

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

**B.Sc. II YEAR Physics Syllabus (MCQ Pattern)**

**Semester III & IV**

(Revised New Syllabus Effective from June 2014)

Course Title	Paper	Semester	Periods	Marks	
				External	Internal
PHY211:Waves, Oscillations and Acoustics	VI	III	45	40	10
PHY212: Statistical physics, Electromagnetic theory & Relativity	VII	III	45	40	10
PHY221: Optics & Lasers	VIII	IV	45	40	10
PHY222: Basic Electronics	IX	IV	45	40	10
PHY203:Practical Course	X	Annual	80	50	-----
PHY204:Practical Course	XI	Annual	80	50	-----

## B.Sc. II YEAR PHYSICS

Semester - III (PHY211: Waves, Oscillations and Acoustics) Paper -VI

Periods: 45

Marks: 40 External + 10 Internal

### Unit –I: Waves:

(10 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,

(Books 1,2)

### Unit—II: Stationary waves:

(11 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.

( Book 1)

### Unit - III: Free and Forced Vibrations:

( 12 Periods )

Free Vibrations, Forced Vibrations, Resonance (Definitions only), Oscillatory Motion of a particle from energy considerations, Damped simple harmonic motion, Aperiodic, Critically Damped Oscillatory Motions, Effect of damping on Frequency, Differential Equation for Forced Vibrations, Amplitude and phase.

(Books 2)

### Unit –IV: Acoustics and Ultrasonics:

(12 Periods)

Reverberation, Reverberation time, Derivation of Reverberation Time (Sabine's formula), Absorption coefficient, Determination of absorption coefficient (reverberation Chamber Method), Conditions for good acoustical designs of auditorium, Ultrasonics, Piezo-electric & magnetostriction effect, Piezoelectric Oscillator, magnetostriction oscillator, Detection of ultrasonic waves: acoustic grating and Kundt's tube Method, Application of ultrasonics

### Books Recommended:

1. Waves and Oscillations – Brijlal and Subrahmanyam. (Vikas Publishing House)
2. Text Book of Sound with Theory of Oscillations and waves – D. R. Khanna and R. S. Bedi. (Atma Ram & Sons Delhi)
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 (PHY212: Statistical Physics, Electromagnetic Theory & Relativity)**

**Paper –VII**

**Periods: 45**

**Marks: 40 External + 10 Internal**

**Unit -I: Statistical Basis and Thermodynamics (12 Periods)**

Statistical Basis, probability, probability and frequency, permutation and combinations, Micro and Macro states, Thermodynamic probability, Entropy & probability, (Book 1)

**Unit S-II: Classical Statistics and Quantum Statistics (12 Periods)**

Phase space, Maxwell-Boltzmann Statistics and Distribution law, Quantum Statistics- Bose-Einstein Statistics and Distribution law, Fermi- Dirac Statistics and Distribution law, comparison of M. B., B.E. and F. D. statistics, Application of Quantum statistics to Photon gas and Electron gas. (Book 1 and 3)

**UNIT –III: Electromagnetic Theory and Maxwell's Equations (11 Periods)**

Ampere's Law, Generalization of Ampere's Law and displacement current, Maxwell's Equations, Derivation of Maxwell's Equations, The electromagnetic Energy, and Poynting Vector, The wave Equation. (Books 4,5,6)

**Unit IV: 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 7 and 8)**

Books Recommended:

1. Heat Thermodynamics and statistical Physics – Brij Lal, Dr. N.Subrahmanyam, P. S. Hemne (Sultan Chand &Company Ltd).
2. Thermodynamics and Statistical Physics- S.L.Kakani(Sultan Chand &Sons)
3. Thermodynamics, Kinetic Theory, and Statistical Thermodynamics – Sears and Salinger, (Narosa Publishing House, New Delhi)
4. Foundatin of Electromagnetic Theory – John R Reitz Frederic J. Milford ,(Narosa Publishing House, New Delhi
5. Classical Electrodynamics- Gupta Singh, Kumar , Pragati Prakashan Meerut.
6. Introduction to Electrodynamics- David J. Griffiths, Prentices Hall, India.
7. Perspectives of Modern physics – Arthur Beiser
8. Relativistic mechanics – Satya Prakash

## B.Sc. II YEAR PHYSICS

**Semester - IV**

**(PHY221: Optics and Lasers)**

**Paper –VIII**

**Periods: 45**

**Marks: 40 External + 10 Internal**

### **Unit–I: Geometrical Optics**

**(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.**

**(Book 1-6)**

### **Unit–II: Interference and Diffraction:**

**(14 Periods)**

Newton's Rings, Determination of wavelength of Sodium light, Michelson Interferometer, Determination of wavelength of monochromatic light, Difference in wavelength between two neighboring spectral lines. **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.

**(Book 1-6)**

### **Unit–III: Polarization**

**(12 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 , Quarter wave plate, Half wave plate, Optical Activity , Specific rotation, Laurent's half shade polarimeter,

**(Books 1 and 2)**

### **Units–IV: Lasers**

**(08 Periods)**

Interaction of light with Matter, Absorption, Spontaneous emission Stimulated emission, Einstein coefficients, Population inversion, Optical & electrical pumping, Lasing Action, Ruby laser, He-Ne laser.

