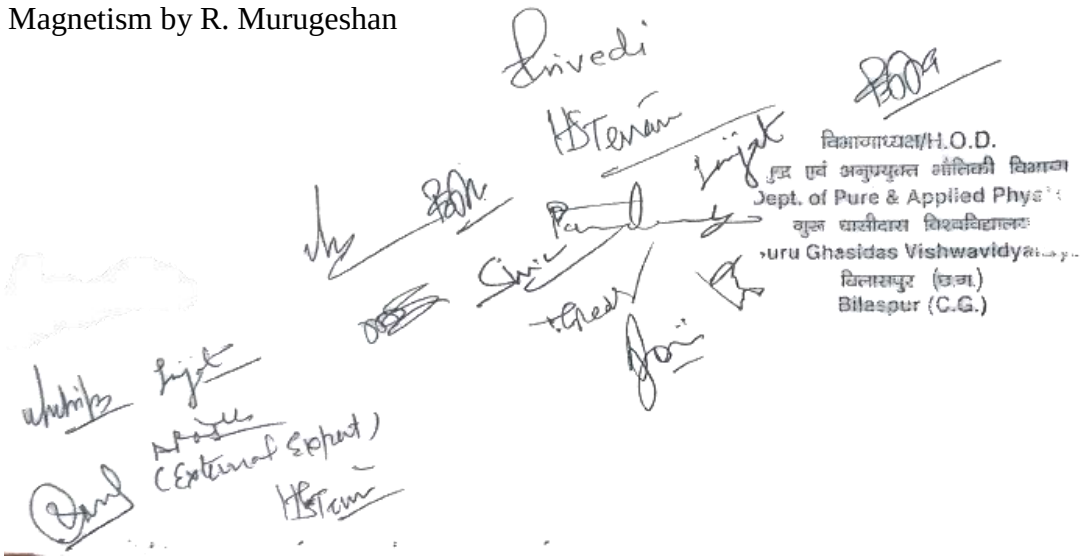
Unit-IV: Steady current, current density, Ohm's law, non-steady current and continuity equation. Force on a moving charge, Lorentz Force Equation and definition of B, motion of a charged particle in a uniform magnetic field, applications: velocity selector and mass spectrometer, magnetic force on a current carrying wire, torque on a current loop.

(7)

Outcomes: To provide the students with the ability to list and describe selected fundamental and experimental techniques in electromagnetic theory.

Text Books:

1. Introduction to Electrodynamics by Griffiths
2. Electricity & Magnetism by J. D. Dubey and R. K. Tiwari
3. Electricity and Magnetism by R. Murugeshan



Semester-II

Paper-IV (BP-201): Kinematics and Oscillations

Objective: The goal is to develop an understanding of various kinds of oscillations and their energy analysis along with particular emphasis on simple harmonic motion.

Unit I: Conservative and non-conservative forces, Motion under central force, Kepler's laws, Gravitation, gravity, Gravitational field and potential due to uniform spherical shell & due to uniform solid sphere, Conservation of mechanical energy. **[8]**

Unit II: Simple Harmonic Oscillations, Displacement in Simple Harmonic Motion, Velocity and Acceleration in Simple Harmonic Motion, Differential equation of SHM, Energy of a Simple Harmonic Oscillator, simple pendulum, compound pendulum, bar pendulum, simple harmonic oscillations of a loaded spring. **[7]**

Unit III: Free Oscillations, Damped Oscillations, Damping Coefficient, Logarithmic Decrement, Forced Oscillations, Amplitude, Phase, Resonance, Sharpness of Resonance, Power Dissipation and Quality Factor and Electrical analogy.** **[8]**

Unit IV: Motion of charged particles in electric & magnetic field: E as an accelerating field, linear accelerator, Transverse B field: 180^{o} deflection, velocity selector, mutually perpendicular E & B field, motion of charged particle in parallel E & B field, Cyclotron.** **[7]**

Outcomes: Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.

**** Obsolete portion have been deleted from above marked units.**

References:

1. Mechanics by Mathur D.S.
2. Mechanics by Upadhyay J.C.
3. The Physics of Vibrations and Waves by Pain, H.J.
4. The Mathematics of Waves and Vibrations by Ghosh, R.K.
5. Oscillations and Waves by Singh, R.B.
6. Oscillations and Waves by Buckley, R.

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Paper-V (BP-202): Electromagnetic Theory-II

Objectives: To provide students a better understanding of Electromagnetic Waves and Fundamentals. Further, the students will also gain the ability to solve the problems in different EM fields.

