

SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar-388120
B.Sc. (Semester - 3)
Subject: Physics
Course: US03CPHY01
Electronics & Optics
(Three Credit Course –3 Hours per week)
(Effective from June-2011)

UNIT- 1 Transistor Biasing Circuits

Introduction, Why 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, Voltage divider biasing circuit, Accurate analysis, Emitter- bias circuit, PNP transistor biasing circuit

UNIT- 2 Small Signal Amplifiers and h-parameters

Introduction, Single stage transistor amplifier, Amplifier performance analysis methods, Graphical method, Equivalent circuit method, h- Parameter equivalent circuit, Amplifier Analysis

UNIT-3 Feedback in amplifier

Introduction, Types of feedback, Voltage gain of feedback amplifier, Advantage of negative feedback, Stabilization of gain, Reduction in distortion and noise, Increase in input impedance, Decrease in output impedance, Increase in bandwidth, Amplifier circuit with negative feedback, RC coupled amplifier without bypass capacitor, Emitter follower

UNIT-4 Oscillators

Introduction, Classification of oscillators, Positive feedback amplifier as an oscillator, The starting voltage, Hartley oscillator, Colpitts oscillator, Basic principles of RC oscillator, Phase shift oscillator, Wien bridge oscillator

UNIT- 5 Lens Aberrations

Aberration of defects of a lens, Chromatic Aberrations, Achromatism of lenses, Achromatism for two lenses in contact, Achromatism for two lenses separated by a distance, Spherical aberration, Minimization of spherical aberration, Coma, Astigmatism

UNIT- 6 Optics: Cardinal Points

Cardinal points of an optical system, Deviation produced by an optical system, Coaxial lens system, Equivalent focal length and cardinal points, Huygens eyepiece, Cardinal points of Huygens eyepiece, Ramsden eyepiece, Cardinal points of Ramsden eyepiece, Comparison of eyepieces

Scope of syllabus:

Text Book:

1. Basic Electronics and Linear Circuits
N. N. Bhargava, D.C. Kulshreshtha and S. C. Gupta
Tata McGraw Hill Publishing Co. Ltd., New Delhi
2. Engineering Physics
R.K.Gaur and S.L. Gupta
Dhanapat Rai Publications

Reference Book:

1. Electronics Principles (6th edition)
A. P. Malvino
Tata McGraw Hill Publishing Co. Ltd., New Delhi
2. A Textbook of Optics
N. Subrahmanyam and Brijlal
S. Chand & Company Limited
3. Textbook of light
D. N. Vasudev
Atma Ram and Sons, New Delhi
4. Fundamental of Optics
F. A. Jenkin and White
McGraw Hill Book Co.
5. Physical Optics
A. K. Ghatak
Tata McGraw Hill Publishing House Co. Ltd., New Delhi

SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar-388120
B.Sc. (Semester - 3)
Subject: Physics
Course: US03CPHY02
Solid State Physics, Thermodynamics and Wave Oscillation
(Three Credit Course –3 Hours per week)
(Effective from June-2011)

UNIT – 1 Crystal Physics - I

Introduction, Lattice point and space lattice, The basis and crystal structure, Unit cells and lattice parameters, Unit cells vs primitive cell, Crystal systems, Crystal symmetry, The 23 symmetry elements in a cubic crystal, Space groups, The Bravais space lattices, Metallic crystal structures: (i) SC (ii) BCC (iii) FCC and (iv) HCP

UNIT- 2 Crystal Physics - II

Cubic Structures: (i) Diamond (ii) ZnS (iii) NaCl and (iv) CsCl, Direction-planes and Miller indices, Important features of Miller indices of crystalline planes, Important planes and directions in a cubic structure
X-ray diffraction
Introduction, X-ray diffraction, Bragg's law, X-ray diffraction methods: Laue method, Rotating Crystal method, Powder method

UNIT - 3 Transmission of Heat

Introduction, Coefficient of thermal conductivity, Rectilinear flow of heat along a bar, Cylindrical flow of heat, Spherical shell method (Radial flow of heat), Searle's method, Lee and Charlton's method for bad conductors, Lee's method for liquids, Thermal Conductivity of rubber, Thermal Conductivity of glass

UNIT – 4 Radiation of Heat

Kirchoff's law, Stefan-Boltzmann's law, Wien's Displacement law (statement only), Rayleigh-Jeans law, Planck' radiation law, Derivation of Stefan's law, Derivation of Newton's law of cooling from Stefan's law, Experimental verification of Stefan's law, Determination of Stefan's constant (Laboratory Method), Disappearing filament optical pyrometer, Total radiation pyrometer, Solar Constant, The Green House Effect

UNIT – 5 Waves and Oscillations - I

Free damped Oscillations

Introduction, Damping forces, Damped oscillation of a system having one degree of freedom, The general solution, Special cases (Large damping, critical damping and small damping), Energy of weakly damped oscillator, Method of describing the damping of an oscillator: (i) Logarithmic decrement, (ii) Relaxation time, (iii) Quality factor or Q-value

UNIT – 6 Waves and Oscillations - II

Damped harmonic oscillators: (i) Moving coil galvanometer and (ii) The LCR circuit

Forced Oscillations and Resonance

Introduction, Forced oscillations of a one dimensional damped harmonic oscillator (General Solution), Driven LCR Circuit, Series Resonance Circuit (Circuit and Electrical impedance Z_e), Parallel Resonance Circuit, Other examples of Resonance (Optical resonance, Nuclear resonance and Nuclear Magnetic Resonance)

Scope of syllabus:

Text book:

