

Bhavan's Sheth R. A. College of Science
B. Sc. (PHYSICS) Semester – I
Syllabus for Physics Theory

Paper	Unit	Topic	Name / Email
101	I	Vector Analysis	Prof. T. N. Shah tejal.shah999@gmail.com
	II	Waves	Prof. D. N. Bhavsar div.bhavsar@gmail.com
	III	Optics	Prof. A. K. Shah atzeel@yahoo.com
	IV	Lasers	Prof. T. N. Shah tejal.shah999@gmail.com

Unit – I : Vector Analysis:

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 Book : Mathematical Methods in Physical Sciences by M. L. Boas (John Wiley & Sons) Chapter 6 Introduction to Classical Mechanics by R. G. Takwalw and P. S. Puranik (Tata McGraw-Hill Pub. Com. Ltd.) Chapters 1,2.

UNIT – II : Waves:

Traveling Waves Speed of propagation of waves in a stretched string longitudinal waves in a bar, Plane waves in a fluid, transmission of energy by a traveling wave.

Sound waves Introduction, Intensity & intensity level, Loudness & pitch radiation from a piston, diffraction, radiation efficiency of a sound source. Newton's and Langrang correction.

Ultrasonics Magnetostriction method, Piezo-electric oscillator, Piezo-electric detectors, Measurement of velocity of ultrasonic waves, diffraction effect & its application to determine the velocity of the waves, the ultrasonic waves & its use.

Reference Book : Mechanics, Wave motion & Heat by Francis Weston Sears (Addison Wesley Publication) Articles : 16.3 to 16.6, 18.1, 18.2, 18.3, 18.6, 18.7 A text book on oscillations, waves & Acoustics by M. Ghosh, D. Bhattacharya (S. Chand) Chapter 23 : Art 23.1 to 23.6

Unit – III : Optics:

Fermat's principle and its applications: Fermat's principle of least time, laws at reflection, 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.

Matrix Method in Optics : Introduction, The matrix method, Unit planes, Nodal point planes, A system of two thin lenses.

Reference Book : A text book of Optics by N. Subrahmanyam, Brijlal and M. N. Avadhulu, S. Chand Publication: Articles : 2.2, 2.5, 2.6, 15.1 to 15.6 (including all sub articles) **Page 2 of 6** Optics – Ajay Ghatak, TMH Edition, Articles : 3.1 to 3.5 Principle of optics – B. K. Mathur

Unit – IV : LASERS

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: A text book of Optics by N. Subrahmanyam, Brijlal and M. N. Avadhulu, S. Chand Publication: Chapter 22 (including all sub articles) Fiber Optics and optoelectronics by R. P. Khare, Oxford University Press. An introduction to LASERS- Theory and Applications by M. N. Avadhanulu, S. Chand & Comp. Ltd.,