

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

B.Sc. II Year Physics Syllabus (MCQ Pattern)

Semester III & IV

(Revised New Syllabus Effective from June 2012)

Course Title	Paper	Semester	Periods	Marks		
				External	Internal	Total
PHY211:Waves, Acoustics & Ultrasonics	VI	III	45	40	10	50
PHY212:Relativity , Nuclear Physics & Statistical physics	VII	III	45	40	10	50
PHY221: Optics & Lasers	VIII	IV	45	40	10	50
PHY222: Electronics	IX	IV	45	40	10	50
PHY203:Practical Course (Annual Pattern)	X	Based on Theory Paper-VI & VII	80	50	-----	50
PHY204:Practical Course (Annual Pattern)	XI	Based on Theory Paper- VIII & IX	80	50	-----	50
Grant Total						300

B.Sc.II Year PHYSICS

Semester - III (PHY211: Waves, Acoustics and Ultrasonics)

Paper -VI

Periods: 45

Marks: 40 External + 10 Internal

Unit –I: Waves: (Book 1 and 2) (12 Periods)

Wave velocity and particle velocity, Differential equation of wave motion, Energy of a plane progressive wave, Equation of motion of a vibrating string, Velocity of transverse waves along a string, Frequency and period of vibration of a string, Problems.

Unit—II: Stationary waves: (10 Periods)

Analytical treatment of stationary waves (closed end & open end pipe at the other end), Investigation of pressure and density changes at displacement Nodes and Antinodes, Distribution of Energy in a stationary wave, Energy is not transferred in a stationary waves, Problems. **(Book 1 and 2)**

Unit—III: Acoustics: (12 Periods)

Noise and Musical sounds, Loudness, pitch, Quality, Intensity of Sound, The Decibel, The Phon, Bel, Reverberation, Reverberation time, Absorption coefficient, Sabine's formula, Acoustical demands of good auditorium. Transducers and their characteristics, pressure microphone, moving coil loud speaker, process of recording and reproduction of sound in compact disc, Problems. **(Book 1 and 2)**

Units—IV: Ultrasonics (11 Periods)

Ultrasonics, properties of ultrasonic waves, Piezo-electric & magnetostriction effect, production of ultrasonic waves by Piezo electric & magnetostriction oscillator, Detection of ultrasonic waves, acoustic grating, Application of ultrasonic Waves, Problems. **(Book 1 and 2)**

Books Recommended:

1. Waves and Oscillations – Brijlal and Subrahmanyam. (Vikas Publishing House)
2. Text Book of Sound - Khanna and Bedi.(Atma Ram & Sons)
3. A text book of Sound - N. Subrahmanyam, Brijlal
4. Sound - M. Ghosh
5. Text Book of Sound - Sharma & Saxena (New Age international publishers)
6. Physics of Vibrations & Waves - H.J.Pain (John Wiley & Sons)

B.Sc.II Year PHYSICS

Semester - III

Paper –VII

(PHY212: Relativity, Nuclear Physics and Statistical Physics)

Periods: 45

Marks: 40 External + 10 Internal

Unit I: Relativity

(10 Periods)

Introduction, frame of reference, , Postulates of Special Theory of Relativity, Galilean Transformations, Lorentz Transformations, Length Contraction, Time dilation, Velocity addition, relativity of mass, Mass energy relation. **(Book 1 and 2)**

Unit II: Nucleus & Nuclear model

(16 Periods)

Introduction, General Properties of Nucleus, Theory of Nuclear composition, Proton-Electron Theory, Proton –neutron theory , Binding energy, Semi-Empirical mass formula, Nuclear models , Liquid Drop Model, shell model . **(Book 3 and 5)**

Accelerators and Detectors

Introduction to accelerators & Detectors , Linear accelerator, Circular accelerators Cyclotron, Synchrocyclotron, Ionization chamber, Geiger Muller counter, **(Book 3, 4 and 5)**

Unit III: Radioactivity

(07 Periods)

Introduction , Charge of Alpha particles, Range of α particles, Geiger-Nuttal law, The Age of the Earth, Biological effects of radioactive radiations **(Book 5 and 3)**

Unit IV: Statistical Physics (12 Periods)

