Dr. Babasaheb Ambedkar Marathawada University
Aurangabad

Credit Based Syllabus

PHYSICS

B.Sc. II Year

Semester III & IV

Effective From

Academic Year June 2010-11

B.Sc. Second Year (IIIrd Semester)

Course – PHY- 201- Paper IX Marks: - 50

Mathematical and Statistical Physics ----- 3 Credits (45 periods)

1. **Vector Algebra:** Introduction, Scalar triple product, Vector triple product, gradient of scalar field, divergence of vector field and curl of vector field and their physical significance, line integrals, surface integral and volume integral with examples, Gauss divergence theorem.

2. **Differentiation:** Partial differentiation, successive differentiation, total differentiation. Exact differentiation, Solution of first order linear differential equations (1) Complimentary function (2) Particular integral, solution of second order linear differential equations - (1) Homogeneous (2) Inhomogeneous

3. **Statistical Mechanics:** Introduction**,** phase space, microstate and micro state, Probability, Thermo-dynamical probability, probability distribution, most probable distribution.

4. **Maxwell's and Boltzmann's Statistics:** Introduction, Maxwell-Boltzmann's distribution law, evaluation of constants $e^{-\alpha}$ and β and energy distribution.

Reference Books

1. Mathematical physics – Gupta- Kumar
2. Mathematical physics – Rajput.
3. Heat, Thermodynamics and Statistical physics – Brijlal and Subramayam
4. Perspective of Modern Physics – Bezier
5. Vector Analysis – Louse- Brand
6. Mathematical methods in Physics – D. Biswas
7. Statistical Physics and Kinematics – Dr. J P Agarwal.
8. Mathematical static – Kapoor and Sexena

B.Sc. Second Year (IIIrd Semester)

Course – PHY- 202 - Paper X Marks: - 50

Modern Physics and Lasers ---------- 3 Credits (45 periods)

1. **Photoelectric Effect:** Introduction, Lenard's method to determine e/m for photoelectron, Richardson and Compton experiment (i) Relation between photoelectric current and retarding potential (ii) Relation between velocity of photoelectrons and the frequency of light, photoelectric cells (i) photoemissive cell (ii) photovoltaic cell (iii) Photo – conductive cell, applications of photoelectric cells.

2. **X-rays :** Introduction, The absorption of X – rays, diffraction of x – ray , Laue's experiment, Bragg's law, Bragg X-ray spectrometer, X –ray spectra, Main feature of continuous X-ray spectrum, Characteristic X –ray spectrum.

3. **Basic Principal of Lasers:** Induced absorption, Spontaneous emission, stimulated emission, population inversion, properties of Laser beam, Laser pumping, two level and three level systems.

4. **Types of Lasers:** Ruby Laser, He – Ne laser, Carbon dioxide (Co_2) laser and applications of laser – Biological, Medical and industrial**.**

Reference Books

1. Modern Physics --- R. Mugadesham.
2. Modern Physics --- J B Rajam.
3. Modern Physics ----- Kumar Krishane, Nandeem
4. Lasers and Nonlinear optics ---- B B Laud
5. A text book of Modern Physics ----- K C Lal and S T Ahmad
6. Lasers – Theory and application ----- Thyagarajan and A K Ghatak

B.Sc. Second Year (IIIrd Semester)

Course – PHY- 203 - Paper XI 1.5 Credits Marks: - 50

List of Experiments ----------

1. Thermal conductivity by Forbe's method
2. Surface tension by Ferguson's method
3. R.P. of telescope.
4. R. P. Grating
5. Wave length by Newton's ring
6. I-D curve by spectrometer.
7. Cauchy's constant by using spectrometer.
8. Determination of BH and BV by earth's Inductor

Course – PHY- 204 - Paper XII 1.5 Credits Marks: - 50

List of Experiments ----------

1. Coefficient of viscosity by oscillating disc method.
2. e / m by Thomson tube.
3. I-V Characteristics of solar cell.
4. High resistance by leakage through condenser
5. Zener diode characteristics (Forward and Reverse Baised)
6. To study Full wave rectifier by π filter
7. Calculation of days between two dates.
8. Preparation of mark list using C^{++}