1. Solid State Physics (5th edition) S.O.Pillai
New Age International Publisher
2. Solid State Physics R K Puri and V K Babbar
S Chand & Company Ltd.
3. Heat and Thermodynamics Brij Lal, N. Subrahmanyam and P S Hemne
S.Chand & Co. Ltd., New Delhi
4. The Physics of Wave and Oscillations N.K.Bajaj
Tata McGraw Hill Publishing Co. Ltd., New Delhi

Reference book:

1. A Text Book on Oscillations, Waves and Acoustics
M.Ghosh, D.Bhattacharya
S.Chand & Company Ltd., New Delhi

SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar - 388 120
B.Sc. (Semester - 3)
Subject: Physics (Practical)
Course No. US03CPHY03
(Three Credit Course –6 Hours per week)
(Effective from June-2011)

List of Practical

1. Kater's Reversible Pendulum (Fixed & Variable distance)
2. Cardinal Points of Two Lens System
3. Dispersive Curve and Power
4. Resolving Power of a telescope
5. Biprism
6. h - parameters of a BJT
7. Frequency Response of a RC Coupled Amplifier (without feedback)
8. Thermal Conductivity (K) of a Rubber Tube
9. Velocity of Sound by Resonance Tube
10. Impedance by Voltage Drop
11. Series Resonance
12. RC Phase shift oscillator
13. ' h ' by photocell
14. Exponential Least square fitting
15. Numerical differentiation

Note:

To provide flexibility up to the maximum of 20% of total experiments can be replaced/ added to the list by the board of studies.

SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar-388120
B.Sc. (Semester - 3)
Subject: Biomedical Instrumentation
Course: US03EPHY01
(Two Credit Course –2 Hours per week)
(Effective from June-2011)

UNIT – 1 Fundamentals of Medical Instrumentation

Sources of biomedical signals, Basic medical instrumentation system, Performance requirement of medical instrumentation systems, General constraints in design of medical instrumentation systems, Basic of diagnostic radiology, Nature and properties of X-rays, Diagnostic ultrasound, Physics of ultrasonic waves, characteristic impedance, wavelength and frequency, velocity of propagation, absorption of ultrasonic energy, Beam width

UNIT - 2 Physiological Transducers

Introduction, Classification of transducers, Performance characteristics of transducers, static characteristics, dynamic characteristics, other characteristics

Displacement, position, and motion transducer

Potentiometric transducer, variable capacitance, linear variable, differential transformer(LVDT), linear or angular encoders, Piezo-electric transducers, other displacement sensors

UNIT – 3 Pressure Transducers

LVDT pressure transducer, strain gauge pressure transducers, unbounded and bonded strain gauges

Transducers for body temperature measurement

Thermocouples, electrical resistance thermometer, thermistors, silicon diode, chemical thermometry

UNIT – 4 Photoelectric Transducers

Photovoltaic or barrier layer cells, Photoemissive cells, silicon diode detectors
Optical fiber sensors

Advantages of optic fiber sensors, types of optical fiber sensors, Photometric sensors, Physical sensors, Chemical sensors, Biosensors, Smart sensors

Text book:

Handbook of Biomedical Instrumentation(2nd Edition) R S Khandpur
Tata McGraw Hill Publications,

SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar-388120
B.Sc. (Semester - 3)
Subject: Basic Geophysics
Course: US03EPHY02
(Two Credit Course –2 Hours per week)
(Effective from June-2011)

UNIT – 1 Introduction to Geology, Earth Structure, Origin and interior of the Earth

Fundamentals of Geology as a Science

Branches of Geology, Interrelation between all the science and status of Geology in them

Origin of the Earth and Universe

Origin of the Universe, their hypotheses, Binary star theory, Accretion theory, Big Bang theory

Internal structure of the Earth

Crust, Mantle and Core, their chemical compositions, Pressure and Temperature in the earth, Earthquakes: tool to understand the interior of the Earth, Velocity of P and S waves inside the earth

Architecture of the Earth

Landscape and its origin, Isostasy

UNIT – 2 Plate tectonics, Earth processes, Fundamentals of Minerals and Rocks

Continental Drift and Plate tectonics

Wegner's theory of continental drift, sea floor spreading, plate tectonics, plate boundaries, linear magnetic anomalies, polar wandering

Introduction and Origin of the Minerals and Rock

Classification and origin of the minerals (Oxides, silicates, carbonates, halides, sulphates, sulphides etc.), Igneous, sedimentary and metamorphic rocks (introductory)

UNIT – 3 Structural Geology, Stratigraphy and Sedimentation

Basic Structural Geology

Introduction to structural geology, terminology, stress and strain concept, folds, faults, joints their classification

Process of Sedimentation and Basins

Sedimentary processes, Depositional processes, sedimentary basins (marine and continental), basin analysis (introductory)

UNIT - 4 Introduction to Earthquakes and Seismology

Basics of Earthquake Science

Origin of Earthquakes, Epicentre, hypocentre, characters of P and S waves, magnitudes and intensity of earthquakes etc.

World distributions of earthquakes and Plate boundaries - Introduction

Relation between the earthquakes and plate boundaries, World distributions

Fundamentals of Seismology

Basic properties of P and S waves in various rocks, reflection and refraction of waves inside the earth (layers, and structures), wave mechanics

Scope of syllabus:

1. Introduction to Geophysics
Howell Benjamin F
McGraw Hill Co., New York
2. Physics of the Earth
Stacey Frank D
Cambridge University Press
3. Seismology and Plate Tectonics
Gubbins Devid
Cambridge University Press
4. Plate Tectonics and Crustal Evolution
Condie Kent C
Heinemann Publication
5. Fundamentals of Geophysics
Lowrie William
Cambridge University Press