Dr. BabasahebAmbedkarMarathawada University Aurangabad

Physics Syllabus

B.Sc. II Year

Semester III & IV

Effective From

Academic Year 2014-15

Dr.BabasahebAmbedkarMarathwada University, Aurangabad.

B.Sc. II[nd] year Physics Syllabus

(Semester-III and IV)

Revised Syllabus from June 2014

Semester	Course Code	Paper	Title of Paper	Periods	Marks
III	Physics 201	VII	Mathematical , Statistical Physics and Relativity	45	50
III	Physics 202	VIII	Modern and Nuclear Physics	45	50
III	Physics 203	IX	Practical	45	50
III	Physics 204	X	Practical	45	50
IV	Physics 205	XI	General Electronics	45	50
IV	Physics 206	XII	Solid State Physics	45	50
IV	Physics 207	XIII	Practical	45	50
IV	Physics 208	XIV	Practical	45	50

Scheme of Practical Examination and marks

Practical Paper IX + X based on theory Paper VII & VIII

Practical Paper XIII + XIV based on theory paper XI & XII

Experiment – 75 marks+ oral 15 marks + 10 marks Record Book =100 marks

VII & XI
VIII & XII

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.
2. **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 g_i, α and β, M.B. distribution function for ideal gas, M.B. Speed distribution law.
3. **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, E_{FO} for electrons in a metal, comparison of three statics, difference between classical and quantum statistics.
4. **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
4. Text book of heat and thermodynamics- J.B. Rajam& C. L. Arora.
5. Modern physics – R. Murgeshan, KiruthigaShivprasath, S. Chand Publication.

B.Sc. II[nd] year Physics (Semester-III)
(Modern and Nuclear Physics)
Course code PHY-202
Paper-VIII

Marks-50

Period-45

1. **Photoelectric Effect :**
   Introduction, Lenard's method to determine e/m for photoelectrons, Richardson and Compton experiment, Relation between photoelectric current and retarding potential, Relation between velocity of photoelectrons and frequency of light, photoelectric cells- (1) Photo- emissive cell (2) Photo- voltaic cell (3) Photoconductive cell, Applications of photoelectric cells.

2. **X-rays :**
   Introduction, The absorption of X-ray's, Laue's experiment, Bragg's Law, The Bragg'sX-ray spectrometer, powder crystal method, The Laue method, x-ray spectra , Main features of continuous x-ray spectrum, Characteristics x-ray spectrum.

3. **Nuclear forces and models :**
   Introduction, Binding energy, Nuclear stability, Nuclear forces , Meson theory of nuclear forces, liquid drop model, shell model, Energy released in Fission , Chain reaction, Atom bomb, Nuclear Reactors, Nuclear fusion, Source of stellar energy.

4. **Particle Accelerators and Detectors :**
   Linear accelerator, Cyclotron, Synchrocyclotron, Betatron, Ionisation chamber, proportional counter, Geiger – Muller counter.

Reference Books:

1. ModernPhysics-J.B.Rajan
2. Modern Physics- R.Murugeshan, Er.Kirutyhiga, Sivaprasath. S.Chand Publication
3. NuclearPhysics- Kaplan
4. NuclearPhysics- B.N.Srivastava
5. Atomic and nuclear physics-N.Subramanyan and Brijlal.

B.Sc. IInd year (Semester-III)
Physics Practical
Course code PHY-203
Marks-50

Paper-IX

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.

Course code PHY-204
Marks-50

Paper-X

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. II[nd] year Physics (Semester-IV)
(General Electronics)
Course code PHY-205
Paper-XI

Marks-50

Period-45

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.

2. **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.

3. **OscillatorsandMultivibrators:**
   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.astablemultivibrator, monostablemultibibrator, bistableMultibrator,

4. **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. II[nd] year Physics (Semester-IV)
(Solid State Physics)
Course code PHY-206
Paper-XII

Period-45 **Marks-50**

1. **Crystal Structure :**
Introduction, Crystal lattice- plane lattice, space lattice, translation vectors, Unit cell, (primitive ,non primitive Wigner . Sietz primitive cell) Basis, symmetry operations, point groups and space groups, type of lattices (two dimensional and three dimensional lattices), 'lattices directions and planes , Miller indices , Inter planer spacing, simple crystal structure.

2. **Bonding and Band theory of solids :**
Introduction, concept of inter – atomic forces, cohesive energy and types of bonding, primary bonds- (ionic bonds, covalent bond and metallic bond), secondary bonds, (Vander Walls bonds and hydrogen bonds).'
The Kroning - Penney model, Energy versus wave vector relationship,different representations(Brillouin zone)

3. **Thermal properties of solids :**
Classical theory of lattice heat capacity (Concept and comparison with experimental values), Einstein's theory of lattice heat capacity, Debye's model of lattice heat capacity, density of modes, limitations of Debye's model.

4. **Free electron theory of metals and Transport properties:**

Drude-Lorentz's classical theory, electrical conductivity, 'thermal conductivity, Wiedemann Franz law, significance of Fermi energy level, Hall effect, Hall voltage and Hall coefficient, experimental determination of Hall coefficient, Importance of Hall effect.

Reference Books :

1. Physics for degree student – C.L.Arora& Dr. P.S.Hemne – S.Chand publication
2. Solid State Physics and Electronics – R.K.Puri& V.K. Babbar- S.Chand publication
3. Fundamentals of Solid State Physics- Saxena, Gupta, Saxena – Pragatiprakashan, Meerat)
4.Solid State Physics , Revised VI th Editions, S.O. Pallai.
5.Introduction to Solid State Physics, VII th Edition., C.Kittel.

B.Sc. IInd year (Semester-IV)
Physics Practical
Course code PHY-207

Paper-XIIIMarks-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 Π filter.
6. Viscosity of liquid using Searle's viscometer.
7. High resistance by leakage through condenser.
8. Viscosity of liquid by oscillating disc method

Note: At least six experiments should be performed.

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 .(r_p, g_m and μ)
8. Self-inductance by Owen's Bridge

Note: At least six experiments should be performed.