

**Shri Govind Guru University**

**GODHRA**

**Syllabus of**  
**B. Sc. Semester - I**  
**PHYSICS**  
**(Theory & Practical)**

**(Based on NEP-2020)**

**Effective from August, 2023**

## **B. Sc. - Semester – I (PHYSICS)**

### **MINOR (Theory):**

### **BS23MN1PH1 : Fundamentals of Physics (Credit -2)**

#### **UNIT -1: Introduction to Classical Mechanics & Gravitation**

##### **1. Vector Algebra and Vector Analysis**

- 1.0 Introduction
- 1.4 Product of two vectors
- 1.6 Definition of a vector in terms of its component
- 1.11 Triple Scalar Product
- 1.12 Reciprocal Vectors
- 1.13 Triple Vector Product
- 2.1 Differentiation of Vectors with respect to a scalar
- 2.2 Differentiation with respect to time, Velocity and Acceleration
- 2.3 Integration of vectors
- 2.4 Partial differentiation

- **TextBook: Introduction to Classical Mechanics** by R. G. Takwale & P. S. Puranik  
(Tata McGraw-Hill Publishing Co. Ltd.)
- ❖ **Reference Book: Mathematical Methods in Physical Sciences** by M. L. Boas  
Chapter 6 (John Wiley & Sons)

##### **2. Gravitation**

- 6.1 Newton's Law of Gravitation
- 6.2 Gravitational Field
- 6.3 Gravitational Potential
- 6.12 Escape Velocity
- 6.13 Kepler's Law of Planetary Motion (All Three)

- **TextBook: Engineering Physics** by R. K. Gaur & S. L. Gupta (Dhanpat Rai Publications)

#### **UNIT – 2 Optics**

##### **1. Fermat's Principle and its Applications**

- 2.1 Introduction
- 2.2 Fermat's principle of least time
- 2.3 Rectilinear propagation of light
- 2.4 Reversibility of light rays
- 2.5 Laws at reflection
- 15.2.1 Interference due to reflected light

## 15.6 Newton's ring

## 2. Laser

### 22.4 Interaction of light with matter Absorption

#### 22.4.1 Absorption

#### 22.4.2 Spontaneous emission

#### 22.4.3 Stimulated emission

### 22.7 Meeting the three requirements

#### 22.7.1 Population inversion

#### 22.7.2 2Metastable states

#### 22.7.3 Confining radiation within the medium

### 22.8 Components of LASER

#### 22.8.1 Active medium

#### 22.8.2 Pumping

#### 22.8.3 Optical resonant cavity

### 22.16 LASER beam characteristics

### 22.19 Applications

- **Text Book: A text book of Optics** by Dr. N. Subrahmanyam, Brijlal and Dr. M. N. Avadhanulu (S. Chand & Company Ltd. Publication)

- ❖ **Reference Books:**

1. Fiber optics and optoelectronics by R. P. Khare, Oxford university press
2. An introduction to LASERS – Theory and Applications by M. N. Avadhanulu, S. Chand & Company Ltd.
3. Optics – Third Edition by Ajay Ghatak

## UNIT: 3 Electric and Electronic Circuits

### 1. Rectifying Circuits & Filter Circuits

#### 2.2 Half wave rectifier

#### 2.8 Full wave rectifier

#### 2.9 Bridge rectifier

#### 3.1 The inductor filter

#### 3.3 The capacitor filter

#### 3.9.1 L-C filter

- **Text Book: Electronic devices and circuits-an introduction** by Allen Mottershead, (Published by PHI Learning private Ltd., New Delhi)

### 2. AC Bridge

#### 5.5 Condition for bridge balance

#### 5.6 Maxwell bridge

#### 5.8 Schering bridge

- **Text Book: Modern Electronic Instrumentation and Measurement Techniques** by

Albert D. Helfrick, William D. Cooper (Published by PHI Learning private Ltd., New Delhi)

## **B. Sc. - Semester – I (PHYSICS)**

### **MINOR(Practical):Fundamentals of Physics Practical (Credit-2)**

#### **Minimum 8 practical must be performed**

**1. Newton's Ring.**

To find the wave length of light of given monochromatic source

**2. Cauchy's Constant.**

To determine Cauchy's constant A and B graphically and to find the wavelength of unknown line of mercury spectrum.

**3. 'g' by Bar pendulum.**

To obtain the value of 'g' by bar pendulum.

**4. To Determine Wave length of LASER light.**

**5. Refractive Index of Liquid using Convex Lens.**

**6. Half-Wave & Full-wave Rectifier.**

Obtain load characteristic and %regulation for Full-wave rectifier with-out filter circuit and by using capacitor filter circuit. Determine ripple factor for Full wave rectifier without filter only.

**7. Bridge Rectifier.**

Obtain load characteristic and regulation for Bridge rectifier without using filter circuit and by using capacitor filter circuit. Obtain ripple factor without filter circuit.

**8. Maxwell's Bridge.**

To find the value of an inductance of an unknown inductor by using Maxwell's bridge circuit.

**9. Series Resonance.**

To determine the frequency of a.c. emf by series resonance circuit varying capacitor.

**10. Parallel Resonance.**

To determine the frequency of a.c. emf by parallel resonance circuit varying capacitor.

**11. LDR Characteristics.**

Obtain IV characteristics of given LDR and calculate its resistance.

(For at least three different light levels).

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