



# **TRIPURA UNIVERSITY**

**(A Central University)  
Suryamaninagar-799022**

**Syllabus**

**For**

**Semester – II**

**Physics (Major/General)**

**Year 2014**

**THREE-YEAR-DEGREE COURSE**

**PHYSICS (HONOURS)**

**Second Semester: PHYSICS (HONOURS), TRIPURA UNIVERSITY**

Total Marks 100

Paper Name : II2

(Theory paper II2-A = 60 marks, Practical paper II2-B = 40 marks)

Each Lecture is of 1 hour duration.

Theory paper II2-A (60 marks)

Total Theory Marks 60

(48 + 12 internal)

Two units: each unit has (24 + 6 marks internal)

**Second Semester: Theory Paper = II2-A**

**UNIT-I**

**Electrostatics and Magnetostatics: (24 + 6 internal)**

Gauss's theorem in electrostatics and its applications, Coulomb's theorem, mechanical force on a charged surface, energy per unit volume, Poisson's equation and Laplace's equation and their solutions in the case of spherical and cylindrical charge distribution.

**Lecture Period: 08**

Electrical images, use of electrical image to the field problems in the case of point charges near conducting plate and conducting sphere.

**Lecture Period: 06**

Capacitance of spherical capacitors and cylindrical capacitors, attracted disc electrometer and quadrant electrometer (only basic principle).

**Lecture Period: 05**

Dipole-dipole interaction, Dielectric medium, polarization and susceptibility, boundary conditions of D and E, dielectric spheres in uniform field.

**Lecture Period: 05**

Intensity of magnetization, permeability, susceptibility and their relations, Boundary conditions for B and H, Hysteresis and hysteresis loss, its importance, magnetic circuit: its theory and applications.

**Lecture Period: 06**

Second Semester: Theory Paper = H2-A

UNIT-II

Optics: (24 + 6 internal)

Refraction at spherical surface, thin lenses and their combination, cardinal points, equivalent lens, chromatic and spherical aberration, qualitative and quantitative study of their remedies with reference to the construction of Ramsden and Huygen's eyepiece.

Lecture Period: 08

Interference of light: Young's experiment, Fresnel's biprism, Interference by Lloyd mirror, interference by thin films including wedge shaped film, Newton's ring; theory and experiment.

Lecture Period: 08

Diffraction (Fresnel class): half period zone, explanation of rectilinear propagation of light, principle of zone plate and its behavior as convergent lens.

Lecture Period: 04

Diffraction (Fraunhofer class): diffraction pattern of single slit, double slit and plane transmission grating (rigorous treatment), Rayleigh criterion of resolution: resolving power of grating. Prism, telescope and microscope.

Lecture Period: 04

Polarization: Nicol prism, polaroids and their uses, production and analysis of plane, circularly and elliptically polarized light by retardation plates and Babinet's compensator, optical activity, Fresnel's explanation of optical activity, Biquartz and half shade polarimeter.

Lecture Period: 06

**Second Semester: Practical Paper = H2-B**  
**(Total marks: 40)**

**Marks division:**

**12 marks = 30 minutes written examination of 12 short questions to be supplied  
by the Head Examiner**

**08 marks = Internal assessment including Laboratory Note Book**

**20 marks = performance of the experiment.**

**Total Practical Period: 60**

**Experiments on General Properties of Matter and Optics**

1. Determination of thermal conductivity of material of disc by Lees and Chorlton's method (applying Bedford's correction)
2. Determination of dispersive power of material of a prism.
3. To draw  $(\delta - \lambda)$  curve and to determine unknown wavelength by prism.
4. To determine unknown concentration of an optically active substance by a polarimeter and to find the specific rotation of the substance.
5. To find the slit width and the separation between slits of a double slit for Fraunhofer diffraction.
6. To determine the coefficient of viscosity of a liquid by Poiseuille's method.

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N.B. Out of six experiments, a minimum of five experiments has to be set up in the laboratory by the concerned Department and must be completed by the students. **Otherwise no practical marks will be given.**

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Paper PH-201A ( or 2A) (Theory)

**Full marks: 50 (Internal Assessment: 10, Semester Exam: 40)**

**Lecture 40, (Each lecture period = 1 hour )**

**Unit I: Acoustic: Lecture Period: 20 (Total: 25 marks, Internal Assessment: 05, Semester Exam: 20)**

Composition of SHMs. Lissajoe's Figure, Damped and forced vibrations (Solutions are to assumed without derivations), resonance and sharpness of resonance.

Differential equation of longitudinal wave using pressure distribution, Stationary waves in strings with various modes, Characteristic features of plucked and struck strings, Young's law.

**Acoustics of building:** Reverberation, Sabine's law, live and dead rooms.

**Unit II: Electrostatics, Magnetostatics, Magnetic effect of Current:  
Lecture Period: 20: (Total: 25 marks, Internal Assessment: 05,  
Semester Exam: 20)**

Coulomb's theorem, mechanical force on a charges surface, energy density,  
Capacitance of spherical and cylindrical capacitors.

Use of Biot-Savart Law for the calculation of magnetic induction due to circular coil and solenoid (finite and infinite)

Magnetic shell and potential due to magnetic shell, equivalence of magnetic shell and current carrying loop.

Hysteresis and calculation of hysteresis loss, selection of material for core of electromagnet.

Theory of Ballistic galvanometer with damping correction.

**PHYSICS (General) Syllabus**  
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**Paper PH-201B( or 2B) (Practical)**

**Full marks: 50 (Internal Assessment: 10, Semester Exam: 40)**

**Total Practical Period: 60 hours**

1. Determination of Young's modulus of the material of a beam by the method of flexure (single length only)
  2. Determination of modulus of rigidity by statical method or by dynamical method.
  3. Determination of moment of inertia of a body about an axis passing through its centre of gravity.
  4. To determine frequency of tuning fork by Melde's experiment.
  5. To determine the refractive index of the given liquid with the help of traveling microscope.
  6. To determine the refractive index of the given liquid with the help of a plane mirror and a convex lens (radius of curvature is to be determined with the help of spherometer).
  7. To determine the focal length of a concave lens by the combination of concave and convex lens using optical bench.
- Determination of 'g' by Kater's pendulum.
- Viscosity of water by Poseuillie's method (diameter of the tube to be measured by microscope)