

**NEW SYLLABUS
B.Sc. Part-I Semester I**

PHYSICS -I PC 22-1010

MECHANICS-I

(MM 33)

Note: 33 marks assigned to theory papers are distributed in following manner

Continuous evaluation	10 marks
Term End Main Exam	23 marks

Max marks: 33

Duration: 3 hour

Note: - In all five questions are to be set. Four questions will be out of the four units taking one question from every unit with 100% internal choice. Fifth question will be of short answer type covering entire course with no choice. The candidates will be required to attempt all the five questions.

Unit I

Physical law and frame of reference

- (a) Inertial and non-inertial frames, Transformation of displacement, Velocity, acceleration between different frames of references involving translation, Galilean transformation and Invariance of Newton's laws
- (b) Coriolis Force, Transformation of displacement, velocity and acceleration between rotating frame, Pseudo Forces, motion relative to earth, Foucault's Pendulum

UNIT-II

Conservation of Forces: Introduction about conservation and non -conservation Forces, Rectilinear motion under conservation forces, Discussion of potential energy curve and motion of a particle.

Unit-III

Centre of Mass: Introduction about centre of mass, centre of mass frame: collision of two particles in one and two dimensions, slowing down of neutron in a moderator, motion of a system with varying mass, angular momentum concept, conservation and charge particle scattering by a nucleus

Unit-IV

Rigid body: Equation of motion of a rigid body ,Inertial Coefficient, Case of J not parallel to w, Kinetic energy of rotation and idea of principal Axes, Precessional motion of a spinning top

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Reference Books-

1. "Fundamental University Physics", Vol. I and II, Addison Wesley, Reading Mars, LISA.
2. "Berkley Physics Course", Vol. I, Mc. Graw Hill, New York.
3. "The Feynmann Lectures in Physics", Vol. 1, R. P. Feynman, R.B. Leighton and M. Sands, B.I. Publications, Bombay, Delhi, Calcutta, Madras.
4. "Physics".Part 1, David Halliday and Resnick , John Wiley and Sons, Inc. Newyork.
5. "Properties of Matter", D.S.Mathur, S.Chand & Company.

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Top right: A signature, the word "Samar", and a large signature "Siddhant".

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NEW SYLLABUS
B.Sc.Part-1 Semester 1

PHYSICS -II PC 22-1011

ELECTROMAGNETISM -I (MM 33)

Note: 33 marks assigned to theory papers are distributed in following manner

Continuous evaluation	10 marks
Term End Main Exam	23 marks

Max marks: 33

Duration : 3 hour

Note:- In all five questions are to be set. Four questions will be out of the four units taking one question from every unit with 100% internal choice. Fifth question will be of short answer type covering entire course with no choice. The candidates will be required to attempt all the five questions.

Unit -I

Scalar and Vector Field: Concept of field, Scalar and vector fields, Gradient of scalar field, Physical significance and formalism of gradient, Divergence and curl of vector field in Cartesian coordinates system, divergence and curl operators, Concept of solid angle, Gauss divergence and Stokes theorem, Gauss law from inverse square law. Differential form of Gauss law

Unit -II

Electric field and potential energy: Invariance of charge, Potential energy of system of (i) Discrete N charges (ii) Continuous charge distributions. Energy required to build a uniformly charged sphere, classical radius of electron, Electric fields due to short electric dipole with external Uniform and non-uniform electric field, potential due to a uniformly charged spherical shell.

Unit-III

Poisson's and Laplace equations in Cartesian co-ordinates and their applications to solve the problems of electrostatics, Invariance of Charge, Gaussian and SI units and their inner conversions, Electric field measure in moving frames, Electric field of a point charge moving with constant velocity