☼ **Note: At least six experiments should be performed for each paper.**

B.Sc. Second Year (IVth Semester)

Course – PHY- 205 - Paper XIII Marks: - 50

Geometrical Optics and Physical Optics --------- 3 Credits (45 periods)

1. **Geometrical Optics:** Introduction, Cardinals points, Cardinals points of two thin lenses separated by a distance, Nodal points and Nodal planes, Ramsdens and Huygens eyepiece.

2. **Resolving power of Optical Instrument:** Definition of resolving power, Distinction between magnification and resolution**,** limit of resolution, Rayleigh Criterion, R.P of Prism, Grating and Telescope.

3. **Interference:** Interference in thin film due to reflected and transmitted light, Newton's ring by reflected light, determination of wavelength of light by Newton's rings experiment, Michelson interferometer – construction, measurement of wavelength**.**

4. **Diffraction:** Introduction, Fresnel's half period zones and rectilinear propagation of light, zone plates, diffraction due to straight edge.

Reference Books

1. Optics- Brijlal and Subramayam.
2. Geometrical and Physical Optics – B.K. Mathur.
3. Optics – J.K. Sharma and K K Sarkar
4. Text of light – Vasudevo D N
5. Fundamentals of Optics – Jenkins and White.
6. Optics – Khandewal D P

B.Sc. Second Year (IVth Semester)

Course – PHY- 206- Paper XIV Marks:-50

Electrodynamics and Relativity ----- 3 Credits (45 periods)

1. **Time varying fields:** Electromagnetic induction, Faradays laws of induction and Lenz's law, self induction, mutual inductance, equation of continuity, displacement current, Maxwell's equation with derivation.

2. **Electromagnetic waves:** The wave equation satisfied by E and B, plane electromagnetic waves in matter, propagation of plane electromagnetic waves in conducting media, poynting vector for free space.

3. **Theory of Relativity:** Introduction, concept of space, concept of time, concept of mass, frame of reference, inertial and non inertial frame.

4. **Relativistic Transformation :** Galilean transformation, Michelson – Morley experiment, Lorentz transformation, Lorentz contraction, Time dilation, Einstein's Mass – energy relation.

Reference Books

1. Electrodynamics by Gupta, Kumar, Singh (Pragati Prakashan)
2. Electromagnetic field and waves by Paul- Lorrain and Dale R Corson.
3. Introduction of electrodynamics by David J. Griffith Third edition.
4. Foundation of electromagnetic theory by John R. Retitz, Fredrick J. Milford and Robert W Christy (third edition).
5. Modern physics by Mugadesham S. Chand.
6. Perspective of Modern Physics - Beiser

B.Sc. Second Year (IVth Semester)

Course – PHY- 207 - Paper XV 1.5 Credits Marks: -50

List of Experiments ---------

1. Owens's Bridge
2. Modulus of rigidity by Static torsion method.
3. Study of CRO (Frequency and voltage sensitivity measurement)
4. Viscosity of liquid using Searle's Viscometer.
5. Ratio of specific heats (Y) of air at constant pressure and constant volume by Clement and Desormen's method.
6. Determination of Stefan's constant by using thermocouple.
7. To convert a given integer to Binary number and vice versa.
8. To find sum of the sine & cosine Series.

Course – PHY- 208 - Paper XVI 1.5 Credits Marks: - 50

List of Experiments ----------

1. Determination of Rydberg's Constant using Spectrometer
2. To draw the histogram of theoretical Gaussian curve.
3. Study of divergence of a laser beam.
4. Study of laser as a monochromatic source.
5. To study specific rotation of given liquid using Polarimeter.
6. Mutual Inductance by Carry-foster's method using B.G.
7. Diffraction due to cylindrical obstacle using optical bench.
8. To find stopping potential using photocell.

☼ **Note: At least six experiments should be performed for each paper.**