**Dr.Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. I Year Physics Syllabus**

**Semester I & II**

**(Revised syllabus Effective from June 2013)**

**B. Sc. I Year Physics (Semester-I)**

**(Mechanics, Properties of Matter and Sound)**

**Course Code – Phy101**

**Paper – I**

**Periods – 45 Marks – 50**   
**1. Mechanics: -         13 periods**

Compound Pendulum- expression of time period, Interchangeability of centre of suspension and oscillation, Kater’s Pendulum.

Newton’s law of Gravitation ( Statement only ) , Gravitational Field , Gravitational Potential, Gravitational Potential of mass, Gravitational potential and field due to spherical shell and solid sphere (at a point, outside , inside and on the surface).

**2. Elasticity: -            10 periods**

Introduction , Moduli of Elasticity ( Elastic constants ), Twisting couple on a cylinder, Bending of Beam – Bending moment, cantilever loaded at free end – (a) When weight of beam is ineffective, (b) When weight of beam is effective, Depression of Beam supported at centre

**3. Viscosity and Surface Tension:  12 Periods**

**Viscosity -** Introduction, energy of liquid in motion, Bernoulli’s Theorem, practical applications: (i) Law of hydrostatic pressure (ii) Filter pump, Poiseuille’s formula.

**Surface Tension** - Introduction, Difference of pressure across a curved surface, Determination of S.T. by Jaeger’s method.

**4. Ultrasonic and Acoustics: -                             10 periods**

**Ultrasonic** - Piezo – electric effect, Piezo – electric Generator, Magnetostriction effect, Magnetostriction oscillator, Applications of ultrasonic – Depth of sea, Chemical effects, Medical applications.

**Acoustics** - Reverberation, Acoustical demands of an auditorium, Sabine’s Law – Derivation of Reverberation time, conditions of good acoustical designs of room.

**References:-**  
1) Elements of Properties of Matter – D. S. Mathur

(S. Chand , 11 th edition , 1992)

2) Physics for Degree students – C. L. Arora and P.S.Heme

(S. Chand , I st edition  2010 )

3) Mechanics and Electrodynamics – Brijlal ,N. Subrahmanyam , Jivan Seshan

( S.Chand , 7 th edition )

4)  Text Book of sound – Khanna and Bedi

(Atma Ram and sons, 1989 edition)

5)  Text Book of sound – N. Subrahmanyam and Brijlal

( Vikas Publishing House 2 nd Revised edition )

**B. Sc. I Year Physics (Semester- II)**

**(Electricity and Magnetism)**

**Course Code – Phy105**

**Paper – V**

**Periods – 45 Marks – 50**

**1)  Vector Algebra : -** **12Periods**

Dot and cross product (Revision), scalar triple product and it’s geometrical interpretation, vector triple product, gradient of a scalar and it’s physical interpretation, Divergence and curl of vector function and their physical interpretation, line, surface and volume integrals, Gauss’s divergence theorem and Stoke’s  theorem .

**2) Electrostatics: -** **13 Periods**

Coulomb’s Law , Electric field , field due to point charge, flux of electric field, Gauss’s law

( with proof ) , Differential from of Gauss law , electric potential , potential due to a point charge, Potential and field due to electric dipole.

Dielectrics, polarization of dielectric, Gauss’s law in dielectrics, Relation between **D**, **E** and **P.**

**3) Magnetostatics: -** **10 Periods**

Magnetic field , Magnetic induction , magnetic flux , Biot-Savart law, Magnetic induction due to straight conductor  carrying current , magnetic induction on  the axis of solenoid ,Ampere’s Law, Differential form Ampere’s Law, Moving coil ballistic Galvanometer - expression for charge.

**4) Transient Currents: -**           **10 periods**

Growth and decay of current in a circuit containing L and R , charge and discharge of a capacitor through resistor, Growth and decay of charge in LCR circuit.

**Reference Books: -**

1)  Mathematical Methods in physics – D.Biswas( New central book agency , 2009 edition )

2) Electricity and Magnetism – R.Murugeshan( S. Chand, 2008 edition )

3) Electrodynamics – Gupta, Kumar, Singh (Pragati Prakashan, Meerut, 18th edition 2005)

4) Foundations of Electromagnetic Theory-Ritz, Milford, Chirstey IIIrd edition.

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**B.Sc. IInd year Physics Syllabus**

**(Semester-III and IV)**

**Revised Syllabus from June 2014**

**B.Sc. IInd year Physics (Semester-III)**

**(Mathematical, Statistical Physics and Relativity)**

**Course code PHY-201**

**Paper-VII**

**Period-45 Marks-50**

1. **Differentiation and ordinary differential equation:**

Limit of function, partial differentiation, successive differentiation, total differentiation, exact differentiation, chain rule.

Ordinary differential equation, order and degree of differential equation, solution of first order differential equation, solution of second order linear differential equation with constant coefficient

a)Homogeneous equations, b) Inhomogeneous equation., Special case of exponential right hand to find P.I.

1. **Statistical basis and classical statistics:**

Introduction, probability, principle of equal a priori probability, probability and frequency, some basis rules of probability theory, permutation and combination, macrostates and microstates, phase space, thermodynamic probability, division of compartments into cells, Maxwell-Boltzmann energy distribution law, evaluation of gi, α and β, M.B. distribution function for ideal gas, M.B. Speed distribution law.

