SARDAR PATEL UNIVERSITY
SYLLABUS FOR APPLIED PHYSICS
SEMESTER – 4 : Core I – Paper I (Theory)
APPLIED PHYSICS COURSE CODE : US04CAPH21 (4 Credit)
COURSE TITLE : Spectroscopy
(According to new course structure – Effective from June 2019)

Unit 1 : Atomic Spectra

Investigation of Spectra, Production of Spectra, Types of Spectra, Wave Number, The Spinning Electron, Space Quantization, Quantum Numbers and their Physical Interpretation, L-S Coupling, J-J Coupling, Experimental study of Zeeman Effect, Classical Interpretation of Normal Zeeman Effect, Anomalous Zeeman Effect, Stark Effect

Unit 2 : Molecular Spectra

Origin of molecular spectra, nature of molecular spectra, different modes of molecular excitation, factors affecting line width of molecular spectra, factors affecting intensity of molecular spectra, Born-Oppenheimer approximation, rotation of linear system, rotational spectra of rigid linear molecules, non-rigid rotator, the energy of a diatomic molecule, vibrating diatomic molecule as a harmonic oscillator, theory of the origin of vibration-rotation spectrum of a molecule, the Anharmonic oscillator

Unit 3 : UV/Visible Spectroscopy

Introduction, Electromagnetic radiation, the electromagnetic spectrum, Interaction of radiation with matter, Laws relating to absorption of radiation, Lambert's law, Beer's law, Beer-Lambert's Law, deviation from Beer's law, Absorption instruments: radiation sources: black body sources, discharge lamps, optical filters: absorption filters, interference filters, monochromators: prism monochromators, diffraction gratings, Holographic gratings, Optical components, Photosensitive Detectors: photovoltaic cells, photo emissive cells, high vacuum photo emissive cells, gas filled photoemissive cells, photomultiplier tubes, silicon diode detector, photodiode arrays.

Unit 4 : IR Spectroscopy

Introduction to infrared spectroscopy, Basic components of IR spectrophotometers: radiation sources, monochromators, entrance and exit slits, mirrors, Detectors: quantum type detector, photodiode, thermal detectors: thermocouple, bolometer, pneumatic detector, pyro-electric detector, Photoconductive IR detectors, Types of IR spectrophotometers: double beam system, Optical null method, ratio recording method, Sample Handling techniques : gas cells, liquid cells.

Text Books :

1. Elements of Spectroscopy by S L Gupta, V Kumar, R C Sharma,Pragati Prakashan
2. Handbook of analytical instrumentation by R.S. Khandpur

Reference Books :

1. Modern Physics by R. Murugeshan and Kiruthiga Sivaprasath, S. Chand & Company Ltd. New Delhi.
2. Molecular structure and Spectroscopy by G Aruldhas, Prentice-Hall of India Private Limited

SARDAR PATEL UNIVERSITY
SYLLABUS FOR APPLIED PHYSICS
SEMESTER – 4 : Core I – Paper II (Theory)
APPLIED PHYSICS COURSE CODE : US04CAPH22 (4 Credit)
COURSE TITLE : Electricity, Magnetism and Solid State Electronics
(According to new course structure – Effective from June 2019)

UNIT 1: Electrostatics

Electric field: Brief introduction to Gradient, Divergence, Curl and Coordinate Systems, Coulomb's Law, The Electric field, Continuous charge distribution, Divergence and curl of Electrostatic fields: Field lines, Flux and Gauss's law, The Divergence of E, Applications of Gauss's law, The Curl of E, Electric Potential: Introduction to potential, Comments on potential, Poisson's equation and Laplace's equation, The potential of a localized charge distribution, Work and Energy in Electrostatics: The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Comments on Electrostatic energy, Conductors: Basic properties of conductors, induced charges, Surface charge and the force on a conductor, capacitors.

UNIT 2: Magnetostatics

The Lorentz Force Law: Magnetic fields, Magnetic forces, Currents, The Biot-Savart law: Steady currents, The Magnetic field of a steady current, The Divergence and Curl of B: Straight-Line currents, The Divergence and Curl of B, Applications of Ampere's law, Comparison of Magnetostatics and Electrostatics, Magnetic Vector Potential: The Vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Electromagnetic induction, Faraday's Law, the induced electric field, Maxwell's equations.