Unit-I: Biot and Savart's law, Magnetic field due to a finite straight wire, Force between two parallel wires, Ampere law, Field inside and outside a current carrying wire, Solenoid and Toroid. (7)

Unit-II: Faraday's law of induction, Lenz law, Motional electromotive force, Induced electric field, Eddy currents, Self inductance, Self inductance of solenoid, Mutual inductance, Mutual inductance of two concentric coplanar loops. (7)

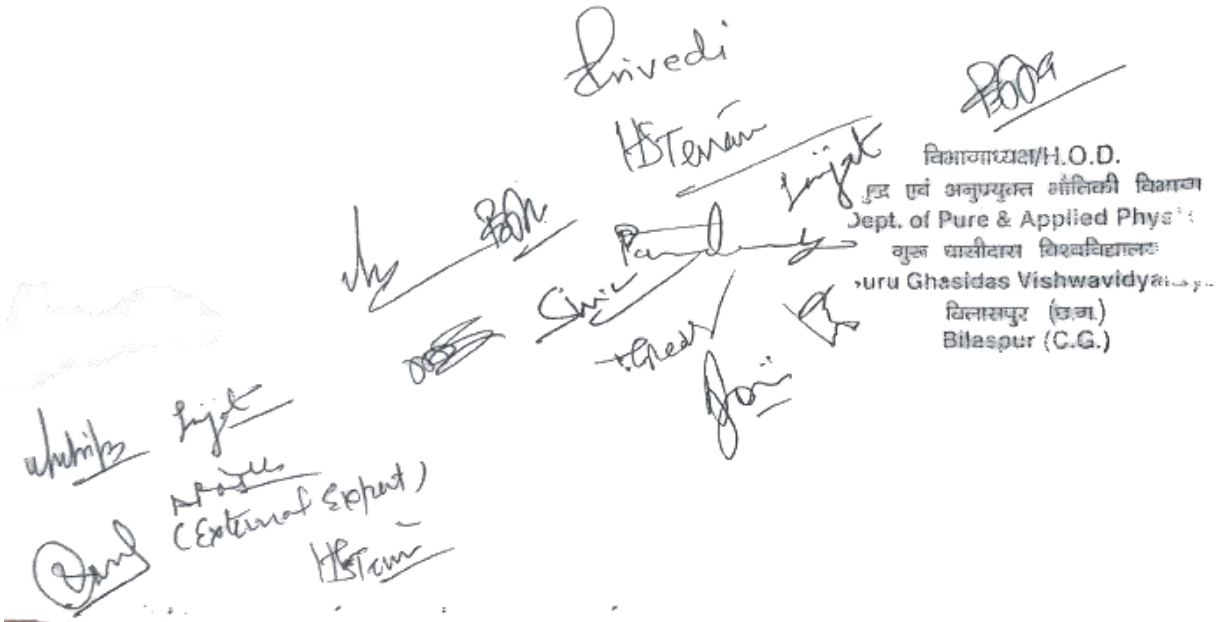
Unit-III: Concept of Maxwell's Displacement current, Guass's law of Magnetism, Maxwell's equations, Electromagnetic field energy density, Poynting's vector and pointing theorem. (7)

Unit-IV: Electromagnetic waves in free space, properties of electromagnetic waves, Electromagnetic waves in conducting medium, Skin depth, relative directions and phase of E and H in conducting medium. (7)

Outcomes: To provide the students with the ability to list and describe selected fundamental and experimental techniques in electromagnetic theory.

Text Books :

1. Introduction to Electrodynamics, Griffiths
2. Electricity and Magnetism, R. Murugeshan
3. Electromagnetic theory and Electrodynamics, Satyaprakash



Paper-VI (BP-203)Lab-II

Objective: This course would empower the student to acquire engineering skills and practical knowledge regarding mechanical motions, which help the students in their everyday life. This syllabus will cater the basic requirements for their higher studies.

List of Experiments

1. To determine the value of acceleration due to gravity by Kater's reversible pendulum.
2. To determine the value of electronic specific charge (e/m) by Thomson's method.
3. To determine the damping constant, relaxation time and quality factor of a simple pendulum as damped harmonic oscillator
4. To determine the damping constant, relaxation time and quality factor of a Ballistic galvanometer as damped harmonic oscillator
5. Spiral Spring (Force constant)
6. Verification of laws of series and parallel combination (LCR)
7. To determine Self Inductance of a Coil by Rayleigh's Method.
8. To determine the Mutual Inductance of Two Coils by Absolute method using a B.G.
9. Self-inductance by Gouy's method
10. Frequency of A.C. mains using sonometer

Outcome: The properties of various oscillations will help the students to identify suitable vibrational techniques for various applications.

Books:

1. Practical Physics-D. Chattopadhyay and P.C. Rakshit
2. Practical Physics-Wilson
3. Practical Physics- Geeta Sanon

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