**(Book 6,7)**

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. Optics and Atomic Physics – D.P. Khandelwal. (Himalaya Publishing House)
4. Optics (Second edition) – A.K.Ghatak
5. Geometrical & Physical optics by D. S. Mathur.

6. Text Book of Optics- N. Subrahmanyam Brijlal, M. N. Avadhanulu (S. Chand) Twenty Third Revised (multi colored Edition 2006)

7. Lasers and Nonlinear Optics – B.B.Laud (Willey .Eastern limited)

## **B.Sc. II YEAR PHYSICS**

**Semester - IV**

**Paper -IX**

### **(PHY222: Electronics)**

**Periods: 45**

**Marks: 40 External + 10 Internal**

#### **Unit I: Regulated Power supply : (10 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. **(Book 2 )**

#### **Unit–II: Bipolar Junction Transistors (BJT): (13Periods)**

Transistor Connections: Common base, common emitter, common collector, Characteristics of common base, common emitter, common collector connections, transistor Load line Analysis, Operating point. Faithful Amplification, Transistor biasing, Stabilization, voltage divider bias Method, Hybrid parameters (or h parameters) Determination of h-parameters, Analysis of common emitter amplifier using h-parameters (current gain, voltage gain, power gain, input resistance and output resistance) **(Book 2,7)**

#### **Unit–III: Operational Amplifier: (12Periods)**

Operational Amplifier, Basic circuit of differential amplifier, common Mode and differential mode signals, 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, Slew rate, Inverting amplifier, Noninverting amplifier. **(Book 2, 6,7)**

#### **Unit IV: Sinusoidal Oscillators: (10 Periods)**

Sinusoidal Oscillator, Types of sinusoidal Oscillators, Oscillatory circuit, Positive feedback Amplifier- Oscillator, Elements of Transistor Oscillator, Barkhausen Criterion, Hartley oscillator, Colpitt's oscillator, R-C Network, Phase shift oscillator, **(Book 2, 9)**

#### **Books Recommended:**

1. Principles of Electronics – V. K. Mehta Rohit Mehta (S.Chand & Co.)

2. Principles of Electronics – V. K. Mehta Rohit Mehta (multicolour Illustrative Edition 2000 and 2013) (S.Chand & Co.)
3. Electronic Principles-Malvino
4. Basic Electronics(Solid State) – B.L.Thereja (S.Chand & Co.)
5. Basic Electronics & Linear Circuits—N.N.Bhargava,D.C.Kulshreshtha(TMh)
6. Op-Amps and Linear Integrated Circuits-Ramakant Gayakwad, (PHI Delhi)
7. Electronic fundamentals and Applications – J. D. Ryder.(TMh publications).
8. Digital & Analogue Techniques—Navneet , Gokhale & Kale (Kitab Mahal)
9. Introduction to Electronics-K.J.M.Rao, (Oxford and IBH Publishing Co.).
10. Solid State Pulse Circuits-David A Bell, Fourth edition, (PHI)
11. Electronics and Radio Engineering-M.L.Gupta, (Dhanpat Rai and sons).
12. Linear Integrated circuits-K.C. Botkar

**B.Sc. II YEAR PHYSICS**

**Semester – Annual**

**Paper –X**

**(PHY203: Practical Course)**

**Periods: 80**

**Marks: 50**

1. Moment of Inertia of a flywheel
2. Kater's pendulum
3.  $Y$  by Cantilever (Oscillation method)
4.  $\eta$  by torsional pendulum
5.  $Y$  and  $\eta$  by Searle's method
6. Determine the dispersive power plane diffraction grating
7. Stefan's constants
8. Surface tension by Fergusson method
9. Frequency of A.C. by Sonometer
10. Determine the specific heat capacity of water
11.  $\mu$  By Spectrometer
12. Determination of ' $\mu$ ' by  $i$ - $\delta$  curve using spectrometer
13. Determination of  $\lambda$  of Sodium light by Newton's ring
14. Diffraction grating normal incidence
15. Resolving power of Telescope
16. Resolving power of grating
17.  $\lambda$  by Biprism
18.  $\lambda$  by Lloyd's single mirror
19. Specific rotation by Laurent's half shade polarimeter

## B.Sc. II YEAR PHYSICS

**Semester –Annual**

**Paper –XI**

**Periods: 80**

**(PHY204: Practical Course)**

**Marks: 50**

1. Potentiometer- measurement of Low resistance
2.  $C_1/C_2$  by Proportional kick's method
3.  $C_1/C_2$  by Method of Mixture
4. Maximum velocity of electron using photocell
5. To study the charging and discharging of condenser through resistance
6. Solar cell characteristics
7. To Study the Zener Diode as voltage regulator
8. High resistance through leakage of condenser
9. Transistor characteristics (C-B mode)
10. Transistor characteristics (C-E mode)
11. Characteristics of photo transistor
12. Power supply using  $\Pi$  filter ( Full Wave rectifier)
13. Transistorized regulated power supply.
14. Load regulation using bridge rectifier.
15. Study of transistorized CE amplifier (Frequency response, gain & 3db band width.)
16. Op-Amp as adder
17. Op-amp as subtractor.
18. Hartely oscillator. Measurement of frequency and amplitude of waveforms.
19. Phase shift oscillator. Measurement of frequency and amplitude of waveforms.
20. Calibration of voltmeter by using Potentiometer.

**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.