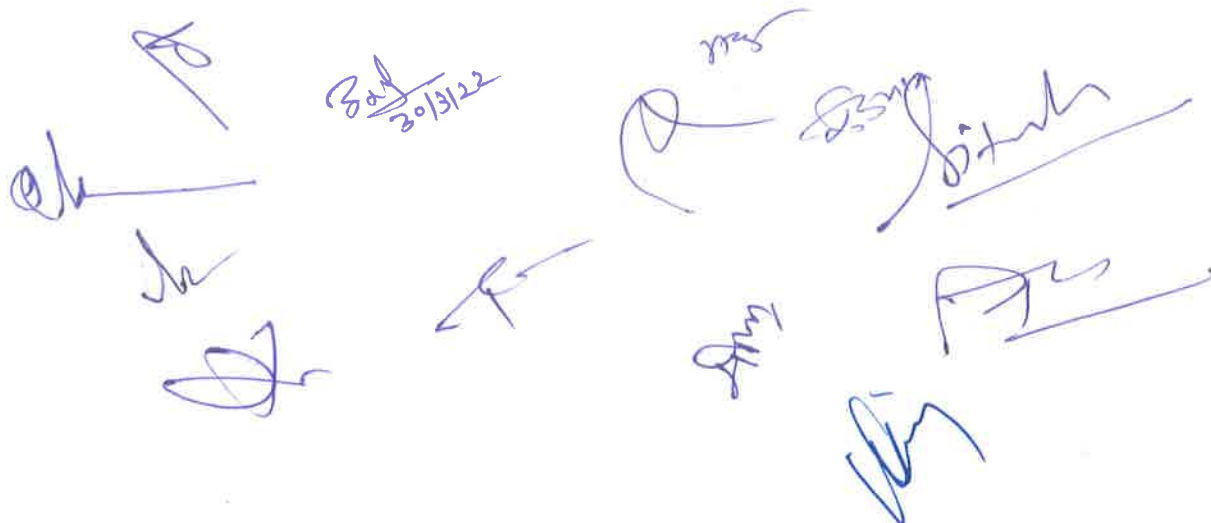
Unit- IV

Electric field in matter: Multipole expansion, definition of moments of charge distribution, Dielectrics, induced dipole moments, polar and non-polar molecules, Free and bound charges, Polarization, Atomic polarizability, electric displacement vector, electric susceptibility, dielectric constant relation between them.

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Reference Books

1. "Electricity and Magnetism with Electronics", K.K.Tewari, S.Chand & Co. Ltd. (2001)
2. "Electricity and Magnetism", D.Chattopadhyay, P.C.Rakshit, New Central Book Agency (P) Ltd
3. "Berkley Physics Course", Vol. I, Mc. Graw Hill, New York.
4. "Electricity and Magnetism", W.J.Duffin , Mc Graw Hill Book Co., Fourth edition.
5. "Electromagnetics", B.B.Laud ,New Age International Publishers, Second edition.
6. "Principles of Electricity and Magnetism",S.Palit, Narosa Publishing House.



NEW SYLLABUS
B.Sc.Part-1 Semester 1

PHYSICS-III PC 22-1012

OPTICS -I

(MM 34)

Note: 34 marks assigned to theory papers are distributed in following manner

Continuous evaluation	10 marks
Term End Main Exam	24 marks

Max marks: 34

Duration: 3 hour

Note:- In all five questions are to be set. Four questions will be out of the four units taking one question from every unit with 100% internal choice. Fifth question will be of short answer type covering entire course with no choice. The candidates will be required to attempt all the five questions.

Unit-I

Interference-I: Concept of spatial and temporal coherence, coherence length, coherence current time, definition and propagation of a wavefront, Huygen,s principle of secondary wavelet. Young's double slit experiment, types of interference, interference by division of wavefront, Fresnel's biprism, measurement of wavelength λ and thickness of thin transparent sheet, interference by division of amplitude, interference in thin film of constant thickness in transmitted and reflected waves, interference produced by a wedge shaped film.

Unit-II

Interference-II: Newton's ring, determination of wavelength and refractive index by Newton's rings, fringe of equal inclination (Haidinger a fringes) equal thickness (fizeau fringes) Michelson's interferometer, shapes of fringes, (measurements of wave length, difference between two spectral lines and thickness of thin transparent sheet).

Unit III

Diffraction I: Fresnel's diffraction, half period zone, Fresnel's diffraction at a circular aperture, straight edge, and at a rectangular slit, Zone plate, multiple foci of Zone plate, comparison between zone plate and convex lens.

Unit-IV

Diffraction II: Fraunhofer's Diffraction, Fraunhofer's diffraction by N parallel slit with two slit as a special case, missing order, plane diffraction grating and its use in determining wavelength, dispersion by grating, criterion of resolution, resolving power of telescope and grating.

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Reference Books

1. "A textbook of Optics", Brijlal and Subramaniam, S.Chand & Company Ltd., 23rd edition.
2. "Text books of Optics and Atomic Physics", D.P. Khandelwal, Himalaya Publishing House.
3. "Optics", Ajoy Ghatak, Tata Mc Graw Hill Pub.Co. Ltd, 2007.
4. "Physics Part II", D.Halliday and R.Resnick, John Wiley & Sons, Inc., Newyork.
5. "Principles of Optics" B.K.Mathur

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NEW SYLLABUS
B.Sc.Part-1 Semester II

PHYSICS-I PC 22-2010

MECHANICS –II

(MM 33)

Note: 33 marks assigned to theory papers are distributed in following manner

Continuous evaluation	10 marks
Term End Main Exam	23 marks

Max marks: 33

Duration: 3 hour

Note:- In all five questions are to be set. Four questions will be out of the four units taking one question from every unit with 100% internal choice. Fifth question will be of short answer type covering entire course with no choice. The candidates will be required to attempt all the five questions.

