GUJARAT UNIVERSITY
Syllabus for Second Year B.Sc.: Semester – IV
Effective from June 2024
DSC-M-PHY-244T (2 Credit)
Sound, Optics and Special theory of Relativity

Learning objectives

To enable learners to

- understand architectural acoustics
- acquire detailed knowledge on the polarization phenomenon of wave optics
- understand the basic concepts of special theory of relativity

Learning outcomes

On successful completion of the course, the learners would gain the knowledge of

- distribution of sound waves in an auditorium
- various kinds of polarization of light waves and their analysis
- the non-existence of ether and Michelson -Morley experiment
- the variation of physical quantities due to relativistic motion of the object

UNIT – I: SOUND AND OPTICS **[15 Hours]**

Sound

Architectural Acoustics, Sabine's formula, Reverberation time-theoretical treatment, Reverberation time of a live room, Reverberation time of a dead room, optimum reverberation time.

Polarization of light & double refraction

Plane polarized light, pictorial representation of light vibrations, method to produce plane polarized light (only names), double refraction or birefringence, geometry of calcite crystal, Optical axis principal section & principal plane, Nicol prism, Parallel & Crossed Nicol prism, Huygen's theory of double refraction in uniaxial crystals, refractive indices for o- rays & e-rays, Polaroids.

Production & Analysis of Polarized light

Introduction, superposition of two plane polarized waves having perpendicular vibrations, The elliptically & circularly polarized light, quarter wave plate, half wave plate, production of plane elliptically & circularly polarized light, detection of plane elliptically & circularly polarized light, systematic analysis of polarized light

Reference book:

1. A textbook on oscillations, waves & acoustics by M. Ghosh, D. Bhattacharya, S. Chand Publishers
Article: 24.1 to 24.5
2. Optics & atomic physics by Singh, Agrawal (Pragati Prakashan, Meerut)
Article: 10.2 to 10.4, 10.9 to 10.12, 10.14 to 10.16, 10.18, 10.21, 11.1 to 11.17
3. Optics by Ajoy Ghatak, Tata McGraw Hill Ltd.
4. A Textbook of Optics by N. Subrahmanyam *&* Brij Lal (S. Chand & Company Ltd.)

UNIT – II: SPECIAL THEORY OF RELATIVITY [15 Hours]

Postulates of Special Relativity, Time Dilation, Doppler Effect, Length Contraction, Twin Paradox, Electricity and Magnetism, Relativity of mass, Mass and Energy, Massless Particles, Lorentz Transformation, Velocity addition, Michelson-Morley Experiment.

Reference Book:

1. Concepts of Modern Physics by Arthur Beiser, 4th edition, McGraw Hill Pub. Co.
Articles: 1.1 to 1.11, Appendix – I
2. Modern Physics by R. Murugeshan and K. Sivaprasath, (S. Chand & Company Ltd.)

GUJARAT UNIVERSITY
Syllabus for Second Year B.Sc.: Semester – IV
Effective from June 2024
DSC-M-PHY-244P (2 Credit)
General Physics and Optics
[60 Hours]

Course objectives

To enable the learners to

- understand the physical phenomena and fundamentals of general Physics
- perform experiments in the field of general Physics

Course outcome

After successful completion of course learners will

- develop the ability to analyse the basic experiment
- conduct experimental investigation on mechanical and optical Physics
- practice recording of experimental work and data graphing

1. Material constant (η) and reverse saturation current (I_0) of PN junction diode.
2. Resonance pendulum
3. Gray to binary and binary to Gray code conversion
4. Optical lever.
5. L by Maxwell's bridge.
6. To find band gap of semiconductor material
7. Decimal to BCD conversion and BCD to seven segment decoder
8. C_1/C_2 by Desauty's method
9. High resistance through leakage
10. To study double refraction in calcite prism.
11. Numerical Study of Oscillatory Motion. (Calculator/computer preferable using Excel)
12. Dielectric constants of given materials.

Reference book:

1. Advanced practical physics for students by Worsnop and Flint
2. B. Sc. Practical Physics by C. L. Arora; S. Chand Publication
3. Practical Physics by G. L. Squires.
4. Practical Physics by Gupta and Kumar; Pragati Prakashan