Introduction , Phase space, Micro and Macro states, Thermodynamic probability, Entropy & probability , Calculus of Probability , Classical Statistics - Maxwell-Boltzmann statistics and Distribution law, Quantum Statistics- Bose- Einstein statistics and Distribution law, Fermi-Dirac statistics and Distribution law. Photon gas , Electron gas **(Book 7 and 8)**

Books Recommended:

1. Perspectives of Modern physics – Arthur Beiser
2. Relativistic mechanics – Satya Prakash

3. Nuclear Physics – D.C.Tayal (Himalaya Publishing House)
4. Nuclear Physics – Irving Kaplan
5. Modern physics – R.Murugesan.(S.Chand & Co.XIth Revised edition)
6. Thermodynamics and Statistical Physics- S.L.Kakani(Sultan Chand & Sons)
7. Thermodynamics, Kinetic Theory, and Statistical Thermodynamics – Sears and Salinger, (Narosa Publishing House, New Delhi)
8. Heat and Thermodynamics – Brij Lal, N.Subrahmanyam, (Sultan Chand & Company Ltd.

B.Sc.II Year PHYSICS

Semester - IV

(PHY221: Optics and Lasers)

Paper –VIII

Periods: 45

Marks: 40 External + 10 Internal

Unit–I: Geometrical Optics (Book 1) (08 Periods)

Cardinal Points of an Optical System(six points), Newton's formula ,
Coaxial Lens System (equivalent focal length and cardinal points), Huygens
Eyepiece, Ramsden Eyepiece and their cardinal points, **Problems.**

Unit–II: Interference (Book 1) (18 Periods)

Interference due to Reflected light (Thin film), Newton's Rings,
Determination of wavelength of Sodium light, Michelson Interferometer,
Determination of wavelength of monochromatic light, Difference in wavelength
between two neighbouring spectral lines, **Problems.**

Diffraction:

Fresnel and Fraunhofer diffraction, Fraunhofer's diffraction due to single and
double slit, Plane diffraction grating, Determination of wavelength of Sodium light,
Rayleigh criterion, Resolving power of grating, Resolving power of Prism, **Problems.**

Unit–III: Polarization (Book 1 and 2) (10 Periods)

Polarization by Reflection, Brewster's law, Malus law, Double refraction, Nicol
prism, Nicol prism as an analyzer, Huygen's explanation of double Refraction in
Uniaxial crystals , Elliptically and Circularly polarized light, Quarter wave plate, Half wave
plate, Optical Activity , Specific rotation, Laurent's half shade polarimeter,
Problems.

Units–IV: Lasers (Book 3) (09 Periods)

Spontaneous & stimulated emission, absorption, Einstein coefficients (definitions),
Population inversion, Optical & electrical pumping, Cavity resonators, Properties of
lasers, Ruby laser, Helium-Neon laser, Applications of lasers.

Books Recommended:

1. A Text Book of Optics - Brijlal and Subrahmanyam. (S. Chand & Co.)
2. B.Sc. Physics Volume –I-- C.L.Arora (S.Chand)
3. Lasers and Nonlinear Optics – B.B.Laud (Willey .Eastern limited)
4. Optics and Atomic Physics – D.P. Khandelwal. (Himalaya Publishing House)
5. Optics (Second edition) – A.K.Ghatak
6. Geometrical & Physical optics by D. S. Mathur.

B.Sc.II Year PHYSICS

Semester - IV

Paper –IX

(PHY222: Electronics)

Periods: 45

Marks: 40 External + 10 Internal

Unit–I: Transistors

Bipolar Junction Transistors (BJT): (Book 1,2,3) (18 Periods)

Introduction, Load line, Transistor biasing, voltage divider bias, Hybrid parameters (or h parameters) Determination of h-parameters, common – emitter amplifier, Analysis of common emitter amplifier and common – collector amplifier using h-parameters (current gain, voltage gain, power gain, input resistance and output resistance)

Field Effect Transistors: (Book 4,6)

JFET: Principle of working, static characteristics, JFET parameters, Transfer characteristics, JFET as an amplifier.

MOSFET: Construction and working in Depletion and Enhancement mode, Types of MOSFET, Characteristics of MOSFET.

