

# **Bajaj College of Science, Wardha (Autonomous)**

## **Syllabus for B.Sc. II (Sem III) w.e.f. Session 2022-23**

### **Physics III (BCSPHYT203)**

#### **Unit I: Waves, Sound and Architectural Acoustics [10h]**

Waves: Speed of transverse wave along a string, formation of standing waves, transverse stationary vibrations of strings and harmonics, longitudinal vibrations in a gas column: open and closed at one end.

Sound: Mechanism of hearing, Quality of sound, Intensity and loudness, bel and decibel, music, musical scales (diatonic and tempered), types of musical instrument.

Architectural Acoustics: Acoustics of building, reverberation and reverberation period, Sabine's formula, factors affecting the acoustics of building, requirements for good acoustics.

#### **Unit II: Electro- Acoustics, Ultrasonics and Power Supply [10h]**

Applied electro-acoustics: Transducers and their characteristics, microphones, loudspeakers.

Ultrasonics: Properties and production of ultrasonic waves, piezoelectric effect, piezoelectric generator, magnetostriction effect and oscillators, frequency of ultrasonic waves, applications of ultrasonic waves (measurement of depth of sea, SONAR system and medical science).

Power supply: Introduction, rectification using half wave and full wave rectifiers ( $I_{d.c.}$ ,  $V_{d.c.}$ ,  $I_{r.m.s.}$ ,  $\eta$  and ripple factor), Working of Full wave bridge rectifier, filters, difference between regulated and unregulated power supply, line and load regulation, voltage stabilization, Zener diode as voltage regulator, Voltage regulation using IC, applications of voltage regulation.

#### **Unit III: Geometric Optics and Interference of light [10h]**

Thick lens, thin lens and lens combinations, Eyepieces (Ramsden's and Huygen's).

Interference in equal thickness thin film, phase change on reflection, refraction, and transmitted system. Newton's ring and its application to determine the wavelength and refractive index, Michelson Interferometer and its application to wavelength determination and wavelength difference, Fabry- Perrot Interferometer and its application.

#### **Unit IV: Diffraction of light [10h]**

Fresnel's diffraction- Half period zones, Zone plates, Diffraction due to straight edge and due to narrow slit.

Fraunhofer diffraction- Fraunhofer diffraction at a single slit, at circular aperture, Plane diffraction grating and its application, Resolving power of grating, Rayleigh's criterion for resolution.

#### **Unit V: Polarization [10 h]**

Production of polarized light: reflection, scattering, pile of plates, double refraction, polaroid. Brewster's law, Malus' law. Superposition of two disturbances. Phenomenon of double refraction: Uniaxial and biaxial crystal, positive and negative crystal, ordinary and extraordinary rays. Double refraction in uniaxial calcite crystal, Nicol prism, phase retardation plates ( Half wave and Quarter wave plates), production of elliptical and circular polarized light (mathematical approach), optical activity, half shade polarimeter. Applications.

## Unit VI: Electrodynamics [10 h]

Electromagnetic spectrum, Electromagnetic (EM) waves and their characteristics, Equation of continuity, displacement current, Maxwell's equations and its significance, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, radiation pressure, transverse nature of EM waves and applications of electromagnetic waves.

### Laboratory-3 (BCSPHY P203)

#### List of Experiments: (Any 10) [40h]

1. To study the speed of waves on stretched string.
2. To determine unknown frequency and to verify the law of inverse variation of frequency and volume of air by Helmholtz resonator.
3. To determine the velocity of sound wave in air (gas) with Kundt's tube.
4. To study the characteristics of microphone.
5. To study the current regulation and ripple factor of half wave/full wave rectifier using semiconductor diodes with L and  $\Pi$  type filter.
6. To study the characteristics of Zener diode.
7. To study the Zener diode voltage regulating characteristics.
8. To determine the focal length of long focus convex lens using short focus convex lens.
9. To study the different lenses and eyepieces.
10. To determine the wavelength of monochromatic light using Newton's ring.
11. To determine the refractive index of material of double image prism.
12. To study of polarization of light by reflection (Brewster's law).
13. To determine the resolving power of a grating.
14. To determine the wavelength of prominent lines of mercury by plane transmission grating.
15. To determine the concentration of sugar solution by half shade polarimeter.

#### Reference Books for theory:

1. A textbook of sound, Subramanyam and Brijlal, Vikas Prakashan.
2. A textbook of Oscillations, Waves and Acoustics by Dr. M. Ghosh, Dr. D. Bhattacharya (S. Chand).
3. Science and Technology of Ultrasonics by Baldevraj, Narosa publication.
4. Optics by Ajoy Ghatak, McGraw Hill Publications.
5. Elements of Electronics by M. K. Bagde, S. P. Singh, K Singh, S Chand publications.
6. A Textbook of Electrical Technology by B.L Thareja, S Chand Publications
7. Physics for Degree students for B. Sc. Second year, by C. L. Arora, Dr. P. S. Hemne.

**Reference Books for Practicals:**

1. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
2. A textbook of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
3. Engineering Practical Physics, S. Panigrahi & B. Mallick, 2015, Cengage Learning India Pvt. Ltd.
4. Collection of Experimental Problems in Physics by Rajesh Khaparde, H. C. Pradhan, Notion Press.
5. Advanced practical physics, Chauhan & Singh, Pragati Publications.