

Krantiguru Shyamji Krishna Verma

# ***Kachchh University***

Mundra Road

**BHUJ :370 001**



SYLLABUS ( CBCS )

**B. Sc. Semester III & IV**

## **PHYSICS**

CODE : US CEPH – 303, 304

US CEPH – 405, 406

With effect from June 2016

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**PATTERN OF QUESTION PAPER**  
**FOR SEMESTER-END EXAMS**

**THEORY**

In each theory paper there will be FOUR Questions (Q.1 to Q.4), one question from every unit. A question will be of **15 Marks**

The structure for each question is as under:

**Section (A) Objective type (*no internal option*)      5 Marks**

*The types of questions for section (A) are varied, like: One line answers, Two line answers, Definitions, Reasoning, Drawing figures etc.*

**Section (B) Descriptive type (*with internal option*)      10 Marks**

*The types of questions for section (B) are varied, like: Derivations, Short notes, Problems etc.*

**PRACTICAL**

There will be FOUR Exercises in each Practical, as under, total of **30 Marks**

*(1) Approach (2) Readings and Calculations (3) Viva (4) Practical Journal*

**K S K V Kachchh University**  
**B. Sc. (Physics) CBCS Syllabus**  
**(In force from June 2016)**

**Semester - III**

**US CEPH – 303 (Thermodynamics, Optics, Atmospheric Physics)**

**Unit-I**

**Thermodynamics**

Thermodynamic Variables; Extensive and intensive Variables; Maxwell's Thermodynamical Relations; Applications of Maxwell's Thermodynamic Relations; Specific Heat Equation; Temperature change in Adiabatic Process; Clausius-Clapeyron's Equation (First Latent Heat Equation); Thermodynamic Potentials; Significance of Thermodynamic Potentials; Relation of Thermodynamical Potentials with their Variables; Relation between  $C_p$ ,  $C_v$  and  $\mu$ ; The TdS Equations; Clapeyron's Latent Heat Equation using Maxwell's Thermodynamical Relations; Clapeyron Latent Heat Equation using Carnot's Cycle; Adiabatic Stretching of a wire; Internal Energy of Ideal and Real Gases; Entropy and the Second law of Thermodynamics; Joule-Kelvin Coefficient; Temperature of Inversion; Heating effect of Hydrogen and Helium at Room Temperature.

**Ref. :** Heat and Thermodynamics and Statistical Physics

by Brijlal, Subrahmanyam, Hemme. S. Chand & Company (Reprint 2012)  
(Chapter 6 Art. 6.1 to 6.3, 6.4, 6.4.1, 6.4.6, 6.4.7, 6.5 to 6.13, 6.15, 6.16, 6.4.4, 6.4.5)

**Unit-II**

**Statistical Mechanics**

Statistical Basis; Probability; Principle of Equal A Priori Probability; Probability and Frequency; Some Basic Rules of Probability Theory; Permutations and Combinations; Macrostate and Microstate; Thermodynamic Probability.

**Laws in Statistical Mechanics:** Degrees of Freedom; Position Space; Momentum Space; Phase Space; The  $\mu$ -space and Gamma Space; Division of Phase Space into Cells; Applications; Fundamental Postulates of Statistical Mechanics; Density of Quantum States of Energy of a Particles; Statistical Ensembles; Microcanonical Ensemble; Canonical Ensemble; Grand- Canonical Ensemble; Comparison of Ensembles; Bridge with Macroscopic Physics; Theories Based on Statistical Mechanics; Entropy and Probability; Boltzmann's Canonical Distribution Law; Application of Boltzmann's Canonical Distribution Law; The Equipartition of energy.

**Ref. :** Heat and Thermodynamics and Statistical Physics

by Brijlal, Subrahmanyam, Hemme. S. Chand & Company (Reprint 2012)  
(Chapter 9, Art. 9.1 to 9.8; Chapter 10, Art. 10.1 to 10.11, 10.13 to 10.18)

## Unit-III

### Optics

**Fresnel Diffraction:** Introduction; Huygens-Fresnel Theory; Fresnel's Assumptions; Rectilinear Propagation of Light; Zone Plate; Action of a zone plate for an incident spherical wave front; Difference between a zone plate and a convex lens; Distinction between Interference and Diffraction; Fresnel and Fraunhofer Types of diffraction; Diffraction at a Circular Aperture; Mathematical Treatment of Diffraction at a circular Aperture; Intensity at a Point away from the centre.

**Fraunhofer Diffraction:** Introduction; Fraunhofer Diffraction at a Single Slit; Fraunhofer Diffraction at Double Slit; Interference and Diffraction.