Unit–II: Operational Amplifier: (Book 5,6) (10Periods)

Theory of differential amplifier, block diagram of Op-Amp, schematic symbol, ideal Characteristics, input offset voltage; input offset current, input bias current, input impedance, Output impedance, open loop gain, CMRR, Supply voltage rejection ratio (SVRR), Large signal voltage gain, Slew rate, Ideal OP-Amp, Equivalent circuit of OP-Amp.

Applications of Op-Amp:

The differential amplifier, Inverting amplifier, non-inverting amplifier.

Unit III: Oscillators: (Book 8) (08Periods)

Hartley oscillator, Colpitt's oscillator, R-C Network, Phase shift oscillator

Unit IV: Regulated Power supply : (Book 1, 2) (09 Periods)

Introduction, ordinary D. C. power supply, Voltage regulation, minimum load resistance, Regulated power supply, Need of regulated power supply, Types of regulators, for low voltage, for high voltage, Zener diode voltage regulator,, Transistor series voltage regulator Series feedback voltage regulator short circuit protection, Transistor shunt voltage regulator, Definition of Line and Load regulation, Problems.

Books Recommended:

1. Principles of Electronics – V. K. Mehta Rohit Mehta (S.Chand & Co.)
2. Electronic Principles-Malvino
3. Basic Electronics(Solid State) – B.L.Thereja(S.Chand & Co.)
4. Basic Electronics & Linear Circuits—N.N.Bhargava,D.C.Kulshreshtha(TMh)
5. Op-Amps and Linear Integrated Circuits-Ramakant Gayakwad, (PHI Delhi)
6. Electronic fundamentals and Applications – J. D. Ryder.(TMh publications).
7. Digital & Analogue Techniques—Navneet , Gokhale & Kale (Kitab Mahal)
8. Introduction to Electronics-K.J.M.Rao, (Oxford and IBH Publishing Co.).
9. Solid State Pulse Circuits-David A Bell, Fourth edition, (PHI)
10. Electronics and Radio Engineering-M.L.Gupta, (Dhanpat Rai and sons).
11. Linear Integrated circuits-K.C. Botkar

B.Sc.II Year PHYSICS

Annual Pattern

Paper –X

(PHY203: Practical Course)

Periods: 80

Marks: 50

1. Moment of Inertia of a flywheel
2. Kater's pendulum
3. γ by Cantilever (Oscillation method)
4. η by torsional pendulum
5. γ and η by Searle's method
6. Coefficient of viscosity by Searle's viscometer
7. Surface tension by Fergusson method
8. Frequency of A.C. by Sonometer
9. Determination of ' μ ' by i - δ curve using spectrometer
10. Determination of λ of Sodium light by Newton's ring
11. Diffraction grating normal incidence
12. λ by Biprism
13. λ by Lloyd's single mirror
14. Resolving power of Telescope
15. Resolving power of grating
16. Thermal conductivity by Searle's method
17. Specific rotation by Laurent's half shade polarimeter
18. Wavelength measurement of LASER by diffraction grating

B.Sc.II Year PHYSICS

Annual Pattern

Periods: 80

(PHY204: Practical Course)

Paper –XI

Marks: 50

1. Potentiometer- measurement of Low resistance
2. C_1/C_2 by Desauty's method
3. Maximum velocity of electron using photocell
4. h/e by Photocell
5. Solar cell characteristics
6. LDR-LED characteristics
7. Photo diode characteristics
8. Transistor characteristics (C-B mode)
9. Transistor characteristics (C-E mode)
10. Characteristics of photo transistor
11. Power supply using π filter (Full Wave rectifier)
12. Transistorized regulated power supply.
13. Load regulation using bridge rectifier.
14. Study of transistorized CE amplifier (Frequency response, gain & 3db band width.)
15. Op-Amp as adder
16. Op-amp as subtractor.
17. Op-amp as integrator
18. Hartely oscillator. Measurement of frequency and amplitude of waveforms.
19. Phase shift oscillator. Measurement of frequency and amplitude of waveforms.

Note: 1. Each student appearing for examination must produce a journal showing that he has completed not less than **12** experiments in each practical course during the year.

2. Internal marks should be given for student's performance in Unit test, Tutorial, oral exam, seminar etc.