Unit-I

Motion Under central force: Introduction about central forces, Motion under central forces, Gravitational interaction, Inertia and gravitational mass, general solution under gravitational Interaction, Kepler laws, Discussion about trajectories, Cases of elliptical and circular orbits, Rutherford scattering

Unit-II

Damped harmonic oscillations: Introduction about oscillation in a potential well, Damped force and motion under damping, Damped Simple Harmonic Oscillator, Power dissipation, Anharmonic Oscillator and simple pendulum as an example

Unit –III

Driven Harmonic oscillation: Driven Harmonic oscillator with damping, Frequency response, phase relation, Quality factor, Resonance series and parallel of LCR circuit, Electromechanical system- Ballistic Galvanometer, coupled Oscillations

Unit-IV

Equation of motion of two coupled simple harmonic oscillators, Normal modes, motion in mixed modes, transient behaviour, Dynamic of number of oscillation with neighbour interaction

Reference Books-

6. "Fundamental University Physics", Vol. I and II, Addison Wesley, Reading Mars, LISA.
7. "Berkley Physics Course", Vol. I, Mc. Graw Hill, New York.
8. "The Feynmann Lectures in Physics", Vol. 1, R. P. Feynman, R.B. Leighton and M. Sands, B.I. Publications, Bombay, Delhi, Calcutta, Madras.
9. "Physics", Part 1, David Halliday and Resnick, John Wiley and Sons, Inc. Newyork.
- "Properties of Matter", D.S.Mathur, S.Chand & Company

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NEW SYLLABUS
B.Sc.Part-1 Semester II

PHYSICS -II PC 22-2011

ELECTROMAGNETISM –II

(MM 33)

Note: 33 marks assigned to theory papers are distributed in following manner

Continuous evaluation	10 marks
Term End Main Exam	23 marks

Max marks: 33

Duration : 3 hour

Note:- In all five questions are to be set. Four questions will be out of the four units taking one question from every unit with 100% internal choice. Fifth question will be of short answer type covering entire course with no choice. The candidates will be required to attempt all the five questions.

Unit -I

Electric potential and electric field due to uniformly polarized sphere (i) outside the sphere (ii) at the surface of the sphere (ii) inside the sphere, Electric fields due to a dielectric sphere placed in a uniform electric field (a) outside sphere (b) inside surface, Electric field due to a charge placed in dielectric medium and Gauss law, Clausius-Mossotti relation in dielectrics

Unit-II

Magneto statics and Magnetic field in a matter: Lorentz force, properties of magnetic field, Ampere's law, Field due to a current carrying solid conducting cylinder (a) Outside(b) At the surface and (c) Inside the cylinder, Ampere's law in different form, Introduction of magnetic vector potential, Poisson's equation for vector potential, Deduction of Bio Savart's law using Magnetic vector potential, Differential form of Ampere's law

Unit-III

Atomic Magnet, Gyro magnetic ratio, Bohr Magneton, Larmour frequency, induced magnetic moment and diamagnetism, spin magnetic moment, Para and Ferro magnetism, Intensity of magnetization, Magnetic permeability and susceptibility, free and bound current densities, Magnetic field due to a uniformly magnetized material and non-uniform magnetized material

Unit-IV

Displacement current, Maxwell's equations in differential and integral form. Electromagnetic waves, Electromagnetic waves in isotropic medium, Properties of Electromagnetic waves, Energy density of electromagnetic waves, Poynting Vector, Radiation pressure of free space, Electromagnetic waves in dispersive medium, Spectrum of Electromagnetic waves.

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Reference Books

1. "Electricity and Magnetism with Electronics", K.K.Tewari, S.Chand & Co. Ltd. (2001)
2. "Electricity and Magnetism", D.Chattopadhyay, P.C.Rakshit, New Central Book Agency (P) Ltd
3. "Berkley Physics Course", Vol. 1, Mc. Graw Hill, New York.
4. "Electricity and Magnetism", W.J.Duffin , Mc Graw Hill Book Co., Fourth edition.
5. "Electromagnetics", B.B.Laud ,New Age International Publishers. Second edition.
6. "Principles of Electricity and Magnetism",S.Palit, Narosa Publishing House.