**Ref. :** A Textbook of OPTICS by Subrahmanyam, Brijlal, Avadhanulu  
S. Chand & Company Ltd., New Delhi. Twenty fourth Revised Edition 2010  
(Chapter 17, Art. 17.1 to 17.8; Chapter 18, Art. 18.1, 18.2, 18.4, 18.5)

## Unit-IV

### Atmospheric Physics

Composition of Planetary atmospheres; Evolution of atmospheres; Earth's neutral atmosphere; Composition of air at the surface; Atmospheric divisions; Other divisions; Pressure and density variations; Static Atmosphere; Dynamic atmosphere; Density and Temperature distribution models; Energetic of the lower atmosphere; Thermodynamics of dry air; Entropy and potential temperature; Heat budget of the atmosphere; Atmospheric circulation; General principles; Coriolis force and angular momentum; Classes of Winds; Basic equations for large scale flow; General atmospheric circulation; Wind pattern with altitude; Thermospheric winds; Acoustic and internal gravity waves.

**Ref. :** An introductory course on Space Science and Earth's atmosphere  
by S. S. Degaonkar.  
(Chapter 3, Art. 3.3, 3.4, 3.6 to 3.9)

## US CEPH – 303 PRACTICALS

- (1) Flatness of plate by Newton's rings
- (2) Thickness of a glass plate and radius of curvature of convex lens by optical lever
- (3) Resolving power of Telescope
- (4) 'L' by Maxwell's Bridge
- (5) Study of Transformer
- (6) Cauchy's Constants
- (7) Experimental check up by Multimeter  
(Power supply, resistor, Transistor, Diode, Capacitor)
- (8) Absorption coefficient of Liquid by photocell.

## US CEPH – 304 (Electricity, Magnetism and Electronics)

### Unit-I

#### Electricity

Electrostatic Energy; Electric Dipole; Dipole in Uniform Electric Field; Electric dipole in Non-Uniform Electric Field; Mutual Potential energy of Two Dipoles; Electric Double layers; Electric Quadrupole.

Conductors and Insulators; Conductor in an Electrostatic field; Electric Field at a surface of a Charged Conductor; Capacitors; Electric Response of a Non-conducting medium to an Electric field; Polarization.

**Ref. :** Electromagnetics by B. B. Laud  
(Chapter 1, Art. 1.14 to 1.20; Chapter 2, Art. 2.1 to 2.4, 2.6, 2.7)

### Unit-II

#### Magnetism

Electric Current; Ohm's law-Electrical conductivity; The calculation of Resistance; Magnetic effect; The Magnetic field; Force on a Current; Bio-Savart law; The laws of Magnetostatics; The Magnetic Potential; Magnetic media; Magnetization; Magnetic field vector; Magnetic Susceptibility and Permeability.

**Ref.:** Electromagnetics by B.B. Laud  
(Chapter 4, Art. 4.1 to 4.9, 4.14 to 14.17)

### Unit-III

#### Electronics

**Bipolar Transistors:** Introduction; Construction of Junction Transistor; Operation of a PNP Transistor; Operation of NPN Transistor; Supply voltage connection; Current Amplification Factors; Transistor leakage Currents; Characteristic Curve of a Transistor in Common-Emitter Connection and Definitions of h-Parameters; Characteristic Curve of a Transistor in Common-Base Connection and Definitions of h-Parameters; Transistor current and Voltage Notations; Transistor as an Amplifier; Basic Transistor Amplifier Circuits; D.C. Load Line; Graphical Analysis of Common-Emitter Voltage Amplifier; A.C. Load Line.

**Ref. :** Elements of Electronics by Bagde and Singh  
(Chapter 3, Art. 3.1 to 3.15)

## Unit-IV

### Electronics

**Electronic Devices:** FET; MosFET; UJT; LED; SCR; Tunnel Diode; Solar cell.

**D.C. Bias and Stabilization:** Introduction; Factors which cause shift of the Operating point; Stability factor; Fixed Bias circuit; Collector to Base Bias; Emitter Bias; Bias Compensation; Thermal Runaway; Thermal Resistance; Condition for thermal Stability.

**Ref.:** Elements of Electronics by Bagde and Singh

(Chapter 4, Art. 4.1 to 4.10)

Principles of Electronics by V.K. Mehta and Rohit Mehta. S. Chand & Company

## US CEPH – 304 PRACTICALS

- (1) Study of X-ray diffraction pattern
- (2) 'g' By bar pendulum
- (3) Logic Gates
- (4) High R by Leakage
- (5) Characteristics of FET
- (6) Hartman Formula
- (7) Permeability of Free space
- (8) Numerical Differentiation