TRIPURA UNIVERSITY

(A Central University)
Suryamaninagar-799022

Syllabus
OF

Physics
(Major & General)

Semester – III

2014

Third Semester:
Total Marks 100
Paper Name : H3
(Theory paper H3-A = 60 marks,
Practical paper H3-B = 40 marks)

Theory paper H3-A (60 marks)
Total Theory Marks 60
(48 + 12 internal)
Two units : each unit has (24 + 6 marks internal)

Third Semester : Theory Paper = H3-A

UNIT-I

Current Electricity: (24 + 6 internal)

D.C. circuits: Kirchoff's laws, Thevenin's theorem, Norton's theorem, superposition theorem, maximum power transfer theorem, problems on current in complicated circuits, inadequacy of Wheatstone's bridge. Platinum resistance thermometer, Callender and Griffith bridge and measurement of high temperature by platinum resistance thermometer. Working principle of potentiometer and its applications.

Thermoelectricity: Thermo emf, laws of Thermoelectricity, Peltier and Thomson's coefficient, total emf developed in a thermocouple, thermoelectric curve and the concept of neutral temperature and temperature of inversion of a thermocouple, thermoelectric power, thermoelectric diagram and its applications, calculation of Peltier and Thomson's coefficients from thermodynamic considerations, uses of thermocouple.

Theory of moving coil dead-beat and ballistic galvanometer, corrections due to damping in ballistic galvanometer, applications of ballistic galvanometer: measurement of capacitance of a capacitor (principle only), measurement of high resistance by the method of leakage (principle only).

Electromagnetic induction: Self and mutual inductance and relation between them, coefficient of coupling, combination of inductances, self inductance of a circular coil and solenoid, mutual inductance between two circular coils and between two coaxial solenoids. Eddy current and its explanation.

Charging and discharging of condenser in L-C-R circuit considering various conditions.
Current in L-R, C-R and L-C-R circuits using operator and imaginary quantity method, resonance in series and parallel L-C-R circuits, power in AC circuits, power factor, wattless current, choke coil and by-pass capacitor, principle of ideal transformer, various transformer losses.

UNIT-II

Thermal Physics: (Thermodynamics, Radiation, Kinetic Theory of Gases, Transport Phenomena and Refrigeration)

(24 + 6 internal)

Limitation of first law of thermodynamics. Necessity of Second law of thermodynamics, Carnot's cycle and its efficiency. Carnot's theorem, thermodynamic scale of temperature. Clausius inequality. Entropy: its properties and physical significance, change of entropy in reversible and irreversible changes, entropy of a perfect gas, entropy of a mixture of N-number of gases, principle of degradation of entropy. Temperature-entropy (T-S) diagram and representation of Carnot's cycle with the help of T-S diagram.

State functions: exact and inexact differential. Thermodynamic functions. Maxwell's thermodynamic relations, their simple deductions and their applications. Clausius-Clapeyron equation. Thermodynamic potentials, enthalpy.

Porus plug experiment Joule-Thomson effect and inversion temperature.

Radiation: emissive power and absorptive power of a body, black body, black body radiation spectrum, , Kirchoff's law and its rigorous derivation, pressure and energy density of diffused radiation. Stefan-Boltzmann law. solar constant and solar temperature. Wien's law, Rayleigh-Jeans law, basic assumptions and statement of Planck's law.

Kinetic Theory of Gases: Basic assumptions of kinetic theory, Ideal gas approximation, Maxwell's distribution law (both in terms of velocity and energy), root mean square and most probable speeds. Collision probability, Distribution of free paths and mean free path from Maxwell's distribution. expression for pressure according to kinetic theory. Degrees of freedom, equipartition of energy (detailed derivation not required), Relation between γ and degree of freedom.

Transport Phenomena: Viscosity and Thermal conductivity and their relation in the case of gas. diffusion in gases. Brownian Motion: Einstein's theory and Perrin's work for determination of Avogardo number.

Refrigeration: Basic principle,

Third Semester: Practical Paper = H3-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.

Electrical Experiments:

Experiment No.	Name of Experiment
1	To construct an 1-Ohm coil and its comparison with standard 1-Ohm
2	To draw thermoelectric curve and to find thermoelectric power at 60^0C using thermocouple.
3	To determine the boiling point of a liquid by platinum resistance thermometer.
4	Determination of high resistance by the method of leakage.
5	Determination of mutual inductance between two coils.
6	Construction of a rectifier circuit and study of output using a CRO with filter and without filter.

N.B. Out of six experiments, a minimum of five experiments have 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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PHYSICS (General) Syllabus, Third Semester Syllabus

Paper PH-301 (Theory)

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

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

Unit I: Current Electricity I

Total Lecture Period: 20 (Total: 25 marks, Internal Assessment: 05, Semester Exam: 20)

Thermoelectricity: Seebeck, Peltier and Thomson's effect, Peltier and Thomson's coefficient, laws of thermoelectricity, total e.m.f. developed in a thermocouple, thermoelectric curve and concept of neutral temperature and temperature of inversion, thermoelectric power, thermoelectric diagram and its applications, calculation of Peltier and Thomson coefficient from thermodynamic considerations.

Electromagnetic Induction: Self inductance of Circular coil and solenoid; Mutual inductance due between two coaxial circular coils, Mutual inductance between a small coil and a solenoid on which the small coil is wound coaxially.

Growth and decay of current in LR circuit, Charging and discharging of capacitor through a resistance (CR circuit), Transient current in LCR circuit (qualitative considerations of different cases without mathematical analyses).

Unit II: Current Electricity II and Atomic Theory

Total Lecture Period: 20 (Total: 25 marks, Internal Assessment: 05, Semester Exam: 20)

Current Electricity II Alternating emf and alternating current: General expressions, their mean and rms values, Mean power and power factor, wattless current, R, L, C, LR, CR and LCR circuit under AC voltage (solution by any method), Reactance and impedance, Resonance in LCR circuit, rejector circuit, choke coil, principle of ideal transformer, various losses in real transformer.

Atomic Theory: Positive rays, analysis by parabola method, Limitation of Bohr's Theory, Extension of Bohr's model as Vector atom model, quantum numbers, normal Zeeman effect. statement of Pauli's exclusion principle.

X-Ray: Bragg's law and explanation, Crystalline and amorphous solids, elementary of crystal study: NaCl and KCl structure, Compton effect and calculation of Compton shift

Paper PH-301B (Practical)

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

Total Practical Period: 60 hours

Experiment No.	Name of the Experiments.

1. Determination of H and M by deflection magnetometer and vibration magnetometer.
2. Determination of the end-correction of a meter-bridge wire and to find the specific resistance of the material of the given wire.
3. Determination of resistance per unit length of the meter bridge wire by Carey Foster's method and determination of unknown resistance.
4. Comparison of the values of two resistance by ther fall of potential method with the help of Carey Foster's bridge.
5. Determination of the reduction factor of a tangent galvanometer with the help of copper voltameter and hence find the value of H.
6. To determine temperature coefficient of resistance of material of a given wire by meter bridge.
7. To determine the resistance of a suspended coil galvanometer by half-deflection method and hence to find its Figure of merit.
8. To determine the current flowing in a circuit by using a potentiometer (r should be supplied)
9. To determine the refractive index of material of prism by using spectrometer.