NEW SYLLABUS
B.Sc.Part-1 Semester II

PHYSICS -III PC 22-2012

OPTICS –II

(MM 34)

Note: 34 marks assigned to theory papers are distributed in following manner

Continuous evaluation	10 marks
Term End Main Exam	24 marks

Max marks: 34

Duration: 3 hour

Note:- In all five questions are to be set. Four questions will be out of the four units taking one question from every unit with 100% internal choice. Fifth question will be of short answer type covering entire course with no choice. The candidates will be required to attempt all the five questions.

Unit –I

Polarization: polarization, plane circular and elliptical polarized light, polarization by (i) reflection (ii) refraction (iii) double refraction (iv) dichroism(polaroid). Identification of polarize light. Huygens's theory of double refraction.

Unit –II

Production of circularly and elliptically polarized light, quarter wave and half wave plates. Analysis of polarized light, Optical activity, Laws of optical activity, Fresnel explanation of optical activity, specific rotation. Polarimeter, types of polarimeters (i) Laurent's half shade polarimeter (ii) Biquartz polarimeter.

Unit-III

Laser: Spontaneous and stimulated emission, Einstein's A &B coefficients. Energy density of radiation as a result of stimulated emission and absorption populated emission and absorption, Population inversion, Methods of optical pumping, Energy level schemes, Helium-Neon, Ruby and Carbon dioxide laser.

Unit-IV

Holography: Basic concept of holography principal, theory, construction and reconstruction of image application of holography.

Fiber optics: Introduction to optical fiber, necessity of cladding, optical fiber system, optical fiber cable, total internal reflection, explanation of propagation of light through an optical fiber.

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Reference Books

6. "A textbook of Optics". Brijlal and Subramaniam, S.Chand & Company Ltd., 23rd edition.
7. "Text books of Optics and Atomic Physics". D.P. Khandelwal, Himalaya Publishing House.
8. "Optics". Ajoy Ghatak, Tata Mc Graw Hill Pub.Co. Ltd, 2007.
9. "Physics Part II". D.Halliday and R.Resnick, John Wiley & Sons, Inc., Newyork.
10. "Principles of Optics" B.K.Malhur



NEW SYLLABUS

B. Sc Part I

PHYSICS PRACTICALS SYLLABUS

Note:- Total number of experiments to be performed by the students during the session should be 16 selecting and 8 from each section.

Section – A

1. To study the variation of power transfer by two different loads by a DC source and to verify maximum power transfer theorem.
2. To study the variation of charge and current in a RC circuit with a different time constant (using a DC source).
3. To study the behavior of a RC circuit with varying resistance and capacitance using AC mains as a power source and also to determine the impedance and phase relations.
4. To study the rise and decay of current in an LR circuit with a source of constant emf.
5. To study the voltage and current behavior of an LR circuit with an AC power source Also determine power factor, impedance and phase relations.
6. To study the characteristics of a semi- conductor junction diode and determine forward and reverse resistances.
7. To study the magnetic field along the axis of a current carrying circular coil. Plot the necessary graph and hence find radius of the circular coil.
8. To determine the specific resistance of a material and determine difference between two small resistance using Carey Fosters Bridge.
9. To convert a galvanometer into a ammeter of a given range.
10. To convert a galvanometer into a voltmeter of a given range.

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Section B

1. To study the random decay and determine the decay constant using the statistical board.
2. Using compound pendulum study the variation of time period with amplitude in large angle oscillations.
3. To study the damping using compound pendulum.
4. To study the excitation of normal modes and measure frequency splitting using two coupled oscillators.
5. To study the frequency of energy transfer as a function of coupling strength using coupled oscillators.
6. To study the viscous fluid damping of a compound pendulum and determining damping coefficient and Q of the oscillator.
7. To study the electromagnetic damping of a compound pendulum and to find the variation of damping coefficient with the assistance of a conducting lamina.
8. To find J by Callender and Barn's Method.
9. To determine Young's modulus by bending of beam.
10. To determine Y , σ and η by Searle's method.
11. To ensure Curie temperature of Monel alloy.
12. To determine modulus of rigidity of a wire using Maxwell's needle.
13. Study of normal modes of a coupled pendulum system. Study of oscillations in mixed modes and find the period of energy exchange between the two oscillators.
14. To study variation of surface tension with temperature using Jaegger's method.
15. To study the specific-rotation of sugar solution by polarimeter.

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