UNIT 3: Transistor Biasing Circuits

Introduction, operating point, transistor saturation, load line analysis, Need to bias a transistor, Selection of operating point, Need for bias stabilization, Requirement of a biasing circuits, Different biasing circuits, Fixed-bias circuit, Collector to base bias circuit, Emitter stabilized bias circuit, transistor switching network, DC bias with voltage feedback, Voltage divider biasing circuit, Approximate analysis, Accurate analysis, Emitter bias circuit, PNP transistor biasing circuit.

UNIT 4: Small Signal Amplifiers and h-parameters

Introduction, Common emitter fixed bias configuration, common base configuration, Single stage transistor amplifier, Amplifier performance analysis methods, Graphical method, AC and DC load lines, Calculation of gain, Input and output phase relationship,

Equivalent circuit method, Development of transistor AC equivalent circuit, h parameter equivalent circuit, Amplifier analysis, Need of multistage amplifier, Gain of multistage amplifier, Amplifier circuit with negative feedback, RC coupled amplifier without bypass capacitor, Emitter follower.

Text Books:

1. Introduction to Electrodynamics by David J Griffiths, Prentice-Hall of India Private Ltd.
2. Electricity and Magnetism by A S Mahajan and A A Rangwala Tata McGraw Hill Publishing Company Ltd
3. Basic Electronics and Linear Circuits by N N Bhargava, D C Kulshreshtha and S. C. Gupta, Tata McGraw Hill Publishing Co. Ltd., New Delhi

Reference Books :

1. Basic Electronics – Solid State by B. L. Theraja, S. Chand Publications

SARDAR PATEL UNIVERSITY
SYLLABUS FOR APPLIED PHYSICS
SEMESTER – 4 : Core I – Paper I (Practicals)
APPLIED PHYSICS COURSE CODE : US04CAPH23 (2 Credit 4 Hours)
COURSE TITLE : Applied Physics Practicals
(According to new course structure – Effective from June 2019)

1. To determine the refractive index of prism using the Brewster's law
2. Determination of Rydberg's constant with the help of diffraction grating and Hydrogen discharge tube.
3. Determination of Laser parameters – Wavelength, and Angle of divergence
4. Experimental determination of Hall voltage.
5. Electrical conductivity by Four probe method.
6. Study of Solar Cell using solar education kit
7. Ultrasonic receiver and transmitter
8. Determination of Planck's constant by photocell method.
9. Particle size determination using Diode Laser.

Reference Books :

1. A Laboratory Manual of Physics for Undergraduates by D P Khandelwal
2. University Practical physics by D C Tayal-Himalayan publishing house.
3. Advanced Practical Physics by Worsnop & Flint.
4. Instructions manual-Kit developed for doing experiments in Physic(At BSc. and M.Sc. Physics levels) by R Srinivasan and K R S Priolkar-Indian Academy of Science, Banglore.
5. B.Sc. Practical Physics by C. L. Arora, S. Chand & Company Ltd. New Delhi.

SARDAR PATEL UNIVERSITY
SYLLABUS FOR APPLIED PHYSICS
SEMESTER – 4 : Core I – Paper II (Practicals)
APPLIED PHYSICS COURSE CODE : [illegible] (2 Credit 4 Hours)
COURSE TITLE : Applied Physics Practicals
(According to new course structure – Effective from June 2019)

1. JFET characteristics
2. Negative feed-back amplifier
3. Fixed voltage biasing using FET / BJT / MOSFET
4. Self-biasing using FET/ BJT / MOSFET
5. Potential divider biasing using FET/ BJT / MOSFET
6. Voltage stabilizer trainer
7. Study of Solar Cell using solar education kit
8. RYB signal generator
9. FET voltage amplifier

Reference Books :

1. A Laboratory Manual of Physics for Undergraduates by D P Khandelwal
2. University Practical physics by D C Tayal-Himalayan publishing house.
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5. B.Sc. Practical Physics by C. L. Arora, S. Chand & Company Ltd. New Delhi.