

Board of Studies in Physics
FACULTY OF SCIENCE
GONDWANA UNIVERSITY, GADCHIROLI

Credit Based Proposed Syllabus of

B.Sc. Second Year (Semester Pattern)

SUBJECT - PHYSICS

Semester III & Semester IV

Proposed Syllabus for B.Sc. II Subject – Physics

The syllabus of Physics as per semester system for the B.Sc. II will be implemented from the Academic year **2013-2014**.

Name of Programme : B.Sc. II

Duration: Two semesters

Semester III: Paper I (3S-PHY 301): Thermodynamics and Acoustics

Paper II (3S-PHY 302): Optics and Laser

Practical (3S- PHY 303): To perform 10 experiments (05 from each group)

Semester IV: Paper I (4S-PHY 401): Quantum Mechanics and Molecular Physics

Paper II (4S-PHY 402): Atomic physics and Solid State Electronics

Practical (4S- PHY 403): To perform 10 experiments (05 from each group)

Paper I: 3S-PHY 301: (Thermodynamics and Acoustics)

Unit I

Laws of Thermodynamics: Thermodynamic variables: extensive and intensive, Zeroth Law, Isochoric, Isobaric and Adiabatic Processes, Reversible and Irreversible Process, P-V diagrams, First Law of thermodynamics, Internal energy as a state function, Cyclic Process, Carnot's Cycle and its efficiency, Carnot's Theorem.

Numericals.

Unit-II

Entropy: Concept of entropy, Principle of increase of entropy, Second Law of thermodynamics, T-S diagram, Thermodynamic Scale of Temperature, Perfect gas scale, Third law of thermodynamics. Heat death of universe.

Thermodynamic Relationships: Maxwell's thermodynamical relations, Clausius – Clapeyron's Equation,

Numericals.

Unit-III

Blackbody Radiation: Black Body in Practice, Black Body Radiation and its Temperature Dependence, Wien's Displacement Law, Rayleigh – Jean's Law, Ultraviolet Catastrophe, Planck's quantum postulates, Planck's law, Complete fit with experiment.

Numericals.

Unit-IV

Acoustics. Noise and music, Intensity and loudness, bel and decibel, the music scale, Transducers and their characteristics (crystal microphone, moving coil loud-speaker), Recording and Reproduction of sound (magnetic tape, compact disc), Acoustics of a hall, reverberation and reverberation period, Sabine's formula. Requirement for a good acoustics.

Numericals.

References and Text books -

1. Heat, thermodynamics and statistical physics, by- Brijlal, Subramayam and Hemne,
2. Publisher: S. Chand & Company Ltd. New Delhi.
3. Physics for degree students B.Sc. Second Year – C.L. Arora, Dr P.S. Hemne,
4. Publisher: S. Chand & Company Ltd. New Delhi.
5. Heat, Thermodynamics and Statistical Physics, by- Pragati Prakashan , Singhal, Agrawal.
6. A Text Book of Heat, by- J. B. Rajam.
7. Treatise on heat, by- Shah, Srivastava.
8. Waves and Oscillations, by-Stephenson.
9. A Text Book of Oscillations, waves and Acoustic, by- Dr. M. Ghosh, Dr. D. Bhattacharya,
Publisher: S. Chand & Company Ltd. New Delhi.
10. Oscillation, waves and sound, by- Sharma and Saxena.
11. Waves and oscillation, by- N. Subrahmanuam and Brijlal, Publisher: S. Chand & Company
12. The Physics of waves and oscillation, by- N. K. Bajaj, Tata McGraw-Hill, publishing co. ltd.

Paper II: 3S-PHY 302: Optics and Laser

Unit I

Interference of light: The principle of super-positions, two-slit interference, Localised fringes, Thin films, Interference fringes at wedge-shaped films, Newton's rings (in reflected and transmitted light) and refractive index measurement.

Numericals.

Unit II

Michelson interferometer, its application for determination of wavelength, Febry-Perot interferometer.

Diffraction: 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, Plane diffraction grating and its applications, Resolving power of grating, Rayleigh's criterion for resolution.

Numericals.

Unit III

Polarization. Concept of polarization, Brewster's law, positive and negative crystal, Nicol prism, its application as an analyzer and polarizer, Double refraction in uniaxial crystal, phase retardation plate (Half and Quarter wave).

Numericals.

Unit IV

LASER- Spatial and temporal coherence, absorption, spontaneous and stimulated emission, Population inversion, Optical pumping, characteristics of laser beam, Ruby laser, Semiconductor laser, Application of lasers.

Numericals.