1. **Quantum statics:**

Need of quantum statistics, Bose-Einstein distribution law, Planck’s radiation law, Fermi-Dirac distribution law, electron gas, Fermi level and Fermi energy, EFO for electrons in a metal, comparison of three statics, difference between classical and quantum statistics.

1. **Theory of relativity:**

Introduction, frame of reference, Galilean transformation equations, Michelson Morley experiment, special theory of relativity, Lorentz transformation equation, length contraction, time dilation, addition of velocities, variation of mass-energy equivalence.

**Reference Books:**

1. Mathematical Physics- Gupta, Kumar
2. Mathematical Physics- B.S. Rajput (PragatiPrakashan)
3. Heat, thermodynamics & statistical Physics- Brijlal, N. Subrahmanyam, P.S. Hemne.

S. Chand Publication

1. Text book of heat and thermodynamics- J.B. Rajam& C. L. Arora.
2. Modern physics – R. Murgeshan, KiruthigaShivprasath, S. Chand Publication.

**B.Sc. IInd year (Semester-III)**

**Physics Practical**

**Course code PHY-203**

**Paper-IX**

**Marks-50**

1. ‘h’ by Photo cell

2. e/m by Thomson’s tube method.

3. Determination of absolute value of BH and BV using Earth Inductor

4. Stefan’s constant by using thermo couple

5. Measurement of low resistant using potentiometer.

6. Determination of A.C. mains using sonometer.

7.Specific rotation by Laurent’s half shade polarimeter.

8. Cauchy’s constant by spectrometer

**Note:** At least six experiments should be performed.

**B.Sc. IInd year (Semester-III)**

**Physics Practical**

**Course code PHY-204**

**Paper-X**

**Marks-50**

1 Thermal conductivity of rubber tube.

2. Study of temperature dependence of total radiation.

3. To draw the histogram of theoretical Gaussian curve.

4. Comparison of capacities by Desauty’s method.

5 Velocity of sound using Helmholtz resonator.

6 Surface tension by Ferguson’s method.

7 R.P. of Telescope.

8. Wave length by Newton’s ring

**Note:** At least six experiments should be performed.

**B.Sc. IInd year Physics (Semester-IV)**

**(General Electronics )**

**Course code PHY-205**

**Paper-XI**

**Period-45 Marks-50**

1. **Semiconductor :**

Introduction, Construction, Working and Characteristics of semiconductor diode,Zenerdiode,Zener diode characteristics,Transistor (PNP and NPN), Transistors characteristics (CE,CB and CC) ,Construction, Working and Characteristics of FET & MOSFET.

1. **TransistorBiasing and Amplifiers :**

Transistor basing,Selection of operatingpoint, bias stability, transistor biasing circuits - fixed bias or base bias, collector feedback bias, emitter feedback bias or self-bias.

Single stage transistor amplifier, frequency response of RC coupled amplifier, Noise in amplifiers, feedback in amplifiers, Op-Amp characteristics, inverting & non-inverting amplifier, Op-Amp as an adder and subtractor.

1. **Oscillatorsand Multivibrators:**

Two port network representation of a transistor, Hybrid parameters or h – parameters, Positive feedback, Basic principle of Oscillators, requirements of feedback, RC Oscillator (Phase shift Oscillator), LC Oscillator (Hartley Oscillator)Transistorised.astable multivibrator, monostable multibibrator, bistableMultibrator,

1. **Modulation and demodulation :**

Modulation, Amplitude modulation, Modulation index, frequency modulation, phase modulation, demodulation, advantages of frequency modulation over amplitude modulation.

**Reference Books :**

1. Basic principle of electronics- V.K. Mehta.
2. Basic Electronics & Linear circuits- N.N. Bhargawa.
3. An introduction to Electronics edition-II or III – A.P. Malvino.
4. Radio engineering- M.L. Gupta.
5. An introduction of Electronics – K.J.M.Rao.

**B.Sc. IInd year (Semester-IV)**

**Physics Practical**

**Course code PHY-207**

**Paper-XIII**

**Marks-50**

1. Energy band gap of semiconductor using thermister.

2. I.V. Characteristics of solar cell.

3. Calibration of bridge wire using Carry-Foster’s bridge.

4. Determination of absolute capacity of condenser using B.G.

5. Full wave rectifier with ∏ filter.

6. Viscosity of liquid using Searle’s viscometer.

7. High resistance by leakage through condenser.

8 **V**iscosity of liquid by oscillating disc method

**Note:** At least six experiments should be performed.

**B.Sc. IInd year (Semester-IV)**

**Physics Practical**

**Course code PHY-208**

**Paper-XIV**

**Marks-50**

1 Transistor characteristics in CE configuration.

2. Transistor characteristics in CB configuration

3. Study of CE amplifier

4.Hartly Oscillator using transistor.

5 Wien bridge Oscillator using transistor/ Op-Amp

6 Op-Amp as adder/substractor

7 JFET characteristics .(rp, gm and μ)

8. Self-inductance by Owen’s Bridge

**Note:** At least six experiments should be performed.