GUJARAT UNIVERSITY
Syllabus for First Year B.Sc.: Semester – I
Effective from June 2023
DSC-M-PHY-113T-A (2 Credit)
Vectors and Waves

UNIT – I: VECTOR ANALYSIS **[15 Hours]**

Introduction, Applications of Vector Multiplication, Triple Scalar Product, Triple Vector Product, Differentiation of Vectors, Fields, Directional Derivative, Gradient, Some other expressions involving ∇, Green's Theorem in the plane, The Divergence and the Divergence theorem. Gauss's law, The curl and Stoke's theorem.

Reference Books:

1. Mathematical Methods in Physical Sciences by M. L. Boas (John Wiley & Sons) Chapter 6

2. Introduction to Classical Mechanics by R. G. Takwale and P. S. Puranik (Tata McGraw-Hill Pub. Com. Ltd.) Chapters 1,2.

UNIT – II: WAVES **[15 Hours]**

Velocity of Acoustic Waves
Velocity of plane longitudinal waves, discuss on the velocity of sound through gases (Newton's value, Laplace's correction), Velocity of longitudinal wave in a solid medium, Velocity of transverse wave propagating along a string stretched under tension.

Speech and Hearing
Human voice, Hearing ear and its structure, mechanism of hearing, Threshold of hearing.

Musical Sound
Musical sound, Musical scale.

Ultrasonics
Magnetostriction method, Piezo-electric oscillator to generate ultrasonics, Measurement of velocity of ultrasonic waves, the ultrasonic waves & its uses.

Reference Books:

1. A text book on oscillations, waves & Acoustics by M. Ghosh, D. Bhattacharya, (S. Chand) Articles: 9.1 to 9.3, 9.5, 18.1, 18.2, 18.4, 19.1, 19.2, 23.1, 23.2, 23.4 and 23.6

2. Mechanics, Wave motion & Heat by Francis Weston Sears (Addison Wesley Publication)

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Effective from June 2023
DSC-M-PHY-113T-B (2 Credit)
Optics and LASER

UNIT – I: OPTICS

[15 Hours]

Farmat's principle and its applications:
Farmat's principle of least time, First and second laws of reflection, First and second laws of refraction.

Interference in thin films: Thin film, Plane parallel film, Interference due to transmitted light, Haidinger fringes, variable thickness (wedge-shaped) film, Newton's ring. Michelson Interferometer, Applications of Michelson interferometer, Fabry-Perot interferometer and etalon

Reference Books:

1. A text book of Optics by N. Subrahmanyam, Brijlal and M. N. Avadhnulu, S. Chand Publication.
   Articles: 2.2, 2.5, 2.6, 15.1 to 15.8, 15.12 (including all sub articles, except 15.2.5, 15.6.10 and 15.12.3)
2. Optics – Ajay Ghatak, TMH Edition
3. Principle of optics – B. K. Mathur

UNIT – II: LA SERS

[15 Hours]

Introduction, Attenuation of light in an optical medium, Thermal equilibrium, Interaction of light with matter, Einstein coefficients and their relations, Light amplification, Meeting the three requirements, Components of Laser, Lasing action, Principal pumping schemes, Type of lasers (excluding Carbon Dioxide Laser), Semiconductor laser, Laser beam characteristics, Applications

Reference Books:

1. A text book of Optics by N. Subrahmanyam, Brijlal and M. N. Avadhnulu, S. Chand Publication:
   Chapter 22 (including all sub articles)

2. Fibre Optics and optoelectronics by R. P. Khare, Oxford University Press.

3. An introduction to LASERS- Theory and Applications by M. N. Avadhanulu, S. Chand & Comp. Ltd

GUJARAT UNIVERSITY
Syllabus for First Year B.Sc.: Semester – I
Effective from June 2023
DSC-M-PHY-113P-A (2 Credit)
General Physics, Electronics
[60 Hours]

1. **To find the prism angle and refractive index of a prism using spectrometer.**
2. **Melde's Experiment.**
   (i) To prove P/L constant. (ii) To prove T/L^2 constant

3. **Resonator**
   To test the accuracy of relation $n^2 (V + Kv)$ = constant and to determine the frequency of unknown fork.

4. **Study of travelling microscope**
   To find distance between two given points, to find diameter of a ring, to find inner and outer diameter of a rubber tube
5. **'g' by Bar pendulum**
   To obtain the value of 'g' by bar pendulum.

6. **Analysis of error**

7. • Measurement of resistance, capacitor and inductance using multimeter
   • Study of diode using multimeter
   • Resistance value using colour code
   • Testing of continuity and fuse

8. **Measurement of Boltzmann's constant using Diode**
9. **Value of inductance**
   For given two inductors determine the value of inductance for each of them (i) by connecting them in series and (ii) by connecting them parallel.

10. **Study of Transformer**
    To determine (i) turn ratio (ii) percentage efficiency (iii) energy loss due to copper, for a given transformer.

11. **Logic Gates (AND, OR, NOT) (Using discrete components)**
    Verification of truth tables and giving understanding of voltage level for '0'and'1'level.
12. **Half-Wave Rectifier**
    Obtain load characteristic and % regulation of Half-wave rectifier without filter and with capacitor filter. Determine ripple factor also.
13. **Series Resonance**
    To determine the frequency of a.c. emf by series resonance circuit varying capacitor.

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

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Syllabus for First Year B.Sc.: Semester – I
Effective from June 2023
DSC-M-PHY-113P-B (2 Credit)
Understanding of Physics
[60 Hours]

1. Resonator

To test the accuracy of relation n^2 (V + Kv) = constant and to determine the frequency of unknown fork.

2. Flywheel

To determine the moment of inertia.

3. Study of travelling microscope

To find distance between two given points, to find diameter of a ring, to find inner and outer diameter of a rubber tube

4. Plotting of a graph and error estimation on graphical plot

- Linear (find slope and intercept) and nonlinear graph
- Logarithmic graph
- Polar graph

5. Simple pendulum

Find the relaxation time and quality factor

6. 'g' by Bar pendulum

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

7. • Measurement of resistance, capacitor and inductance using multimeter
• Study of diode using multimeter
• Resistance value using colour code
• Testing of continuity and fuse

8. Measurement of Boltzmann's constant using Diode

9. Thevenin and Norton theorem

10. Value of inductance

For given two inductors determine the value of inductance for each of them (i) by connecting them in series and (ii) by connecting them parallel.

11. Study of Transformer

To determine (i) turn ratio (ii) percentage efficiency (iii) energy loss due to copper, for a given transformer.

12. Logic Gates (AND, OR, NOT) (Using discrete components)

Verification of truth tables and giving understanding of voltage level for '0'and '1'level.

13. Half-Wave Rectifier

Obtain load characteristic and % regulation of Half-wave rectifier without filter and with capacitor filter. Determine ripple factor also.

Reference book:

1. Advanced practical physics for students by Worsnop and Flint
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