References and Text books -

1. Physics for Degree students for B. Sc. Second year, by- C. L. Arora, Dr. P. S. Hemne.
Publisher: S. Chand & Company Ltd. New Delhi.
2. Optics and Spectroscopy, by- R. Murugesan , Kiruthign Sivaprakash.
3. Optics, by- Brijlal and Subramayam.
Publisher: S. Chand & Company Ltd. New Delhi.
4. Optics, by- Ajay Agatak.
5. A text book of optics, by- Dr. Subrahmanyam, Brijlal and M. N. Avadhanulu.
Publisher: S. Chand & Company Ltd. New Delhi.
6. Optics, by- J. K. Sharma, K. K. Sarkar.
7. Fundamentals of optics, by-Jenkins and white.
8. Optics, by- D. P. Khandelwal.
9. Lasers and Non linear optics. By- B. B. Laud
10. LASERS- Theory and Applications, by- Thyagarajan and A. K. Ghatak
11. Optics and LASER, by- V. K. Sewane
12. Introduction to Lasers, by- Dr. Avadhanulu, Dr. P. S. Hemne.
Publisher: S. Chand & Company Ltd. New Delhi.

3S-PHY 303 :(Practical)

1. Every student will have to perform at least **Five (05)** experiments per semester.
2. Every student will have to perform **two** experiments one from each group at the time of university practical examination in 6 hours.
3. The distribution of practical/laboratory work of 30 marks is-

Two experiments (9 Marks each)	- 18 Marks
Record book	- 06 Marks
Viva Voce	- 06 Marks

Total	30 Marks

List of the experiments-

Group A

1. Study of resistance thermometry using thermistor.
2. Study of conduction of heat through poor conductor in circular form (Lee's disc method).
3. Study of conduction of heat through poor conductor in cylindrical form (Using Rubber tube).
4. Thermal conductivity of a rubber in the form of a tube.
5. Specific heat of solid by method of mixture and radiation correction.
6. Specific heat capacity of graphite and its variation with temperature.
7. Determination of specific heat of a liquid (turpentine oil) by method of cooling.
8. To study the adiabatic expansion of a gas and determination of ratio of two sp. heats of a gas by Clement and Desorme's method.
9. Mechanical Equivalent of Heat (J) by Calendar - Barne's constant flow method
10. Determination of specific heat capacity of a liquid by Calendar - Barne's constant flow method
11. Mechanical Equivalent of Heat (J) by Joule's calorimeter.
12. Determination of temperature coefficient of resistance of Platinum using Platinum Resistance Thermometer.
13. Determination of the coefficient of linear expansion of a rod by optical lever method.
14. To determine velocity of the transverse waves on stretched string using sonometer.
15. Study of the characteristics of loudspeaker (woofer, squawker and tweeter)
16. Study of the characteristics of a microphone
17. Study of directional characteristics of a microphone.
18. Study of interference with two coherent sources of sound and determination of velocity of sound in air.

Group B

1. Determination of focal length of a concave lens using a short focus convex lens
2. Determination of focal length of long focus convex lens using an auxiliary short focus convex lens.
3. Refractive index μ of glass prism by plotting I - δ curve using spectrometer (Schuster's method).
4. Refractive index μ of flint glass prism for sodium light using spectrometer.
5. Dispersion power (ω) of a glass prism using hydrogen discharge tube.
6. Dispersion power (ω) of a glass prism using mercury lamp.
7. Resolving power of a prism
8. Determination of refractive indices of different colours and plotting the graph of refractive index vs. wavelength.
9. Determination of angular magnifying power of a telescope.
10. Determination of linear magnifying power of a telescope.
11. To determine the wavelength (λ) of monochromatic light source by Newton's rings.

12. To determine the radius of curvature of plano-convex lens by Newton's rings apparatus.
13. To determine wavelength of monochromatic light source (λ) by Fresnel's biprism.
14. To determine the wavelength of sodium light using a plane transmission grating.
15. To determine the wavelength of mono-chromatic light using a plane transmission grating in minimum deviation position.
16. To determine the wavelength (λ) of prominent lines of mercury by a plane transmission grating.
17. To determine the resolving power of a telescope.
18. To determine the refractive index of the material using Brewster's law.
19. To study the divergence of a laser beam.
20. To determine wavelength of a LASER beam using plane diffraction grating.

References books -

1. B.Sc. Practical Physics - – Dr P.S. Hemne, Harnam Singh
Publisher: S. Chand & Company Ltd. New Delhi.
2. Practical Physics For B. Sc. II –Kale, Soman, Gawande & Gokhale
Publisher: Kitab Mahal, Nagpur
3. Practical Physics For B. Sc. III –Kale, Bahekar & Gokhale
Publisher: Kitab Mahal, Nagpur
4. University Practical Physics – D.C. Tayal, Ila Agrawal
Publisher: Himalaya Publishing House
5. B.Sc. Practical Physics - C. L. Arora
Publisher: S. Chand & Company Ltd. New Delhi.
6. A Text Book on Practical Physics – K. G. Muzumdar, B. Ghosh
Publisher: Shreedhar Publishers, Kolkata